वार्षिक प्रतिवेदन
Annual Report
2016-17

AICRP-National Seed Project (Crops)

ICAR- Indian Institute of Seed Science
(Indian Council of Agricultural Research)
Kushmaur, Mau 275 103 (UP)
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AICRP
"National Seed Project (Crops)"

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ICAR- Indian Institute of Seed Science
(Formerly ICAR-Directorate of Seed Research)
(Indian Council of Agricultural Research)
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Acknowledgement

Seed is prime input having the capacity to ensure food security by means of seed security. Increased food grain production in the country despite of abnormal weather conditions for last couple of years could largely be credited to the use of quality seed of improved varieties/ hybrids, improved farming practices along with ingenuity of Indian farmers. Role of quality seed is documented and acknowledged across farming systems and ICAR duly acknowledged this fact by the launch of flagship projects *i.e.* AICRP- NSP (Crops), for which coordination is entrusted upon IISS, Mau. To operate quality seed programme, it is essential to produce sufficient quantity of breeder seed. Similarly, to organize well orchestered successful seed production programmes, research back up on various aspects of seed production technology, quality maintenance and its fine tuning, storage, seed health and seed processing etc. are vital and found to be indispensable, in order to address issues such as Seed Replacement Rate (SRR) and Varietal Replacement Rate (VRR) and develop need based technological interventions. Launch of AICRP-NSP (Crops) has been a milestone under ICAR in order to bring holistic dimension in reference to seed in related farming systems. AICRP-NSP (Crops) under aegis of ICAR is guiding, coordinating and promoting seed technology research and breeder seed production very systematically with an appropriate research backdrop.

Annual Report 2016-17 is compilation of progress made by varied co-operating centers under AICRP-National Seed Project (crops) under its two components viz. Breeder Seed Production and Seed Technology Research. It is my immense pleasure to express deep sense of gratitude and sincere thanks to Dr. T. Mohapatra, Hon'ble Secretary, DARE & Director General, ICAR for persistent support. I acknowledge gratefully Dr. J. S. Sandhu, DDG (Crop Science), who is the mission leader of this project, for his kind support, guidance and constant encouragement. I thank Dr. D.K. Yadava, ADG (Seed) (Acting) and Dr. J.S. Chauhan, former ADG (Seed) for their tireless help and active co-operation rendered. I also thank Seed Section, DAC&FW, MoA&FW for their cooperation in implementation of BSP programme. I owe indebtedness to all nodal officers and scientists from various co-operating centers, who did commendable job in successful implementation of the project which I gratefully acknowledge and appreciate. I gratefully acknowledge the immense support of Principal Investigators; Dr. L.V. Subba Rao, Dr. P.C. Nautiyal, Dr. M.S. Bhale, Dr. J.P. Sinha and Dr. Amit Bera who have done meticulous compilation of various reports, technical programme and for providing technical guidance to scientists. I also take this opportunity to acknowledge all scientists and staff of IISS primarily Dr. Somasundaram G. and Dr. Sripathy K.V. for their efforts in successful co-ordination of this massive project across the country. I firmly believe that this project, down the line would tread us towards attaining seed sufficiency with adept technological backup for quality seed driven agricultural growth.

(Dinesh K. Agarwal)
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Director's Report

Seed is prime input encompassing the capacity to ensure food security *i.e.* seed security can play a crucial role in ensuring food security. Desired growth rates in agriculture can only be made possible, if the prime input "seed" gets its rightful importance. The pace of progress in food production is largely depend upon innate vibrancy of seed programme upon which it is able to multiply and market quality seed of high yielding varieties with superior genetics. The ICAR, on its part has also taken various initiatives to augment the breeder seed production and seed technology research along with other crop improvement programmes. With the commitment of national seed security, ICAR launched All India Coordinated Research Project on seed i.e. 'National Seed Project- (Crops)' in 1979-80, which in due course became one of the flagship projects of ICAR itself. The AICRP-NSP (Crops) has been strengthened very well over the years and during XII plan the horizons of the project were extended to N-E states, which in turn developed state of art facilities both in respect of infrastructure and capacity building in seed realm. At present, the Breeder Seed Production (BSP) programme is operating at 41 centres and Seed Technology Research (STR) at 24 centres under AICRP-NSP (Crops) at various SAUs and ICAR institutes across the country.

Launch of AICRP – NSP (Crops) was instrumental in strengthening the Indian seed sector, as witnessed by multifold increase in breeder seed production from a meager quantity of 3914 quintals during 1981–82 to a level of **127823.36** quintals during 2015-16 and during 2016-17 it is anticipated to reach **124040.20** quintals, surpassing the indents received both from DAC&FW and state governments. The NARES system continues to facilitate enhanced availability of breeder seed that constitutes the backbone of quality seed availability of notified varieties and parental lines of hybrids, which in turn multiplied to produce foundation and certified / quality seeds through downstream seed multiplication. Success of quality seed production programme depends upon production of sufficient quantity of seed with appropriate technological back up on various aspects of seed technology *viz*. production research, maintenance, quality assurance, processing, storage, seed protection and seed quality enhancement. Seed Technology Research (STR) component of AICRP –NSP (crops) provides apt platform in this endeavor to devise and standardize varied region specific seed based technologies across the country.

Continuous technological breakthroughs in seed research are vital to meet the demands of global seed market and at the same time for assurance of uninterrupted availability of quality seed at domestic level. Indian Seed Industry is one of the vibrant domains in the world seed market with compound annual growth rate of 17.6% compared to global growth of 6-7%. AICRP-NSP (Crops) aims to address crucial areas in quality seed production and seed research *viz*. Seed Production & Certification; Seed Physiology, Storage & Testing; Seed Pathology; Seed Entomology and Seed Processing through nationwide network of cooperating centres. Futuristic strategies should be focused on appropriate maintenance breeding, climate resilient seed production through identification of non-traditional provenances for offseason seed production and inclusion of novel approaches *viz*. DNA based profiling for genetic purity testing, seed biopriming for effective seed health management and nanotechnology for external & internal designing of seeds. Efforts mounted in streamlining of National Seed Research and Extension System will pay dividends by adjusting skewed anomalies *viz*. SRR and VRR and making Indian seed market, a force to reckon with in international seed domain.

The major mandates of the project are as follows:

Mandate

1. To produce adequate quantity of nucleus and breeder seed as per national requirements.
2. To conduct, coordinate and monitor research on different aspects of seed science and technology.
3. To generate basic information on seed certification standards including seed health.
4. To disseminate information and impart training on seed production, processing, storage & packaging, quality control and seed health.
5. To make linkages with crop improvement projects, seed industries, seed certification agencies, NGOs / KGK / KVK *etc*.

Breeder seed production

The progress of breeder seed production of improved varieties with superior genetics and distribution is taking place at an incredibly faster pace, as witnessed in increased breeder seed production of **127823.36q** as against the indent of **122519.61q** in 2015-16 (*Kharif*, 2015 and *Rabi*/Summer 2015-16) (Figure 1). The breeder seed production during 2016-17 (*Kharif*, 2016 and *Rabi*/Summer 2016-17) is anticipated to reach **124040.20q** against the indent of **113867.04q**. The breeder seed production has amended the availability of quality seeds in subsequent generations in the seed multiplication chain and also resulted in increased Seed Replacement Rate (SRR) of varied crops across all the states.

Thrust areas in Breeder Seed Production (BSP)

- Production of adequate quantities of breeder seed as per national requirement.
- Quality maintenance of nucleus and breeder seeds by employing dynamic maintenance breeding and rapid genetic purity testing tools.
- Effectively ensure and monitor generation system of seed multiplication at national level through bar code and QR coding module.
- Identification of suitable provenance for offseason seed production to compensate the effects of changing climate.
- Networking for development of national database of DNA profiles for varietal identification.
- Harnessing the potential of rice fallows for seed production of oilseed and pulses.
- Identification of suitable seed provenance for institution of 'National Seed Grid'
    a. Soybean- Maharashtra and Madhya Pradesh;
    b. Groundnut- Gujarat and Andhra Pradesh;
    c. Chickpea- Madhya Pradesh, Maharashtra and Andhra Pradesh;
    d. Pigeonpea- Karnataka and Andhra Pradesh and
    e. Lentil- Madhya Pradesh

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17*
Year	73687.0	79913.0	91410.0	87215.0	90576.7	98798.6	84783.6	86292.2	122159.6	113867.0
Production	92059.8	91882.8	115866.8	115695.5	117826.9	95011.6	89265.2	100074.8	127823.4	124040.2

Fig. 1: Breeder Seed of field crops produced during 2007-08 to 2016-17

Thrust areas in Seed Technology Research (STR)

a. Seed Production and certification

- Identification of suitable alternative areas for seed production in a bid to search non-traditional provenances
- Development and optimization of climate resilient seed production technology
- Optimization of micro-nutrients and growth regulators in relation to reproductive behaviour to augment the seed yield
- Studies on effect of climate change on pollination dynamics
- Developing alternative methods (self-incompatibility & apomixis systems) for hybrid seed production in a bid to exploit heterosis
- Harmonization of seed standards in tune to the needs of global certification standards.

b. Seed physiology, testing and storage

- Studies on physiological manipulations to enhance ovule to seed ratio
- Identification of seed vigour traits as a sensitive measure of seed quality in major crops
- Validation/up-gradation of field and seed standards/protocols, isolation distance, sample size, physical purity and ODV's in varied crops
- Standardization of seed testing procedures in field, vegetable, medicinal and green manure crops
- Standardization of DNA finger printing/molecular markers tools to supplement GOT

- Use of second and third generation tools for seed quality enhancement
- Identification of suitable seed treatments / materials / methods for safe storage of seed

c. Seed Pathology

- Identification of disease free zones for quality seed production
- Development of rapid and reliable techniques for detection, identification and screening of seed materials for different seed borne diseases
- Development of integrated strategies for management of seed borne diseases
- Development of field and seed standards for seed borne diseases and strengthening of work on biological control of seed borne diseases.
- Revisiting of field and seed standards for seed-borne diseases
- Monitoring, detection, and management of new seed borne diseases

d. Seed Entomology

- Pest risk analysis for efficient management of insect pests under seed storage
- Evaluation of new insecticide molecules for management of storage insects
- Management of insect pollinators for increasing pollination efficiency and seed set
- Determining the efficacy of novel packaging material with new chemistry for management of storage insects

e. Seed Processing

- Standardization of sieve sizes and processing methodology for different crop varieties / parental lines.
- Bringing mechanization in seed production to march towards precision farming

Impact

- Surplus availability of breeder seed with appropriate technological framework
- Availability of quality seed at farmers doorstep
- Increased Seed Replacement Rate (SRR) & Varietal Replacement Rate (VRR) for varied crops
- Enhanced crop productivity
- In raising availability and access of food grains and providing food and nutritional security through seed security
- Increased monetary returns to the farmers *vis-à-vis* farm income.

Linkages

Linkages of AICRP-NSP (Crops) with other esteemed organizations/ institutes engaged in seed research both in public and private sectors has helped to address the quality seed production, availability and research issues at local, regional, zonal and national level, which in turn facilitated strong and meaningful basic, applied and anticipatory research to support the national strategic seed research plans.

- AICRPs of Field/ Horticultural Crops
- State Agricultural Universities
- ICAR Institutes
- Seed Division of DAC&FW, GOI
- Seed industries of both public and private sector
- National & State Seed Corporations
- Seed Certification Agencies
- PPV and FR Authority

Seed Technology Research Highlights during 2016-17

Research Highlights of experiments conducted in different disciplines / divisions *viz.,* Seed Production & Certification; Seed Physiology, Storage and Testing; Seed Pathology; Seed Entomology and Seed Processing under AICRP-NSP (Crops) STR component during 2016-17 at varied cooperating centers are given below:

A. Seed Production and Certification

- Investigations on standardization of isolation distance for hybrid seed production in wheat revealed the pollen flow from contaminator line (red glumed) resulting in seed set on tester line (white glumed) was upto 6m in downward wind direction
- The effect of various presowing interventions for enhancing seed quality, health, yield and storability suggested that; in *Kabuli* chickpea and lentil, seed treatment with leaf extract (*Lantana camara* @ 10%) recorded higher germination (95 & 88% respectively) and higher number of pods (80.40& 105.27 per plant respectively) and seed yield (27.80 & 7.52 g per plant respectively). While in fieldpea, presowing seed treatment (seed priming with sodium molybdate @ 500 ppm) recorded significantly higher seed yield (20.46 g/plant) over control (13.58 g/plant), recording 33.62% increment over control
- Investigation to describe the effect of seed film coating polymers for efficient quality enhancement operations in various crops revealed that

1. Film coating in paddy with *Polymer (DISCO AG SP RED L-200)+Thiram+Quick Roots/mycorrhiza* documented significantly superior values for number of tillers (19.0), number of seeds per panicle (178.8), plant yield (41.4 g), plot yield (7745.0 g, which was 12.5% higher over control)
2. Similarly in wheat, film coating with *Polymer (DISCO AG SP RED L-200)+Thiram+ Quick Roots/ mycorrhiza* recorded maximum field emergence (78.75%), 100 seed weight (4.25 g), seed yield (46.97 q/ha, while control recorded 38.06 q/ha)
3. Seed film coating with *Polymer (DISCO AG SP RED L-200)+Thiram+Genius coat* in soybean presented significantly higher germination (82.0% at 4 months after storage), pods per plant (144.3), 100 seed weight (13.02 g), yield per plant (29.0 g) and seed yield [9.02 q/ha, while control exhibited 6.49 q/ha (28.10% increase)]

Further, in storage all the above treatments in their respective crop domains shown superior seed quality attributes compared to other treatments and control.

- Experiment conducted for standardization of seed production technology in three major green manure crops showed that

    1. In Daincha (*Sesbania aculeata*) combination of foliar application of DAP (2%)+Micronutrient mixture ($ZnSO_4$ 0.5%+Boric acid 0.3%)+NAA @ 40 ppm at initiation of flower and at the end of flowering period with pinching of terminal bud at 60 days after sowing produced maximum pods per plant (66.00), seed yield (17.7 g per plant, while control recorded 14.9 g), 100 seed weight (1.96 g), germination (86.0%) and seed yield per plot (2.92kg).

    2. Effect of pinching/ foliar sprays in Sunhemp (*Crotolaria juncea*) shown significantly highest seed yield (10.80 q/ha), seeds per pod (11.13), dry pod yield per plot (14.72 kg), 100-seed weight (1.31 g) and reflected more number of pods per plant (193.75) and less number of pods shattered per plant before 1st (0.14) and 2nd (0.20) picking, with pinching of terminal bud at 60 days after sowing along with foliar application of DAP (2%)+Micro nutrient mixture ($ZnSO_4$ 0.5%+Boric acid 0.3%)+NAA @ 40 ppm.

    3. In Pillipesara (*Phaseolus trilobata*), pinching of terminal buds (40 days after sowing) and foliar application of DAP (2%) + Micronutrient mixture (2%)+Micro nutrient mixture ($ZnSO_4$ 0.5%+Boric acid 0.3%)+NAA @ 40 ppm at initiation of flowering and at end of flowering period presented significantly higher seed yield (8.45 q/ha), number of pods per plant (155.75), dry pods yield per plant (30.00 g) (12.83% increment over control) and less number of pods shattered per plant before 1st picking (1.05).

- In a bid to standardize the techniques to mitigate the effects of elevated temperature during seed setting, investigations in wheat revealed that two foliar sprays (vegetative stage & seed filling stage) of glycine betaine (600 ppm) exhibited significantly superior chlorophyll index (vegetative stage- 42.95 & seed filling stage- 44.49), seed setting (99.19 %), 100 seed weight (3.96 g) and seed yield (16.87 g/plant) under first sowing condition (standard sowing date). In second sowing condition (late sown, flowering & seed set coincides high temperature stress) also two foliar spray (vegetative stage & seed filling stage) of glycine betaine (600 ppm) recorded significantly superior chlorophyll index (vegetative stage- 41.76 & seed filling stage- 43.76), seed setting (99.10 %), 100 seed weight (4.24 g) and seed yield (11.10 g/plant, increment of 26.12% over control). Similarly in sorghum and mustard, spraying of salicylic acid (800 ppm) and α-Tocopherol (500 ppm) respectively, presented significantly superior values with reference to seed yield, yield attributing traits and seed quality parameters.

- Experiments instituted for standardization of seed production techniques in millets revealed certain significant observation as mentioned below;

    1. In Fingermillet (*cv*. ML 365), priming of seeds with 2% (KH_2PO_4) for 6h (1:1 w/v) followed transplanting (21 days old seedling) and application of organic and inorganic fertilizers along with borax spray (125kg neem + 1250kg vermin compost + 50kg urea + 50kg SSP and 50kg MOP per ha + top dressing urea at 3-4 weeks after transplanting + 2% Borax during flowering) exhibited significantly higher no. of tiller per plant (16.50), seed yield (90.90 g/plant; 4.25 kg/plot and 70.80 q/ha) over the control (direct sowing & normal package of practice) [(no. of tiller per plant- 9.72; seed yield- (49.50 g/plant; 2.35 kg/plot and 39.09 q/ha)].

    2. In Kodomillet, direct sowing with seed priming (2% KH_2PO_4 for 6 hour) + 125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Muriate of potash per ha + Top

dressing urea at 4 weeks after sowing + 2% Borax spray at flowering stage) recorded significantly higher chlorophyll content (27.73), no. of tillers (3.33), panicle weight (1.70 kg/plant), 100 seed weight (0.41 g) and seed yield (6.64 g per plant; 24.08 q/ha).

- Experiment conducted to identify the offseason planting window in soybean suggested that, under Madhya Pradesh condition in varieties *viz*. JS 20-24 (early type) and JS 20-29 (late type) planting may be carried out till 20th December with negligible reduction in yield and seed quality parameters. While under Rahuri condition for cv. Phule Agrani, sowing during 15th January (offseason) was found to be economical exhibiting seed yield of 11.60 q/ha, reduction was only 16.90% over standard sowing date (standard sowing- 13.57 q/ha)
- Various seed encrustation treatments (seed encrustation @ 1:1.2 buildup with thiram; thiram & mycorrhiza; and thiram & genius coat) enabling direct seeding in small seed crops revealed that:
    1. In onion, seed encrustation (1:1.2 buildup with thiram and Mycorrhiza) exhibited significantly highest bulb yield under 7th November transplanting (40.04 t/ha, while direct sowing yielded 36.0 t/ha) in Delhi condition
    2. Seed encrustation in carrot (1:1.2 buildup with thiram and genius coat) showed better performance in terms of plant height, biomass, root growth and early induction of flowering than other treatments
    3. However, under direct sowing, seed encrustation in berseem @ 1:1.2 buildup (with Thiram + Genius coat, thiram, and thiram + Mycorrhiza) performed significantly superior, revealing higher seed yield (4.51, 4.30 and 4.08 q/ha; while direct sowing without encrustation exhibited 3.84 q/ha)

B. Seed Physiology, Storage and Testing

- Seed vigor encompassing multiple growth attributes of seedling is also the measure of seed physiological potential for selection of seed lot for particular field condition or it may act as an aspect for predicting behavior of seed lot in storage. Seed physiological parameters *viz*. seedling vigour, tillers per plant, root-shoot ratio, root volume, pigments (chlorophyll and carotenoids) were found to be better seed vigour traits in rice hybrid seed resulting in higher number of tillers and leaf area index leading to higher yield
- In rice hybrids, SSR markers RM 237, RM 16 and RM 84 were found to be specific for JRH 5, while RM 5 exhibited specificity with JRH 8. RM 1 and RM 19 presented unique banding pattern for JBR 7 and JBR 8 respectively
- SSR markers *viz*. RM 81057, RM 10103, RM 9a2 found to be unique for rice hybrid KRH-4 and RM 9310, RM 9106 were identified as molecular ID's for KRH-2 for reliable and quick assessment of genetic purity
- Influence of local environment being one of the elements in seed deterioration during storage, storing of groundnut seeds (off-shell) in air tight containers at ambient condition with seed desiccant beads (10 g/kg seed) recorded superior seed quality attributes even after 8 months of storage. Similarly, soybean seeds stored in Polythene bag (250 gauge with silica gel @ 0.30kg/1.5kg of seed) maintained seed quality parameters (germination, seedling length, seedling dry weight, seedling vigour index –I and seedling vigour index-II) even after 6 months of storage

- Biopriming (*Trichoderma viride* @ 10g/kg seed) resulted in higher germination, field emergence, amylase and catalase activity in redgram. Similarly, chickpea seed priming with KCl @ 1.5% for 8 hours improved seed germination and seedling vigour indices.
- Nano-coating of rice seeds with titanium oxide (400 ppm) resulted in maximum germination, seedling growth parameters and vigour indices. However, concentration over the 400 ppm reduced the effect of nanopriming. In maize, silver (1250 ppm/kg seed) and iron oxide (1250 ppm/kg seed) nanoparticles treatment improved germination, seedling length and vigour indices
- Seed treatment with HYT-D @ 3ml/kg seed significantly improves essential seed quality parameters for higher field emergence, yield attributing traits and seed yield in wheat, paddy and soybean, in general increment in seed yield was 12.54-18.92%.
- A total of 27 demonstrations of seed priming technology were organized at farmer's field across the centers during 2016-17 and farmers were convinced upon low cost technological intervention for maximizing grain yield (8.0-11.0%) advance in grain yield in crops viz. wheat, pearlmillet, sorghum and chickpea).

C. Seed Pathology

- Cumin Seed Wash Examination technique is identified as a relatively quick method for the detection of surface adhered spores of *Alternaria burnsii*, the causal agent of devastating blight.
- Effective prevention of the transmission of pathogens *Colletotrichum dematium* from plant to seed and management of pod blight complex disease of soybean may be achieved through two applications of Carbendazim + Mancozeb (0.30%) first at pod formation and second at pre-harvest stage, resulted in 80.32% disease control over check.
- Effective management of cumin blight *(Alternaria burnsii*) may be achieved by three applications of Azoxystrobin (0.025%) at 10 day interval after appearance of blight disease along with the basic seed treatment with Thiram @ 0.3% per kg seed, prior to sowing.
- Bio-priming of safflower seeds with *Trichoderma harzianum*+ *Pseudomonas fluorescens* @ 5 g/ kg of seed each is effective against seedborne *Fusarium carthamii* responsible for wilt disease. Treatment results in enhanced seed germination, emergence and reduced wilt incidence with seed yield enhancement.
- Bio-priming of sunflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 5 g/ kg of seed each is effective against seed-borne *Alternaria helianthi* responsible for leaf blight disease.
- Effective management of seed rot, seedling blight, die-back and fruit rot of chilli caused by *Colletotrichum capsici* and *Alternaria alternata* may be achieved through seed dressing with *Trichoderma harzianum* @10g or *Trichoderma viride* @ 5g + *Pseudomonas fluorescens* @ 5g / kg seed. Use of biopesticides also results in higher seed germination and vigour.
- Chilli seed associated three anthracnose fungi can be detected by polymer chain reaction based technique using the specific primers with known sequence, developed by earlier workers. The fungi and primers are *Colletotrichum truncatum* (Ccap F; Ccap R.); *Colletotrichum gloeosporioides* (Cboncoll F; Cboncoll R.); *Colletotrichum coccodes* (Cco 1NF1; Cco2NR1).

D. Seed Entomology

- Among various newer insecticides evaluated along with standard chemical (Deltamethrin) against major storage insect-pests damaging cereals and pulse seeds, Emamectin benzoate (Proclaim 5SG) @ 2ppm (40.0 mg/kg seed), Spinosad (Tracer 45 SC) @ 2ppm (4.4 mg/kg seed) were found on par with Deltamethrin (Decis 2.8 EC) @1.0ppm and provided maximum control against storage pest upto 6-9 months. Whereas Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed), Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed), Rynaxypyr (Coragen 20 SC) @ 2ppm (0.01ml/kg seed) and Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed) were effective to some extent but not as effective as Emamectin benzoate, Spinosad or Deltamethrin
    - Among 1542 samples of farmers saved seed evaluated for seed health status revealed that about 45.6% seed samples were having germination below IMSCS, about 26.2% samples presented insect damage beyond permissible limit as per IMSCS and intensity of damaged seed varied from 0.25-5.0%
    - Bee pollination plays major role in improving quantity of seed produced in berseem, apart from seed yield, parameter like seed germination and vigour also improved substantially due to bee pollination, in general 24.66-38.25% increment was observed in seed yield employing bee pollination over open pollination.
    - CO_2 concentration of 50% (v/v) provided effective protection against angoumois grain moth in paddy, groundnut beetle in groundnut and pulse bruchid in greengram and pigeonpea without affecting seed quality upto 6-9 months under storage
    - As an alternative to chemical strategies, effectiveness of CO_2 treatment in 200L capacity containers for storage of paddy seed has been successfully demonstrated at TNAU, Coimbatore. UAS, Bengaluru and PJTSAU, Hyderabad for management of storage insect pest
    - In order to portray the efficacy of botanicals, various formulations *viz*. Karanj oil (*Pongamia pinnata*) @5ml/kg seed, *Acorus calamus* TNAU formulation @ 10 ml/kg seed, neemazal 10000ppm @1.5ml/kg seed, and citronella oil @ 5 ml/kg of seed were tested along with emamectin benzoate and deltamethrin. Results revealed that *Acorus calamus* TNAU formulation treated seeds on par with emamectin benzoate and deltamethrin recorded maximum germination and least insect damage (within permissible limit) upto six months of storage in paddy, wheat, chickpea, pigeonpea, mungbean, fieldpea and blackgram
    - Management of groundnut pod borer with insecticides *viz*. Emamectin benzoate @ 2ppm, Spinosad@ 2ppm, Thiodicarb@ 2ppm, Rynaxypyr@ 2ppm, Profenofos@ 2ppm, Novaluron@ 5ppm and Deltamethrin @ 1ppm revealed that emamectin benzoate, spinosad and deltamethrin were highly effective, as they provided complete protection upto 6-9 months and maintained seed germination above IMSCS
    - Experiment conducted to devise chemical strategy for mangement of pulse beetle at storage suggested that spraying emamectin benzoate @0.3ml/L and profenofos 50 EC @ 1ml/L at preharvest stage (50% pod maturity and maturity) reduced adult emergence significantly during storage period in greengram, blackgram, chickpea and pigeonpea

- Novel packaging material (insecticide incorporated polypropylene bag) i.e. 'Zerofly' bags found to be highly effective in management of storage insects (insect damage either nil or within permissible limit) and also stored seeds maintained germination above IMSCS up to 6-8 months in paddy, wheat, greengram, chickpea and sunflower.

E. Seed Processing

- Optimum sieve size for thickness grading in three paddy varieties *viz*. Pusa 44, PB 1121 and PB 1509 was found to be 1.8 mm (O) against recommended 1.7 mm (O) with maximum seed recovery of 98.3, 98.5 and 98.1% respectively
- In chickpea varieties,small seeded (GBM-2, Saki-9516 and Vijay), medium seeded (Vishal & Jaki-9218) and bold seeded (Digvijay), grading sieve (round) of size 5.0 mm, 5.5 mm and 6.0 mm were found optimum exhibiting best seed quality parameters in comparison of general recommended sieve size (5.0 r)
- The optimum grading sieve size was found to be 4.00 mm (R) and 2.8 mm (R) against recommended size of 4.0 (R) for soybean varieties DSb-21 and DGGV-2, respectively, exhibiting higher seed recovery (82.84 & 84.62%) and better seed quality
- Wheat varieties *viz*.DBW-17, K-607, K-9423, K-7903 and DBW-107showed better seed recovery of 95.0 to 93.80% with sieve size of 2.1 mm(O) as against recommended 2.3 mm (O) sieves
- Sieve size of 2.4 mm (S) was found effective and economical for grading wheat varieties HD 2967, HD 2851 and WR 544 registering seed recovery of 96.2, 94.9 and 94.6% with germination of 98.8, 98.6 and 98.4% respectively.
- Optimum sieve size for grading of pigeonpea cultivars *viz*. TS-3R and BRG-5, was found to be 3.75 mm (R) and 4.00 mm (R) exhibiting maximum seed recovery (91.6 & 99.10%) and physical purity (98.1 & 98.2%) respectively
- In fieldbean varieties HA-4 grading by 6.5mm (R) sieve size (no recommended sieve size) found effective and economical with maximum seed recovery (89.5%) and seed quality parameters above IMSCS
- Manual harvesting and mechanical threshing employing multicrop thresher at drum speed of 500 rpm was found economical over manual harvesting and threshing in paddy exhibiting 97 % germination and 2.9% mechanical damage. While usage of combine harvester at 900 rpm drum speed significantly reduced germination (91 %) and increased mechanical damage (4.7%)

Awards and Publications

In reference to recognitions, scientists / cooperating centres received 33 awards / merit certificates for excellence in seed research and development activities, and published 149research papers related to seed science and technology in national / international peer reviewed journals.

Extension activities

Imparting field level training and practical exposure to field staff and farmers engaged in seed production programme are being taken up by different centres. Several extension activities like *exhibitions, kisan mela, kisan goshti, field day, demonstration* have been conducted by several cooperating centres mentioned below.

In order to create the required scientific manpower and to enhance the expertise and skill of the existing scientific staff, STR centres were entrusted with the task of conducting training programmes under human resource development (HRD). This would certainly boost the quality and quantity of the seed and would help to increase the Seed Replacement Rate (SRR) in different crops.

Sl. No.	Centres	Training (No's)	Exhibition/kisan mela (No's)	Seed day/ Field day/ FLD's (No's)	Research paper (No's)	Awards (No's)
1	SKUAT, Srinagar	10	1	8	9	2
2	HPKVV, Palampur	3	-	6	12	1
3	CCSHAU, Hisar	4	2	1	5	-
4	GBPUAT, Pantnagar	-	2	-	-	-
5	NDUA&T, Faizabad	-	2	-	7	9
6	BHU, Varanasi	2	1	1	5	-
7	BAU, Ranchi	2	-	1	-	-
8	RPCAU, Pusa	2	2	1	2	-
9	OUA&T, Bhubaneswar	3	1	1	10	-
10	SKNAU, Jobner	2	-	-	1	1
11	SKRAU, Bikaner	5	2	-	-	-
12	SDAU, SKNagar	1	-	40	1	-
13	JAU, Jamnagar	2	5	-	16	-
14	AAU, Anand	2	1	3	3	3
15	IGKVV, Raipur	3	-	-	3	-
16	JNKVV, Jabalpur	8	4	15	8	2
17	MPKV, Rahuri	-	-	1	17	-
18	PDKV, Akola	2	1	-	-	-
19	UAS, Bengaluru	5	-	2	17	1
20	UAS, Dharwad	4	1	1	-	1
21	UAS, Raichur	3	1	13	14	8
22	PJTSAU, Hyderabad	2	1	3	9	1
23	TNAU, Coimbatore	1	1	-	-	1
24	KAU, Thrissur	5	-	5	1	-
25	BCKV,Mohanpur	7	-	5	-	-
26	KKV, Dapoli	3	-	2	-	-
27	PAJANCOA, Karaikal	1	1	1	2	1
28	IIRR, Hyderabad	4	1	-	7	2
	Total	**86**	**30**	**110**	**149**	**33**

Monitoring

Monitoring Teams for different zones (Northern Zone I, Northern Zone II, Western Zone I, Western Zone II, Eastern Zone I, Eastern Zone II, Central Zone I, Central Zone II, North Eastern Zone, Southern Zone I and Southern Zone II) were constituted during the last workshop have visited different centres and the observations made by different monitoring teams have been presented (monitoring report section). Director, ICAR-IISS, Mau has also monitored the progress of BSP and conduct of the STR research activities by various centres during 2016-17.

निदेशक का प्रतिवेदन

खाद्य सुरक्षा सुनिश्चित करने में बीज एक अहम आगत है। इसलिए खाद्य सुरक्षा में बीजों की सुरक्षा महत्वपूर्ण भूमिका निभा सकती है। कृषि में वांक्षित वृद्धि दर केवल तभी संभव हो सकती है जब मुख्य आगत ''बीज'' को इसका सही महत्व प्राप्त हो। देश के खाद्यान्न उत्पादन में वृद्धि आनुवांशिक रूप से जीवंत बीज कार्यक्रम जिसमें उच्च उपज क्षमता एवं अच्छे अनुवांशिकी गुण वाले गुणवत्तायुक्त बीज जो बाजार के मांग के आधार पर उपलब्धता पर निर्भर करती है। इस उद्देश्य के दृष्टिगत भा.कृ.अनु.परिषद फसल सुधार कार्यक्रमों के साथ प्रजनक बीज उत्पादन एवं बीज अनुसंधान को बढ़ावा दे रही है। राष्ट्रीय खाद्य सुरक्षा को ध्यान में रखते हुए भा.कृ.अनु.प. ने बीज पर अखिल भारतीय समन्वित शोध परियोजना-राष्ट्रीय बीज परियोजना (फसल) की शुरूआत वर्ष 1979-80 में की जो कि तद्परान्त भा.कृ.अनु.प. का एक महत्वपूर्ण कार्यक्रम बन गया। इस प्रकार बढ़ते वर्षों के साथ राष्ट्रीय बीज परियोजना सुदृढ़ होती गयी जिससे बीज के क्षेत्र में ढ़ाँचागत विकास एवं क्षमता निर्माण में सकारात्मक परिवर्तन हुआ। वर्तमान में प्रजनक बीज उत्पादन एवं बीज प्रौद्योगिकी अनुसंधान क्रमशः 41 और 24 केन्द्रों पर देश के विभिन्न कृषि विश्वविद्यालयों एवं भारतीय कृषि अनुसंधान परिषद के संस्थानों में चलाया जा रहा है।

बीज क्षेत्र के संवर्धन में अखिल भारतीय समन्वित शोध परियोजना-राष्ट्रीय बीज परियोजना (फसल) का विशेष योगदान रहा है जिससे बीज क्षेत्र में अमूल परिवर्तन हुआ व इसका मुख्य श्रेय इस परियोजना को जाता है। प्रजनक बीज का उत्पादन वर्ष 1981-82 में 3914 क्विंटल से बढ़कर वर्ष 2015-16 में 127823.36 क्विंटल हो गया और अनुमान है कि वर्ष 2016-17 में यह 124040.20 क्विंटल होगा। यह बढ़ोत्तरी भारत सरकार के कृषि मंत्रालय की माँग से ज्यादा है। भा.कृ.अनु.प. एवं राज्य कृषि विश्वविद्यालयों के तंत्र के द्वारा प्रजनक बीजों की उत्पादन एवं उपलब्धता लगातार बढ़ती जा रही है जो कि नामित प्रजातियों एवं संकर प्रजातियों के जनक लाइनों के गुणवत्ता युक्त बीजों की उपलब्धता का मुख्य आधार है। यह आधारीय, सत्यापित एवं गुणवत्तायुक्त बीजों के क्रमबद्ध द्विगुणन में काम आता है। गुणवत्तायुक्त बीज उत्पादन कार्यक्रम की सफलता बीज प्रौद्योगिकी अनुसंधान के विभिन्न आयामों को समाहित करते हुए पर्याप्त मात्रा में उत्पादित बीज पर निर्भर करता है। परियोजना के अन्तर्गत बीज प्रौद्योगिकी अनुसं ान विभिन्न बीज उत्पादन तकनीकी के मानकीकरण हेतु एक प्लेटफार्म प्रदान करता है।

भारतीय बीज उद्योग वैश्विक बीज बाजार में एक जीवन्त परिक्षेत्र है जिसकी वृद्धि दर 17.6 प्रतिशत है। यह वैश्विक वृद्धि दर जो 6.7 प्रतिशत की तुलना में बहुत ज्यादा है। अखिल भारतीय समन्वित शोध परियोजना-राष्ट्रीय बीज परियोजना (फसल) बीज विज्ञान के विभिन्न पहलुओं यथा बीज परीक्षण, बीज रोग विज्ञान, बीज कीट विज्ञान, बीज विधायन को सम्पूर्ण राष्ट्र में व्याप्त सहयोगी केन्द्रों द्वारा सम्पादित करती है। भविष्य की रणनीति के अनुसार मुख्यतः उपयुक्त बीज उत्पादन स्रोत, प्रजनकीय रखरखाव, जलवायु उपयोगी बीज उत्पादन एवं डी.एन.ए. आधारित प्रोफाइलिंग, आनुवांशिक शुद्धता परीक्षण, बीज जैविकी प्रारम्भन, प्रभावी बीज स्वास्थ्य प्रबंधन एवं नैनो तकनीकी को समाहित करने पर विशेष ध्यान देने की आवश्यकता है। यह राष्ट्रीय बीज अनुसंधान तंत्र को अि क प्रभावी बनाने में एवं बीज प्रतिस्थापन दर एवं प्रजाति प्रतिस्थापन दर की वृद्धि में सहायक होगा।

इस परियोजना के मुख्य अधिदेश निम्नलिखित है :-

अधिदेशः

1. राष्ट्रीय आवश्यकताओं के अनुसार उच्च गुणवत्ता के नाभिकीय और आजनक बीज की पर्याप्त मात्रा में उत्पादन।
2. बीज विज्ञान और प्रौद्योगिकी के विभिन्न क्षेत्रों में अनुसंधान, समन्वय एवं निगरानी करना।
3. बीज स्वास्थ्य के साथ-साथ बीज प्रमाणीकरण मानकों के लिए मूलभूत सूचनाओं को एकत्रित करना।

4. बीज उत्पादन, विधायन, भण्डारण, पैकेजिंग, गुणवत्ता नियंत्रण एवं बीज स्वास्थ्य से संबंधित सूचनाओं का प्रसार एवं प्रशिक्षण देना।
5. बीज के क्षेत्र में कार्यरत विभिन्न फसल सुधार परियोजना, बीज उद्यम, बीज प्रमाणीकरण संस्था, बीज व्यापार, गैर सरकारी संस्थाएं/कृषि ज्ञान केन्द्रों/कृषि विज्ञान केन्द्रों से कड़ी स्थापित करना।

प्रजनक बीज उत्पादन

उन्नतशील प्रजातियों के प्रजनक बीजों का उत्पादन उत्तम जेनेटिक्स के साथ अविश्वसनीय रूप से तेज गति से बढ़ा है जो वर्ष 2015-16 (खरीफ 2015 एवं रबी/जायद 2015-16) में 127823.36 क्विंटल रहा जबकि मांग 122519.61 क्विंटल की थी। यह अनुमान किया जा रहा है कि वर्ष 2016-17 (खरीफ 2016 एवं रबी/जायद 2016-17) में प्रजनक बीज उत्पादन 113867.04 क्विंटल माँग के सापेक्ष 124040.20 क्विंटल होगा।

बीज गुणन विधि द्वारा दूसरी पीढ़ी में गुणवत्तायुक्त बीजों की उपलब्धता को सुनिश्चित किया है जिसके परिणामस्वरूप सभी राज्यों में बीज प्रतिस्थापन दर में वृद्धि हुयी है।

प्रजनक बीज उत्पादन में महत्वपूर्ण क्षेत्र

- राष्ट्रीय आवश्यकता के अनुसार प्रजनक बीज की पर्याप्त मात्रा का उत्पादन।
- नाभिकीय और प्रजनक बीज के गुणवत्ता को बनाए रखने के लिए सक्षम मेंटिनेन्स ब्रींडिंग और रैपिड जेनेटिक प्यूरिटी टेस्टिंग टूल्स को शामिल करना।
- बारकोड व क्यू बारकोड द्वारा निगरानी।
- ऑफ सीजन में बीज उत्पादन के लिए संभावित क्षेत्र खोजना जिससे मौसम के प्रभाव को कम किया जा सके।
- प्रजनक बीज उत्पादन के क्षेत्र में लक्ष्य एवं उत्पादन के बीच का अन्तर कम करना।
- धान की खेती के बाद खाली जमीन में तिलहनी और दलहनी फसलों के बीजोत्पादन की संभावना तलाशना।
- राष्ट्रीय बीज ग्रीड की स्थापना के लिए संभावनाएं तलाशना यथा -
    a. सोयबीन - महाराष्ट्र और मध्य प्रदेश
    b. मूँगफली - गुजरात और आन्ध्र प्रदेश
    c. चना - मध्य प्रदेश, महाराष्ट्र और आन्ध्र प्रदेश
    d. अरहर - कर्नाटक और आन्ध्र प्रदेश
    e. मसूर - मध्य प्रदेश

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17*
Year	73687.0	79913.0	91410.0	87215.0	90576.7	98798.6	84783.6	86292.2	122159.6	113867.0
Production	92059.8	91882.8	115866.8	115695.5	117826.9	95011.6	89265.2	100074.8	127823.4	124040.2

वर्ष 2007-08 से अब तक का वर्ष वार प्रजनक बीज उत्पादन निम्न चित्र में दर्शाया गया है।

बीज प्रौद्योगिकी अनुसंधान में महत्वपूर्ण क्षेत्र

बीज उत्पादन और प्रमाणीकरण

- पारम्परिक क्षेत्रों में बीज उत्पादन हेतु उपयुक्त बीज उत्पादन क्षेत्रों की पहचान।
- जलवायु उपयुक्त बीज उत्पादन तकनीकी का विकास एवं अनुकूलन।
- बीज उपज बढ़ाने हेतु सूक्ष्म तत्वों एवं वृद्धि नियामकों का अध्ययन करना।
- फसलों में पुष्प परागण को प्रभावित करने वाले जलवायु परिवर्तन के प्रभावों का अध्ययन करना।
- संकर बीज उत्पादन में प्रयुक्त हेट्रोसिस विकास हेतु वैकल्पित विधियों का विकास करना।
- वैश्विक बीज प्रमाणीकरण मानकों की आवश्यकतानुसार बीज मानकों को नियमित करना।

बीज दैहिकी, भंडारण एवं परीक्षण

- अण्डाणु बीज अनुपात बढ़ाने हेतु दैहिकी विषय पर अध्ययन।
- मुख्य फसलों में बीजों की गुणवत्ता जाँच हेतु विभिन्न बीज ओज कारकों की पहचान।
- प्रक्षेत्र एवं बीज मानकों यथा पृथक्करण दूरी, नमुना आकार, भौतिक शुद्धता एवं ओडीवी का उच्चीकरण।
- प्रक्षेत्र सब्जियों, औषधीयों एवं हरी खाद की फसलों में बीज परीक्षण विधियों का मानकीकरण।
- जी.ओ.टी. पूरक के रूप में मोलीकुलर मार्कर/डीएनए फिगंर प्रिटिंग का मानकीकरण।

- बीज गुणवत्ता में परिवर्धन हेतु द्वितीय एवं तृतीय पीढ़ी के विधियों/उपकरणों का उपयोग करना।
- बीजों के सुरक्षित भण्डारण हेतु उपयुक्त बीज उपचार/पदार्थ विधियों की पहचान।

बीज रोग विज्ञान

- गुणवत्तायुक्त बीज उत्पादन हेतु रोग मुक्त क्षेत्र की पहचान।
- विभिन्न बीज जनित रोगों की पहचान एवं निर्धारण हेतु तीव्र एवं प्रभावी विधियों की पहचान एवं विकास।
- बीज जनित रोगों के प्रबन्धन हेतु रणनीति का विकास।
- बीज जनित रोगों के प्रक्षेत्र एवं बीज मानकों का विकास तथा उनके जैविक नियन्त्रण हेतु विभिन्न विधियों का विकास करना।
- बीज जनित रोगों का प्रबन्धन, निर्धारण एवं निगरानी करना।

बीज कीट विज्ञान

- भण्डारित बीज में कीटों के प्रभावी प्रबन्धन हेतु पेस्ट रिस्क का विश्लेषण करना।
- भण्डारण कीटों के प्रबन्धन हेतु नई कीटनाशक अणुओं का मूल्यांकन।
- अधिक एवं प्रभावी बीज बढ़ाने हेतु विभिन्न कीट परागण कर्ताओं का प्रबन्धन।
- भण्डारण कीट के प्रबन्धन हेतु प्रयुक्त विभिन्न नई पैकेजिंग मैटेरियल की प्रभाविता का निर्धारण।

बीज विधायन

- विभिन्न फसल प्रजातियों एवं जनक पंक्तियों के विधायन हेतु विधायन विधियों एवं चलनी के आकार का मानकीकरण।
- बीज उत्पादन हेतु अधिकाधिक मशीनीकरण करना।

प्रभाव

- प्रजनक बीज की प्रचुर उपलब्धता सुनिश्चित होना।
- किसानों के घरों पर गुणवत्ता युक्त बीज की उपलब्धता।
- विभिन्न फसलों के बीज प्रतिस्थापन दर एवं प्रजाति प्रतिस्थापन दर को बढ़ाना।
- बढ़ी हुई फसल उत्पादकता।
- बीज सुरक्षा द्वारा पोषण सुरक्षा सुनिश्चित करना।
- खेती की आय के साथ-साथ किसानों की आमदनी बढ़ाना।

सम्पर्क

- अखिल भारतीय समन्वित शोध परियोजना-राष्ट्रीय बीज परियोजना (फसल) का सम्पर्क विभिन्न सरकारी व गैरसरकारी क्षेत्रों के संस्थानों से है। जिनका विवरण निम्नानुसार है।
- प्रक्षेत्र एवं उद्यानिकी फसलों की अखिल भारतीय समन्वित शोध परियोजनायें।

- राज्य कृषि विश्वविद्यालयों।
- भारतीय कृषि अनुसंधान परिषद के संस्थानों।
- भारत सरकार के कृषि, सहकारिता एवं किसान कल्याण मंत्रालय का बीज अनुभाग।
- राष्ट्रीय एवं राज्य बीज निगम
- सरकारी एवं गैरसरकारी क्षेत्र की विभिन्न बीज उद्यम।
- बीज प्रमाणीकरण संस्थायें।
- पौधा किस्म और कृषक अधिकार संरक्षण प्राधिकरण।

बीज प्रौद्योगिकी अनुसंधान की शोध उपलब्धियाँ 2016-17

बीज प्रौद्योगिकी अनुसंधान के विभिन्न क्षेत्रों जैसे कि बीज उत्पादन एवं प्रमाणीकरण, बीज दैहिकी, भण्डारण परीक्षण, बीज रोग विज्ञान, बीज कीट विज्ञान एवं बीज विधायन पर किये गये विभिन्न प्रयोगों से प्राप्त शोध परिणामों का संक्षिप्त विवरण निम्नानुसार है:-

बीज उत्पादन एवं प्रमाणीकरण

- गेहूँ में संकर बीज उत्पादन हेतु पृथक्करण दूरी का मानकीकरण किया गया जिसमें अधिकतम पराग प्रवाह 6 मी. हवा की दिशा में पाया गया है। अतः शुद्ध कतार को संदूषण से बचाने के लिए 6 मी. पृथक्करण पर्याप्त है।
- विभिन्न फसलों में बीजों की गुणवत्ता, स्वस्थ उपज एवं भण्डारण क्षमता को बढ़ाने हेतु बुआई पूर्व विभिन्न प्रयोग किये गये, जिनमें काबुली चना तथा मसूर में लैन्टाना कैमेरा के पत्ती निचोड़ (Leaf extract) से उपचारित बीज में क्रमशः 95 व 88 प्रतिशत अंकुरण एवं अधिक मात्रा में फलियां (80.40 एवं 105.27 प्रति पौधा) एवं दाने (27.80 एवं 7.52 ग्रा./पौधा) क्रमशः पाये गये हैं। मटर में सोडियम मॉलिब्डेट (500 ppm) द्वारा बीज प्रारम्भन, बीज उपज बढ़ाने में उपयोगी पाया गया।
- विभिन्न फसलों में गुणवत्ता सुधार हेतु बीज फिल्म कोटिंग पॉलीमर पर अध्ययन किया गया जिसके परिणामस्वरूप धान में पालिमर + थाइरम + माइकोराइजा के मिश्रण से 12.5% अधिक उपज प्राप्त हुई। इसी प्रकार गेहूँ एवं सोयाबीन में उपरोक्त वि ि से बीज परिवर्धन से बीज भार एवं बीज उत्पादन में वृद्धि पायी गयी। पॉलीमर द्वारा फिल्म लेपन, बीज भण्डारण की अव ि में अच्छी बीज गुणवत्ता बनाए रखने में भी मददगार है।
- ढ़ैचा में डी.ए.पी. 2 प्रतिशत तथा सूक्ष्म पोषक तत्व मिश्रण ($ZnSO_4$ 0.05% + Boric acid 0.3%) एवं नैप्थलिन एसीटीक एसीड (40 ppm) का संस्तुत मात्रा में फूल आने के पूर्व एवं फूल आने के समय की अवस्था में पर्णीय छिड़काव करना बीज उपज एवं बीज अंकुरण की दृष्टिकोण से अच्छा पाया गया है, यही पर्णीय छिड़काव सन्ई की फसल में बुआई के 60 दिन बाद करने पर उपयोगी पाया गया है। पिलिपसेरा फसल में डी.ए.पी. 2 प्रतिशत + सूक्ष्म पोषक तत्व मिश्रण ($ZnSO_4$ 0.05% + Boric acid 0.3%) तथा नेपथलिन एसिटिक एसिड (40 ppm) का पर्णीय छिड़काव उपज के विभिन्न कारकों एवं बीज उपज के लिए मददगार एवं प्रभावकारी उपचार है।
- बढ़ते हुए तापमान के प्रभाव को कम करने के लिए विभिन्न तकनीकों का मानकीकरण किया गया। जिनमें गेहूँ में दो बार ग्लाईसीन बिटेन (600 ppm) की मात्रा से (शाकीय अवस्था एवं बीज भराव अवस्था) पर्णीय उपचार क्लोरोफिल सूचकांक व बीज उत्पादन को बढ़ाता है तथा ज्वार में सैलिसिलीक एसीड (800 ppm) तथा सरसों में अल्फा टोकोफिरोल (500 ppm), का छिड़काव बीज उत्पादन में मददगार साबित हुए हैं।

- मिलेट्स में बीज उत्पादन तकनीकी के मानकीकरण हेतु विभिन्न प्रयोग किये गये जिनका परिणाम निम्नवत है :-

  i. रागी में पोटैशियम हाइड्रोजन फास्फेट 2 प्रतिशत के साथ बीज प्रारम्भन फिर कार्बेन्डाजिम द्वारा बीज उपचार एवं कार्बनिक व अकार्बनिक उर्वरकों का प्रयोग विभिन्न बीज उपज मानकों एवं बीज उपज हेतु उपयोगी पाया गया है।

  ii. कोदो में सीधी बुवाई की दशा में, बीज प्रारम्भन (2 प्रतिशत पोटैशियम हाइड्रोजन फास्फेट 4 से 6 घंटे के लिए) + 125 किग्रा. नीम + 1250 किग्रा. वर्मीकम्पोस्ट प्रति हेक्टेयर + 50 किग्रा. यूरिया + 50 किग्रा. सुपरफास्फेट + 50 किग्रा. म्यूरेट ऑफ पोटाश + टाप ड्रेसिंग यूरिया चतुर्थ सप्ताह में + 2 प्रतिशत बोरेक्स पुष्पण अवधी में प्रयोग करने से बीज उपज मानकों एवं बीज उपज में वृद्धि पायी गयी है।

- सोयाबीन में मुख्य फसल मौसम-तर बीज उत्पादन हेतु वैकल्पिक बुवाई समय निर्धारित करने हेतु परीक्षण किये गये। JS 20-24 तथा JS 20-29 की 20 दिसम्बर तक बुआई करके देखा गया कि उपज में मामूली गिरावट है। समय से बुआई में कुल 13.57q/ha पाया गया तथा लेट बुआई में 11.60 q/ha उत्पादन पाया गया।

विभिन्न बीज इन्क्रस्टेशन उपचार (बीज इन्क्रस्टेशन @ 1:1.2 थायरम माइकोराइजा एवं थाइरम एवं जिनियस कोट) के साथ प्रयोग किये गये, जिसके परिणाम निम्नवत हैं:-

1. प्याज में उपरोक्त उपचार से खेत में फसल की जमाव स्थिति अच्छी पायी गयी तथा सीधी बुआई की तुलना में प्याज की उपज में सार्थक वृद्धि पायी गयी।
2. गाजर की फसल में भी उपरोक्त उपचार से जमाव, जड़ वृद्धि, पौध ओज आदि में सकारात्मक धनात्मक प्रभाव पाया गया।
3. बरसीम की फसल में उपरोक्त उपचार सार्थक स्तर पर जमाव कारकों एवं उपज कारकों पर अच्छा पाया गया।

बीज दैहिकी भण्डारण एवं परीक्षण

- धान प्रजातियों में बीज ओज का धनात्मक संबंध उद्भव कल्लों की संख्या एवं बीज उपज के साथ पाया गया। धान की संकर किस्मों में पौध लम्बाई प्राथमिक एवं द्वितीय जड़ की लम्बाई, जड़ आयतन, जड़ पौध वजन पैतृक फसल की तुलना में अधिक पाये गये है। जिसके परिणामस्वरूप संकर फसल में आति क्षेत्रफल एवं बीज उपज भी अधिक पायी गयी है।
- संकर धान जे.आर.एच. 5 में अनुवांशिक शुद्धता निर्धारण करने हेतु एस एस आर चिन्हक आर एम 237, आर एम 16 एवं आर एम 84 उपर्युक्त पाये गये।
- एस एस आर चिन्हक आर एम 81057, आर एम 10103, आर एम 9a2 के.आर.एच. 4 संकर धान के लिए तथा आर एम 9310, आर एम 9106 संकर धान के.आर.एच. 2 के लिए उपर्युक्त पाये गये हैं।
- ट्राइकोडर्मा विरडी @10 ग्राम/किग्रा बीज द्वारा जैव प्रारम्भन, तथा KCl@1.5 प्रतिशत/8 घंटा द्वारा रासायनिक बीज प्रारम्भन चने में बीज अंकुरण तथा उत्पाद वृद्धि के लिए फायदेमंद पाये गये हैं।
- बीज का मेटल आक्साइड नैनोपार्टीकिल (Titancimoxide@400ppm) द्वारा ड्राई ड्रेसिंग करने से मक्के के जमाव ओज एवं अन्य दैहिकी पहलु में सुधार पाया गया।
- एच.वाई.टी.-डी./3 उस/किग्रा. की दर से बीज उपचार करने से धान, सोयाबीन एवं गेहूँ में जमाव एवं अन्य बीज संबंधित कारकों में सुधार पाया गया।

- वर्ष 2016-17 में किसानों के खेत पर बीज प्रारम्भन तकनीकी से सम्बन्धित 27 प्रक्षेत्र प्रदर्शन सम्पन्न किये गये जिसको किसानों द्वारा कम लागत तकनीकी के रूप में वृहद स्तर पर अपनाया गया।

बीज रोग विज्ञान

- जीरा में झुलसा के प्रभावी प्रबन्धन हेतु एजोक्ट्रोबीन @0.25 प्रतिशत का घोल 10 दिन के अन्तराल पर करने से रोग की सघनता एवं प्रभाविता कम हो जाती है। अल्टरनेरिया बुरन्सी जो कि क्यूमिन ब्लाईट को पैदा करता है के निर्धारण हेतु बीज धोवन निरीक्षण तकनीक सर्वाधिक शीघ्र एवं प्रभावी पायी गयी है।
- सोयाबीन में पोड ब्लाइट काम्पलेक्स रोग के प्रबन्ध हेतु कार्बेन्डाजिन और मैन्कोजेब (0.30 प्रतिशत) का दो बार छिड़काव उपयोगी पाया गया है जिससे 62.3 प्रतिशत रोग नियंत्रित हो जाता है।
- बीज गलन पौध अंगमारी डाईबैक एवं फल गलन जो कि मिर्चे की फसल में बहुतायत पाया जाता है के प्रभावी प्रबंधन हेतु ट्राइकोडरमा हारजियानम @ 10 ग्राम अथवा ट्राइकोडरमा विरडी @ 5 ग्राम + सुडोमोनास लोरोसेन्स @ 5 ग्राम प्रति किग्रा. बीज द्वारा बीज ड्रेसिंग प्रभावी पायी गयी है।
- मिर्च के एन्थ्रोकनोज कवक के विभिन्न प्रजातियों के निर्धारण हेतु पी.सी.आर. आधारित निर्धारण तकनीकी सबसे उपयोगी पायी गयी है।
- ट्राइकोडरमा हारजियानम + सीडोमानास लोरिसेन्सीस @ 5 ग्राम/किग्रा. सूर्यमुखी बीज का जैव प्रारम्भन बीज एवं फस्ल के लिए लाभदायक पाया गया है।

बीज कीट विज्ञान

- खाद्यान्न और दलहनी बीजों के भंडारण में क्षति पहुँचाने वाले मुख्य कीटों के विरूद्ध अनेक कीटनाशी का मूल्यांकन मानक कीटनाशी डेल्टामेथ्रीन के साथ किया गया। नये कीटनाशी का मूल्यांकन निम्न प्रकार किया गया। जैसे इमामैक्टीन बैन्जोएट (प्रोपक्लेन 5SG) @ 2ppm(40mg/kg) बीज ऐस्पाइनोसेड (ट्रेसर 45SC) @ 2ppm (4.4 मिग्रा./किग्रा. बीज) को डेल्टामेथ्रीन (डेसिस 2.8 EC) @ 1ppm के बराबर प्रभावी पाया गया और 6 से 9 माह तक भण्डारण में सबसे अधिक प्रभावी पाया गया। प्रोफिनोफास (क्यूराक्रम 50EC) @ 2ppm (0.004 उस/किग्रा. बीज), क्लोरफेनापायर (इन्ट्रीपीड 10 EC) @ 2ppm (0.02 ml/किग्रा. बीज), रिन्नेक्सीपायर (कोराजेन 20SC) @ 2ppm (0.01 ml/किग्रा बीज) और नोवाल्यूरान (रिमोन 10 EC) @ 5ppm (0.05ml/किग्रा. बीज) को कुछ हद तक प्रभावी पाया गया, लेकिन इमामेक्टिन बैन्जोयेट, इस्पाइनोसेड या डेल्टामेथ्रीन के बराबर प्रभावी नहीं पाया गया।
- किसान से प्राप्त 1542 नमूनों को बीज स्वास्थ्य के लिए मूल्यांकन किया गया, जिसमें पाया गया कि 45.6 प्रतिशत के अंकुरण अन्तर्राष्ट्रीय मानक से कम है लेकिन 26.2 प्रतिशत बीज के नमूनों में भण्डारण कीट का आक्रमण पाया गया।
- मधुमक्खी परागण बरसीम के बीज उत्पादन की गुणवत्ता में महत्वपूर्ण रोल अदा करता है। बीज उपज के अलावा बीज का अंकुरण और ओज दोनों में वृद्धि पायी गयी। अरहर की फसल में दुसरे परागकर्ता जैसे लीफकटर मधुमक्खी, कारपेन्टर म ुमक्खी का महत्वपूर्ण रोल पाया गया है।
- 50 प्रतिशत (V/V) का कार्बनडाई आक्साइड की सान्द्रता गेहूँ की खपरा बीटल, मूँगफली की बीटल, मूँग और अरहर के पल्स ब्रुचीड के आक्रमण को नियंत्रण करने में प्रभावी पाया गया। इसमें बीज गुणवत्ता में 6 से 9 माह तक भण्डारण में कोई क्षति नहीं पहुँचती है।

- अनेक बोटेनिकल्स के साथ किये गये प्रयोग में एकरस कैलमेस टीएनएयू फार्मूलेशन को सबसे उत्कृष्ठ पाया गया।
- मूँगफली फली छेदक भण्डारण में बहुत क्षति पहुँचाता है। इसका नियंत्रण इमामेक्टिन वैन्जोएट, स्पाइनोसेड, डेल्टामेथ्रीन से अधिक प्रभावी पाया गया है।
- भण्डार पर पल्स बिटल के प्रबंधन के लिए रासायनिक रणनीति विकसित करने के लिए इमामेक्टिन बेनजोएट @ 0.3ml/L और प्रोफेनेफेस 50 EC@ 1 ml/L का छिड़काव के लिए प्रोत्साहन दिया जाता है, जो कि हरा चना, काला चना तथा काबुली चना तथा अरहर के भण्डारण में लाभदायक है।
- ''जीरो लाई बैग'' कीट-पतंगों से भण्डारित बीज को सुरक्षित रखने में सहयोग करता है। जीरो लाई बैग में धान, गेहूँ, हरा चना, अरहर और सूर्यमुखी के बीज लगभग 6.8 माह तक IMSCS के मानक अनुसार सुरक्षित रखा जा सकता है।

बीज प्रसंस्करण

- धान के प्रभेद पुसा 44, पी.एस. 1121 एवं पी.बी. 1509 में चलनी का 1.8 mm आकार, 1.7 mm की तुलना में अधिक बीज रिकवरी हेतु उपर्युक्त पाया गया है।
- चने में छोटे आकार के बीज (जी.बी.एम. 2, साकी 9516, विजय), मध्यम आकार के (विशाल, जाकी 9218) एवं बड़े आकार के लिए चलनी आकार 5.0 mm, 5.5 mm एवं 6.0 mm उपर्युक्त पाये गये हैं।
- सोयाबीज प्रजाति DSb-21 एवं DGGV-2 के लिए चलनी आकार क्रमशः 4.00 mm (आर) एवं 2.8 mm (आर), संस्तुत चलनी आकार 4.00 mm (आर) की तुलना में अधिक बीज प्राप्ति के लिए उपर्युक्त पाये गये हैं।
- अरहर के प्रभेद TS-3R और BRG-5 के लिए चलनी का आकार क्रमशः 3.5 mm एवं 4.8 mm अधिक बीज प्राप्ति (91.6 एवं 99.10 प्रतिशत) एवं भौतिक शुद्धता (98.1 एवं 98.2 प्रतिशत) के लिए उपर्युक्त पाये गये हैं।
- गेहूँ की प्रजाति (डी.बी.डब्ल्यू 17, के. 607, के. 9423, के. 7903 एवं डी.बी.डब्ल्यू 107) के लिए 2.1 mm (O) चलनी का आकार 2.3 mm (O) की तुलना में उत्कृष्ट एवं प्रभावी पाया गया।
- बीन्स (फली) के लिए 6.5 mm (R) की चलनी उत्कृष्ट पायी गयी है।

पुरस्कार और प्रकाशन

विभिन्न वैज्ञानिकों/सहभागी केन्द्रों को बीज अनुसंधान के क्षेत्र में उनके उत्कृष्ठ कार्य के लिए 33 पुरस्कार/मेरिट सर्टिफिकेट प्रदान किये गये तथा 149 अनुसंधान पत्र को राष्ट्रीय और अन्तर्राष्ट्रीय पत्रिकाओं में प्रकाशित हुए।

प्रसार गतिविधियां

विभिन्न केन्द्रों द्वारा बीज उत्पादन कार्यक्रम के अंतर्गत अनेक प्रक्षेत्र प्रशिक्षण और कौशल विकास के लिए प्रक्षेत्र कर्मचारियों और किसानों को प्रशिक्षण दिया गया एवं अनेक प्रकार की गतिविधियों जैसे प्रदर्शनी, किसान मेला, किसान गोष्ठी, प्रक्षेत्र दिवस आदि का अनेक सहभागी केन्द्रों द्वारा प्रदर्शन किया गया जिसका विवरण निम्नवत है। इससे बीज के गुणवत्ता, मात्रा तथा विभिन्न फसलों के बीज प्रतिस्थापन दर में धनात्मक प्रभाव पड़ेगा।

विभिन्न केन्द्रों द्वारा आयोजित प्रशिक्षण एवं प्रसार गतिविधियों का विवरण निम्न तालिका में दिया गया है।

क्र.सं.	केन्द्र	प्रशिक्षण संख्या	प्रदर्शनी/किसान मेला	बीज/ प्रक्षेत्र दिवस	शोध पत्र	पुरस्कार
1	SKUAST, Srinagar	10	1	8	9	2
2	CSHHPKV, Palampur	3	-	6	12	1
3	CCSHAU, Hisar	4	2	1	5	-
4	GBPUAT, Pantnagar	-	2	-	-	-
5	NDUAT, Faizabad	-	2	-	7	9
6	BHU, Varanasi	2	1	1	5	-
7	BAU, Ranchi	2	-	1	-	-
8	RPCAU, Pusa	2	2	1	2	-
9	OUA&T, Bhubaneswar	3	1	1	10	-
10	SKNAU, Jobenar	2	-	-	1	1
11	SKRAU,Bikaner	5	2	-	-	-
12	SDAU, SK Nagar	1	-	40	1	-
13	JAU, Jamnagar	2	5	-	16	-
14	AAU, Anand	2	1	3	3	3
15	IGKV, Raipur	3	-	-	3	-
16	JNKVV, Jabalpur	8	4	15	8	2
17	MPKV, Rahuri	-	-	1	17	-
18	PDKV, Akola	2	1	-	-	-
19	UAS, Bangalore	5	-	2	17	1
20	UAS, Dharwad	4	1	1	-	1
21	UAS, Raichur	3	1	13	14	8
22	PJTSAU, Hyderabad	2	1	3	9	1
23	TNAU, Coimbatore	1	1	-	-	1
24	KAU, Trichur	5	-	5	1	-
25	BCKV, Mohanpur	7	-	5	-	-
26	KKV, Dapoli	3	-	2	-	-
27	PAJANCOA&RI, Karaikal	1	1	1	2	1
28	ICAR-IIRR, Hyderabad	4	1	-	7	2
	योग	**86**	**30**	**110**	**149**	**33**

निगरानी

देश के विभिन्न क्षेत्रों के लिए निगरानी समिति का गठन किया गया। निगरानी समिति के अलावा भारतीय कृषि अनुसंधान परिषद-भारतीय बीज विज्ञान संस्थान, मऊ के निदेशक द्वारा भी विभिन्न प्रजनक बीज उत्पादन केन्द्रों व बीज तकनीकी अनुसंधान केन्द्रों के निगरानी का कार्य वर्ष 2016-17 के दौरान किया गया।

Breeder Seed Production




भाकृअनुप
ICAR

Breeder Seed Production

The progress in breeder seed production during the year 2015-16 has been record breaking in the account of AICRP-NSP (Crops). The total breeder seed production during 2015-16 has touched 127823.36q against the total indent of 122159.61q, apart from marginal shortfall in few varieties due to climate vagaries the major requirement have been met as per indents in varied crops. Perusal of statistics clearly suggests that the present level of breeder seed production is exceeding the national requirement and is sufficient to produce required amount of certified seed for realizing the targeted SRR in varied crops. The centre-wise and crop-wise breeder seed production is detailed here under.

Breeder Seed Production against GOI Indent: A total of 62100.74q breeder seed of different crops was produced against GOI indent of 57036.35q. Center-wise breeder seed production have been elucidated in Tables 1 and 3, which reflect that the production was as per requirement and in majority of centres the level of breeder seed production is far exceeding the requirement. However, in some cases there were some marginal shortfalls mainly at CSAUAT, Kanpur; NDUAT, Faizabad; UAS, Dharwad; PDKV, Akola; VNMKV, Parbhani; UAS, Bengaluru; BAU, Ranchi and RVSKVV, Gwalior owing to changing climate coupled with biotic and abiotic stresses. Considering the overall indent and production levels, major breeder seed production centres were UAS, Dharwad (16746.32); JNKVV, Jabalpur (14886.84q); ANGRAU, Andhra Pradesh (10322.40q); GBPUAT, Pantnagar (5767.59q); PAU, Ludhiana (5162.11q) and SKRAU, Bikaner (4481.35).

Breeder Seed Production against State Indent: Efforts were also made to collect and collate information with regard to breeder seed production against state indents. During the year 2015-16, a total of 13892.16q of breeder seed was produced against the state indent of 12702.38q. Some of the centres viz. PAU, Ludhiana; CCSHAU, Hisar; SDAU, SK Nagar; RPCAU, Dholi; ANGRAU, Andhra Pradesh; TNAU, Coimbatore and PJTSAU, Hyderabad produced higher quantity of breeder seed against state requirement.

Breeder Seed Production under ICAR Seed Project: Breeder seed production of varied field crops was also undertaken under ICAR Seed Project by majority of cooperating centres to meet the additional requirement. In toto, 51838.46q of breeder seed was produced against the target of 52428.88q during 2015-16. Majority of share comes from centres viz. JNKVV, Jabalpur; GBPUAT, Pantnagar; UAS, Dharwad; BAU, Ranchi; RVSKVV, Gwalior and ICAR-IIMR, Hyderabad.

Crop-wise Breeder Seed Production: Out of the total breeder seed produced, the major share belongs to cereal crops 81996.86q in which maximum breeder seed was produced for wheat (42609.95q) followed by paddy (23312.70q). Under pulse crops a total of 11244.96q breeder seed was produced out of which 6601.78q was alone contributed by chickpea followed by mungbean 1268.99q, pigeonpea 1061.88q and lentil 770.78q. In oilseeds, total breeder seed production was 32963.50q against the indent of 45941.89q. soybean and groundnut together have contributed 31833.33q to total breeder seed produced for oilseeds. Breeder seed produced in case of fiber crops was 181.68q against the indent of 117.58q in which, cotton had the major share of 112.99q. In case of forage crops, breeder seed production was 1436.36q against the indent of 1342.87q out of which 841.35q alone is contributed from forage guar (cluster bean).

Shortfall: It is to be noted that there were marginal shortfall in production with respect to GOI indents. Shortfall were observed at NDUAT, Faizabad; CSAUAT, Kanpur; RPCAU, Dholi; JNKVV, Jabalpur; UAS, Dharwad; UAS, Bengaluru; PDKV, Akola; VNMKV, Parbhani and TNAU, Coimbatore which need to be addressed in subsequent years through proper planning of breeder seed production activity.

Anticipated Breeder Seed Production during 2016-17: The breeder seed production during 2016-17 (Kharif 2016 and Rabi/Summer 2016-17) is anticipated to notch a level of 124040.20q against the total indent of 113867.04q (Table 5 and Table 8). The majority of share will be coming from cereal crops with 67911.95q against the indent of 57677.87q, followed by oilseed crops (30977.80q), pulse crops (23798.42q), forage crops (1141.86q) and fibre crops (210.17q) (Table 8).

Conclusion

After reviewing the progress of breeder seed production of different centres, following conclusions were made:

1. Over the years, there has been significant improvement in production of breeder seed, execution of GOT to ensure purity and regarding utilization of revolving fund. Most of the centers are using molecular markers in addition to GOT to ensure genetic purity.
2. The value of total breeder seed production at the existing sale price is more than Rs.100 crore and is exceedingly adequate to produce sufficient quantity of quality seed through downstream seed multiplication chain to achieve the delineated SRR in field crops.
3. GBPUAT, Pantnagar; JNKVV, Jabalpur; UAS, Dharwad; IGKV, Raipur; VNMKV, Parbhani; UAS. Bengaluru and ICAR-NRRI, Cuttack were rated as very good performing centres. Special mention need to be made of GBPUAT, Pantnagar which has recorded highest cumulative profit.
4. All the centres have refunded the revolving fund amount. Few centres have invested the profit obtained through the operation of revolving funds for infrastructure development in their respective centres.

Table 1: Centre-wise and crop-wise information on breeder seed production during 2015-16

(Figures in quintals)

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
State Agricultural Universities									
1. SKUA &T, Srinagar									
Cereal Crops	**Rice**								
	Shalimar Rice 1	0.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00
	Shalimar Rice 2	0.00	0.00	2.00	2.30	0.00	0.00	2.00	2.30
	Shalimar Rice 3	0.00	0.00	2.00	2.50	0.00	0.00	2.00	2.50
	Jehlum	0.00	0.00	7.00	8.50	0.00	0.00	7.00	8.50
	Total	**0.00**	**0.00**	**14.00**	**16.30**	**0.00**	**0.00**	**14.00**	**16.30**
	Wheat								
	Shalimar Wheat 2	0.00	0.00	10.78	13.00	0.00	0.00	10.78	13.00
	Total	**0.00**	**0.00**	**10.78**	**13.00**	**0.00**	**0.00**	**10.78**	**13.00**
	Maize								
	C 4	0.00	0.00	1.00	1.66	0.00	0.00	1.00	1.66
	C 6	0.00	0.00	2.00	2.00	0.00	0.00	2.00	2.00
	Shalimar KG 1	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Shalimar KG 2	0.00	0.00	1.72	6.50	0.00	0.00	1.72	6.50
	Total	**0.00**	**0.00**	**5.72**	**11.16**	**0.00**	**0.00**	**5.72**	**11.16**
	Total Cereal Crops	**0.00**	**0.00**	**30.50**	**40.46**	**0.00**	**0.00**	**30.50**	**40.46**
Pulse Crops	**Rajmash**								
	Shalimar Rajmash 1	0.00	0.00	0.31	0.31	0.00	0.00	0.31	0.31
	Shalimar Rajmash 2	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	Total	**0.00**	**0.00**	**0.61**	**0.61**	**0.00**	**0.00**	**0.61**	**0.61**
	Cowpea								
	Shalimar Cowpea 1	0.00	0.00	0.52	0.47	0.00	0.00	0.52	0.47
	Total	**0.00**	**0.00**	**0.52**	**0.47**	**0.00**	**0.00**	**0.52**	**0.47**
	Mung								
	Shalimar Mung 1	0.00	0.00	0.50	0.48	0.00	0.00	0.50	0.48
	Total	**0.00**	**0.00**	**0.50**	**0.48**	**0.00**	**0.00**	**0.50**	**0.48**
	Field Pea								
	Shalimar Pea 1	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**
	Lentil								
	Shalimar Masoor 1	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Shalimar Masoor 2	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	Total	**0.00**	**0.00**	**1.50**	**1.50**	**0.00**	**0.00**	**1.50**	**1.50**
	Total pulse crops	**0.00**	**0.00**	**3.63**	**3.56**	**0.00**	**0.00**	**3.63**	**3.56**
Oilseed crops	**Brown Sarson**								
	KOS 101	0.00	0.00	1.20	1.20	0.00	0.00	1.20	1.20
	Total	**0.00**	**0.00**	**1.20**	**1.20**	**0.00**	**0.00**	**1.20**	**1.20**
	Total Oilseed crops	**0.00**	**0.00**	**1.20**	**1.20**	**0.00**	**0.00**	**1.20**	**1.20**
Forage crops	**Oats**								
	Sabzar	2.50	2.50	49.00	55.49	0.00	0.00	51.50	57.99
	Total	**2.50**	**2.50**	**49.00**	**55.49**	**0.00**	**0.00**	**51.50**	**57.99**
	Total Forage crops	**2.50**	**2.50**	**49.00**	**55.49**	**0.00**	**0.00**	**51.50**	**57.99**
Grand Total (Srinagar)		**2.50**	**2.50**	**84.33**	**100.71**	**0.00**	**0.00**	**86.83**	**103.21**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
2. CSKHPKV, Palampur									
Cereal Crops	**Rice**								
	HPR 2143	8.00	6.50	0.00	0.00	5.00	7.30	13.00	13.80
	HPR 1068	8.00	1.20	0.00	0.00	5.00	5.30	13.00	6.50
	HPR 1156	5.00	2.20	0.00	0.00	0.00	0.00	5.00	2.20
	RP 2421	2.00	2.70	0.00	0.00	2.00	1.00	4.00	3.70
	Kasturi Basmati	0.00	0.00	1.00	4.00	5.00	8.00	6.00	12.00
	VL Dhan 221	0.00	0.00	0.00	1.50	0.00	0.00	0.00	1.50
	Pusa 1509	0.00	0.00	0.00	0.00	2.00	1.70	2.00	1.70
	Pusa 1121	0.00	0.00	0.00	1.00	2.00	1.10	2.00	2.10
	Palam Lal Dhan 1	0.00	0.00	0.50	1.00	2.00	2.20	2.50	3.20
	Palam Basmati 1	0.00	0.00	0.00	1.00	5.00	5.50	5.00	6.50
	Total	**23.00**	**12.60**	**1.50**	**8.50**	**28.00**	**32.10**	**52.50**	**53.20**
	Wheat								
	HPW 155	20.00	20.80	0.00	0.00	0.00	0.00	20.00	20.80
	HPW 236	0.00	0.00	0.00	40.00	40.00	39.50	40.00	79.50
	HPW 211	0.00	0.00	0.00	2.00	5.00	6.00	5.00	8.00
	HPW 249	0.00	0.00	0.00	3.00	1.00	3.00	1.00	6.00
	VL 829	0.00	0.00	10.00	12.00	1.00	4.30	11.00	16.30
	VL 892	0.00	0.00	20.00	2.50	0.00	0.00	20.00	2.50
	VL 907	0.00	0.00	10.00	12.10	0.00	0.00	10.00	12.10
	HPW 349	39.00	40.80	0.00	0.00	0.00	0.00	39.00	40.80
	HPW 360	0.00	0.00	0.00	4.00	5.00	7.60	5.00	11.60
	HPW 368	0.00	0.00	0.00	10.00	10.00	12.50	10.00	22.50
	HS 507	0.00	0.00	50.00	13.20	0.00	0.00	50.00	13.20
	WH 1080	30.00	31.00	40.00	25.00	0.00	0.00	70.00	56.00
	HD 2967	0.00	0.00	40.00	60.00	0.00	0.00	40.00	60.00
	DPW 621 050	20.00	26.00	50.00	32.00	0.00	0.00	70.00	58.00
	Him Pratham	0.00	0.00	0.00	0.00	2.00	3.70	2.00	3.70
	Total	**109.00**	**118.60**	**220.00**	**215.80**	**64.00**	**76.60**	**393.00**	**411.00**
	Barley								
	HBL 113	0.00	0.00	0.00	0.00	1.00	0.50	1.00	0.50
	VLB 118	0.00	0.00	0.00	0.00	2.00	4.50	2.00	4.50
	BHS 380	0.00	0.00	0.00	0.00	1.00	1.30	1.00	1.30
	HBL316	0.00	0.00	0.00	0.00	0.50	0.40	0.50	0.40
	HBL276	0.00	0.00	0.00	0.00	0.50	0.40	0.50	0.40
	HBL391	0.00	0.00	0.00	0.00	0.50	0.40	0.50	0.40
	BHS 400	0.00	0.00	0.00	7.00	4.00	5.00	4.00	12.00
	Total	**0.00**	**0.00**	**0.00**	**7.00**	**9.50**	**12.50**	**9.50**	**19.50**
	Maize								
	Baj Makka	0.00	0.00	0.00	0.00	1.50	1.60	1.50	1.60
	Girija	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Early composite	0.00	0.00	0.00	0.00	1.00	1.25	1.00	1.25
	Baj popcorn	0.00	0.00	0.00	0.00	0.20	0.60	0.20	0.60
	Baby corn VL 78	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	Total	**0.00**	**0.00**	**0.00**	**2.00**	**2.90**	**3.65**	**2.90**	**5.65**
	Total Cereal Crops	**132.00**	**131.20**	**221.50**	**233.30**	**104.40**	**124.85**	**457.90**	**489.35**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Chickpea**								
	Him Chana II	6.00	2.00	1.00	0.00	0.00	0.00	7.00	2.00
	Him Chana I	0.00	0.00	0.50	0.21	0.00	0.00	0.50	0.21
	GPF 2	0.00	1.00	2.00	0.00	0.00	0.00	2.00	1.00
	DKG 986	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.60
	HPG 17	0.00	0.00	0.50	0.37	0.00	0.00	0.50	0.37
	Total	**6.00**	**3.00**	**4.00**	**0.58**	**0.00**	**0.60**	**10.00**	**4.18**
	Urd								
	UG 218	2.00	2.30	1.00	0.00	0.00	0.00	3.00	2.30
	Kullu 4	0.00	0.00	0.00	0.00	0.50	0.25	0.50	0.25
	Palampur 93	0.00	0.00	0.00	0.00	2.00	2.44	2.00	2.44
	Pant U 19	0.00	0.00	0.00	0.00	1.00	0.76	1.00	0.76
	PDU 1	0.00	0.00	0.00	0.00	0.20	0.05	0.20	0.05
	Him Mash 1	1.50	1.50	0.00	0.00	20.00	25.26	21.50	26.76
	Total	**3.50**	**3.80**	**1.00**	**0.00**	**23.70**	**28.76**	**28.20**	**32.56**
	Lentil								
	Vipasha	1.50	1.50	0.50	1.00	0.00	0.00	2.00	2.50
	Total	**1.50**	**1.50**	**0.50**	**1.00**	**0.00**	**0.00**	**2.00**	**2.50**
	Rajmash								
	Baspa	0.00	0.00	1.00	1.50	0.50	0.50	1.50	2.00
	Jwala	0.00	0.00	9.00	4.85	0.00	0.00	9.00	4.85
	Kailash	0.00	0.00	2.00	2.00	3.00	2.00	5.00	4.00
	Kanchan	0.00	0.00	5.00	2.04	0.00	0.00	5.00	2.04
	Him 1	0.00	0.00	1.00	1.48	0.00	0.00	1.00	1.48
	Total	**0.00**	**0.00**	**18.00**	**11.87**	**3.50**	**2.50**	**21.50**	**14.37**
	Mung								
	Suketi	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
	Horsegram								
	HPK 4	0.00	0.00	0.00	0.00	1.00	0.85	1.00	0.85
	VLG 1	0.00	0.00	0.00	0.00	0.20	0.15	0.20	0.15
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.20**	**1.00**	**1.20**	**1.00**
	Total Pulse Crops	**11.50**	**8.80**	**23.50**	**13.45**	**28.40**	**32.86**	**63.40**	**55.11**
Oilseed Crops	**Soybean**								
	Hara Soya	2.00	5.00	0.00	0.00	5.00	7.50	7.00	12.50
	Palam Soya	0.00	0.00	1.00	1.20	4.00	5.00	5.00	6.20
	Himso 1588	0.00	0.00	0.00	0.00	1.00	0.80	1.00	0.80
	Shivalik	0.00	0.00	2.00	2.00	2.00	6.38	4.00	8.38
	Total	**2.00**	**5.00**	**3.00**	**3.20**	**12.00**	**19.68**	**17.00**	**27.88**
	Raya								
	RCC 4	0.05	0.05	0.00	0.05	0.20	0.19	0.25	0.29
	Total	**0.05**	**0.05**	**0.00**	**0.05**	**0.20**	**0.19**	**0.25**	**0.29**
	Toria								
	Bhawani	0.00	0.00	0.00	2.00	2.00	4.00	2.00	6.00
	Total	**0.00**	**0.00**	**0.00**	**2.00**	**2.00**	**4.00**	**2.00**	**6.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Brown Sarson								
	KBS 3	0.05	0.05	0.00	0.20	0.20	0.38	0.25	0.63
	Total	**0.05**	**0.05**	**0.00**	**0.20**	**0.20**	**0.38**	**0.25**	**0.63**
	Gobhi Sarson								
	ONK 1	0.00	0.00	0.50	0.00	1.00	1.28	1.50	1.28
	Neelam	0.20	0.20	0.40	0.05	2.00	2.93	2.60	3.18
	GCS 7	0.00	0.00	0.32	0.00	1.00	0.80	1.32	0.80
	Total	**0.20**	**0.20**	**1.22**	**0.05**	**4.00**	**5.01**	**5.42**	**5.26**
	Karan Rai								
	Jayanti	0.00	0.00	0.00	0.30	0.20	0.36	0.20	0.66
	Total	**0.00**	**0.00**	**0.00**	**0.30**	**0.20**	**0.36**	**0.20**	**0.66**
	Linseed								
	Nagarkot	0.20	0.30	0.00	0.00	0.00	0.85	0.20	1.15
	Binwa	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Baner	0.20	0.30	0.00	0.00	0.00	0.55	0.20	0.85
	Himani	0.10	0.30	0.00	0.00	0.00	0.60	0.10	0.90
	Him Alsi 2	0.10	0.20	0.00	0.00	0.00	0.60	0.10	0.80
	Himalini	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
	Bhagsu	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
	Total	**0.60**	**1.10**	**0.00**	**0.00**	**0.00**	**3.20**	**0.60**	**4.30**
	Sesamum								
	LTK 4	0.00	0.00	0.05	0.10	4.00	4.40	4.05	4.50
	Total	**0.00**	**0.00**	**0.05**	**0.10**	**4.00**	**4.40**	**4.05**	**4.50**
	Total Oilseed Crops	**2.90**	**6.40**	**4.27**	**5.90**	**22.60**	**37.22**	**29.77**	**49.52**
Forage Crops									
	Oat								
	Palampur 1	0.00	0.00	0.00	0.00	5.00	7.50	5.00	7.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**7.50**	**5.00**	**7.50**
	Maize								
	African Tall	0.00	0.00	0.00	0.00	10.00	5.50	10.00	5.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**5.50**	**10.00**	**5.50**
	Setaria								
	PSS1	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.20**	**0.10**	**0.20**
	Red Clover								
	Palam clover 1	0.00	0.00	0.00	0.00	0.10	0.30	0.10	0.30
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.30**	**0.10**	**0.30**
	Total Forage Crops	**0.00**	**0.00**	**0.00**	**0.00**	**15.20**	**13.50**	**15.20**	**13.50**
Grand Total (Palampur)		**146.40**	**146.40**	**249.27**	**252.65**	**170.60**	**208.43**	**566.27**	**607.48**
3. PAU, Ludhiana									
Cereal Crops	**Rice**								
	PR 111	7.00	7.50	0.00	0.00	0.00	0.00	7.00	7.50
	PR 113	9.10	10.00	0.00	0.00	0.00	0.00	9.10	10.00
	PR 114	17.00	17.00	0.00	0.00	0.00	0.00	17.00	17.00
	PR 115	2.50	5.00	0.00	0.00	0.00	0.00	2.50	5.00
	PR 116	2.50	6.00	0.00	0.00	0.00	0.00	2.50	6.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	PR 118	17.50	18.00	0.00	0.00	0.00	0.00	17.50	18.00
	PR 121	10.00	16.00	0.00	0.00	0.00	0.00	10.00	16.00
	PR 122	8.10	9.00	0.00	0.00	0.00	0.00	8.10	9.00
	PR 123	11.00	12.00	0.00	0.00	0.00	0.00	11.00	12.00
	PR 124	25.00	30.00	0.00	0.00	0.00	0.00	25.00	30.00
	PAU 201	7.00	7.00	0.00	0.00	0.00	0.00	7.00	7.00
	Pb Bas. 2	0.50	5.00	0.00	0.00	0.00	0.00	0.50	5.00
	Pb Bas. 3	16.50	16.50	0.00	0.00	0.00	0.00	16.50	16.50
	Pusa 1121	0.00	0.00	10	30	0.00	0.00	10.00	30.00
	Pb. Mehak 1	0.00	0.00	0.04	4	0.00	0.00	0.04	4.00
	Pusa Bas. 1509	0.00	0.00	0.08	9	0.00	0.00	0.08	9.00
	Total	**133.70**	**159.00**	**10.12**	**43.00**	**0.00**	**0.00**	**143.82**	**202.00**
	Wheat								
	PBW 343	13.00	13.00	0.00	0.00	0.00	0.00	13.00	13.00
	PBW 373*	61.20	16.00	0.00	0.00	0.00	0.00	61.20	16.00
	PBW 443	8.50	8.50	0.00	0.00	0.00	0.00	8.50	8.50
	PBW 502	126.00	126.00	0.00	0.00	0.00	0.00	126.00	126.00
	PBW 509	87.00	87.00	0.00	0.00	0.00	0.00	87.00	87.00
	PBW 533	5.20	13.60	0.00	0.00	0.00	0.00	5.20	13.60
	PBW 550	465.60	466.00	0.00	0.00	0.00	0.00	465.60	466.00
	PBW 590	259.20	260.00	0.00	0.00	0.00	0.00	259.20	260.00
	PBW 596	2.00	6.00	0.00	0.00	0.00	0.00	2.00	6.00
	PBW 621	204.80	289.00	0.00	0.00	0.00	0.00	204.80	289.00
	PBW 644	103.20	143.65	0.00	0.00	0.00	0.00	103.20	143.65
	PBW 658	22.20	35.70	0.00	0.00	0.00	0.00	22.20	35.70
	PBW 660	7.00	17.00	0.00	0.00	0.00	0.00	7.00	17.00
	PBW 677	40.00	500.00	0.00	0.00	0.00	0.00	40.00	500.00
	PBW 725	41.00	500.00	0.00	0.00	0.00	0.00	41.00	500.00
	DBW 17	112.00	137.36	0.00	0.00	0.00	0.00	112.00	137.36
	WHD 943*	53.40	27.58	0.00	0.00	0.00	0.00	53.40	27.58
	WH 1105	492.40	602.82	0.00	0.00	0.00	0.00	492.40	602.82
	HD 2967	370.00	568.99	0.00	0.00	0.00	0.00	370.00	568.99
	PBW 226#	42.60	0.00	0.00	0.00	0.00	0.00	42.60	0.00
	HD 3086	0.00	0.00	400.00	691.00	0.00	0.00	400.00	691.00
	Total	**2516.30**	**3818.20**	**400.00**	**691.00**	**0.00**	**0.00**	**2916.30**	**4509.20**
	Maize								
	LM 5	0.00	0.00	0.70	0.70	0.00	0.00	0.70	0.70
	LM 13	0.00	0.00	18.00	18.00	0.00	0.00	18.00	18.00
	LM 14	0.00	0.00	10.00	13.00	0.00	0.00	10.00	13.00
	LM 16	0.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00
	LM 18	0.00	0.00	1.00	1.75	0.00	0.00	1.00	1.75
	LM 19	0.00	0.00	1.00	1.80	0.00	0.00	1.00	1.80
	LM 20	0.00	0.00	1.00	2.50	0.00	0.00	1.00	2.50
	LM 23	0.00	0.00	1.60	1.60	0.00	0.00	1.60	1.60
	LM 24	0.00	0.00	1.20	1.50	0.00	0.00	1.20	1.50
	Total	**0.00**	**0.00**	**37.50**	**43.85**	**0.00**	**0.00**	**37.50**	**43.85**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Barley								
	PL 426	78.25	78.25	0.00	0.00	0.00	0.00	78.25	78.25
	PL 751	1.40	16.45	0.00	0.00	0.00	0.00	1.40	16.45
	PL 807	0.35	35.57	0.00	0.00	0.00	0.00	0.35	35.57
	DWRUB 52	0.00	0.00	0.35	35.57	0.00	0.00	0.35	35.57
	Total	**80.00**	**130.27**	**0.35**	**35.57**	**0.00**	**0.00**	**80.35**	**165.84**
	Total Cereal Crops	**2730.00**	**4107.47**	**447.97**	**813.42**	**0.00**	**0.00**	**3177.97**	**4920.89**
Pulse Crops	**Chickpea**								
	GPF 2	6.50	7.00	0.00	0.00	0.00	0.00	6.50	7.00
	PBG 5	0.24	1.00	0.00	0.00	0.00	0.00	0.24	1.00
	Hare Chola 1	4.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00
	PGB 7	7.00	5.00	0.00	0.00	0.00	0.00	7.00	5.00
	L 555	0.40	0.40	0.00	0.00	0.00	0.00	0.40	0.40
	Total	**18.14**	**13.40**	**0.00**	**0.00**	**0.00**	**0.00**	**18.14**	**13.40**
	Arhar								
	PAU 201	0.00	0.00	0.20	0.50	0.00	0.00	0.20	0.50
	PAU 881	0.50	0.60	0.00	0.00	0.00	0.00	0.50	0.60
	Total	**0.50**	**0.60**	**0.20**	**0.50**	**0.00**	**0.00**	**0.70**	**1.10**
	Mung								
	SML 668	37.00	40.00	0.00	0.00	0.00	0.00	37.00	40.00
	Total	**37.00**	**40.00**	**0.00**	**0.00**	**0.00**	**0.00**	**37.00**	**40.00**
	Lentil								
	LL 699	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	LL 931	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	Total	**0.60**	**0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.60**	**0.60**
	Rajmash								
	Mash 114	1.10	1.10	0.00	0.00	0.00	0.00	1.10	1.10
	Mash 479	6.00	9.00	0.00	0.00	0.00	0.00	6.00	9.00
	Mash 338	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	Mash 1008	0.40	0.40	0.00	0.00	0.00	0.00	0.40	0.40
	Total	**7.70**	**11.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.70**	**11.00**
	Total Pulse Crops	**63.94**	**65.60**	**0.20**	**0.50**	**0.00**	**0.00**	**64.14**	**66.10**
Oilseed Crops	**Groundnut**								
	SG 99	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Total	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**0.00**	**1.00**	**1.00**
	Soybean								
	SL 958	0.35	0.70	0.00	0.00	0.00	0.00	0.35	0.70
	SL 525	0.00	0.00	0.35	0.60	0.00	0.00	0.35	0.60
	SL 744	0.00	0.00	0.15	0.30	0.00	0.00	0.15	0.30
	Total	**0.35**	**0.70**	**0.50**	**0.90**	**0.00**	**0.00**	**0.85**	**1.60**
	Sesamum								
	TC 289	0.02	0.05	0.00	0.00	0.00	0.00	0.02	0.05
	RT 346	0.00	0.00	0.04	0.40	0.00	0.00	0.04	0.40
	Total	**0.02**	**0.05**	**0.04**	**0.40**	**0.00**	**0.00**	**0.06**	**0.45**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Raya								
	PBR 91	0.03	1.89	0.00	0.00	0.00	0.00	0.03	1.89
	PBR 357	0.03	2.35	0.00	0.00	0.00	0.00	0.03	2.35
	RLC 1	0.03	0.05	0.00	0.00	0.00	0.00	0.03	0.05
	RLM 619**	0.04	0	0.00	0.00	0.00	0.00	0.04	0.00
	Total	**0.13**	**4.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.13**	**4.29**
	Toria								
	TL 15	0.07	0.07	0.00	0.00	0.00	0.00	0.07	0.07
	TL 17	0.03	3.83	0.00	0.00	0.00	0.00	0.03	3.83
	Total	**0.10**	**3.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**3.90**
	Gobhi Sarson								
	GSC 6	0.13	0.43	0.00	0.00	0.00	0.00	0.13	0.43
	GSC 7	0.03	11.48	0.00	0.00	0.00	0.00	0.03	11.48
	Total	**0.16**	**11.91**	**0.00**	**0.00**	**0.00**	**0.00**	**0.16**	**11.91**
	Total Oilseed Crops	**0.76**	**20.85**	**1.54**	**2.30**	**0.00**	**0.00**	**2.30**	**23.15**
Fibre Crops	**Cotton**								
	F 505	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	F 846	0.80	0.80	0.00	0.00	0.00	0.00	0.80	0.80
	F 1054	0.45	0.45	0.00	0.00	0.00	0.00	0.45	0.45
	F 1378	1.05	1.05	0.00	0.00	0.00	0.00	1.05	1.05
	F 1861	0.70	0.70	0.00	0.00	0.00	0.00	0.70	0.70
	FDK 124	0.00	0.00	0.04	2.00	0.00	0.00	0.04	2.00
	LD 327	0.00	0.00	0.04	2.00	0.00	0.00	0.04	2.00
	LD 694	0.00	0.00	0.04	2.00	0.00	0.00	0.04	2.00
	LH 1556	0.00	0.00	0.04	0.35	0.00	0.00	0.04	0.35
	LH 2076	0.00	0.00	0.04	0.30	0.00	0.00	0.04	0.30
	Total	**3.50**	**3.50**	**0.20**	**6.65**	**0.00**	**0.00**	**3.70**	**10.15**
	Total Fibre Crops	**3.50**	**3.50**	**0.20**	**6.65**	**0.00**	**0.00**	**3.70**	**10.15**
Forage Crops	**Maize**								
	J 1006	31.80	35.00	0.00	0.00	0.00	0.00	31.80	35.00
	Total	**31.80**	**35.00**	**0.00**	**0.00**	**0.00**	**0.00**	**31.80**	**35.00**
	Guinea Grass								
	PGG 518	0.00	0.00	0.10	0.30	0.00	0.00	0.10	0.30
	Total	**0.00**	**0.00**	**0.10**	**0.30**	**0.00**	**0.00**	**0.10**	**0.30**
	Pearl millet								
	FBC 16	0.20	1.50	0.00	0.00	0.00	0.00	0.20	1.50
	PCB 164	0.00	0.00	0.08	4.00	0.00	0.00	0.08	4.00
	Total	**0.20**	**1.50**	**0.08**	**4.00**	**0.00**	**0.00**	**0.28**	**5.50**
	Berseem								
	BL 1	5.30	5.30	0.00	0.00	0.00	0.00	5.30	5.30
	BL 10	20.25	22.00	0.00	0.00	0.00	0.00	20.25	22.00
	BL 42	7.83	8.50	0.00	0.00	0.00	0.00	7.83	8.50
	BL 180	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Total	**35.38**	**37.80**	**0.00**	**0.00**	**0.00**	**0.00**	**35.38**	**37.80**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Oat								
	OL 10	1.00	8.00	0.00	0.00	0.00	0.00	1.00	8.00
	Kent	53.00	53.00	0.00	0.00	0.00	0.00	53.00	53.00
	Total	**54.00**	**61.00**	**0.00**	**0.00**	**0.00**	**0.00**	**54.00**	**61.00**
	Metha								
	M 150	0.00	0.00	0.15	1.00	0.00	0.00	0.15	1.00
	Total	**0.00**	**0.00**	**0.15**	**1.00**	**0.00**	**0.00**	**0.15**	**1.00**
	Guar								
	HG 365	0.00	0.00	0.10	0.50	0.00	0.00	0.10	0.50
	Total	**0.00**	**0.00**	**0.10**	**0.50**	**0.00**	**0.00**	**0.10**	**0.50**
	Rye Grass								
	PBRG 1	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**
	Sorghum								
	A Line	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	B Line	0.07	0.07	0.00	0.00	0.00	0.00	0.07	0.07
	R Line	0.05	0.05	0.00	0.00	0.00	0.00	0.05	0.05
	Total	**0.22**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.22**	**0.22**
	Total Forage Crops	**121.60**	**135.52**	**0.93**	**6.30**	**0.00**	**0.00**	**122.53**	**141.82**
	Grand Total (Ludhiana)	**2919.80**	**4332.94**	**450.84**	**829.17**	**0.00**	**0.00**	**3370.64**	**5162.11**
4. CCSHAU, Hisar									
Cereal Crops	**Rice**								
	HKR-127	2.50	7.44	0.00	0.00	0.00	0.00	2.50	7.44
	HKR-47	9.10	10.48	0.00	0.00	0.00	0.00	9.10	10.48
	Taraori Basmati	1.50	5.42	0.00	0.00	0.00	0.00	1.50	5.42
	Basmati-370	4.50	7.32	0.00	0.00	0.00	0.00	4.50	7.32
	HKR 48	0.00	10.72	0.00	0.00	0.00	0.00	0.00	10.72
	CSR 30	0.00	15.25	0.00	0.00	0.00	0.00	0.00	15.25
	Pusa Basmati 1121	0.00	9.28	0.00	0.00	0.00	0.00	0.00	9.28
	Pusa Basmati 1	0.00	4.08	0.00	0.00	0.00	0.00	0.00	4.08
	Total	**17.60**	**69.99**	**0.00**	**0.00**	**0.00**	**0.00**	**17.60**	**69.99**
	Wheat								
	C-306	0.00	0.00	50.00	60.40	0.00	0.00	50.00	60.40
	WH-147	0.00	0.00	45.00	47.20	0.00	0.00	45.00	47.20
	WH-283	27.60	35.50	15.00	10.90	0.00	0.00	42.60	46.40
	WH-711	144.20	200.00	0.00	0.00	0.00	0.00	144.20	200.00
	WH-1021	42.40	55.50	0.00	0.00	0.00	0.00	42.40	55.50
	WH-1105	419.00	600.00	90.00	90.00	0.00	0.00	509.00	690.00
	WH-1025	37.00	39.00	0.00	0.00	0.00	0.00	37.00	39.00
	WH-1080	95.20	96.00	0.00	0.00	0.00	0.00	95.20	96.00
	PBW-343	0.00	0.00	52.00	56.80	0.00	0.00	52.00	56.80
	WH-1124	67.00	170.00	0.00	0.00	0.00	0.00	67.00	170.00
	HD-2967	0.00	0.00	165.00	170.40	0.00	0.00	165.00	170.40
	HD-3086	0.00	0.00	95.00	97.60	0.00	0.00	95.00	97.60
	WHD-943	80.00	51.60	0.00	0.00	0.00	0.00	80.00	51.60
	WH-1142	0.00	0.00	70.00	72.40	0.00	0.00	70.00	72.40
	Raj-3765	0.00	0.00	20.00	21.60	0.00	0.00	20.00	21.60
	Total	**912.40**	**1247.60**	**602.00**	**627.30**	**0.00**	**0.00**	**1514.40**	**1874.90**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Barley								
	BH 393	59.30	77.20	25.00	8.20	0.00	0.00	84.30	85.40
	BH 902	103.40	105.70	0.00	0.00	0.00	0.00	103.40	105.70
	BH 946	8.80	25.00	0.00	0.00	0.00	0.00	8.80	25.00
	Total	**171.50**	**207.90**	**25.00**	**8.20**	**0.00**	**0.00**	**196.50**	**216.10**
	Maize								
	KHKI 193-1	3.28	1.27	0.00	0.00	0.00	0.00	3.28	1.27
	HKI 193-2	8.44	1.07	0.00	0.00	0.00	0.00	8.44	1.07
	KHI 163	1.70	1.08	0.00	0.00	0.00	0.00	1.70	1.08
	HKI 161	4.54	0.62	0.00	0.00	0.00	0.00	4.54	0.62
	HKI 1128	0.16	0.15	0.00	0.00	0.00	0.00	0.16	0.15
	Total	**18.12**	**4.19**	**0.00**	**0.00**	**0.00**	**0.00**	**18.12**	**4.19**
	Total Cereal Crops	**1119.62**	**1529.68**	**627.00**	**635.50**	**0.00**	**0.00**	**1746.62**	**2165.18**
Pulse Crops	**Chickpea**								
	HC 5	1.00	0.88	0.00	0.00	0.00	0.00	1.00	0.88
	C 235	2.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00
	HK 2	30.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
	Total	**33.00**	**1.88**	**0.00**	**0.00**	**0.00**	**0.00**	**33.00**	**1.88**
	Fieldpea								
	HFP 529	25.00	1.65	0.00	0.00	0.00	0.00	25.00	1.65
	Total	**25.00**	**1.65**	**0.00**	**0.00**	**0.00**	**0.00**	**25.00**	**1.65**
	Arhar								
	Manak	0.70	0.75	0.00	0.00	0.00	0.00	0.70	0.75
	Paras	0.75	0.80	0.00	0.00	0.00	0.00	0.75	0.80
	Total	**1.45**	**1.55**	**0.00**	**0.00**	**0.00**	**0.00**	**1.45**	**1.55**
	Mung								
	MH 421	28.00	87.55	0.00	0.00	0.00	0.00	28.00	87.55
	Basanti (MH 125)	5.00	0.98	0.00	0.00	0.00	0.00	5.00	0.98
	Sattya (M 2-15)	13.00	3.85	0.00	0.00	0.00	0.00	13.00	3.85
	Total	**46.00**	**92.38**	**0.00**	**0.00**	**0.00**	**0.00**	**46.00**	**92.38**
	Urd								
	UH 1	7.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00
	Total	**7.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.00**	**0.00**
	Guar								
	HG 365	26.60	2.20	0.00	0.00	0.00	0.00	26.60	2.20
	HG 563	17.40	6.35	0.00	0.00	0.00	0.00	17.40	6.35
	HG 2-20	88.00	15.20	0.00	0.00	0.00	0.00	88.00	15.20
	HG 884	35.00	0.00	0.00	0.00	0.00	0.00	35.00	0.00
	Total	**167.00**	**23.75**	**0.00**	**0.00**	**0.00**	**0.00**	**167.00**	**23.75**
	Lentil								
	Garima	0.80	0.00	0.00	0.00	0.00	0.00	0.80	0.00
	HM 1	0.80	0.00	0.00	0.00	0.00	0.00	0.80	0.00
	Total	**1.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.60**	**0.00**
	Total Pulse Crops	**281.05**	**121.21**	**0.00**	**0.00**	**0.00**	**0.00**	**281.05**	**121.21**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Mustard**								
	RH 30	1.59	2.00	8.00	9.20	0.00	0.00	9.59	11.20
	RH 8812 (Laxmi)	2.45	3.00	4.50	5.60	0.00	0.00	6.95	8.60
	RH 0406	0.32	0.40	0.00	0.00	0.00	0.00	0.32	0.40
	RH 9304	0.05	0.20	0.00	0.00	0.00	0.00	0.05	0.20
	RH 9801	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	RH 0749	0.65	1.00	5.50	6.65	0.00	0.00	6.15	7.65
	RH 0119	0.50	2.20	0.00	0.00	0.00	0.00	0.50	2.20
	YSH 0401	0.40	0.50	0.00	0.00	0.00	0.00	0.40	0.50
	Total	**6.01**	**9.40**	**18.00**	**21.45**	**0.00**	**0.00**	**24.01**	**30.85**
	Til								
	HT 1	0.02	0.10	0.00	0.00	0.00	0.00	0.02	0.10
	HT 2	0.02	0.12	0.00	0.00	0.00	0.00	0.02	0.12
	Total	**0.04**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.22**
	Total Oilseed Crops	**6.05**	**9.62**	**18.00**	**21.45**	**0.00**	**0.00**	**24.05**	**31.07**
Forage Crops	**Oat**								
	HJ 8	12.00	18.01	0.00	0.00	0.00	0.00	12.00	18.01
	OS 6	5.00	15.86	0.00	0.00	0.00	0.00	5.00	15.86
	Total	**17.00**	**33.87**	**0.00**	**0.00**	**0.00**	**0.00**	**17.00**	**33.87**
	Sorghum								
	HJ 513	1.25	1.25	0.00	0.00	0.00	0.00	1.25	1.25
	HC 136	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	Total	**1.55**	**1.55**	**0.00**	**0.00**	**0.00**	**0.00**	**1.55**	**1.55**
	Cowpea								
	HC 46	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
	Total	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**0.00**
	Berseem								
	HB 1	0.50	1.50	0.00	0.00	0.00	0.00	0.50	1.50
	Mescavi	1.20	4.00	0.00	0.00	0.00	0.00	1.20	4.00
	Total	**1.70**	**5.50**	**0.00**	**0.00**	**0.00**	**0.00**	**1.70**	**5.50**
	Total Forage Crops	**25.25**	**40.92**	**0.00**	**0.00**	**0.00**	**0.00**	**25.25**	**40.92**
Fibre Crops	**Cotton**								
	HD-123	1.90	2.00	7.00	8.63	0.00	0.00	8.90	10.63
	HD-432	0.50	1.00	9.00	10.00	0.00	0.00	9.50	11.00
	HD-324	0.00	0.00	1.50	2.00	0.00	0.00	1.50	2.00
	H-10981	1.40	2.00	2.00	2.45	0.00	0.00	3.40	4.45
	H-1226	0.00	0.00	0.03	0.05	0.00	0.00	0.03	0.05
	H-1236	0.00	0.00	0.50	0.60	0.00	0.00	0.50	0.60
	H-1117	0.00	0.00	0.20	0.25	0.00	0.00	0.20	0.25
	H-1316	0.00	0.00	0.30	0.40	0.00	0.00	0.30	0.40
	AAH-1 (Male)	0.04	0.05	0.00	0.00	0.00	0.00	0.04	0.05
	AAH-1 (Female)	0.09	0.12	0.00	0.00	0.00	0.00	0.09	0.12
	HHH-223(Male)	0.00	0.00	0.08	0.10	0.00	0.00	0.08	0.10
	HHH-223(Female)	0.00	0.00	0.04	0.05	0.00	0.00	0.04	0.05
	Total	**3.93**	**5.17**	**20.65**	**24.53**	**0.00**	**0.00**	**24.58**	**29.70**
	Total Fibre Crops	**3.93**	**5.17**	**20.65**	**24.53**	**0.00**	**0.00**	**24.58**	**29.70**
	Grand Total (Hisar)	**1435.90**	**1706.60**	**665.65**	**681.48**	**0.00**	**0.00**	**2101.55**	**2388.08**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
5. GBPUA&T, Pantnagar									
Cereal Crops	**Rice**								
	Pant Dhan 19 (IET 17544)	0.50	10.00	0.00	0.00	10.00	20.00	10.50	30.00
	Pant Dhan 4	5.00	6.50	0.00	0.00	0.00	0.00	5.00	6.50
	Pant Dhan 18 (IET 17920)	5.00	10.00	0.00	0.00	10.00	12.00	15.00	22.00
	Pant Dhan 10 (IET 8616)	1.00	2.50	0.00	0.00	8.00	10.00	9.00	12.50
	Pant Dhan 12 (IET 10955)	3.00	10.00	0.00	0.00	8.00	10.00	11.00	20.00
	Pant Dhan 11 (IET 9620)	0.50	3.00	0.00	0.00	8.00	10.00	8.50	13.00
	PS Dhan 15 (IET 14132)	1.00	12.00	0.00	0.00	8.00	10.00	9.00	22.00
	PS Dhan 17 (IET 17263)	1.00	2.50	0.55	1.00	0.00	0.00	1.55	3.50
	Govind	3.50	10.00	0.00	0.00	50.00	60.00	53.50	70.00
	UPRI 95-17A (IR 58025A)	0.20	0.20	0.10	0.10	0.00	0.00	0.30	0.30
	UPRI 95-17B (IR 58025B)	0.10	0.50	0.10	0.10	0.00	0.00	0.20	0.60
	UPRI 93-287 R	0.10	0.10	0.10	0.10	0.00	0.00	0.20	0.20
	Pant Dhan 24	10.00	27.00	0.00	0.00	10.00	20.00	20.00	47.00
	MTU 7029	0.00	0.00	0.00	0.00	40.00	50.00	40.00	50.00
	BPT 5204	0.00	0.00	0.00	0.00	5.00	8.00	5.00	8.00
	Pusa 44	0.00	0.00	0.00	0.00	25.00	30.00	25.00	30.00
	PR 113	0.00	0.00	0.00	0.00	450.00	465.00	450.00	465.00
	Pusa Sugandh 4 (Pusa 1121)	0.00	0.00	0.00	0.00	150.00	190.00	150.00	190.00
	Pant Basmati 1	0.00	0.00	0.00	0.00	60.00	69.00	60.00	69.00
	NDR 359	0.00	0.00	0.00	0.00	85.00	95.00	85.00	95.00
	PR 121	0.00	0.00	0.00	0.00	20.00	22.00	20.00	22.00
	HKR 47	0.00	0.00	0.65	1.00	150.00	165.00	150.65	166.00
	Vivek Dhan 154	0.00	0.00	0.00	0.00	0.50	0.80	0.50	0.80
	Pusa 1460	0.00	0.00	0.40	1.00	35.00	39.00	35.40	40.00
	Pusa Sugandh 5 (Pusa 2511)	0.00	0.00	0.00	0.00	20.00	25.00	20.00	25.00
	Total	**30.90**	**94.30**	**1.90**	**3.30**	**1152.50**	**1310.80**	**1185.30**	**1408.40**
	Wheat								
	CBW 38	40.00	50.90	0.00	0.00	30.00	40.00	70.00	90.90
	DBW 17	65.00	100.00	22.00	24.90	0.00	0.00	87.00	124.90
	DPW 621-50	70.00	153.00	30.00	40.90	50.00	60.00	150.00	253.90
	HD 2329	38.20	16.40	0.00	0.00	0.00	0.00	38.20	16.40
	HD 2932	20.60	32.30	0.00	0.00	0.00	0.00	20.60	32.30
	HD 2967	207.60	847.90	50.00	100.00	200.00	300.00	457.60	1247.90
	HD 2987	17.00	34.50	0.00	0.00	0.00	0.00	17.00	34.50
	PBW 154	153.20	232.00	0.00	0.00	100.00	200.00	253.20	432.00
	PBW 502	30.00	70.00	0.00	0.00	65.00	78.90	95.00	148.90
	UP 262	25.20	32.10	0.00	0.00	0.00	0.00	25.20	32.10
	UP 2338	12.60	5.28	0.00	0.00	0.00	0.00	12.60	5.28
	UP 2425	1.00	3.35	0.00	0.00	5.00	6.00	6.00	9.35
	UP 2526	25.00	50.00	2.00	4.50	15.00	20.00	42.00	74.50
	UP 2554	16.00	26.80	0.00	0.00	0.00	0.00	16.00	26.80
	UP 2565	46.80	70.00	0.00	0.00	30.00	48.00	76.80	118.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	UP 2572	47.00	60.00	2.00	3.40	8.00	10.00	57.00	73.40
	UP 2628	21.00	50.00	2.50	4.50	15.00	20.00	38.50	74.50
	DBW 88	0.00	0.00	0.00	0.00	30.00	40.50	30.00	40.50
	HD 2733	0.00	0.00	0.00	0.00	20.00	27.00	20.00	27.00
	PBW 226	0.00	0.00	0.00	0.00	60.00	94.80	60.00	94.80
	PBW 343	0.00	0.00	0.00	0.00	160.00	229.20	160.00	229.20
	PBW 373	0.00	0.00	0.00	0.00	80.00	99.79	80.00	99.79
	PBW 550	0.00	0.00	5.00	10.00	45.00	53.00	50.00	63.00
	WH 1105	0.00	0.00	0.00	0.00	250.00	303.50	250.00	303.50
	WH 711	0.00	0.00	0.00	0.00	35.00	48.50	35.00	48.50
	UP 2748	0.00	0.00	0.00	0.00	20.00	27.00	20.00	27.00
	UP 2785	0.00	0.00	0.00	0.00	0.50	1.00	0.50	1.00
	UP 2782	0.00	0.00	0.00	0.00	0.50	1.00	0.50	1.00
	Total	**836.20**	**1834.53**	**113.50**	**188.20**	**1219.00**	**1708.19**	**2168.70**	**3730.92**
	Maize								
	Pant Sankul Makka 3	0.20	1.74	0.00	0.00	0.50	0.00	0.70	1.74
	Total	**0.20**	**1.74**	**0.00**	**0.00**	**0.50**	**0.00**	**0.70**	**1.74**
	Barley								
	PRB 502	1.20	0.00	0.00	0.00	0.00	0.00	1.20	0.00
	UPB 1008	2.30	3.00	0.00	0.00	0.00	0.00	2.30	3.00
	Total	**3.50**	**3.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.50**	**3.00**
	Total Cereal Crops	**870.80**	**1933.57**	**115.40**	**191.50**	**2372.00**	**3018.99**	**3358.20**	**5144.06**
Pulse Crops	**Pigeonpea**								
	UPAS 120	15.65	18.00	0.00	0.00	0.00	0.00	15.65	18.00
	PA 291	8.81	9.00	1.25	1.00	0.00	0.00	10.06	10.00
	Total	**24.46**	**27.00**	**1.25**	**1.00**	**0.00**	**0.00**	**25.71**	**28.00**
	Chickpea								
	PG 186	1.00	3.00	5.00	5.00	8.00	8.00	14.00	16.00
	Pant Kabuli Chana 1	2.00	3.00	0.53	0.75	0.50	1.00	3.03	4.75
	Pusa 362	0.00	0.00	0.00	0.00	8.00	10.00	8.00	10.00
	PG 043	0.00	0.00	0.00	0.00	4.00	5.00	4.00	5.00
	Total	**3.00**	**6.00**	**5.53**	**5.75**	**20.50**	**24.00**	**29.03**	**35.75**
	Urd								
	PU 31	65.00	55.00	2.50	2.00	0.00	0.00	67.50	57.00
	PU 35	0.00	0.00	0.00	0.00	1.00	3.00	1.00	3.00
	PU 40	8.00	8.00	1.00	2.00	8.00	10.00	17.00	20.00
	Total	**73.00**	**63.00**	**3.50**	**4.00**	**9.00**	**13.00**	**85.50**	**80.00**
	Moong								
	Pant Moong 2	0.00	0.00	0.00	0.00	5.00	6.00	5.00	6.00
	Pant Moong 4	4.00	5.50	0.00	0.00	4.00	5.00	8.00	10.50
	Pant Moong 5	19.05	24.00	0.10	1.00	0.00	0.00	19.15	25.00
	Pant Moong 6	11.06	10.00	0.00	0.00	0.00	0.00	11.06	10.00
	Total	**34.11**	**39.50**	**0.10**	**1.00**	**9.00**	**11.00**	**43.21**	**51.50**
	Lentil								
	PL 6	15.00	12.35	0.00	0.00	0.00	0.00	15.00	12.35
	PL 7	24.00	18.70	0.00	0.00	0.00	0.00	24.00	18.70
	PL 8	35.00	50.00	2.00	4.00	40.00	50.00	77.00	104.00
	Total	**74.00**	**81.05**	**2.00**	**4.00**	**40.00**	**50.00**	**116.00**	**135.05**
	Field Pea								
	Pant Pea 13	10.00	7.85	0.00	0.00	0.00	0.00	10.00	7.85
	Pant Pea 14	56.00	50.88	0.00	0.00	0.00	0.00	56.00	50.88
	Pant Pea 42	10.00	9.20	0.00	0.00	0.00	0.00	10.00	9.20
	Pant Pea 25	1.50	0.00	0.00	0.00	0.00	0.00	1.50	0.00
	Total	**77.50**	**67.93**	**0.00**	**0.00**	**0.00**	**0.00**	**77.50**	**67.93**
	Total Pulse Crops	**286.07**	**284.48**	**12.38**	**15.75**	**78.50**	**98.00**	**376.95**	**398.23**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Soybean**								
	PS 1092	3.00	3.00	3.02	4.00	5.00	8.00	11.02	15.00
	PS 1225	75.00	100.00	1.73	2.00	15.00	23.00	91.73	125.00
	PS 1347	15.00	20.00	2.31	3.00	3.00	4.00	20.31	27.00
	Pant Soybean 19 (PS 1368)	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	PS 1042	3.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00
	Total	**106.00**	**133.00**	**7.06**	**9.00**	**23.00**	**35.00**	**136.06**	**177.00**
	Rai								
	Pant Pili Sarson 1	5.00	6.00	0.50	1.00	2.00	3.50	7.50	10.50
	Total	**5.00**	**6.00**	**0.50**	**1.00**	**2.00**	**3.50**	**7.50**	**10.50**
	Toria								
	PT 303	3.45	5.00	5.00	4.85	0.00	0.00	8.45	9.85
	PT 507	0.00	0.00	2.00	4.20	1.00	2.00	3.00	6.20
	Uttara	1.54	2.50	2.00	4.00	5.00	6.00	8.54	12.50
	Total	**4.99**	**7.50**	**9.00**	**13.05**	**6.00**	**8.00**	**19.99**	**28.55**
	Total Oilseed Crops	**115.99**	**146.50**	**16.56**	**23.05**	**31.00**	**46.50**	**163.55**	**216.05**
Forage Crops	**Sorghum**								
	Pant Chari 5	0.50	1.50	0.00	0.00	1.50	2.00	2.00	3.50
	Pant Chari 6 (UPMC 503)	4.75	3.50	0.00	0.00	0.00	0.00	4.75	3.50
	467 A	0.20	0.00	0.00	0.00	0.00	0.00	0.20	0.00
	467 B	0.15	0.00	0.00	0.00	0.00	0.00	0.15	0.00
	Total	**5.60**	**5.00**	**0.00**	**0.00**	**1.50**	**2.00**	**7.10**	**7.00**
	Forage Cowpea								
	UPC 8705	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Total	**1.00**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**2.00**
	Grain Cowpea								
	Pant Lobia 1	60.00	0.25	0.00	0.00	0.00	0.00	60.00	0.25
	Pant Lobia 4	11.00	0.00	0.00	0.00	0.00	0.00	11.00	0.00
	Total	**71.00**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**71.00**	**0.25**
	Total Forage Crops	**77.60**	**7.25**	**0.00**	**0.00**	**1.50**	**2.00**	**79.10**	**9.25**
	Grand Total (Pantnagar)	**1350.46**	**2371.80**	**144.34**	**230.30**	**2483.00**	**3165.49**	**3977.80**	**5767.59**
6. NDUA&T, Faizabad									
Cereal Crops	**Rice**								
	Sarjoo 52	13.00	50.00	0.00	0.00	100.00	100.00	113.00	150.00
	Shusksmrat	6.00	4.00	0.00	0.00	0.00	0.00	6.00	4.00
	NDR 8002	22.30	8.72	0.00	0.00	0.00	0.00	22.30	8.72
	NDR 97	1.50	5.00	0.00	0.00	10.00	11.78	11.50	16.78
	NDR 2064	4.50	10.00	0.00	0.00	15.00	16.00	19.50	26.00
	NDR 2065	7.00	10.90	0.00	0.00	0.00	0.00	7.00	10.90
	NDR 359	16.50	25.00	0.00	0.00	50.00	53.90	66.50	78.90
	MTU 7029	0.00	0.00	0.00	0.00	75.00	101.66	75.00	101.66
	BPT 5204	0.00	0.00	0.00	0.00	50.00	178.20	50.00	178.20
	Swarna Sub 1	0.00	0.00	0.00	0.00	50.00	113.53	50.00	113.53
	NUD 2008	5.00	10.00	0.00	0.00	0.00	0.00	5.00	10.00
	N. Lalmati	1.00	1.35	0.00	0.00	0.00	0.00	1.00	1.35
	IPB 1	0.00	0.00	0.00	0.00	1.00	0.89	1.00	0.89
	PB 1	0.00	0.00	0.00	0.00	25.00	28.00	25.00	28.00
	Pusa Pb. 1509	0.00	0.00	0.00	0.00	10.00	11.66	10.00	11.66
	NDR 3112-1	11.50	15.00	0.00	0.00	15.00	21.93	26.50	36.93
	Jal Lahari	0.00	0.00	0.00	0.00	4.00	4.30	4.00	4.30
	Total	**88.30**	**139.97**	**0.00**	**0.00**	**405.00**	**641.85**	**493.30**	**781.82**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Wheat								
	K 7903	0.00	10.00	0.00	0.00	10.00	23.10	10.00	33.10
	NW 2036	28.00	28.50	0.00	0.00	0.00	0.00	28.00	28.50
	NW 1067	40.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
	HD 2967	0.00	30.55	0.00	0.00	25.00	30.00	25.00	60.55
	PBW 550	100.00	39.50	0.00	0.00	0.00	0.00	100.00	39.50
	PBW 373	32.00	32.00	0.00	0.00	75.00	100.00	107.00	132.00
	WH 711	71.00	0.00	0.00	0.00	0.00	0.00	71.00	0.00
	NW 1014	0.00	0.00	0.00	0.00	10.00	20.05	10.00	20.05
	NW 1076	0.00	17.00	0.00	0.00	20.00	20.03	20.00	37.03
	PBW 154	0.00	38.40	0.00	0.00	100.00	150.00	100.00	188.40
	PBW 502	0.00	22.68	0.00	0.00	40.00	50.00	40.00	72.68
	HUW 234	0.00	0.00	0.00	0.00	7.50	6.68	7.50	6.68
	NW 5054	0.00	14.28	0.00	0.00	20.00	20.00	20.00	34.28
	Total	**271.00**	**232.91**	**0.00**	**0.00**	**307.50**	**419.86**	**578.50**	**652.77**
	Barley								
	NB 2	31.53	35.00	0.00	0.00	0.00	25.00	31.53	60.00
	NDB 943	36.36	6.54	0.00	0.00	0.00	0.00	36.36	6.54
	NDB 209	22.20	0.00	0.00	0.00	0.00	0.00	22.20	0.00
	NDB 1020	49.90	0.00	0.00	0.00	0.00	0.00	49.90	0.00
	NDB 1173	23.42	5.00	0.00	0.00	0.00	0.00	23.42	5.00
	NB 1445	0.00	0.00	0.00	0.00	3.50	3.45	3.50	3.45
	NB 1465	0.00	0.00	0.00	0.00	3.50	3.46	3.50	3.46
	Total	**163.41**	**46.54**	**0.00**	**0.00**	**7.00**	**31.91**	**170.41**	**78.45**
	Total Cereal Crops	**522.71**	**419.42**	**0.00**	**0.00**	**719.50**	**1093.62**	**1242.21**	**1513.04**
Pulse Crops	**Pigeonpea**								
	NDA 1	14.10	20.00	0.00	0.00	15.00	15.13	29.10	35.13
	NDA 2	0.00	0.00	0.00	0.00	17.50	18.97	17.50	18.97
	Total	**14.10**	**20.00**	**0.00**	**0.00**	**32.50**	**34.10**	**46.60**	**54.10**
	Chickpea								
	Udai	0.00	0.00	0.00	0.00	10.00	11.54	10.00	11.54
	Pusa 362	0.00	0.00	0.00	0.00	10.00	10.28	10.00	10.28
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**21.82**	20.00	21.82
	Urd								
	NDU 1	0.00	0.00	0.00	0.00	3.00	3.12	3.00	3.12
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**3.12**	**3.00**	**3.12**
	Mung								
	NDM 1	0.00	0.00	0.00	0.00	0.50	0.35	0.50	0.35
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.35**	**0.50**	**0.35**
	Field Pea								
	HUDP 15	60.00	5.34	0.00	0.00	0.00	0.00	60.00	5.34
	Total	**60.00**	**5.34**	**0.00**	**0.00**	**0.00**	**0.00**	**60.00**	**5.34**
	Lentil								
	NDL 1	9.00	14.60	0.00	0.00	0.00	0.00	9.00	14.60
	HUL 57	0.00	0.00	0.00	0.00	20.00	22.70	20.00	22.70
	Total	**9.00**	**14.60**	**0.00**	**0.00**	**20.00**	**22.70**	**29.00**	**37.30**
	Total Pulse Crops	**83.10**	**39.94**	**0.00**	**0.00**	**76.00**	**82.09**	**159.10**	**122.03**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Rai**								
	NDR 8501	0.50	6.25	0.00	0.00	0.00	0.00	0.50	6.25
	NDRE 4	0.00	0.00	0.00	0.00	4.00	4.29	4.00	4.29
	Pitambari	0.00	0.00	0.00	0.00	5.00	6.55	5.00	6.55
	Total	**0.50**	**6.25**	**0.00**	**0.00**	**9.00**	**10.84**	**9.50**	**17.09**
	Total Oilseed Crops	**0.50**	**6.25**	**0.00**	**0.00**	**9.00**	**10.84**	**9.50**	**17.09**
Fibre Crops	**Jute**								
	Ankit	0.00	0.00	0.00	0.00	0.25	0.35	0.25	0.35
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.35**	**0.25**	**0.35**
	Total Fibre Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.35**	**0.25**	**0.35**
Grand Total (Faizabad)		**606.31**	**465.61**	**0.00**	**0.00**	**804.75**	**1186.90**	**1411.06**	**1652.51**
7. CSAUA&T, Kanpur									
Cereal Crops	**Wheat**								
	DBW-107	200.00	0.00	0.00	0.00	0.00	0.00	200.00	0.00
	K-607	0.00	0.00	120.00	120.40	0.00	0.00	120.00	120.40
	PBW 550	27.10	0.00	136.00	136.00	0.00	0.00	163.10	136.00
	DBW-39	0.00	0.00	42.00	42.00	0.00	0.00	42.00	42.00
	HUW-234	0.00	0.00	41.00	41.00	0.00	0.00	41.00	41.00
	K-307	79.00	0.00	43.00	0.00	0.00	0.00	122.00	0.00
	K-402(Mahi)	5.00	5.00	89.00	89.00	0.00	0.00	94.00	94.00
	K-7903	16.40	16.40	48.00	48.00	0.00	0.00	64.40	64.40
	K-9423	137.40	60.80	0.00	0.00	0.00	0.00	137.40	60.80
	K-9107	5.80	5.80	15.00	15.00	0.00	0.00	20.80	20.80
	K-1006	0.00	0.00	180.00	181.60	0.00	0.00	180.00	181.60
	K- 9351	88.00	50.00	0.00	0.00	0.00	0.00	88.00	50.00
	K-9533	88.00	31.60	88.00	0.00	0.00	0.00	176.00	31.60
	PBW-343	0.00	0.00	84.00	84.00	0.00	0.00	84.00	84.00
	WH-147	0.00	0.00	48.00	48.40	0.00	0.00	48.00	48.40
	DBW-17	200.00	208.40	0.00	0.00	0.00	0.00	200.00	208.40
	K-9465	8.00	8.00	8.00	8.00	0.00	0.00	16.00	16.00
	K-68	1.40	0.00	0.00	0.00	0.00	0.00	1.40	0.00
	Total	**856.10**	**386.00**	**942.00**	**813.40**	**0.00**	**0.00**	**1798.10**	**1199.40**
	Barley								
	Priti (K 409)	12.11	5.60	0.00	0.00	0.00	0.00	12.11	5.60
	Ritambhara (K 551)	8.22	0.00	0.00	0.00	0.00	0.00	8.22	0.00
	Haritama (K 560)	2.00	2.90	0.00	0.00	0.00	0.00	2.00	2.90
	Gitanjali	0.00	0.00	1.60	1.60	0.00	0.00	1.60	1.60
	Total	**22.33**	**8.50**	**1.60**	**1.60**	**0.00**	**0.00**	**23.93**	**10.10**
	Maize								
	Azad Uttam	0.00	0.00	5.00	6.83	0.00	0.00	5.00	6.83
	Azad Kamal	0.20	1.12	0.00	0.00	0.00	0.00	0.20	1.12
	Total	**0.20**	**1.12**	**5.00**	**6.83**	**0.00**	**0.00**	**5.20**	**7.95**
	Sorghum								
	CSV 15	0.00	0.00	2.00	1.95	0.00	0.00	2.00	1.95
	Bundela	0.00	0.00	2.00	1.63	0.00	0.00	2.00	1.63
	Total	**0.00**	**0.00**	**4.00**	**3.58**	**0.00**	**0.00**	**4.00**	**3.58**
	Total Cereal Crops	**878.63**	**395.62**	**952.60**	**825.41**	**0.00**	**0.00**	**1831.23**	**1221.03**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Chickpea**								
	Uday (KPG 59)	0.00	0.00	36.00	36.19	0.00	0.00	36.00	36.19
	Radhey	0.00	0.00	1.40	1.40	0.00	0.00	1.40	1.40
	KGD 1168	0.00	0.00	4.10	4.92	0.00	0.00	4.10	4.92
	KWR 108	0.00	0.00	34.20	37.32	0.00	0.00	34.20	37.32
	Pragati	0.00	0.00	2.10	2.15	0.00	0.00	2.10	2.15
	Total	**0.00**	**0.00**	**77.80**	**81.98**	**0.00**	**0.00**	**77.80**	**81.98**
	Mung								
	IPM 2-3	22.00	29.00	0.00	0.00	0.00	0.00	22.00	29.00
	Sweta	5.00	5.00	10.00	11.33	0.00	0.00	15.00	16.33
	Swati	28.00	22.50	0.00	0.00	0.00	0.00	28.00	22.50
	PDM 139	15.00	15.00	0.00	0.00	0.00	0.00	15.00	15.00
	Total	**70.00**	**71.50**	**10.00**	**11.33**	**0.00**	**0.00**	**80.00**	**82.83**
	Urd								
	Shekhar 1	6.00	6.08	0.00	0.00	0.00	0.00	6.00	6.08
	Shekhar 2	9.50	9.50	5.00	4.92	0.00	0.00	14.50	14.42
	Azad 1	2.50	2.20	2.00	1.05	0.00	0.00	4.50	3.25
	Azad 2	0.20	0.10	6.00	6.50	0.00	0.00	6.20	6.60
	Azad 3	30.00	28.10	0.00	0.00	0.00	0.00	30.00	28.10
	Total	**48.20**	**45.98**	**13.00**	**12.47**	**0.00**	**0.00**	**61.20**	**58.45**
	Field pea								
	Indra(KPMR400)	111.00	10.00	0.00	0.00	0.00	0.00	111.00	10.00
	Jai(KPMR522)	85.00	17.00	0.00	0.00	0.00	0.00	85.00	17.00
	Rachna	21.00	0.00	0.00	0.00	0.00	0.00	21.00	0.00
	Total	**217.00**	**27.00**	**0.00**	**0.00**	**0.00**	**0.00**	**217.00**	**27.00**
	Lentil								
	Azad masoor1(KLS 218)	27.40	9.90	0.00	0.00	0.00	0.00	27.40	9.90
	K-75(Malika)	6.00	6.00	24.00	24.14	0.00	0.00	30.00	30.14
	Shekhar 3	21.00	21.50	0.00	0.00	0.00	0.00	21.00	21.50
	Shekhar (KLB 303)	14.22	10.50	0.00	0.00	0.00	0.00	14.22	10.50
	Total	**68.62**	**47.90**	**24.00**	**24.14**	**0.00**	**0.00**	**92.62**	**72.04**
	Total Pulse Crop	**403.82**	**192.38**	**124.80**	**129.92**	**0.00**	**0.00**	**528.62**	**322.30**
Oilseed Crops	**Groundnut**								
	Kushal	0.00	0.00	4.00	0.04	0.00	0.00	4.00	0.04
	Ambar	0.00	0.00	4.00	1.40	0.00	0.00	4.00	1.40
	Total	**0.00**	**0.00**	**8.00**	**1.44**	**0.00**	**0.00**	**8.00**	**1.44**
	Linseed								
	Mau Azad Alsi-2	0.61	0.40	0.00	0.00	0.00	0.00	0.61	0.40
	Ruchi	6.28	1.20	0.00	0.00	0.00	0.00	6.28	1.20
	Azad Alsi 1	3.48	1.40	0.00	0.00	0.00	0.00	3.48	1.40
	Sharda	0.11	0.00	1.14	0.00	0.00	0.00	1.25	0.00
	Parvati	2.98	2.80	0.00	0.00	0.00	0.00	2.98	2.80
	Shekhar	1.30	1.90	3.30	0.00	0.00	0.00	4.60	1.90
	Padmini	1.30	0.00	0.00	0.00	0.00	0.00	1.30	0.00
	Sheela	1.20	0.00	0.00	0.00	0.00	0.00	1.20	0.00
	Total	**17.26**	**7.70**	**4.44**	**0.00**	**0.00**	**0.00**	**21.70**	**7.70**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Rai/Mustard								
	Urvashi	0.20	0.20	2.50	2.46	0.00	0.00	2.70	2.66
	Basanti	0.10	0.10	1.20	1.18	0.00	0.00	1.30	1.28
	Ashirwad	0.05	0.05	1.55	1.55	0.00	0.00	1.60	1.60
	T-59 (Varuna)	3.06	3.10	8.44	8.40	0.00	0.00	11.50	11.50
	Maya	0.15	0.15	2.75	2.09	0.00	0.00	2.90	2.24
	Rohini	2.43	2.43	3.30	3.29	0.00	0.00	5.73	5.72
	Vardan	0.00	0.00	1.70	1.68	0.00	0.00	1.70	1.68
	Vaibhav	0.00	0.00	1.34	1.34	0.00	0.00	1.34	1.34
	Pitambari	0.80	0.80	5.00	5.00	0.00	0.00	5.80	5.80
	Kanti	0.10	0.10	2.80	2.80	0.00	0.00	2.90	2.90
	Total	**6.89**	**6.93**	**30.58**	**29.79**	**0.00**	**0.00**	**37.47**	**36.72**
	Toria								
	Bhawani	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.00
	T 9	0.00	0.00	4.88	4.88	0.00	0.00	4.88	4.88
	Tapeswari	1.08	1.08	0.40	0.40	0.00	0.00	1.48	1.48
	Total	**1.13**	**1.08**	**5.28**	**5.28**	**0.00**	**0.00**	**6.41**	**6.36**
	Til								
	T 78	0.00	0.00	10.00	2.38	0.00	0.00	10.00	2.38
	Pragati	6.25	1.54	0.00	0.00	0.00	0.00	6.25	1.54
	Total	**6.25**	**1.54**	**10.00**	**2.38**	**0.00**	**0.00**	**16.25**	**3.92**
	Total Oilseed Crop	**31.53**	**17.25**	**58.30**	**38.89**	**0.00**	**0.00**	**89.83**	**56.14**
	Grant Total (Kanpur)	**1313.98**	**605.25**	**1135.70**	**994.22**	**0.00**	**0.00**	**2449.68**	**1599.47**
8. BHU, Varanasi									
Cereal Crops	**Rice**								
	HUBR 2-1	4.00	6.00	2.00	10.32	4.00	3.13	10.00	19.45
	HUR 4-3	7.00	7.20	2.00	2.58	3.25	4.24	12.25	14.02
	HUR 3022	4.00	5.30	0.00	0.00	2.50	7.79	6.50	13.09
	Shabhagi Dhan	3.00	4.10	0.10	0.35	0.50	0.73	3.60	5.18
	Sawarna Sub-1	11.00	11.70	0.10	0.10	4.00	4.90	15.10	16.70
	IDR 763	0.00	0.00	2.00	3.50	1.00	1.02	3.00	4.52
	HUR 105	4.50	12.00	12.00	16.35	10.00	23.27	26.50	51.62
	HUR 36	0.00	0.00	1.00	1.90	2.00	3.00	3.00	4.90
	HUBR 10-9	3.50	4.00	2.00	4.98	1.00	2.01	6.50	10.99
	BPT 5204	0.00	0.00	20.00	26.90	2.00	10.53	22.00	37.43
	Total	**37.00**	**50.30**	**41.20**	**66.98**	**30.25**	**60.62**	**108.45**	**177.90**
	Wheat								
	HUW 234	18.60	62.41	0.00	0.00	0.00	2.52	18.60	64.93
	HUW 468	0.00	0.00	5.00	5.90	0.00	1.00	5.00	6.90
	HUW 510	45.00	56.71	0.00	0.00	0.00	0.00	45.00	56.71
	Total	**63.60**	**119.12**	**5.00**	**5.90**	**0.00**	**3.52**	**68.60**	**128.54**
	Barley								
	HUB 113	1.20	1.67	5.00	5.00	0.00	19.05	6.20	25.72
	Total	**1.20**	**1.67**	**5.00**	**5.00**	**0.00**	**19.05**	**6.20**	**25.72**
	Total Cereal Crops	**101.80**	**171.09**	**51.20**	**77.88**	**30.25**	**83.19**	**183.25**	**332.16**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Field pea**								
	HUDP 15	15.00	12.00	0.00	0.00	0.00	2.00	15.00	14.00
	Total	**15.00**	**12.00**	**0.00**	**0.00**	**0.00**	**2.00**	**15.00**	**14.00**
	Mung								
	HUM 12	5.00	4.50	0.00	0.00	0.00	0.00	5.00	4.50
	HUM 16	5.00	8.00	0.00	0.00	0.00	0.00	5.00	8.00
	HUM 1	10.00	8.50	0.00	0.00	0.00	0.00	10.00	8.50
	Total	**20.00**	**21.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**21.00**
	Pigeonpea								
	MA 13	9.00	9.58	0.00	0.00	0.00	0.00	9.00	9.58
	Total	**9.00**	**9.58**	**0.00**	**0.00**	**0.00**	**0.00**	**9.00**	**9.58**
	Lentil								
	HUL 57	23.00	10.00	0.00	0.00	0.00	12.53	23.00	22.53
	Total	**23.00**	**10.00**	**0.00**	**0.00**	**0.00**	**12.53**	**23.00**	**22.53**
	Total Pulse Crops	**67.00**	**52.58**	**0.00**	**0.00**	**0.00**	**14.53**	**67.00**	**67.11**
	Grand Total (Varanasi)	**168.80**	**223.67**	**51.20**	**77.88**	**30.25**	**97.72**	**250.25**	**399.27**
9. AAU, Jorhat									
Cereal Crops	**Rice**								
	Bahadur	0.50	0.50	0.00	36.00	0.00	0.00	0.50	36.50
	Gitesh	20.00	20.00	0.00	34.00	0.00	0.00	20.00	54.00
	Ketekijoha	15.00	15.00	0.00	25.00	0.00	0.00	15.00	40.00
	Luit	15.00	15.00	0.00	17.00	0.00	0.00	15.00	32.00
	Masuri	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Ranjit	17.00	20.00	0.00	130.00	0.00	0.00	17.00	150.00
	Swarna Sub 1	35.00	35.00	0.00	0.00	0.00	0.00	35.00	35.00
	Aghoni	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.70
	Manoharsali	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Lachit	0.00	0.00	0.00	1.40	0.00	0.00	0.00	1.40
	Summer							0.00	0.00
	Luit	0.00	0.00	0.00	12.00	0.00	0.00	0.00	12.00
	Jaymati	0.00	0.00	0.00	35.00	0.00	0.00	0.00	35.00
	Kanaklata	0.00	0.00	0.00	30.00	0.00	0.00	0.00	30.00
	Total	**104.50**	**107.50**	**0.00**	**323.10**	**0.00**	**0.00**	**104.50**	**430.60**
	Total Cereal Crops	**104.50**	**107.50**	**0.00**	**323.10**	**0.00**	**0.00**	**104.50**	**430.60**
Pulse Crops	**Mung**								
	Pratap (SG 1)	0.00	4.00	0.00	0.00	0.00	0.00	0.00	4.00
	Total	**0.00**	**4.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**
	Lentil								
	HUL 57	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	IKLS 218	12.00	7.80	0.00	0.00	0.00	0.00	12.00	7.80
	PL 406	0.00	0.00	0.00	2.50	0.00	0.00	0.00	2.50
	Total	**12.00**	**7.80**	**0.00**	**5.50**	**0.00**	**0.00**	**12.00**	**13.30**
	Total Pulse Crops	**12.00**	**11.80**	**0.00**	**5.50**	**0.00**	**0.00**	**12.00**	**17.30**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Toria**								
	M 27	3.05	4.00	0.00	0.00	0.00	0.00	3.05	4.00
	TS 36	0.10	2.50	0.00	0.00	0.00	0.00	0.10	2.50
	TS 38	0.00	0.00	0.00	7.50	0.00	0.00	0.00	7.50
	TS 29	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	TS 67	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Total	**3.15**	**6.50**	**0.00**	**9.70**	**0.00**	**0.00**	**3.15**	**16.20**
	Total Oilseed Crops	**3.15**	**6.50**	**0.00**	**9.70**	**0.00**	**0.00**	**3.15**	**16.20**
Fibre Crops	**Jute**								
	Tarun	0.05	0.05	0.00	0.15	0.00	0.00	0.05	0.20
	Total	**0.05**	**0.05**	**0.00**	**0.15**	**0.00**	**0.00**	**0.05**	**0.20**
	Total Fibre Crops	**0.05**	**0.05**	**0.00**	**0.15**	**0.00**	**0.00**	**0.05**	**0.20**
	Grand Total (Jorhat)	**119.70**	**125.85**	**0.00**	**338.45**	**0.00**	**0.00**	**119.70**	**464.30**
10. BAU, Ranchi									
Cereal Crops	**Rice**								
	Birsa Vikas Dhan-109	21.00	3.00	0.00	0.00	0.00	0.00	21.00	3.00
	Birsa Vikas Dhan-110	2.00	3.90	0.60	0.60	0.00	0.00	2.60	4.50
	Birsamati	3.00	4.00	0.00	0.00	0.00	0.00	3.00	4.00
	Lalat (IET 9947)	0.00	0.00	20.00	25.80	0.00	0.00	20.00	25.80
	Naveen	0.00	0.00	0.60	15.60	0.00	0.00	0.60	15.60
	Sahbhagi	0.00	0.00	6.00	29.70	0.00	0.00	6.00	29.70
	MTU-1010	0.00	0.00	4.00	8.40	0.00	0.00	4.00	8.40
	Rajendera Mansuri	0.00	0.00	0.60	9.00	0.00	0.00	0.60	9.00
	Swarna(MTU-7029)	0.00	0.00	5.00	10.50	0.00	0.00	5.00	10.50
	Abhishek	0.00	0.00	5.00	14.10	0.00	0.00	5.00	14.10
	Total	**26.00**	**10.90**	**41.80**	**113.70**	**0.00**	**0.00**	**67.80**	**124.60**
	Wheat								
	K-9107	0.00	0.00	20.00	31.20	0.00	0.00	20.00	31.20
	Total	**0.00**	**0.00**	**20.00**	**31.20**	**0.00**	**0.00**	**20.00**	**31.20**
	Maize								
	Birsa Makai 1	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	Suwan 1	0.00	0.00	0.30	2.40	0.00	0.00	0.30	2.40
	Total	**0.30**	**0.30**	**0.30**	**2.40**	**0.00**	**0.00**	**0.60**	**2.70**
	Ragi								
	A 404	1.00	1.00	0.30	1.25	0.00	0.00	1.30	2.25
	Total	**1.00**	**1.00**	**0.30**	**1.25**	**0.00**	**0.00**	**1.30**	**2.25**
	Total Cereal Crops	**27.30**	**12.20**	**62.40**	**148.55**	**0.00**	**0.00**	**89.70**	**160.75**
Pulse Crops	**Urd**								
	Birsa urd 1	3.00	2.50	0.00	0.00	0.00	0.00	3.00	2.50
	Shekhar 2	0.00	0.00	0.30	0.50	0.00	0.00	0.30	0.50
	Total	**3.00**	**2.50**	**0.30**	**0.50**	**0.00**	**0.00**	**3.30**	**3.00**
	Chickpea								
	KPG 59	0.00	0.00	1.00	0.31	0.00	0.00	1.00	0.31
	KWR 108	0.00	0.00	0.75	0.45	0.00	0.00	0.75	0.45
	Total	**0.00**	**0.00**	**1.75**	**0.76**	**0.00**	**0.00**	**1.75**	**0.76**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Mung								
	Pusa Vishal	0.00	0.00	2.60	5.91	0.00	0.00	2.60	5.91
	Total	**0.00**	**0.00**	**2.60**	**5.91**	**0.00**	**0.00**	**2.60**	**5.91**
	Pigeonpea								
	Birsa Arhar 1	0.00	0.00	0.30	0.74	0.00	0.00	0.30	0.74
	Total	**0.00**	**0.00**	**0.30**	**0.74**	**0.00**	**0.00**	**0.30**	**0.74**
	Horse Gram								
	Birsa Kulthi 1	0.00	0.00	1.00	0.75	0.00	0.00	1.00	0.75
	Total	**0.00**	**0.00**	**1.00**	**0.75**	**0.00**	**0.00**	**1.00**	**0.75**
	Lentil								
	KLS 218	0.00	0.00	1.00	2.50	0.00	0.00	1.00	2.50
	Total	**0.00**	**0.00**	**1.00**	**2.50**	**0.00**	**0.00**	**1.00**	**2.50**
	Total Pulse Crops	**3.00**	**2.50**	**6.95**	**11.16**	**0.00**	**0.00**	**9.95**	**13.66**
Oilseed Crops	**Mustard**								
	BAUR 9502 (Shivani)	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	Pusa Bold	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	Total	**0.00**	**0.00**	**0.30**	**0.80**	**0.00**	**0.00**	**0.30**	**0.80**
	Linseed								
	T 397	0.00	0.00	1.00	0.85	0.00	0.00	1.00	0.85
	BAU 06-03	0.00	0.00	0.50	1.27	0.00	0.00	0.50	1.27
	Surbhi	0.00	0.00	0.50	1.42	0.00	0.00	0.50	1.42
	Total	**0.00**	**0.00**	**2.00**	**3.54**	**0.00**	**0.00**	**2.00**	**3.54**
	Niger								
	Pooja (BNS 10)	2.24	0.60	0.00	0.00	0.00	0.00	2.24	0.60
	Birsa Niger 3	2.35	0.20	0.00	0.00	0.00	0.00	2.35	0.20
	Total	**4.59**	**0.80**	**0.00**	**0.00**	**0.00**	**0.00**	**4.59**	**0.80**
	Soybean								
	Birsa Soybean 1	0.00	0.00	0.75	0.45	0.00	0.00	0.75	0.45
	Total	**0.00**	**0.00**	**0.75**	**0.45**	**0.00**	**0.00**	**0.75**	**0.45**
	Til								
	Shekhar 2	0.00	0.00	0.20	0.26	0.00	0.00	0.20	0.26
	Total	**0.00**	**0.00**	**0.20**	**0.26**	**0.00**	**0.00**	**0.20**	**0.26**
	Total Oilseed Crops	**4.59**	**0.80**	**3.25**	**5.05**	**0.00**	**0.00**	**7.84**	**5.85**
	Grand Total (Ranchi)	**34.89**	**15.50**	**72.60**	**164.76**	**0.00**	**0.00**	**107.49**	**180.26**
11. RAU, Dholi									
Cereal Crops	**Rice**								
	R. Sweta	0.00	0.00	91.20	155.60	140.00	190.10	231.20	345.70
	R. Mahsuri	72.00	100.00	114.00	211.50	463.94	435.94	649.94	747.44
	Rajshree	0.50	1.00	15.00	26.00	945.00	250.00	960.50	277.00
	Prabhat	0.00	0.00	3.30	20.00	480.00	220.72	483.30	240.72
	CSR-36	0.00	0.00	2.00	7.00	0.00	0.00	2.00	7.00
	Sahbhagi Dhan	0.00	0.00	6.00	24.00	75.00	38.80	81.00	62.80
	R. Bhagwati	15.50	0.00	92.50	69.00	720.00	229.30	828.00	298.30
	R. Kasturi	6.00	6.00	10.50	11.50	69.00	43.00	85.50	60.50
	R. Suwasini	6.00	6.00	8.00	8.25	46.00	34.00	60.00	48.25
	Swerna Sub-1	0.00	0.00	2.00	3.00	70.00	29.20	72.00	32.20
	Sudha	0.00	0.00	1.00	0.70	15.00	3.15	16.00	3.85
	Vaidehi	0.00	0.00	1.30	0.75	15.00	2.14	16.30	2.89
	Total	**100.00**	**113.00**	**346.80**	**537.30**	**3038.94**	**1476.35**	**3485.74**	**2126.65**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Wheat								
	HD-2733	41.00	97.00	0.00	0.00	900.00	739.00	941.00	836.00
	HD-2824	0.00	0.00	0.00	0.00	150.00	93.00	150.00	93.00
	HD-2967	87.00	323.00	15.00	16.00	400.00	103.00	502.00	442.00
	K-307	58.00	58.00	17.00	20.00	125.00	78.00	200.00	156.00
	DBW-14	16.00	82.50	0.00	0.00	100.00	80.50	116.00	163.00
	PBW 373	20.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
	HI-1563	0.00	0.00	2.00	2.00	275.00	68.75	277.00	70.75
	HD-2985	228.00	89.50	32.00	0.00	0.00	0.00	260.00	89.50
	WR-544	0.00	0.00	130.00	0.00	0.00	0.00	130.00	0.00
	HD-2888	0.00	0.00	1.00	3.20	1.00	3.20	2.00	6.40
	Total	**450.00**	**650.00**	**197.00**	**41.20**	**1951.00**	**1165.45**	**2598.00**	**1856.65**
	Finger Millet								
	RAU 08	0.00	0.00	3.00	1.98	0.00	0.00	3.00	1.98
	Total	**0.00**	**0.00**	**3.00**	**1.98**	**0.00**	**0.00**	**3.00**	**1.98**
	Total Cereal Crops	**550.00**	**763.00**	**546.80**	**580.48**	**4989.94**	**2641.80**	**6086.74**	**3985.28**
Pulse Crops	**Chickpea**								
	Pusa-372	0.00	0.00	4.00	4.08	0.00	0.00	4.00	4.08
	Total	**0.00**	**0.00**	**4.00**	**4.08**	**0.00**	**0.00**	**4.00**	**4.08**
	Mung								
	SML-668	0.00	0.00	8.75	5.00	25.00	25.78	33.75	30.78
	MEHA	0.00	0.00	5.00	2.30	3.00	3.28	8.00	5.58
	PDM-139	0.00	0.00	4.00	5.00	2.00	1.94	6.00	6.94
	Pusa Vishal	0.00	0.00	2.34	10.45	0.00	0.00	2.34	10.45
	TMB-37	0.00	0.00	5.00	1.00	5.00	1.00	10.00	2.00
	Total	**0.00**	**0.00**	**25.09**	**23.75**	**35.00**	**32.00**	**60.09**	**55.75**
	Pigeonpea								
	Bahar	15.00	15.00	8.00	1.55	40.00	4.40	63.00	20.95
	NDA-1	10.00	13.00	8.00	6.72	0.00	0.00	18.00	19.72
	Total	**25.00**	**28.00**	**16.00**	**8.27**	**40.00**	**4.40**	**81.00**	**40.67**
	Urd								
	PU 31	0.00	0.00	5.00	0.82	0.00	0.00	5.00	0.82
	Total	**0.00**	**0.00**	**5.00**	**0.82**	**0.00**	**0.00**	**5.00**	**0.82**
	Lentil								
	Arun	0.00	0.00	10.00	1.58	64.00	10.43	74.00	12.01
	KLS 218	0.00	0.00	2.40	1.87	16.00	6.05	18.40	7.92
	HUL 57	0.00	0.00	10.00	2.68	80.00	9.40	90.00	12.08
	Total	**0.00**	**0.00**	**22.40**	**6.13**	**160.00**	**25.88**	**182.40**	**32.01**
	Field pea								
	HUDP 15	45.00	10.00	1.00	0.00	1.00	0.00	47.00	10.00
	Kashinandni	0.00	0.00	1.00	0.20	1.00	2.95	2.00	3.15
	Total	**45.00**	**10.00**	**2.00**	**0.20**	**2.00**	**2.95**	**49.00**	**13.15**
	Total Pulse Crops	**70.00**	**38.00**	**74.49**	**43.25**	**237.00**	**65.23**	**381.49**	**146.48**
	Grand Total (Dholi)	**620.00**	**801.00**	**621.29**	**623.73**	**5226.94**	**2707.03**	**6468.23**	**4131.76**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
12. OUA&T, Bhubaneswar									
Cereal Crops	**Rice**								
	Parijat	7.00	15.00	0.00	0.00	0.00	0.00	7.00	15.00
	Khandagiri	5.00	5.00	33.86	33.86	0.00	0.00	38.86	38.86
	Jogesh	10.00	10.00	10.35	10.35	0.00	0.00	20.35	20.35
	Sidhant	10.00	10.00	4.35	4.35	0.00	0.00	14.35	14.35
	Lalat	36.00	36.00	67.80	67.80	0.00	0.00	103.80	103.80
	Jyotirmayee	0.00	0.00	0.46	0.46	0.00	0.00	0.46	0.46
	Gajapati	0.50	0.60	0.00	0.00	0.00	0.00	0.50	0.60
	IR 36	0.00	0.00	0.70	0.70	0.00	0.00	0.70	0.70
	IR 64	0.00	0.00	0.60	0.60	0.00	0.00	0.60	0.60
	Mandakini	33.00	33.00	21.00	0.00	0.00	0.00	54.00	33.00
	Hiranmayee	0.00	0.00	2.85	2.85	0.00	0.00	2.85	2.85
	Manaswini	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	Bhuban	1.00	1.00	0.80	0.80	0.00	0.00	1.80	1.80
	Pratikshya	159.00	160.00	0.00	0.00	0.00	0.00	159.00	160.00
	Surendra	1.00	1.00	1.40	2.40	0.00	0.00	2.40	3.40
	Ranidhan	109.00	109.00	21.80	14.60	0.00	0.00	130.80	123.60
	Daya	0.50	0.55	0.00	0.00	0.00	0.00	0.50	0.55
	Mrunalini	20.00	17.00	0.00	0.00	0.00	0.00	20.00	17.00
	Tejaswini	20.00	18.00	0.00	0.00	0.00	0.00	20.00	18.00
	Nua Acharmati	0.00	0.00	0.26	0.26	0.00	0.00	0.26	0.26
	Nuakalajeera	0.00	0.00	0.53	0.53	0.00	0.00	0.53	0.53
	Upahara	20.00	17.00	0.00	0.00	0.00	0.00	20.00	17.00
	Total	**482.00**	**483.15**	**166.76**	**139.56**	**0.00**	**0.00**	**648.76**	**622.71**
	Total Cereal Crops	**482.00**	**483.15**	**166.76**	**139.56**	**0.00**	**0.00**	**648.76**	**622.71**
Pulse Crops	**Mung**								
	Kamadev	9.00	5.90	0.00	0.00	0.00	0.00	9.00	5.90
	OBGG-52	10.00	9.70	0.00	0.00	0.00	0.00	10.00	9.70
	TARM- 1	16.00	0.00	0.00	0.00	0.00	0.00	16.00	0.00
	IPM 02-14	18.00	11.13	0.00	0.00	0.00	0.00	18.00	11.13
	Total	**53.00**	**26.73**	**0.00**	**0.00**	**0.00**	**0.00**	**53.00**	**26.73**
	Urd								
	Ujala(OBG-17)	8.00	2.00	0.00	0.00	0.00	0.00	8.00	2.00
	Prasad	45.00	3.40	0.00	0.00	0.00	0.00	45.00	3.40
	Pant U-31	17.00	9.00	0.00	0.00	0.00	0.00	17.00	9.00
	Total	**70.00**	**14.40**	**0.00**	**0.00**	**0.00**	**0.00**	**70.00**	**14.40**
	Total Pulse Crops	**123.00**	**41.13**	**0.00**	**0.00**	**0.00**	**0.00**	**123.00**	**41.13**
Oilseed Crops	**Groundnut**								
	Devi	580.00	600.00	0.00	0.00	0.00	0.00	580.00	600.00
	Smruti	20.10	30.00	0.00	0.00	0.00	0.00	20.10	30.00
	TAG 24	230.00	265.00	0.00	0.00	0.00	0.00	230.00	265.00
	Total	**830.10**	**895.00**	**0.00**	**0.00**	**0.00**	**0.00**	**830.10**	**895.00**
	Niger								
	Utkal Niger 150	1.50	1.50	0.00	0.00	0.00	0.00	1.50	1.50
	Deomali	2.00	3.00	0.00	0.00	0.00	0.00	2.00	3.00
	Total	**3.50**	**4.50**	**0.00**	**0.00**	**0.00**	**0.00**	**3.50**	**4.50**
	Mustard								
	Parbati	2.00	0.55	0.00	0.00	0.00	0.00	2.00	0.55
	Anuradha	1.50	0.70	0.00	0.00	0.00	0.00	1.50	0.70
	Total	**3.50**	**1.25**	**0.00**	**0.00**	**0.00**	**0.00**	**3.50**	**1.25**
	Total Oilseed Crops	**837.10**	**900.75**	**0.00**	**0.00**	**0.00**	**0.00**	**837.10**	**900.75**
	Grand Total (Bhubaneswar)	**1442.10**	**1425.03**	**166.76**	**139.56**	**0.00**	**0.00**	**1608.86**	**1564.59**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
13. MAF, Kota									
Cereal Crops	**Rice**								
	Pratap 1	1.00	18.00	0.00	0.00	0.00	0.00	1.00	18.00
	Total	**1.00**	**18.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**18.00**
	Wheat								
	GW 273	0.00	31.20	0.00	0.00	0.00	0.00	0.00	31.20
	HW 2004	22.00	5.00	0.00	0.00	0.00	0.00	22.00	5.00
	GW 496	0.00	21.40	0.00	0.00	0.00	0.00	0.00	21.40
	Sujata	78.00	90.00	0.00	0.00	0.00	0.00	78.00	90.00
	HI 8498	34.60	42.00	0.00	0.00	0.00	0.00	34.60	42.00
	Lok 1	0.00	189.40	0.00	0.00	0.00	0.00	0.00	189.40
	PBW 343	270.70	320.00	0.00	0.00	0.00	0.00	270.70	320.00
	PBW 502	0.00	75.00	0.00	0.00	0.00	0.00	0.00	75.00
	Raj 1482	0.00	291.00	0.00	0.00	0.00	0.00	0.00	291.00
	Raj 3077	0.00	128.86	0.00	0.00	0.00	0.00	0.00	128.86
	Raj 3765	0.00	148.60	0.00	0.00	0.00	0.00	0.00	148.60
	Raj 4037	0.00	215.15	0.00	0.00	0.00	0.00	0.00	215.15
	Raj 4083	0.00	76.60	0.00	0.00	0.00	0.00	0.00	76.60
	Raj 4120	0.00	110.50	0.00	0.00	0.00	0.00	0.00	110.50
	Raj 4238	0.00	89.90	0.00	0.00	0.00	0.00	0.00	89.90
	GW 366	0.00	12.00	0.00	0.00	0.00	0.00	0.00	12.00
	HI 1544	40.00	120.00	0.00	0.00	0.00	0.00	40.00	120.00
	Raj 4079	63.00	180.00	0.00	0.00	0.00	0.00	63.00	180.00
	C 306	156.20	332.00	0.00	0.00	0.00	0.00	156.20	332.00
	WH 147	176.80	263.10	0.00	0.00	0.00	0.00	176.80	263.10
	Total	**841.30**	**2741.71**	**0.00**	**0.00**	**0.00**	**0.00**	**841.30**	**2741.71**
	Total Cereal Crops	**842.30**	**2759.71**	**0.00**	**0.00**	**0.00**	**0.00**	**842.30**	**2759.71**
Pulse Crops	**Chickpea**								
	GNG 1581	182.00	440.00	0.00	0.00	0.00	0.00	182.00	440.00
	JG 14	225.00	115.00	0.00	0.00	0.00	0.00	225.00	115.00
	GNG 1958	24.00	18.00	0.00	0.00	0.00	0.00	24.00	18.00
	GNG 469	9.00	30.00	0.00	0.00	0.00	0.00	9.00	30.00
	Total	**440.00**	**603.00**	**0.00**	**0.00**	**0.00**	**0.00**	**440.00**	**603.00**
	Field pea								
	Prakash	20.00	8.00	0.00	0.00	0.00	0.00	20.00	8.00
	Total	**20.00**	**8.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**8.00**
	Mung								
	IPM 02 03	60.00	15.00	0.00	0.00	0.00	0.00	60.00	15.00
	Total	**60.00**	**15.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60.00**	**15.00**
	Urd								
	Pratap U 1	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Total	**10.00**	**10.00**	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**10.00**
	Total Pulse Crops	**530.00**	**636.00**	**0.00**	**0.00**	**0.00**	**0.00**	**530.00**	**636.00**
Oilseed Crops	**Soybean**								
	JS-335	100.00	30.00	0.00	0.00	0.00	0.00	100.00	30.00
	JS 93-05	200.00	32.00	0.00	0.00	0.00	0.00	200.00	32.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	JS 95-60	150.00	36.00	0.00	0.00	0.00	0.00	150.00	36.00
	Pratap Soya-2	15.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
	Pratap Soya-1	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
	RKS-45	150.00	14.00	0.00	0.00	0.00	0.00	150.00	14.00
	RKS-24	250.00	84.00	0.00	0.00	0.00	0.00	250.00	84.00
	Total	**870.00**	**196.00**	**0.00**	**0.00**	**0.00**	**0.00**	**870.00**	**196.00**
	Total Oilseed Crops	**870.00**	**196.00**	**0.00**	**0.00**	**0.00**	**0.00**	**870.00**	**196.00**
	Grand Total (Kota)	**2242.30**	**3591.71**	**0.00**	**0.00**	**0.00**	**0.00**	**2242.30**	**3591.71**
14. RAU, Bikaner									
Cereal Crops	**Wheat**								
	Raj 3077	120.00	150.00	0.00	0.00	100.00	0.00	220.00	150.00
	Raj 3765	255.00	145.00	0.00	0.00	50.00	0.00	305.00	145.00
	Raj 3777	143.00	100.00	0.00	0.00	50.00	0.00	193.00	100.00
	Raj 4079	822.00	672.00	0.00	0.00	20.00	0.00	842.00	672.00
	Raj 4120	423.00	490.00	0.00	0.00	20.00	0.00	443.00	490.00
	Raj 4238	243.00	100.00	0.00	0.00	0.00	0.00	243.00	100.00
	Raj 1482	200.00	90.00	0.00	0.00	20.00	0.00	220.00	90.00
	HD 2967	0.00	157.00	0.00	0.00	0.00	0.00	0.00	157.00
	HD 3086	0.00	85.00	0.00	0.00	0.00	0.00	0.00	85.00
	WH 1105	0.00	80.00	0.00	0.00	0.00	0.00	0.00	80.00
	PBW 343	0.00	9.00	0.00	0.00	0.00	0.00	0.00	9.00
	Total	**2206.00**	**2078.00**	**0.00**	**0.00**	**260.00**	**0.00**	**2466.00**	**2078.00**
	Barley								
	RD 2660	0.00	70.00	0.00	0.00	0.00	0.00	0.00	70.00
	RD 2715	0.00	0.00	0.00	0.00	0.00	45.67	0.00	45.67
	Total	**0.00**	**70.00**	**0.00**	**0.00**	**0.00**	**45.67**	**0.00**	**115.67**
	Total Cereal Crops	**2206.00**	**2148.00**	**0.00**	**0.00**	**260.00**	**45.67**	**2466.00**	**2193.67**
Pulse Crops	**Chickpea**								
	GNG 1581	300.00	418.00	0.00	0.00	50.00	0.00	350.00	418.00
	GNG 1958	100.00	113.00	0.00	0.00	30.00	0.00	130.00	113.00
	GNG 663	4.00	9.00	0.00	0.00	30.00	150.00	34.00	159.00
	RSG 974	0.00	75.00	0.00	0.00	0.00	0.00	0.00	75.00
	RSG 888	0.00	0.00	0.00	0.00	0.00	7.00	0.00	7.00
	Total	**404.00**	**615.00**	**0.00**	**0.00**	**110.00**	**157.00**	**514.00**	**772.00**
	Mung								
	IPM 02 03	30.00	39.00	0.00	0.00	0.00	0.00	30.00	39.00
	Ganga 1	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.30
	SML 668	0.00	19.00	0.00	0.00	10.00	12.00	10.00	31.00
	Total	**30.00**	**58.30**	**0.00**	**0.00**	**10.00**	**12.00**	**40.00**	**70.30**
	Mothbean								
	RMO 40	3.60	4.00	0.00	0.00	50.00	35.00	53.60	39.00
	RMO 257	44.00	5.00	0.00	0.00	0.00	0.00	44.00	5.00
	RMB 25	5.50	5.00	0.00	0.00	0.00	0.00	5.50	5.00
	RMO 435	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50
	Total	**58.60**	**20.50**	**0.00**	**0.00**	**50.00**	**35.00**	**108.60**	**55.50**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Produc-tion	Indent	Production
	Cowpea								
	RC 19	2.00	2.20	0.00	0.00	0.00	0.00	2.00	2.20
	RC 101	8.00	8.20	0.00	0.00	0.00	0.00	8.00	8.20
	Total	**10.00**	**10.40**	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**10.40**
	Total Pulse Crops	**502.60**	**704.20**	**0.00**	**0.00**	**170.00**	**204.00**	**672.60**	**908.20**
Oilseed Crops	**Mustard**								
	RGN 298	0.22	4.00	0.00	0.00	0.00	0.00	0.22	4.00
	RGN 229	0.30	1.00	0.00	0.00	10.00	2.00	10.30	3.00
	RGN 236	0.20	0.80	0.00	0.00	0.00	0.00	0.20	0.80
	RGN 145	0.27	0.60	0.00	0.00	0.00	0.00	0.27	0.60
	RGN 303	0.04	0.00	0.00	0.00	0.00	1.50	0.04	1.50
	RGN 48	0.26	0.80	0.00	0.00	0.00	0.00	0.26	0.80
	RGN 73	0.17	0.00	0.00	0.00	0.00	0.00	0.17	0.00
	Total	**1.46**	**7.20**	**0.00**	**0.00**	**10.00**	**3.50**	**11.46**	**10.70**
	Groundnut								
	HNG 123	86.00	30.00	0.00	0.00	20.00	0.00	106.00	30.00
	HNG 69	28.00	30.00	0.00	0.00	20.00	0.00	48.00	30.00
	Mallika	65.00	70.00	0.00	0.00	20.00	0.00	85.00	70.00
	HNG 10	0.00	0.00	0.00	0.00	200.00	210.00	200.00	210.00
	GG 20	0.00	0.00	0.00	0.00	100.00	150.00	100.00	150.00
	Total	**179.00**	**130.00**	**0.00**	**0.00**	**360.00**	**360.00**	**539.00**	**490.00**
	Total Oilseed Crops	**180.46**	**137.20**	**0.00**	**0.00**	**370.00**	**363.50**	**550.46**	**500.70**
Forage crop	**Guar**								
	RGC 1038	30.00	35.00	0.00	0.00	10.00	13.00	40.00	48.00
	RGC 986	1.20	0.00	0.00	0.00	0.00	0.00	1.20	0.00
	RGC 936	9.90	20.00	0.00	0.00	200.00	210.00	209.90	230.00
	RGC 1066	13.30	18.00	0.00	0.00	10.00	20.00	23.30	38.00
	RGC 1055	13.45	25.00	0.00	0.00	50.00	60.00	63.45	85.00
	RGC 1002	1.80	10.00	0.00	0.00	200.00	215.00	201.80	225.00
	RGC 1003	2.50	9.00	0.00	0.00	200.00	205.00	202.50	214.00
	RGC 1017	1.30	0.00	0.00	0.00	0.00	0.00	1.30	0.00
	RGC 197	2.85	0.00	0.00	0.00	0.00	0.00	2.85	0.00
	Total	**76.30**	**117.00**	**0.00**	**0.00**	**670.00**	**723.00**	**746.30**	**840.00**
	Oat								
	UPO 212	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**0.00**	**10.00**
	Methi								
	RMt 305	0.00	0.00	0.00	0.00	0.00	2.40	0.00	2.40
	RMt 1	0.00	0.00	0.00	0.00	0.00	20.98	0.00	20.98
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**23.38**	**0.00**	**23.38**
	Total forage crops	**76.30**	**117.00**	**0.00**	**0.00**	**670.00**	**756.38**	**746.30**	**873.38**
Fibre Crops	**Cotton**								
	RG 542	3.00	2.00	0.00	0.00	0.00	0.00	3.00	2.00
	RS 2013	0.35	0.00	0.00	0.00	0.00	0.00	0.35	0.00
	RS 810	0.05	0.00	0.00	0.00	0.00	0.00	0.05	0.00
	RG 8	4.65	3.40	0.00	0.00	0.00	0.00	4.65	3.40
	Total	**8.05**	**5.40**	**0.00**	**0.00**	**0.00**	**0.00**	**8.05**	**5.40**
	Total Fibre Crops	**8.05**	**5.40**	**0.00**	**0.00**	**0.00**	**0.00**	**8.05**	**5.40**
	Grand Total (Bikaner)	**2973.41**	**3111.80**	**0.00**	**0.00**	**1470.00**	**1369.55**	**4443.41**	**4481.35**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
15. SDAU, S.K. Nagar									
Cereal Crops	**Wheat**								
	GW 496	166.40	170.00	410.40	599.20	0.00	0.00	576.80	769.20
	GW 322	400.00	426.00	3.20	13.95	0.00	0.00	403.20	439.95
	GW 273	0.00	0.00	64.80	81.40	0.00	0.00	64.80	81.40
	GW 173	30.00	51.20	73.20	94.42	0.00	0.00	103.20	145.62
	GW 503	0.00	0.00	5.20	14.80	0.00	0.00	5.20	14.80
	GW 11	0.00	0.00	27.00	41.85	0.00	0.00	27.00	41.85
	GDW 1255	3.00	3.00	53.40	41.80	0.00	0.00	56.40	44.80
	LOK 1	0.00	0.00	198.10	300.00	0.00	0.00	198.10	300.00
	GW 451	0.00	0.00	0.00	170.00	0.00	0.00	0.00	170.00
	Total	**599.40**	**650.20**	**835.30**	**1357.42**	**0.00**	**0.00**	**1434.70**	**2007.62**
	Total Cereal Crops	**599.40**	**650.20**	**835.30**	**1357.42**	**0.00**	**0.00**	**1434.70**	**2007.62**
Pulse Crops	**Mung**								
	K 851	0.00	0.00	2.61	3.49	0.00	0.00	2.61	3.49
	GM 4	14.00	11.05	87.41	132.14	0.00	0.00	101.41	143.19
	Total	**14.00**	**11.05**	**90.02**	**135.63**	**0.00**	**0.00**	**104.02**	**146.68**
	Pigeonpea								
	ICPL 87	0.00	0.00	2.20	1.20	0.00	0.00	2.20	1.20
	GT 101	0.00	0.00	0.25	1.00	0.00	0.00	0.25	1.00
	GT 100	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	BDN 2	0.00	0.00	3.69	4.50	0.00	0.00	3.69	4.50
	Total	**0.00**	**0.00**	**6.44**	**7.00**	**0.00**	**0.00**	**6.44**	**7.00**
	Field pea								
	Guj. Field pea	0.00	0.00	0.20	1.00	0.00	0.00	0.20	1.00
	GDFP 1	35.00	36.00	0.00	0.00	0.00	0.00	35.00	36.00
	Total	**35.00**	**36.00**	**0.20**	**1.00**	**0.00**	**0.00**	**35.20**	**37.00**
	Urd								
	T 9	0.00	0.00	10.50	18.29	0.00	0.00	10.50	18.29
	GU 1	0.00	0.00	18.55	49.85	0.00	0.00	18.55	49.85
	Total	**0.00**	**0.00**	**29.05**	**68.14**	**0.00**	**0.00**	**29.05**	**68.14**
	Guar								
	GG 1	0.00	0.00	2.65	4.37	0.00	0.00	2.65	4.37
	GG 2	0.00	0.00	0.85	4.00	0.00	0.00	0.85	4.00
	Total	**0.00**	**0.00**	**3.50**	**8.37**	**0.00**	**0.00**	**3.50**	**8.37**
	Cowpea								
	GC 3	2.00	1.30	0.00	0.00	0.00	0.00	2.00	1.30
	GC 4	40.00	2.20	0.00	0.00	0.00	0.00	40.00	2.20
	Summer							0.00	0.00
	GC 4	40.00	91.32	0.00	0.00	0.00	0.00	40.00	91.32
	Total	**82.00**	**94.82**	**0.00**	**0.00**	**0.00**	**0.00**	**82.00**	**94.82**
	Moth Bean								
	GMO 1	0.00	0.00	0.50	0.37	0.00	0.00	0.50	0.37
	GMO 2	0.00	0.00	0.50	0.33	0.00	0.00	0.50	0.33
	Total	**0.00**	**0.00**	**1.00**	**0.70**	**0.00**	**0.00**	**1.00**	**0.70**
	Total Pulse Crops	**131.00**	**141.87**	**130.21**	**220.84**	**0.00**	**0.00**	**261.21**	**362.71**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Mustard**								
	GM 1	0.00	0.00	0.25	0.30	0.00	0.00	0.25	0.30
	GM 2	0.02	0.05	0.30	0.30	0.00	0.00	0.32	0.35
	GM 3	0.04	0.05	0.44	0.45	0.00	0.00	0.48	0.50
	Varuna	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
	Total	**0.06**	**0.10**	**1.09**	**1.15**	**0.00**	**0.00**	**1.15**	**1.25**
	Castor								
	VP 1 (C)	0.00	0.00	0.82	0.11	0.00	0.00	0.82	0.11
	VI 9	0.00	0.00	0.46	0.73	0.00	0.00	0.46	0.73
	48 1	1.04	1.12	1.43	4.12	0.00	0.00	2.47	5.24
	JI 35	0.00	0.00	1.58	4.28	0.00	0.00	1.58	4.28
	SH 72	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
	JI 96	0.00	0.00	0.04	0.84	0.00	0.00	0.04	0.84
	SKI 215	0.76	1.00	1.58	4.75	0.00	0.00	2.34	5.75
	JP 65	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
	VI 1 (M)	1.04	1.36	6.43	12.75	0.00	0.00	7.47	14.11
	SKP 84	1.80	2.00	3.36	2.46	0.00	0.00	5.16	4.46
	Total	**4.64**	**5.48**	**15.78**	**30.04**	**0.00**	**0.00**	**20.42**	**35.52**
	Total Oilseed Crops	**4.70**	**5.58**	**16.87**	**31.19**	**0.00**	**0.00**	**21.57**	**36.77**
	Grand Total (S. K. Nagar)	**735.10**	**797.65**	**982.38**	**1609.45**	**0.00**	**0.00**	**1717.48**	**2407.10**
16. AAU, Anand									
Cereal Crops	**Paddy**								
	Gurjari	0.00	0.00	0.00	0.00	200.00	70.25	200.00	70.25
	GR 3	0.00	0.00	0.00	0.00		6.30		6.30
	GR 4	0.00	0.00	0.00	0.00		7.00		7.00
	GR 7	0.00	0.00	0.00	0.00		9.00		9.00
	Jaya	0.00	0.00	0.00	0.00		24.00		24.00
	GR 11	0.00	0.00	0.00	0.00		15.00		15.00
	Masuri	0.00	0.00	0.00	0.00		12.50		12.50
	IR 28	0.00	0.00	0.00	0.00		3.00		3.00
	GAR 13	0.00	0.00	0.00	0.00		25.00		25.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**200.00**	**172.05**	**200.00**	**172.05**
	Wheat								
	GW 322	0.00	0.00	0.00	0.00	300.00	109.60	300.00	109.60
	LOK 1	0.00	0.00	0.00	0.00		57.85		57.85
	GW 273	0.00	0.00	0.00	0.00		81.00		81.00
	GW 451	0.00	0.00	0.00	0.00		10.00		10.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**300.00**	**258.45**	**300.00**	**258.45**
	Maize								
	GM 2	0.00	0.00	0.00	0.00	25.00	17.10	25.00	17.10
	Narmada Moti	0.00	0.00	0.00	0.00		8.86		8.86
	IGI 1101	0.00	0.00	0.00	0.00		2.52		2.52
	IGI 1102	0.00	0.00	0.00	0.00		1.60		1.60
	IGI 1103	0.00	0.00	0.00	0.00		0.66		0.66
	IGI 1104	0.00	0.00	0.00	0.00		0.05		0.05
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**25.00**	**30.79**	**25.00**	**30.79**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**525.00**	**461.29**	**525.00**	**461.29**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Mung**								
	GAM 5	0.00	29.49	0.00	0.00	0.00	0.00	0.00	29.49
	Meha	1.00	7.84	0.00	0.00	0.00	0.00	1.00	7.84
	Total	**1.00**	**37.33**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**37.33**
	Pigeonpea								
	AGT 2	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**0.00**	**5.00**
	Chickpea								
	GG 2	60.00	20.53	0.00	0.00	0.00	0.00	60.00	20.53
	Total	**60.00**	**20.53**	**0.00**	**0.00**	**0.00**	**0.00**	**60.00**	**20.53**
	Total Pulse Crops	**61.00**	**57.86**	**0.00**	**0.00**	**0.00**	**5.00**	**61.00**	**62.86**
Oilseed Crops	**Soybean**								
	NRC 37	0.00	0.00	0.00	0.00	0.00	9.50	0.00	9.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**9.50**	**0.00**	**9.50**
	Groundnut								
	GG 20	0.00	0.00	0.00	0.00	0.00	37.50	0.00	37.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**37.50**	**0.00**	**37.50**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**47.00**	**0.00**	**47.00**
Fibre Crops	**Cotton**								
	V 797	0.00	0.00	0.00	0.00	30.00	6.99	30.00	6.99
	G Cot 13	0.00	0.00	0.00	0.00		4.64		4.64
	ADC 1	0.00	0.00	0.00	0.00		3.72		3.72
	G Cot 21	0.00	0.00	0.00	0.00		30.66		30.66
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**46.01**	**30.00**	**46.01**
	Total Fibre Crops	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**46.01**	**30.00**	**46.01**
Forage Crops	**Oat**								
	Kent	50.00	25.00	0.00	0.00	0.00	0.00	50.00	25.00
	Total	**50.00**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.00**	**25.00**
	Lucerne								
	AL 3	0.00	0.00	0.00	0.00	15.00	0.30	15.00	0.30
	Anand 2	0.00	0.00	0.00	0.00		7.00		7.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**15.00**	**7.30**	**15.00**	**7.30**
	Total Forage crops	**50.00**	**25.00**	**0.00**	**0.00**	**15.00**	**7.30**	**65.00**	**32.30**
	Grand Total (Anand)	**111.00**	**82.86**	**0.00**	**0.00**	**570.00**	**566.60**	**681.00**	**649.46**
17. JAU, Jamnagar									
Cereal Crops	**Wheat**								
	LOK 1	0.00	35.00	0.00	0.00	0.00	0.00	0.00	35.00
	GW 366	172.40	180.00	0.00	0.00	0.00	0.00	172.40	180.00
	GW 496	0.00	70.00	0.00	0.00	0.00	0.00	0.00	70.00
	Total	**172.40**	**285.00**	**0.00**	**0.00**	**0.00**	**0.00**	**172.40**	**285.00**
	Pearl Millet								
	ICMA 95444	0.00	0.00	0.00	1.40	0.00	0.00	0.00	1.40
	ICMB 95444	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	ICMA 96222	0.00	0.00	0.00	2.90	0.00	0.00	0.00	2.90
	ICMB 96222	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	ICMA 98444	0.00	0.00	0.00	1.20	0.00	0.00	0.00	1.20

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	ICMB 98444	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.30
	ICMA 04999	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	ICMB 04999	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	J 2340	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
	J-2454	0.00	0.00	0.00	1.90	0.00	0.00	0.00	1.90
	Total	**0.00**	**0.00**	**0.00**	**11.30**	**0.00**	**0.00**	**0.00**	**11.30**
	Total Cereal Crops	**172.40**	**285.00**	**0.00**	**11.30**	**0.00**	**0.00**	**172.40**	**296.30**
Pulse Crops	**Chickpea**								
	GG-1	20.00	30.50	0.00	0.00	12.35	5.50	32.35	36.00
	GG 2	7.50	20.50	0.00	0.00	18.25	8.50	25.75	29.00
	GJG 4	56.00	32.80	0.00	0.00	0.00	0.00	56.00	32.80
	GG 4	56.00	32.80	0.00	0.00	0.00	0.00	56.00	32.80
	Total	**139.50**	**116.60**	**0.00**	**0.00**	**30.60**	**14.00**	**170.10**	**130.60**
	Total Pulse Crops	**139.50**	**116.60**	**0.00**	**0.00**	**30.60**	**14.00**	**170.10**	**130.60**
Oilseed Crops	**Groundnut**								
	GG 2	37.50	56.40	0.00	0.00	0.00	0.00	37.50	56.40
	GG 5	12.20	12.00	0.00	0.00	0.00	0.00	12.20	12.00
	GG 7	2.20	19.44	0.00	0.00	0.00	0.00	2.20	19.44
	GG 8	20.00	21.00	0.00	0.00	0.00	0.00	20.00	21.00
	GJG 9	30.90	91.85	0.00	0.00	0.00	0.00	30.90	91.85
	GJG 31	21.90	55.20	0.00	0.00	0.00	0.00	21.90	55.20
	GAUG 10	50.00	36.00	0.00	0.00	0.00	0.00	50.00	36.00
	GJG-HPS 1	11.20	11.75	0.00	0.00	0.00	0.00	11.20	11.75
	GJG 17	23.90	25.84	0.00	0.00	0.00	0.00	23.90	25.84
	GG 11	117.30	38.35	0.00	0.00	0.00	0.00	117.30	38.35
	GG 16	0.00	7.30	0.00	0.00	0.00	0.00	0.00	7.30
	GG 20	1134.50	1342.19	0.00	0.00	0.00	0.00	1134.50	1342.19
	GG 21	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	GJG 22	44.50	89.00	0.00	0.00	0.00	0.00	44.50	89.00
	Total	**1526.10**	**1826.32**	**0.00**	**0.00**	**0.00**	**0.00**	**1526.10**	**1826.32**
	Sesamum								
	GT 1	1.30	1.00	0.00	0.00	0.00	0.00	1.30	1.00
	GT 2	12.19	4.50	0.00	0.00	0.00	0.00	12.19	4.50
	GT 3	4.22	5.00	0.00	0.00	0.00	0.00	4.22	5.00
	GT 4	2.69	3.00	0.00	0.00	0.00	0.00	2.69	3.00
	GT 10	3.55	10.05	0.00	0.00	0.00	0.00	3.55	10.05
	Purva 1	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	Total	**24.05**	**23.85**	**0.00**	**0.00**	**0.00**	**0.00**	**24.05**	**23.85**
	Total Oilseed Crops	**1550.15**	**1850.17**	**0.00**	**0.00**	**0.00**	**0.00**	**1550.15**	**1850.17**
	Grand Total (Jamnagar)	**1862.05**	**2251.77**	**0.00**	**11.30**	**30.60**	**14.00**	**1892.65**	**2277.07**
18. IGKV, Raipur									
Cereal Crops	**Rice**								
	Mahamaya	118.00	120.00	5.00	17.40	0.00	0.00	123.00	137.40
	Karma Mahsuri	66.50	66.60	0.00	0.00	0.00	0.00	66.50	66.60
	Bamleshwari	55.00	55.20	0.00	0.00	0.00	0.00	55.00	55.20
	Samleshwari	36.00	38.40	0.00	0.00	0.00	0.00	36.00	38.40
	Chandrahasini	64.00	64.20	0.00	0.00	0.00	0.00	64.00	64.20

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	IR-64	60.00	67.50	0.00	0.00	0.00	0.00	60.00	67.50
	IR-36	30.00	35.40	0.00	0.00	0.00	0.00	30.00	35.40
	Poornima	15.50	24.60	0.00	0.00	0.00	0.00	15.50	24.60
	Danteshwari	43.00	45.00	0.00	0.00	0.00	0.00	43.00	45.00
	IGKV R1	8.00	18.00	0.00	0.00	30.00	41.70	38.00	59.70
	IGKV R2	5.00	5.10	0.00	0.00	25.00	25.80	30.00	30.90
	IGKV R 1244	1.50	10.20	0.00	0.00	10.00	16.20	11.50	26.40
	Jaldubi	0.60	1.20	0.00	0.00	0.00	0.00	0.60	1.20
	Indira Barani Dhan 1	6.00	9.90	2.00	3.90	0.00	0.00	8.00	13.80
	Indira Arobic 1	5.00	6.00	0.00	0.00	5.00	9.00	10.00	15.00
	Total	**514.10**	**567.30**	**7.00**	**21.30**	**70.00**	**92.70**	**591.10**	**681.30**
	Wheat								
	Ratan	6.00	6.80	0.00	0.00	10.00	10.00	16.00	16.80
	GW 273	94.60	95.00	0.00	0.00	28.00	20.60	122.60	115.60
	GW 366	69.00	69.60	0.00	0.00	0.00	0.00	69.00	69.60
	MP 1203	11.00	10.00	0.00	0.00	0.00	0.00	11.00	10.00
	Sujata	35.00	17.60	0.00	0.00	0.00	0.00	35.00	17.60
	DBW 110	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	Total	**215.60**	**199.00**	**0.00**	**0.00**	**40.00**	**32.60**	**255.60**	**231.60**
	Kodo								
	Indira Kodo 1	1.00	1.00	0.00	0.00	0.40	0.50	1.40	1.50
	Total	**1.00**	**1.00**	**0.00**	**0.00**	**0.40**	**0.50**	**1.40**	**1.50**
	Total Cereal Crops	**730.70**	**767.30**	**7.00**	**21.30**	**110.40**	**125.80**	**848.10**	**914.40**
Pulse Crops	**Chickpea**								
	Vaibhav	36.00	27.00	0.00	0.00	0.00	0.00	36.00	27.00
	JG 14	0.00	0.00	0.00	0.00	60.00	42.00	60.00	42.00
	Total	**36.00**	**27.00**	**0.00**	**0.00**	**60.00**	**42.00**	**96.00**	**69.00**
	Field pea								
	Paras	7.00	10.00	3.00	10.95	3.00	10.95	13.00	31.90
	Shubhra	2.00	2.00	0.00	0.00	1.00	1.10	3.00	3.10
	Total	**9.00**	**12.00**	**3.00**	**10.95**	**4.00**	**12.05**	**16.00**	**35.00**
	Lathyrus								
	Prateek	2.20	2.50	2.00	2.50	0.00	0.00	4.20	5.00
	Maha Teora	0.00	0.00	0.00	0.00	10.00	12.40	10.00	12.40
	Total	**2.20**	**2.50**	**2.00**	**2.50**	**10.00**	**12.40**	**14.20**	**17.40**
	Mung								
	HUM 12	9.31	10.40	5.00	5.00	0.00	0.00	14.31	15.40
	Pairy Mung	0.20	0.35	0.00	0.00	0.00	0.00	0.20	0.35
	Total	**9.51**	**10.75**	**5.00**	**5.00**	**0.00**	**0.00**	**14.51**	**15.75**
	Urd								
	Indira Urd 1	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
	Total	**5.00**	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**5.00**
	Arhar								
	Asha	5.40	5.40	0.00	0.00	7.00	7.20	12.40	12.60
	Rajeev Lochan	4.00	4.40	2.00	2.00	7.00	7.50	13.00	13.90
	Total	**9.40**	**9.80**	**2.00**	**2.00**	**14.00**	**14.70**	**25.40**	**26.50**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Horse Gram								
	Indira Kolthi 1	0.50	0.60	0.00	0.00	0.00	0.00	0.50	0.60
	Total	**0.50**	**0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.60**
	Total Pulse Crops	**71.61**	**67.65**	**12.00**	**20.45**	**88.00**	**81.15**	**171.61**	**169.25**
Oilseed Crops	**Soybean**								
	JS 335	100.00	110.80	0.00	0.00	0.00	0.00	100.00	110.80
	JS 93-05	100.00	102.40	0.00	0.00	75.00	75.60	175.00	178.00
	JS 97-52	100.00	200.00	0.00	0.00	0.00	0.00	100.00	200.00
	JS 95-60	0.00	0.00	5.00	2.10	0.00	0.00	5.00	2.10
	Total	**300.00**	**413.20**	**5.00**	**2.10**	**75.00**	**75.60**	**380.00**	**490.90**
	Linseed								
	Deepika	3.25	3.50	2.00	7.30	0.00	0.00	5.25	10.80
	Kartika	6.14	6.20	0.00	0.00	5.00	7.40	11.14	13.60
	RLC 92	1.30	1.50	0.00	0.00	5.00	6.00	6.30	7.50
	Indira Alsi 32	10.20	11.00	2.00	3.00	5.00	16.60	17.20	30.60
	Total	**20.89**	**22.20**	**4.00**	**10.30**	**15.00**	**30.00**	**39.89**	**62.50**
	Mustard								
	CG Sarson 1	0.26	0.60	0.00	0.00	0.00	0.00	0.26	0.60
	Total	**0.26**	**0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.26**	**0.60**
	Total Oilseed Crops	**321.15**	**436.00**	**9.00**	**12.40**	**90.00**	**105.60**	**420.15**	**554.00**
	Grand Total (Raipur)	**1123.46**	**1270.95**	**28.00**	**54.15**	**288.40**	**312.55**	**1439.86**	**1637.65**
19. JNKVV, Jabalpur									
Cereal Crops	**Rice**								
	MTU-1010	0.00	0.00	885.04	885.04	1000.00	1000.00	1885.04	1885.04
	Danteshwari	0.00	0.00	50.90	50.90	62.00	62.00	112.90	112.90
	IR 36	50.00	50.00	5.73	5.73	0.00	0.00	55.73	55.73
	IR 64	80.00	80.00	503.46	503.46	1000.00	1000.00	1583.46	1583.46
	Kranti	12.00	12.00	727.75	727.75	1000.00	1000.00	1739.75	1739.75
	P 1460	0.00	0.00	2.69	2.69	2.00	2.00	4.69	4.69
	PS 3	0.00	0.00	5.38	5.38	8.00	8.00	13.38	13.38
	PS 4	0.00	0.00	93.91	93.91	100.00	100.00	193.91	193.91
	PS 5	0.00	0.00	4.18	4.18	4.06	4.06	8.24	8.24
	Sahbhagi	0.00	0.00	50.63	50.63	60.00	60.00	110.63	110.63
	WGL 32100	0.00	0.00	20.51	20.51	17.00	17.00	37.51	37.51
	JR 201	50.00	50.00	0.13	0.13	0.00	0.00	50.13	50.13
	JR 503	0.00	0.00	3.00	3.00	6.00	6.00	9.00	9.00
	JRH 19	0.00	0.00	0.18	0.18	0.00	0.00	0.18	0.18
	JRH 5	0.00	0.00	4.68	4.68	0.00	0.00	4.68	4.68
	JRH 8	0.00	0.00	0.45	0.45	0.00	0.00	0.45	0.45
	JRH 5 A Line	0.50	0.50	0.50	0.50	0.50	0.50	1.50	1.50
	JRH 5 R Line	0.10	0.10	0.40	0.40	1.00	1.00	1.50	1.50
	JRH 8 A Line	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	JRH 8 R Line	0.10	0.10	0.80	0.80	0.10	0.10	1.00	1.00
	JRH 5 B Line	0.10	0.10	0.20	0.20	0.20	0.20	0.50	0.50
	JRH 19 A line	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	JRH 19 B line	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.25

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	JRH 19 R line	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.25
	BVD 109	0.00	0.00	0.22	0.22	0.00	0.00	0.22	0.22
	IGKVR 2	0.00	0.00	8.24	8.24	0.00	0.00	8.24	8.24
	JIR 13	0.00	0.00	7.93	7.93	0.00	0.00	7.93	7.93
	JRV 1	0.00	0.00	13.50	13.50	0.00	0.00	13.50	13.50
	Total	**193.30**	**193.30**	**2391.41**	**2391.41**	**3260.86**	**3260.86**	**5845.57**	**5845.57**
	Wheat								
	GW 322	205.40	1563.90	0.00	0.00	0.00	0.00	205.40	1563.90
	JW 3211	125.00	479.30	0.00	0.00	0.00	0.00	125.00	479.30
	GW 273	48.60	753.60	0.00	0.00	0.00	0.00	48.60	753.60
	GW 366	328.00	946.00	0.00	0.00	0.00	0.00	328.00	946.00
	LOK 1	0.00	0.00	167.46	167.46	200.00	200.00	367.46	367.46
	JW 1106	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	JW 3020	128.00	275.10	0.00	0.00	0.00	0.00	128.00	275.10
	JW 3173	57.00	253.20	0.00	0.00	0.00	0.00	57.00	253.20
	MP 1201	10.00	20.30	0.00	0.00	0.00	0.00	10.00	20.30
	MP 1202	15.00	131.10	0.00	0.00	0.00	0.00	15.00	131.10
	MP 1203	87.00	130.70	0.00	0.00	0.00	0.00	87.00	130.70
	MP 1215	132.00	241.70	0.00	0.00	0.00	0.00	132.00	241.70
	HD 2932	0.00	0.00	7.44	7.44	0.00	0.00	7.44	7.44
	JSW 17	18.00	18.60	0.00	0.00	0.00	0.00	18.00	18.60
	MP 3336	50.00	134.50	0.00	0.00	0.00	0.00	50.00	134.50
	JW 3288	66.00	625.80	0.00	0.00	0.00	0.00	66.00	625.80
	Sudha	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	C 306	0.00	0.00	30.00	30.00	42.86	42.86	72.86	72.86
	JW 3382	0.00	0.00	15.65	15.65	12.00	12.00	27.65	27.65
	MP 1142	40.00	60.20	0.00	0.00	0.00	0.00	40.00	60.20
	Total	**1350.00**	**5674.00**	**220.55**	**220.55**	**254.86**	**254.86**	**1825.41**	**6149.41**
	Maize								
	JM 216	0.00	0.00	20.00	20.00	25.00	25.00	45.00	45.00
	Total	**0.00**	**0.00**	**20.00**	**20.00**	**25.00**	**25.00**	**45.00**	**45.00**
	Kutki								
	JK 8	0.00	0.00	1.24	1.24	2.00	2.00	3.24	3.24
	Total	**0.00**	**0.00**	**1.24**	**1.24**	**2.00**	**2.00**	**3.24**	**3.24**
	Barely								
	JB 58	41.00	32.20	0.00	0.00	0.00	0.00	41.00	32.20
	JB 1	22.00	27.60	0.00	0.00	0.00	0.00	22.00	27.60
	JB 110	18.00	0.00	0.00	0.00	0.00	0.00	18.00	0.00
	Total	**81.00**	**59.80**	**0.00**	**0.00**	**0.00**	**0.00**	**81.00**	**59.80**
	Kodo								
	JK 41	0.00	0.00	7.55	7.55	0.00	0.00	7.55	7.55
	JK 439	1.00	1.50	1.72	1.72	0.00	0.00	2.72	3.22
	JK 65	0.05	0.07	0.00	0.00	0.00	0.00	0.05	0.07
	Total	**1.05**	**1.57**	**9.27**	**9.27**	**0.00**	**0.00**	**10.32**	**10.84**
	Total Cereal Crops	**1625.35**	**5928.67**	**2642.47**	**2642.47**	**3542.72**	**3542.72**	**7810.54**	**12113.86**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Chickpea**								
	JG 11	0.00	126.00	0.00	0.00	0.00	0.00	0.00	126.00
	JG 315 (DM)	313.14	70.00	0.00	0.00	0.00	0.00	313.14	70.00
	JG 63 (DM)	374.00	310.00	0.00	0.00	0.00	0.00	374.00	310.00
	JG 130 (DB)	0.00	42.80	0.00	0.00	0.00	0.00	0.00	42.80
	JAKI 92-18 (DB)	0.00	96.50	0.00	0.00	0.00	0.00	0.00	96.50
	JG 16	0.00	110.70	0.00	0.00	0.00	0.00	0.00	110.70
	JG 322 (DM)	242.20	360.90	0.00	0.00	0.00	0.00	242.20	360.90
	JG 74 (DM)	76.00	10.00	0.00	0.00	0.00	0.00	76.00	10.00
	JG 14	227.00	164.61	0.00	0.00	0.00	0.00	227.00	164.61
	JG 12 (DSM)	25.00	24.00	0.00	0.00	0.00	0.00	25.00	24.00
	Total	**1257.34**	**1315.51**	**0.00**	**0.00**	**0.00**	**0.00**	**1257.34**	**1315.51**
	Pigeonpea								
	TJT 501	0.00	232.00	0.00	0.00	0.00	0.00	0.00	232.00
	IPC 87-119	0.00	9.00	0.00	0.00	0.00	0.00	0.00	9.00
	ICPL 87	8.00	8.10	0.00	0.00	0.00	0.00	8.00	8.10
	Total	**8.00**	**249.10**	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**249.10**
	Field pea								
	JP 885	14.00	14.00	1.00	1.00	0.00	0.00	15.00	15.00
	IPF 9913	0.00	0.00	0.30	0.30	0.65	0.65	0.95	0.95
	IPF 9925	0.00	0.00	4.00	4.00	5.26	5.26	9.26	9.26
	Arkel	0.00	0.00	40.00	40.00	35.74	35.74	75.74	75.74
	JM 6	25.00	11.29	0.00	0.00	0.00	0.00	25.00	11.29
	PSM-3	0.00	0.00	20.00	20.00	28.84	28.84	48.84	48.84
	Total	**39.00**	**25.29**	**65.30**	**65.30**	**70.49**	**70.49**	**174.79**	**161.08**
	Mung								
	TMB 37	1.50	8.80	0.00	0.00	0.00	0.00	1.50	8.80
	PDM 139	0.00	6.60	0.00	0.00	81.00	81.00	81.00	87.60
	TJM 3	8.00	3.80	0.00	0.00	0.00	0.00	8.00	3.80
	HUM 12	0.00	0.00	3.25	3.25	4.00	4.00	7.25	7.25
	PDM 11	0.00	0.00	2.50	2.50	0.00	0.00	2.50	2.50
	Total	**9.50**	**19.20**	**5.75**	**5.75**	**85.00**	**85.00**	**100.25**	**109.95**
	Urdbean								
	PU 19	0.00	19.40	0.00	0.00	0.00	0.00	0.00	19.40
	JU 3	23.00	0.00	0.00	0.00	0.00	0.00	23.00	0.00
	LBG 20	0.00	9.00	0.00	0.00	0.00	0.00	0.00	9.00
	PU 35	0.00	1.40	0.00	0.00	0.00	0.00	0.00	1.40
	PDU 1	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.30
	PU 30	0.00	1.70	0.00	0.00	0.00	0.00	0.00	1.70
	TU 94-2	9.00	1.10	0.00	0.00	0.00	0.00	9.00	1.10
	Total	**32.00**	**32.90**	**0.00**	**0.00**	**0.00**	**0.00**	**32.00**	**32.90**
	Lentil								
	JL 3	27.00	51.00	0.00	0.00	0.00	0.00	27.00	51.00
	RVL 31	13.00	0.00	0.00	0.00	0.00	0.00	13.00	0.00
	Total	**40.00**	**51.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.00**	**51.00**
	Total Pulse Crop	**1385.84**	**1693.00**	**71.05**	**71.05**	**155.49**	**155.49**	**1612.38**	**1919.54**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Groundnut**								
	TG 37 A	0.00	0.00	2.00	2.00	2.50	2.50	4.50	4.50
	Total	**0.00**	**0.00**	**2.00**	**2.00**	**2.50**	**2.50**	**4.50**	**4.50**
	Soybean								
	JS 9305	800.00	0.00	0.00	0.00	0.00	0.00	800.00	0.00
	JS 9560	1850.00	12.00	0.00	0.00	0.00	0.00	1850.00	12.00
	JS 9752	500.00	150.00	0.00	0.00	0.00	0.00	500.00	150.00
	JS 335	600.00	150.00	0.00	0.00	0.00	0.00	600.00	150.00
	JS 20-29	340.00	321.00	0.00	0.00	0.00	0.00	340.00	321.00
	JS 20-34	180.00	76.00	0.00	0.00	0.00	0.00	180.00	76.00
	Total	**4270.00**	**709.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4270.00**	**709.00**
	Mustard								
	Pusa Jaikisan	0.00	0.00	2.68	2.68	2.00	2.00	4.68	4.68
	Total	**0.00**	**0.00**	**2.68**	**2.68**	**2.00**	**2.00**	**4.68**	**4.68**
	Sesame								
	JTS 8	2.00	2.96	0.00	0.00	0.00	0.00	2.00	2.96
	TKG 21	0.08	0.68	0.00	0.00	0.00	0.00	0.08	0.68
	TKG 22	1.95	7.40	0.00	0.00	0.00	0.00	1.95	7.40
	TKG 306	1.50	3.55	0.00	0.00	0.00	0.00	1.50	3.55
	TKG 308	0.50	5.10	0.00	0.00	0.00	0.00	0.50	5.10
	TKG 55	0.00	0.00	0.35	0.35	1.00	1.00	1.35	1.35
	Total	**6.03**	**19.69**	**0.35**	**0.35**	**1.00**	**1.00**	**7.38**	**21.04**
	Linseed								
	JLS 66	0.00	0.00	7.24	7.24	10.00	10.00	17.24	17.24
	JLS 67	0.00	0.00	2.34	2.34	4.00	4.00	6.34	6.34
	JLS 27	0.00	0.00	28.79	28.79	20.00	20.00	48.79	48.79
	PKDL 21	0.00	0.00	2.68	2.68	2.00	2.00	4.68	4.68
	PKDL 41	0.00	0.00	1.00	1.00	1.98	1.98	2.98	2.98
	Total	**0.00**	**0.00**	**42.05**	**42.05**	**37.98**	**37.98**	**80.03**	**80.03**
	Niger								
	JNC 1	0.00	0.00	0.40	0.40	0.50	0.50	0.90	0.90
	JNC 6	0.00	0.00	1.69	1.69	2.00	2.00	3.69	3.69
	JNC 9	0.00	0.00	1.25	1.25	1.00	1.00	2.25	2.25
	JNS 28	0.00	0.00	0.48	0.48	0.00	0.00	0.48	0.48
	Total	**0.00**	**0.00**	**3.82**	**3.82**	**3.50**	**3.50**	**7.32**	**7.32**
	Total Oilseed Crop	**4276.03**	**728.69**	**50.90**	**50.90**	**46.98**	**46.98**	**4373.91**	**826.57**
Forage Crops	**Berseem**								
	JB 1	2.75	6.49	0.00	0.00	0.00	0.00	2.75	6.49
	JB 5	0.50	10.38	0.00	0.00	0.00	0.00	0.50	10.38
	Total	**3.25**	**16.87**	**0.00**	**0.00**	**0.00**	**0.00**	**3.25**	**16.87**
	Oat								
	JO 1	0.00	0.00	5.00	5.00	5.00	5.00	10.00	10.00
	Total	**0.00**	**0.00**	**5.00**	**5.00**	**5.00**	**5.00**	**10.00**	**10.00**
	Total Forage Crops	**3.25**	**16.87**	**5.00**	**5.00**	**5.00**	**5.00**	**13.25**	**26.87**
	Grant Total (Jabalpur)	**7290.47**	**8367.23**	**2769.42**	**2769.42**	**3750.19**	**3750.19**	**13810.08**	**14886.84**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
20. MPKV, Rahuri									
Cereal Crops	**Wheat**								
	HD-2189	52.20	85.00	0.00	0.00	0.00	0.00	52.20	85.00
	Trimbak	64.20	245.00	0.00	0.00	0.00	0.00	64.20	245.00
	Tapovan	4.00	18.00	0.00	0.00	0.00	0.00	4.00	18.00
	Godawari	11.00	17.00	0.00	0.00	0.00	0.00	11.00	17.00
	Netrawwati	19.00	45.00	0.00	0.00	0.00	0.00	19.00	45.00
	P. Samadhan	0.00	0.00	2.00	20.00	0.00	10.00	2.00	30.00
	Total	**150.40**	**410.00**	**2.00**	**20.00**	**0.00**	**10.00**	**152.40**	**440.00**
	Rice								
	Indrayani	21.00	40.00	2.00	2.00	0.00	0.00	23.00	42.00
	P.Radha	4.50	7.40	0.00	0.00	0.00	0.00	4.50	7.40
	Bhogawati	1.00	10.00	0.00	0.00	0.00	0.00	1.00	10.00
	P.Samrudhi	1.50	40.00	0.00	0.00	0.00	0.00	1.50	40.00
	P.RDN-06	0.00	0.00	0.25	0.00	0.00	0.00	0.25	0.00
	Total	**28.00**	**97.40**	**2.25**	**2.00**	**0.00**	**0.00**	**30.25**	**99.40**
	Sorghum								
	M-35-1	0.00	0.00	1.00	0.14	0.00	0.00	1.00	0.14
	P. Chitra	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08
	P. Amruta	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.20
	P. Anuradha	0.60	1.20	0.00	0.00	0.00	0.00	0.60	1.20
	P. Panchami	0.00	0.00	0.00	0.20	0.00	0.38	0.00	0.58
	P. Ruchira	0.00	0.00	0.00	0.30	0.00	0.33	0.00	0.63
	P.Revati	5.00	9.00	0.00	0.00	0.00	0.00	5.00	9.00
	P. Vasudha	4.00	8.00	0.00	0.00	0.00	0.00	4.00	8.00
	CSV-30 F	1.50	2.42	0.00	0.00	0.00	0.00	1.50	2.42
	P.Suchitra	0.00	0.00	0.20	4.00	0.00	2.76	0.20	6.76
	P. Rohini	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.66
	P. Madhur	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.90
	185 A	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	185 B	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	RSSV-260 (R)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	CSV-22	0.20	0.30	0.00	0.00	0.00	0.00	0.20	0.30
	Total	**11.30**	**20.92**	**1.20**	**4.84**	**0.00**	**5.13**	**12.50**	**30.89**
	Bajra								
	DHLB 8A	0.00	0.10	0.05	0.20	0.00	0.18	0.05	0.48
	DHLB 8B	0.00	0.02	0.03	0.08	0.00	0.05	0.03	0.15
	DHLBI 967	0.00	0.02	0.03	0.07	0.00	0.03	0.03	0.12
	Dhanshakti	0.00	0.05	0.05	0.32	0.00	0.30	0.05	0.67
	Total	**0.00**	**0.19**	**0.16**	**0.67**	**0.00**	**0.56**	**0.16**	**1.42**
	Maize								
	GPM-456 (F)	0.10	4.50	0.00	0.00	0.00	0.00	0.10	4.50
	GPM-342 (M)	0.50	3.00	0.00	0.00	0.00	0.00	0.50	3.00
	QMI-1403	0.00	0.00	0.00	0.00	0.00	1.60	0.00	1.60
	QMI-1401	0.00	0.00	0.00	0.00	0.00	4.90	0.00	4.90
	Total	**0.60**	**7.50**	**0.00**	**0.00**	**0.00**	**6.50**	**0.60**	**14.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Finger Millet								
	P Nachani	0.06	1.50	0.00	0.00	0.00	0.00	0.06	1.50
	Total	**0.06**	**1.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**1.50**
	Littlemillet								
	KOPLM 83	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.02**
	Total Cereal Crops	**190.36**	**537.51**	**5.61**	**27.51**	**0.00**	**22.21**	**195.97**	**587.23**
Pulse Crops	**Gram**								
	Vijay	141.00	101.30	10.00	0.00	0.00	0.00	151.00	101.30
	Vishal	101.60	172.40	0.00	0.00	0.00	0.00	101.60	172.40
	Virat	109.00	103.20	5.00	0.00	0.00	0.00	114.00	103.20
	D. Vijay	254.00	165.10	20.00	0.00	0.00	0.00	274.00	165.10
	Rajas	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
	Kripa	2.00	5.20	2.00	0.00	0.00	0.00	4.00	5.20
	Vihar	31.00	30.00	0.00	0.00	0.00	0.00	31.00	30.00
	Total	**639.60**	**577.20**	**37.00**	**0.00**	**0.00**	**0.00**	**676.60**	**577.20**
	Urd								
	TAU 1	0.00	0.10	0.00	0.10	0.00	0.28	0.00	0.48
	Total	**0.00**	**0.10**	**0.00**	**0.10**	**0.00**	**0.28**	**0.00**	**0.48**
	Mung								
	Vaibhav	3.00	5.35	0.00	0.00	0.00	0.00	3.00	5.35
	Kop 1	0.00	0.00	1.00	0.17	0.00	0.00	1.00	0.17
	Total	**3.00**	**5.35**	**1.00**	**0.17**	**0.00**	**0.00**	**4.00**	**5.52**
	Pigeonpea								
	ICPL 87	1.00	0.98	0.00	0.00	0.00	0.00	1.00	0.98
	Vipula	4.70	5.00	0.00	0.00	0.00	0.00	4.70	5.00
	Total	**5.70**	**5.98**	**0.00**	**0.00**	**0.00**	**0.00**	**5.70**	**5.98**
	Rajmash								
	Varun	0.00	0.00	0.00	0.00	0.00	3.90	0.00	3.90
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.90**	**0.00**	**3.90**
	Total Pulse Crops	**648.30**	**588.63**	**38.00**	**0.27**	**0.00**	**4.18**	**686.30**	**593.08**
Oilseed Crops	**Soybean**								
	JS-335	300.00	300.00	400.00	165.30	0.00	0.00	700.00	465.30
	JS-9305	0.00	10.00	0.00	10.00	0.00	49.60	0.00	69.60
	P. Kalyani	80.00	19.00	5.00	0.00	0.00	0.00	85.00	19.00
	P. Agrani	200.00	25.00	100.00	15.00	0.00	0.00	300.00	40.00
	KS-103	0.00	0.00	0.00	0.00	0.00	2.85	0.00	2.85
	MAUS-162	0.00	20.00	0.00	0.00	0.00	0.00	0.00	20.00
	Total	**580.00**	**374.00**	**505.00**	**190.30**	**0.00**	**52.45**	**1085.00**	**616.75**
	Groundnut								
	TAG-24	0.00	0.00	0.00	0.00	0.00	3.00	0.00	3.00
	SB-XI	0.00	0.00	50.00	0.00	0.00	0.00	50.00	0.00
	P.Bharti	0.00	0.00	0.00	3.00	0.00	2.10	0.00	5.10
	P. Morana	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	P.Unnati	2.00	0.00	2.00	0.00	0.00	0.00	4.00	0.00
	P.Warana	0.00	0.00	0.00	3.00	0.00	9.02	0.00	12.02
	TPG-41	40.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
	Total	**42.00**	**0.00**	**52.00**	**6.00**	**0.00**	**16.12**	**94.00**	**22.12**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Sesamum								
	PT 1	0.00	0.00	0.00	0.05	0.00	0.08	0.00	0.13
	JLT 408	0.05	0.12	0.02	0.03	0.00	0.00	0.07	0.15
	Total	**0.05**	**0.12**	**0.02**	**0.08**	**0.00**	**0.08**	**0.07**	**0.28**
	Safflower								
	Bhima	0.50	1.25	0.00	0.00	0.00	0.00	0.50	1.25
	P. kusuma	0.10	0.40	0.10	0.40	0.00	0.28	0.20	1.08
	SSF-708	3.00	3.68	0.00	0.00	0.00	0.00	3.00	3.68
	Chandrabhaga	0.00	0.00	0.10	0.20	0.00	0.04	0.10	0.24
	Total	**3.60**	**5.33**	**0.20**	**0.60**	**0.00**	**0.32**	**3.80**	**6.25**
	Niger								
	P. Karala	0.25	0.17	0.00	0.00	0.00	0.00	0.25	0.17
	Total	**0.25**	**0.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.17**
	Total Oilseed Crops	**625.90**	**379.62**	**557.22**	**196.98**	**0.00**	**68.97**	**1183.12**	**645.57**
Forage Crops	**Cowpea**								
	Shewta	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
	Total	**0.00**	**0.00**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.05**
	Maize								
	African Tall	18.19	22.00	0.00	0.00	0.00	0.00	18.19	22.00
	Total	**18.19**	**22.00**	**0.00**	**0.00**	**0.00**	**0.00**	**18.19**	**22.00**
	Oat								
	Harita	25.00	10.20	0.00	0.00	0.00	0.00	25.00	10.20
	Kent	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	Total	**25.00**	**10.20**	**0.00**	**0.00**	**0.00**	**2.00**	**25.00**	**12.20**
	Lucerne								
	RL 88	0.10	0.11	0.00	0.00	0.00	0.00	0.10	0.11
	Total	**0.10**	**0.11**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.11**
	Bajra								
	Giant bajra	0.00	0.05	0.00	0.15	0.00	0.00	0.00	0.20
	Total	**0.00**	**0.05**	**0.00**	**0.15**	**0.00**	**0.00**	**0.00**	**0.20**
	Stylo								
	P. Kranti	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.10**
	Total Forage Crops	**43.29**	**32.36**	**0.00**	**0.30**	**0.00**	**2.00**	**43.29**	**34.66**
Fibre Crops	**Cotton**								
	JLA-794	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.40
	RHC-006	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.07
	P. Dhanvantary	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.08
	Phule 688	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
	P.Anmol	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03
	RAC-717	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
	RHCB-011	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
	JLA 505	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.15
	Total	**0.00**	**0.00**	**0.00**	**0.82**	**0.00**	**0.00**	**0.00**	**0.82**
	Total Fiber Crops	**0.00**	**0.00**	**0.00**	**0.82**	**0.00**	**0.00**	**0.00**	**0.82**
	Grand Total (Rahuri)	**1507.85**	**1538.12**	**600.83**	**225.88**	**0.00**	**97.36**	**2108.68**	**1861.36**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
21. PDKV, Akola									
Cereal Crops	**Rice**								
	PKV-HMT	121.00	60.00	0.00	0.00	0.00	0.00	121.00	60.00
	PKV Kisan	0.00	0.00	0.60	0.60	0.00	8.00	0.60	8.60
	SYE 1	0.00	0.00	0.00	0.00	0.00	7.00	0.00	7.00
	PKV Ganesh	0.00	0.00	0.00	0.00	0.00	1.50	0.00	1.50
	PKV Khamang	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Karjat 184	1.20	5.00	0.00	0.00	0.00	0.00	1.20	5.00
	Ratnagiri 5	0.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00
	SKY 381	0.00	0.00	0.00	0.00	0.00	20.00	0.00	20.00
	SYE 432-37-23-11-27	0.00	0.00	0.00	0.00	0.00	18.00	0.00	18.00
	Total	**122.20**	**65.00**	**0.60**	**0.60**	**0.00**	**66.50**	**122.80**	**132.10**
	Wheat								
	AKAW 4627	5.00	17.60	0.00	0.00	0.00	0.00	5.00	17.60
	AKAW 3722	2.00	9.00	0.00	0.00	0.00	0.00	2.00	9.00
	PKV Washim	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	HD 2189	0.00	0.00	10.00	12.00	0.00	0.00	10.00	12.00
	Total	**9.00**	**28.60**	**10.00**	**12.00**	**0.00**	**0.00**	**19.00**	**40.60**
	Sorghum								
	MS 14 A	0.20	0.70	0.00	0.00	0.00	0.00	0.20	0.70
	MS 14 B	0.15	0.65	0.00	0.00	0.00	0.00	0.15	0.65
	AKR 150 R	0.15	1.00	0.00	0.00	0.00	0.00	0.15	1.00
	MS 30 A	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
	MS 30 B	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07
	AKR 456	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07
	PKV Ashwini	0.10	3.00	0.00	0.00	0.00	0.00	0.10	3.00
	PKV Kranti	0.00	0.00	0.20	0.20	0.00	2.00	0.20	2.20
	Total	**0.60**	**5.35**	**0.44**	**0.44**	**0.00**	**2.00**	**1.04**	**7.79**
	Pearlmillet								
	PKV (Raj) A line	0.02	0.25	0.00	0.00	0.00	0.00	0.02	0.25
	B Line	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	R Line	0.10	0.12	0.00	0.00	0.00	0.00	0.10	0.12
	Total	**0.22**	**0.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.22**	**0.67**
	Total Cereal Crops	**132.02**	**99.62**	**11.04**	**13.04**	**0.00**	**68.50**	**143.06**	**181.16**
Pulse Crops	**Mung**								
	Kopargaon	0.00	0.00	1.00	1.00	0.00	18.00	1.00	19.00
	PKVM 8802	2.00	6.00	0.00	0.00	0.00	0.00	2.00	6.00
	PKV AKM 4	3.00	0.30	0.00	0.00	0.00	0.00	3.00	0.30
	PKV Green Gold	0.20	1.00	0.00	0.00	0.00	0.00	0.20	1.00
	Total	**5.20**	**7.30**	**1.00**	**1.00**	**0.00**	**18.00**	**6.20**	**26.30**
	Pigeonpea								
	ICPL 87 I 19	5.70	2.10	0.00	0.00	0.00	0.00	5.70	2.10
	PKV Tara	2.50	3.00	1.00	1.00	0.00	15.00	3.50	19.00
	Total	**8.20**	**5.10**	**1.00**	**1.00**	**0.00**	**15.00**	**9.20**	**21.10**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Urd								
	TAU 1	15.00	1.90	0.00	0.00	0.00	0.00	15.00	1.90
	AKU 10-1	0.00	0.00	1.50	0.50	0.00	0.00	1.50	0.50
	AKU 15	3.00	4.00	0.00	0.00	0.00	3.00	3.00	7.00
	Total	**18.00**	**5.90**	**1.50**	**0.50**	**0.00**	**3.00**	**19.50**	**9.40**
	Chickpea								
	JAKI 9218	189.00	157.00	50.00	50.00	0.00	0.00	239.00	207.00
	PKV Kabuli 2	57.00	36.00	2.00	2.00	0.00	0.00	59.00	38.00
	PKV Kabuli 4	12.00	0.40	2.00	0.00	0.00	0.00	14.00	0.40
	Total	**258.00**	**193.40**	**54.00**	**52.00**	**0.00**	**0.00**	**312.00**	**245.40**
	Total Pulse Crops	**289.40**	**211.70**	**57.50**	**54.50**	**0.00**	**36.00**	**346.90**	**302.20**
Oilseed Crops	**Soybean**								
	JS 335	200.00	150.00	100.00	7.00	0.00	0.00	300.00	157.00
	MAUS 71	0.00	0.00	0.00	0.00	0.00	12.00	0.00	12.00
	JS 9305	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
	NRC 37	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
	Total	**200.00**	**150.00**	**100.00**	**7.00**	**0.00**	**32.00**	**300.00**	**189.00**
	Groundnut								
	TAG-24	5.80	5.80	10.00	3.00	0.00	0.00	15.80	8.80
	AK 159	6.00	4.40	0.00	0.00	0.00	0.00	6.00	4.40
	Total	**11.80**	**10.20**	**10.00**	**3.00**	**0.00**	**0.00**	**21.80**	**13.20**
	Safflower								
	AKS 207	2.08	3.75	0.50	0.50	0.00	2.42	2.58	6.67
	PKV Pink	0.00	0.00	0.10	0.10	0.00	4.90	0.10	5.00
	Total	**2.08**	**3.75**	**0.60**	**0.60**	**0.00**	**7.32**	**2.68**	**11.67**
	Sesamum								
	PKV NT 11	0.02	0.40	0.02	0.02	0.00	0.00	0.04	0.42
	Total	**0.02**	**0.40**	**0.02**	**0.02**	**0.00**	**0.00**	**0.04**	**0.42**
	Linseed								
	NL 206	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
	NL 97	0.06	16.00	0.00	0.00	0.00	0.20	0.06	16.20
	Total	**0.06**	**16.00**	**0.00**	**0.00**	**0.00**	**0.35**	**0.06**	**16.35**
	Mustard								
	CAN 9	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**0.00**	**0.20**
	Total Oilseed Crops	**213.96**	**180.35**	**110.62**	**10.62**	**0.00**	**39.87**	**324.58**	**230.84**
Fiber Crops	**Cotton**								
	Hy. cotton parents								
	AK 32	0.03	0.03	0.00	0.00	0.00	0.07	0.03	0.10
	DHY 286 1	0.02	0.02	0.00	0.00	0.00	0.13	0.02	0.15
	Improved cotton								
	AKA 5	1.00	1.00	0.50	0.60	0.00	0.00	1.50	1.60
	AKA 7	1.25	1.25	1.00	1.00	0.00	2.00	2.25	4.25
	AKA 8	0.75	0.20	0.20	0.10	0.00	0.00	0.95	0.30
	AKH 081	0.25	0.25	0.10	0.10	0.00	0.10	0.35	0.45
	Total	**3.30**	**2.75**	**1.80**	**1.80**	**0.00**	**2.30**	**5.10**	**6.85**
	Total Fiber Crops	**3.30**	**2.75**	**1.80**	**1.80**	**0.00**	**2.30**	**5.10**	**6.85**
	Grand Total (Akola)	**638.68**	**494.42**	**180.96**	**79.96**	**0.00**	**146.67**	**819.64**	**721.05**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
22. MAU, Parbhani									
Cereal Crops	**Wheat**								
	NIAW 301	0.00	0.00	0.00	0.00	40.00	28.00	40.00	28.00
	NIAW 1415	0.00	0.00	0.00	0.00	40.00	22.00	40.00	22.00
	NIAW 1994	0.00	0.00	0.00	0.00	38.00	19.80	38.00	19.80
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**118.00**	**69.80**	**118.00**	**69.80**
	Sorghum								
	PVK 400	0.00	0.00	0.00	0.00	48.00	7.50	48.00	7.50
	PVK 809	0.10	4.00	0.00	0.00	24.00	40.00	24.10	44.00
	PVK 801	0.00	0.00	0.00	0.00	108.00	121.10	108.00	121.10
	PMS 28 A	1.50	2.60	0.00	0.00	0.00	0.00	1.50	2.60
	PMS 28 B	1.00	1.60	0.00	0.00	0.00	0.00	1.00	1.60
	C 43	1.00	5.30	0.00	0.00	0.00	0.00	1.00	5.30
	PMS 71 A	0.00	0.00	0.00	0.00	12.00	6.00	12.00	6.00
	PMS 71 B	0.00	0.00	0.00	0.00	6.00	5.00	6.00	5.00
	KR 196	0.00	0.00	0.00	0.00	12.00	7.00	12.00	7.00
	CSV 18	0.25	0.50	0.00	0.00	23.00	14.50	23.25	15.00
	Parbhani moti	2.00	5.00	0.00	0.00	397.00	272.59	399.00	277.59
	Total	**5.85**	**19.00**	**0.00**	**0.00**	**630.00**	**473.69**	**635.85**	**492.69**
	Pearlmillet								
	ABPC 4-3	0.05	10.50	0.00	0.00	0.00	0.00	0.05	10.50
	Total	**0.05**	**10.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**10.50**
	Total Cereal Crops	**5.90**	**29.50**	**0.00**	**0.00**	**748.00**	**543.49**	**753.90**	**572.99**
Pulse Crops	**Chickpea**								
	BDNG 797	4.00	163.00	0.00	0.00	0.00	0.00	4.00	163.00
	BDN 9 3	0.00	0.00	0.00	0.00	7.50	4.50	7.50	4.50
	BDNGK 798	0.00	0.00	0.00	0.00	9.00	1.33	9.00	1.33
	Total	**4.00**	**163.00**	**0.00**	**0.00**	**16.50**	**5.83**	**20.50**	**168.83**
	Urd								
	BDU 1	0.00	0.00	0.00	0.00	10.00	3.00	10.00	3.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**3.00**	**10.00**	**3.00**
	Pigeonpea								
	BDN 711	5.00	38.60	0.00	0.00	340.00	171.40	345.00	210.00
	BDN 708	4.00	7.10	0.00	0.00	5.00	0.00	9.00	7.10
	BSMR 853	7.00	8.00	0.00	0.00	0.00	0.00	7.00	8.00
	BSMR 736	12.40	42.10	0.00	0.00	170.00	91.20	182.40	133.30
	Total	**28.40**	**95.80**	**0.00**	**0.00**	**515.00**	**262.60**	**543.40**	**358.40**
	Mung								
	BPMR 145	0.00	0.00	0.00	0.00	30.00	19.80	30.00	19.80
	BM 2002 1	8.00	8.00	0.00	0.00	20.00	3.00	28.00	11.00
	BM 2003 2	12.00	9.40	0.00	0.00	30.00	19.80	42.00	29.20
	Total	**20.00**	**17.40**	**0.00**	**0.00**	**80.00**	**42.60**	**100.00**	**60.00**
	Total Pulse Crops	**52.40**	**276.20**	**0.00**	**0.00**	**621.50**	**314.03**	**673.90**	**590.23**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Soybean**								
	MAUS 162	60.00	54.00	0.00	0.00	301.50	10.63	361.50	64.63
	MAUS 158	250.00	430.70	0.00	0.00	368.00	190.70	618.00	621.40
	MAUS 71	600.00	348.70	0.00	0.00	0.00	0.00	600.00	348.70
	MAUS 81	0.00	0.00	0.00	0.00	240.00	34.19	240.00	34.19
	MAUS 612	0.00	0.00	0.00	0.00	10.00	7.06	10.00	7.06
	JS 335	300.00	40.00	0.00	0.00	0.00	0.00	300.00	40.00
	JS 93-05	100.00	50.00	0.00	0.00	185.00	44.89	285.00	94.89
	Total	**1310.00**	**923.40**	**0.00**	**0.00**	**1104.50**	**287.47**	**2414.50**	**1210.87**
	Safflower								
	PBNS 12	1.00	50.00	0.00	0.00	518.42	167.81	519.42	217.81
	PBNS 86	0.40	1.00	0.00	0.00	3.50	0.00	3.90	1.00
	Total	**1.40**	**51.00**	**0.00**	**0.00**	**521.92**	**167.81**	**523.32**	**218.81**
	Groundnut								
	TLG 45	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Total	**2.00**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**2.00**
	Total Oilseed Crops	**1313.40**	**976.40**	**0.00**	**0.00**	**1626.42**	**455.28**	**2939.82**	**1431.68**
Fibre Crops	**Cotton**								
	NH 615	0.25	1.25	0.00	0.00	24.0	2.7	24.25	3.94
	NH 635	0.00	0.00	0.00	0.00	3.0	0.4	3.00	0.41
	PA 08	0.00	0.00	0.00	0.00	3.0	0.2	3.00	0.21
	PA 183	0.01	0.02	0.00	0.00	0.0	0.0	0.01	0.02
	Total	**0.26**	**1.27**	**0.00**	**0.00**	**30.00**	**3.31**	**30.26**	**4.58**
	Total Fibre Crops	**0.26**	**1.27**	**0.00**	**0.00**	**30.00**	**3.31**	**30.26**	**4.58**
	Grand Total (Parbhani)	**1371.96**	**1283.37**	**0.00**	**0.00**	**3025.92**	**1316.11**	**4397.88**	**2599.48**
23. UAS, Bangalore									
Cereal Crops	**Rice**								
	Thanu (KMP 101)	3.00	10.00	2.25	7.00	0.00	0.00	5.25	17.00
	BR 2655	3.50	5.00	2.25	2.25	0.00	0.00	5.75	7.25
	Aerobic Rice								
	Onasiri (MAS 26)	0.00	0.00	1.00	0.50	0.00	0.00	1.00	0.50
	Sharada (MAS 946-1)	0.00	0.00	1.00	0.50	0.00	0.00	1.00	0.50
	Total	**6.50**	**15.00**	**6.50**	**10.25**	**0.00**	**0.00**	**13.00**	**25.25**
	Maize								
	African Tall	0.00	0.00	7.00	10.20	0.00	0.00	7.00	10.20
	NAC 6004	7.00	5.00	0.00	0.00	0.00	0.00	7.00	5.00
	Total	**7.00**	**5.00**	**7.00**	**10.20**	**0.00**	**0.00**	**14.00**	**15.20**
	Finger Millet								
	GPU-28	2.78	4.67	0.15	2.17	0.00	0.00	2.93	6.84
	GPU-48	0.60	4.35	0.20	2.85	0.00	0.00	0.80	7.20
	GPU-67	10.14	10.19	0.25	3.69	0.00	0.00	10.39	13.88
	ML-365	11.00	11.00	1.00	11.97	0.00	0.00	12.00	22.97
	L-5	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10
	KMR-204	0.00	0.00	0.00	3.10	0.00	0.00	0.00	3.10
	KMR-301	0.10	3.10	0.00	0.00	0.00	0.00	0.10	3.10
	Indaf-5	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.15

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Indaf 7	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	Indaf 9	0.00	0.00	0.10	0.20	0.00	0.00	0.10	0.20
	MR 1	0.20	0.20	0.00	0.00	0.00	0.00	0.20	0.20
	MR 6	0.60	0.30	0.20	0.00	0.00	0.00	0.80	0.30
	Total	**25.42**	**33.81**	**1.90**	**27.23**	**0.00**	**0.00**	**27.32**	**61.04**
	Total Cereal Crops	**38.92**	**53.81**	**15.40**	**47.68**	**0.00**	**0.00**	**54.32**	**101.49**
Pulse Crops	**Pigeonpea**								
	BRG 1	0.55	2.00	0.45	5.00	0.00	0.00	1.00	7.00
	BRG 2	1.95	4.00	0.55	12.01	0.00	0.00	2.50	16.01
	BRG 4	4.50	5.00	2.00	3.50	0.00	0.00	6.50	8.50
	Total	**7.00**	**11.00**	**3.00**	**20.51**	**0.00**	**0.00**	**10.00**	**31.51**
	Cowpea								
	KBC 2	0.00	0.00	2.00	3.00	0.00	0.00	2.00	3.00
	KM 5	0.00	0.00	0.00	1.20	0.00	0.00	0.00	1.20
	Pusa 152	6.00	6.00	1.10	4.00	0.00	0.00	7.10	10.00
	PKB 4	0.00	0.00	0.00	1.50	0.00	0.00	0.00	1.50
	PKB 6	1.70	0.00	0.00	2.00	0.00	0.00	1.70	2.00
	IT 38956-1	0.00	0.00	3.00	1.08	0.00	0.00	3.00	1.08
	MFC 08-14	0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00
	Total	**7.70**	**6.00**	**6.10**	**17.78**	**0.00**	**0.00**	**13.80**	**23.78**
	Pea								
	HA 3	0.00	0.00	0.50	0.20	0.00	0.00	0.50	0.20
	Total	**0.00**	**0.00**	**0.50**	**0.20**	**0.00**	**0.00**	**0.50**	**0.20**
	Total Pulse Crops	**14.70**	**17.00**	**9.60**	**38.49**	**0.00**	**0.00**	**24.30**	**55.49**
Oilseed Crops	**Soybean**								
	JS 335	200.00	245.00	0.00	0.00	0.00	0.00	200.00	245.00
	Total	**200.00**	**245.00**	**0.00**	**0.00**	**0.00**	**0.00**	**200.00**	**245.00**
	Sunflower								
	RHA-95C-1	0.13	1.50	0.12	2.00	0.00	0.00	0.25	3.50
	CMS-17A	0.02	2.00	0.30	0.50	0.00	0.00	0.32	2.50
	CMS-17B	0.01	0.60	0.00	0.00	0.00	0.00	0.01	0.60
	CMS-335A	0.14	3.00	0.20	1.00	0.00	0.00	0.34	4.00
	CMS-335B	0.21	0.70	0.10	0.50	0.00	0.00	0.31	1.20
	CMS-234A	0.14	2.00	0.00	0.00	0.00	0.00	0.14	2.00
	CMS-234B	0.06	0.50	0.04	1.00	0.00	0.00	0.10	1.50
	Total	**0.71**	**10.30**	**0.76**	**5.00**	**0.00**	**0.00**	**1.47**	**15.30**
	Groundnut								
	ICGV 91114	400.00	14.00	0.00	0.00	0.00	0.00	400.00	14.00
	Total	**400.00**	**14.00**	**0.00**	**0.00**	**0.00**	**0.00**	**400.00**	**14.00**
	Total Oilseed Crops	**600.71**	**269.30**	**0.76**	**5.00**	**0.00**	**0.00**	**601.47**	**274.30**
	Grand Total (Bangalore)	**654.33**	**340.11**	**25.76**	**91.17**	**0.00**	**0.00**	**680.09**	**431.28**
24. UAS, Dharwad									
Cereal Crops	**Rice**								
	Abhilash	1.30	1.50	0.00	0.00	611.50	450.00	612.80	451.50
	Intan	1.50	2.00	0.00	0.00	312.00	300.00	313.50	302.00
	Jaya	0.00	0.00	1.00	1.00	250.00	380.00	251.00	381.00
	Siri-1253	0.50	0.30	0.00	0.00	0.25	0.25	0.75	0.55
	Total	**3.30**	**3.80**	**1.00**	**1.00**	**1173.75**	**1130.25**	**1178.05**	**1135.05**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Wheat								
	DWR-162	8.80	17.80	0.00	0.00	3.00	13.50	11.80	31.30
	UAS-304	0.00	0.00	0.00	0.00	6.00	0.00	6.00	0.00
	UAS-415	3.00	3.80	0.00	0.00	1.50	3.30	4.50	7.10
	UAS-428	10.00	0.00	0.00	0.00	1.50	0.00	11.50	0.00
	DWR-2006	0.00	0.00	0.00	0.00	3.00	0.00	3.00	0.00
	DDK-1025	0.00	0.00	0.00	0.00	10.00	4.00	10.00	4.00
	DDK-1029	0.00	0.00	0.00	0.00	10.00	13.20	10.00	13.20
	Total	**21.80**	**21.60**	**0.00**	**0.00**	**35.00**	**34.00**	**56.80**	**55.60**
	Maize								
	CI-4	0.15	0.15	1.85	1.85	2.00	2.00	4.00	4.00
	CI-5	0.00	0.00	0.50	0.50	50.00	60.00	50.50	60.50
	KDMI-15	0.10	0.50	0.50	0.50	1.10	1.10	1.70	2.10
	KDMI-16	0.10	0.40	0.30	0.40	0.40	0.40	0.80	1.20
	African Tall	0.25	2.00	2.25	2.00	51.50	40.00	54.00	44.00
	CM-111	0.30	0.30	0.00	0.00	0.30	0.30	0.60	0.60
	CM-202	0.35	0.35	0.00	0.00	0.35	0.35	0.70	0.70
	CM-500	0.25	0.25	0.00	0.00	0.25	0.25	0.50	0.50
	CM-501	0.15	0.15	0.00	0.00	0.15	0.15	0.30	0.30
	Total	**1.65**	**4.10**	**5.40**	**5.25**	**106.05**	**104.55**	**113.10**	**113.90**
	Sorghum								
	M-35-1	5.50	5.50	0.00	0.00	1.20	0.00	6.70	5.50
	CSV 29R	1.20	5.00	0.00	0.00	0.00	0.00	1.20	5.00
	Total	**6.70**	**10.50**	**0.00**	**0.00**	**1.20**	**0.00**	**7.90**	**10.50**
	Total Cereal Crops	**33.45**	**40.00**	**6.40**	**6.25**	**1316.00**	**1268.80**	**1355.85**	**1315.05**
Pulse Crops	**Mung**								
	DGGV-2	0.00	0.00	5.00	8.00	5.00	8.00	10.00	16.00
	Total	**0.00**	**0.00**	**5.00**	**8.00**	**5.00**	**8.00**	**10.00**	**16.00**
	Chickpea								
	JG-11	150.00	50.00	0.00	0.00	20.00	0.00	170.00	50.00
	Jaki-9218	200.00	90.00	0.00	0.00	25.00	17.40	225.00	107.40
	Total	**350.00**	**140.00**	**0.00**	**0.00**	**45.00**	**17.40**	**395.00**	**157.40**
	Urd								
	TAU-1	0.00	0.00	2.00	2.00	10.00	6.00	12.00	8.00
	DU-1	0.00	0.00	5.00	10.20	15.00	11.00	20.00	21.20
	DBGV-05	0.00	0.00	5.00	6.00	15.25	8.00	20.25	14.00
	Total	**0.00**	**0.00**	**12.00**	**18.20**	**40.25**	**25.00**	**52.25**	**43.20**
	Cowpea								
	DCS 47-1	0.00	0.00	2.00	2.00	2.00	2.00	4.00	4.00
	Total	**0.00**	**0.00**	**2.00**	**2.00**	**2.00**	**2.00**	**4.00**	**4.00**
	Total Pulse Crops	**350.00**	**140.00**	**19.00**	**28.20**	**92.25**	**52.40**	**461.25**	**220.60**
Oilseed Crops	**Soybean**								
	JS-335	2000.00	1400.00	200.00	200.00	3000.00	2500.00	5200.00	4100.00
	JS-9305	1000.00	500.00	100.00	100.00	1500.00	1000.00	2600.00	1600.00
	DSb-21	500.00	200.00	300.00	300.00	8000.00	4500.00	8800.00	5000.00
	DSb 1	60.00	33.00	0.00	0.00	0.00	0.00	60.00	33.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Summer								
	TAG-24	0.00	350.00	0.00	0.00	0.00	0.00	0.00	350.00
	TG-37A	0.00	300.00	0.00	0.00	0.00	0.00	0.00	300.00
	TDG-39 (TGLPS-3)	0.00	35.00	0.00	0.00	0.00	0.00	0.00	35.00
	GPBD-5	0.00	32.00	0.00	0.00	0.00	0.00	0.00	32.00
	Dh-101	0.00	15.00	0.00	0.00	0.00	0.00	0.00	15.00
	Dh-86	0.00	8.00	0.00	0.00	0.00	0.00	0.00	8.00
	Total	**960.40**	**1400.40**	**276.00**	**300.78**	**3282.00**	**2167.20**	**4518.40**	**3868.38**
	Safflower								
	A 1	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.10**	**0.10**
	Sesamum								
	DS 5	0.00	0.00	1.00	1.00	6.00	4.00	7.00	5.00
	Total	**0.00**	**0.00**	**1.00**	**1.00**	**6.00**	**4.00**	**7.00**	**5.00**
	Total Oilseed Crops	**6070.40**	**4137.10**	**877.00**	**901.78**	**15788.10**	**10171.30**	**22735.50**	**15210.18**
Fibre Crops	**Cotton**								
	SB (YF) 425	0.02	0.02	0.00	0.00	0.25	0.25	0.27	0.27
	DS 28	0.02	0.02	0.00	0.00	0.20	0.20	0.22	0.22
	Total	**0.04**	**0.04**	**0.00**	**0.00**	**0.45**	**0.45**	**0.49**	**0.49**
	Total Fibre Crops	**0.04**	**0.04**	**0.00**	**0.00**	**0.45**	**0.45**	**0.49**	**0.49**
	Grand Total (Dharwad)	**6453.89**	**4317.14**	**902.40**	**936.23**	**17196.80**	**11492.95**	**24553.09**	**16746.32**
25. ANGRAU, Hyderabad									
Cereal Crops	**Rice**								
	BPT 2231	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	BPT 2270	0.00	0.00	0.00	0.00	30.00	12.00	30.00	12.00
	BPT3291	35.50	35.00	0.00	0.00	0.00	0.00	35.50	35.00
	BPT 5204	75.00	75.00	225.00	245.00	0.00	0.00	300.00	320.00
	IR 64	0.00	0.00	0.00	0.00	100.00	168.00	100.00	168.00
	MTU 1006	1.50	1.00	0.50	0.00	0.00	0.00	2.00	1.00
	MTU 1031	0.60	0.60	0.40	0.30	0.00	0.00	1.00	0.90
	MTU 1032	0.60	0.60	0.40	0.30	0.00	0.00	1.00	0.90
	MTU 1061	5.50	5.50	95.00	119.07	0.00	0.00	100.50	124.57
	MTU 1064	50.00	53.00	0.00	0.00	0.00	0.00	50.00	53.00
	MTU 1075	5.00	5.00	65.00	136.60	0.00	0.00	70.00	141.60
	MTU 1121	0.00	0.00	30.00	127.05	0.00	0.00	30.00	127.05
	MTU 2077	0.00	0.00	10.00	10.00	0.00	0.00	10.00	10.00
	MTU 2716	0.00	0.00	5.00	3.20	0.00	0.00	5.00	3.20
	MTU 3626	20.00	20.00	30.00	20.08	0.00	0.00	50.00	40.08
	PLA 1100	0.00	0.00	50.00	22.50	0.00	0.00	50.00	22.50
	MTU 1001	190.00	190.00	104.90	36.15	0.00	0.00	294.90	226.15
	MTU 1010	373.00	400.00	94.00	82.57	0.00	0.00	467.00	482.57
	MTU 7029	300.00	300.00	0.00	0.00	0.00	271.00	300.00	571.00
	NDLR 7	0.00	0.00	0.00	0.00	10.00	0.00	10.00	0.00
	NDLR 8	0.00	0.00	0.00	0.00	50.00	52.00	50.00	52.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	NLR 145	5.00	5.00	0.00	0.00	15.00	20.00	20.00	25.00
	NLR 20084	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	NLR 28523	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	NLR 3041	0.00	0.00	0.00	0.00	20.00	25.00	20.00	25.00
	NLR 30491	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
	NLR 32999	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	NLR 33892	3.00	3.00	0.00	0.00	8.00	107.00	11.00	110.00
	NLR 34449	25.30	25.30	0.00	0.00	174.70	224.70	200.00	250.00
	NLR 40024	0.00	0.00	0.00	0.00	10.00	15.00	10.00	15.00
	NLR 9674	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	RGL 11414	0.00	0.00	0.00	0.00	10.00	25.00	10.00	25.00
	RGL 2537	5.00	5.00	0.00	0.00	15.00	35.00	20.00	40.00
	RGL 2538	15.00	15.00	0.00	0.00	5.00	10.00	20.00	25.00
	Total	**1115.00**	**1144.00**	**710.20**	**802.82**	**472.70**	**989.70**	**2297.90**	**2936.52**
	Foxtail Millet								
	SiA3085	2.00	2.00	0.00	0.00	3.00	108.00	5.00	110.00
	SiA326	3.00	6.00	0.00	0.00	2.00	2.00	5.00	8.00
	AK132	8.00	64.00	0.00	0.00	0.00	0.00	8.00	64.00
	Krishnadevaraya	0.00	0.00	0.00	0.00	1.50	1.50	1.50	1.50
	Narasimha	0.00	0.00	0.00	0.00	1.50	1.50	1.50	1.50
	SiA 3156	0.00	0.00	0.00	0.00	4.00	4.00	4.00	4.00
	Srilakshmi	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	Suryanandi	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	Total	**13.00**	**72.00**	**0.00**	**0.00**	**16.00**	**121.00**	**21.00**	**185.00**
	Total Cereal Crops	**1128.00**	**1216.00**	**710.20**	**802.82**	**488.70**	**1110.70**	**2318.90**	**3121.52**
Pulse Crops	**Chickpea**								
	JAKI9218	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	JG11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	NBeG-3	12.00	178.90	0.00	0.00	0.00	0.00	12.00	178.90
	NBeG-47	0.00	0.00	0.00	0.00	27.50	59.85	27.50	59.85
	Total	**12.00**	**178.90**	**0.00**	**0.00**	**27.50**	**59.85**	**39.50**	**238.75**
	Pigeonpea								
	ICPL 85063	8.60	7.00	0.00	0.00	0.00	0.00	8.60	7.00
	LRG 41	6.60	30.00	0.00	0.00	0.00	0.00	6.60	30.00
	ICPL 87119	0.00	0.00	0.00	0.00	5.00	2.50	5.00	2.50
	LRG 30	0.00	0.00	0.00	0.00	3.00	3.00	3.00	3.00
	LRG 52	0.00	0.00	0.00	0.00	10.00	7.00	10.00	7.00
	Total	**15.20**	**37.00**	**0.00**	**0.00**	**18.00**	**12.50**	**33.20**	**49.50**
	Mung								
	LGG460	24.00	61.00	0.00	0.00	0.00	0.00	24.00	61.00
	MGG 347	6.00	6.00	0.00	0.00	0.00	0.00	6.00	6.00
	TM 96-2	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	Total	**30.00**	**69.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**69.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Urd								
	PU 31	12.00	33.00	0.00	0.00	0.00	0.00	12.00	33.00
	LBG 752	28.00	31.00	0.00	0.00	0.00	0.00	28.00	31.00
	LM 752	28.00	31.80	0.00	0.00	0.00	0.00	28.00	31.80
	LBG 623	7.00	6.00	0.00	0.00	0.00	0.00	7.00	6.00
	LBG 645	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	LBG 787	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
	Total	**75.00**	**101.80**	**0.00**	**0.00**	**22.00**	**22.00**	**97.00**	**123.80**
	Total Pulse Crops	**132.20**	**386.70**	**0.00**	**0.00**	**67.50**	**94.35**	**199.70**	**481.05**
Oilseed Crops	**Groundnut**								
	Kadiri 7	100.00	460.23	0.00	0.00	0.00	0.00	100.00	460.23
	K6	1963.20	4412.30	0.00	0.00	0.00	0.00	1963.20	4412.30
	K9	725.30	1247.50	0.00	0.00	0.00	0.00	725.30	1247.50
	Kadiri Harithandra	200.00	531.30	0.00	0.00	0.00	0.00	200.00	531.30
	Total	**2988.50**	**6651.33**	**0.00**	**0.00**	**0.00**	**0.00**	**2988.50**	**6651.33**
	Sesamum								
	Madhavi	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	Gouri	0.00	0.00	0.00	0.00	2.00	1.00	2.00	1.00
	YLM11	0.00	0.00	0.00	0.00	5.00	1.00	5.00	1.00
	YLM17	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00
	YLM66	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**18.50**	**13.50**	**18.50**	**13.50**
	Total Oilseed Crops	**2988.50**	**6651.33**	**0.00**	**0.00**	**18.50**	**13.50**	**3007.00**	**6664.83**
Fiber Crops	**Mesta**								
	AMV 5	0.00	0.00	0.00	0.00	1.00	55.00	1.00	55.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**55.00**	**1.00**	**55.00**
	Total Fiber Crops	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**55.00**	**1.00**	**55.00**
Grand Total (ANGRAU, Hyderabad)		**4248.70**	**8254.03**	**710.20**	**802.82**	**575.70**	**1273.55**	**5526.60**	**10322.40**
26. PJTSAU, Hyderabad									
Cereal Crops	**Rice**								
	BPT-5204	40.00	40.00	100.00	100.00	160.00	160.00	300.00	300.00
	MTU-1010	50.00	50.00	150.00	150.00	100.00	100.00	300.00	300.00
	MTU-1001	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00
	MTU-7029	60.00	60.00	0.00	0.00	40.00	40.00	100.00	100.00
	JGL-11470	2.00	2.50	0.00	0.00	5.00	6.50	7.00	9.00
	JGL-11727	0.00	0.00	0.50	2.00	0.00	0.00	0.50	2.00
	JGL-1798	8.50	10.00	91.50	92.00	0.00	0.00	100.00	102.00
	JGL-384	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	JGL-3844	0.00	0.00	3.00	5.00	0.00	0.00	3.00	5.00
	JGL-3855	0.00	0.00	1.00	3.00	0.00	0.00	1.00	3.00
	RNR-1446	0.00	0.00	0.00	0.00	11.50	12.00	11.50	12.00
	RNR-2458	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	RNR-2465	0.00	0.00	0.00	0.00	1.00	6.00	1.00	6.00
	RNR-2354	10.00	10.00	5.00	5.00	0.00	0.00	15.00	15.00
	RNR-15048	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	RNRM-7	0.50	0.50	0.50	0.50	0.00	0.00	1.00	1.00
	WGL-14	2.00	3.00	48.00	50.00	0.00	0.00	50.00	53.00
	IET 18004	45.00	45.00	0.00	0.00	0.00	0.00	45.00	45.00
	WGL-32100	45.00	45.00	55.00	60.00	100.00	105.00	200.00	210.00
	JGL-11118	0.00	0.00	3.00	5.00	0.00	0.00	3.00	5.00
	JGL-17004	0.00	0.00	4.00	5.00	0.00	0.00	4.00	5.00
	JGL-18047	0.00	0.00	0.00	0.00	22.00	25.00	22.00	25.00
	RDR-763	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	RNR-10754	1.50	1.50	58.50	60.00	0.00	0.00	60.00	61.50
	IR-64	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	WGL-13400	0.00	0.00	10.00	10.00	0.00	0.00	10.00	10.00
	WGL-20471	10.00	10.00	40.00	40.00	0.00	0.00	50.00	50.00
	WGL-22245	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	WGL-283	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	WGL-3825	0.00	0.00	0.00	0.00	6.00	7.00	6.00	7.00
	WGL-3962	0.00	0.00	10.00	10.00	0.00	0.00	10.00	10.00
	WGL-44	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00
	Total	**274.50**	**277.50**	**627.00**	**644.50**	**655.50**	**671.50**	**1557.00**	**1593.50**
	Maize								
	BML 6	6.12	6.12	0.20	0.20	0.00	0.00	6.32	6.32
	BML 7	3.06	3.06	0.10	0.10	0.00	0.00	3.16	3.16
	Total	**9.18**	**9.18**	**0.30**	**0.30**	**0.00**	**0.00**	**9.48**	**9.48**
	Sorghum								
	PSV 56	0.80	5.00	1.20	1.50	0.00	0.00	2.00	6.50
	PSV 462	0.10	0.10	0.10	0.50	0.00	0.00	0.20	0.60
	Total	**0.90**	**5.10**	**1.30**	**2.00**	**0.00**	**0.00**	**2.20**	**7.10**
	Total Cereal Crops	**284.58**	**291.78**	**628.60**	**646.80**	**655.50**	**671.50**	**1568.68**	**1610.08**
Pulse Crops	**Chickpea**								
	JG 11	0.00	0.00	0.00	0.00	35.00	35.00	35.00	35.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**35.00**	**35.00**	**35.00**	**35.00**
	Pigeonpea								
	ICPL 85063	0.00	0.00	0.00	0.00	3.00	3.00	3.00	3.00
	ICPL 87119	0.00	0.00	0.00	0.00	8.00	8.00	8.00	8.00
	PRG 158	0.00	0.00	1.00	4.00	0.00	0.00	1.00	4.00
	PRG 176	0.00	0.00	0.50	5.00	0.00	0.00	0.50	5.00
	Total	**0.00**	**0.00**	**1.50**	**9.00**	**11.00**	**11.00**	**12.50**	**20.00**
	Mung								
	MGG 295	0.00	0.00	5.00	7.00	0.00	0.00	5.00	7.00
	MGG 347	0.00	0.00	0.00	0.00	8.50	9.00	8.50	9.00
	Total	**0.00**	**0.00**	**5.00**	**7.00**	**8.50**	**9.00**	**13.50**	**16.00**
	Urd								
	MBG 207	2.50	2.50	2.50	2.50	0.00	0.00	5.00	5.00
	T 9	0.00	0.00	0.10	0.20	0.00	0.00	0.10	0.20
	PU 31	0.00	0.00	0.00	0.00	5.20	5.00	5.20	5.00
	Total	**2.50**	**2.50**	**2.60**	**2.70**	**5.20**	**5.00**	**10.30**	**10.20**
	Total Pulse Crops	**2.50**	**2.50**	**9.10**	**18.70**	**59.70**	**60.00**	**71.30**	**81.20**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Oilseed Crops	**Soybean**								
	JS 335	0.00	0.00	375.00	250.00	0.00	0.00	375.00	250.00
	Basara (ADB 22)	0.00	0.00	50.00	15.00	0.00	0.00	50.00	15.00
	Total	**0.00**	**0.00**	**425.00**	**265.00**	**0.00**	**0.00**	**425.00**	**265.00**
	Castor								
	PCS 4 (Kranthi)	0.00	0.00	1.50	3.00	0.00	0.00	1.50	3.00
	Total	**0.00**	**0.00**	**1.50**	**3.00**	**0.00**	**0.00**	**1.50**	**3.00**
	Sesamum								
	Swetha	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	Rajeswari	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	Total	**0.00**	**0.00**	**0.60**	**0.60**	**0.00**	**0.00**	**0.60**	**0.60**
	Total Oilseed Crops	**0.00**	**0.00**	**427.10**	**268.60**	**0.00**	**0.00**	**427.10**	**268.60**
	Grand Total (PJTSAU)	**287.08**	**294.28**	**1064.80**	**934.10**	**715.20**	**731.50**	**2067.08**	**1959.88**
27. TNAU, Coimbatore									
Cereal Crops	**Rice**								
	ADT 36	0.00	0.00	35.45	56.95	0.00	0.00	35.45	56.95
	ADT 37	10.80	10.80	105.90	119.28	0.00	0.00	116.70	130.08
	ADT 38	0.00	0.00	15.50	15.50	0.00	0.00	15.50	15.50
	ADT 39	5.00	5.00	67.05	67.06	0.00	0.00	72.05	72.06
	ADT 42	0.00	0.00	7.50	7.50	0.00	0.00	7.50	7.50
	ADT 43	5.80	5.80	147.30	147.30	0.00	0.00	153.10	153.10
	ADT 44	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	ADT (R) 45	6.50	6.50	111.50	110.40	0.00	0.00	118.00	116.90
	ADT (R) 48	0.50	2.00	0.00	0.00	0.00	0.00	0.50	2.00
	ADT (R) 49	0.00	0.00	27.10	30.00	0.00	0.00	27.10	30.00
	ADT (R) 50	0.00	0.00	16.80	20.50	0.00	0.00	16.80	20.50
	CO 43	0.00	0.00	12.80	12.80	0.00	0.00	12.80	12.80
	CO (R) 48	0.00	0.00	2.30	4.00	0.00	0.00	2.30	4.00
	CO (R) 49	0.00	0.00	13.40	15.00	0.00	0.00	13.40	15.00
	CO (R) 50	0.00	0.00	20.30	18.80	0.00	0.00	20.30	18.80
	CO (R) 51	0.00	0.00	61.60	77.10	0.00	0.00	61.60	77.10
	IR 20	0.00	0.00	43.00	36.80	0.00	0.00	43.00	36.80
	IR 36	0.00	0.00	7.50	8.50	0.00	0.00	7.50	8.50
	IR 50	0.00	0.00	25.00	24.70	0.00	0.00	25.00	24.70
	ASD 16	0.00	0.00	91.70	95.85	0.00	0.00	91.70	95.85
	ASD 18	0.00	0.00	3.50	5.00	0.00	0.00	3.50	5.00
	ASD 19	0.00	0.00	51.75	52.00	0.00	0.00	51.75	52.00
	Anna (R) 4	0.00	0.00	6.90	13.00	0.00	0.00	6.90	13.00
	CR 1009	0.00	0.00	123.69	110.00	0.00	0.00	123.69	110.00
	I.W.Ponni	0.00	0.00	31.00	30.10	0.00	0.00	31.00	30.10
	MDU 6	0.00	0.00	2.00	2.00	0.00	0.00	2.00	2.00
	TPS 5	0.00	0.00	1.50	5.00	0.00	0.00	1.50	5.00
	TRY 1	0.00	0.00	17.10	28.80	0.00	0.00	17.10	28.80
	TRY 3	0.00	0.00	6.10	13.50	0.00	0.00	6.10	13.50
	TKM 9	0.00	0.00	25.00	20.00	0.00	0.00	25.00	20.00
	TKM 13	0.00	0.00	5.15	4.50	0.00	0.00	5.15	4.50
	Total	**29.10**	**30.60**	**1085.39**	**1151.94**	**0.00**	**0.00**	**1114.49**	**1182.54**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Maize								
	COH (M) 6 PL								
	A Line	0.00	0.00	4.80	4.80	0.00	0.00	4.80	4.80
	B Line	0.00	0.00	2.40	2.40	0.00	0.00	2.40	2.40
	COH (M) 7 PL								
	Female Line	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20
	Male Line	0.00	0.00	0.10	0.12	0.00	0.00	0.10	0.12
	COH (M) 8 PL								
	Female Line	0.05	0.05	0.20	0.20	0.00	0.00	0.25	0.25
	Male Line	0.03	0.03	0.10	0.10	0.00	0.00	0.13	0.13
	COH (M) 9 PL								
	Female Line	0.05	0.05	0.00	0.00	0.00	0.00	0.05	0.05
	Male Line	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00
	Total	**0.16**	**0.13**	**7.80**	**7.82**	**0.00**	**0.00**	**7.96**	**7.95**
	Sorghum								
	K 11	0.00	0.00	0.46	0.46	0.00	0.00	0.46	0.46
	CO (FS) 29	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	CO (S) 30	0.00	0.00	0.06	0.15	0.00	0.00	0.06	0.15
	K 12	0.00	0.00	0.12	0.12	0.00	0.00	0.12	0.12
	Total	**2.00**	**2.00**	**0.64**	**0.73**	**0.00**	**0.00**	**2.64**	**2.73**
	Finger Millet / Ragi								
	CO (Ra) 14	0.00	0.00	0.18	0.18	0.00	0.00	0.18	0.18
	CO (Ra) 15	0.00	0.00	0.66	0.66	0.00	0.00	0.66	0.66
	Paiyur 2	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
	Total	**0.00**	**0.00**	**0.94**	**0.94**	**0.00**	**0.00**	**0.94**	**0.94**
	Cumbu								
	CO (Cu) 9	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20
	Total	**0.00**	**0.00**	**0.20**	**0.20**	**0.00**	**0.00**	**0.20**	**0.20**
	Barnyard Millet/ Kudiraivali								
	CO (Kv) 2	0.00	0.00	1.91	1.91	0.00	0.00	1.91	1.91
	Total	**0.00**	**0.00**	**1.91**	**1.91**	**0.00**	**0.00**	**1.91**	**1.91**
	Samai/ Kutki								
	CO4	0.00	0.00	0.72	0.81	0.00	0.00	0.72	0.81
	Total	**0.00**	**0.00**	**0.72**	**0.81**	**0.00**	**0.00**	**0.72**	**0.81**
	Varagu/ Kodo								
	CO 3	0.00	0.00	0.18	0.20	0.00	0.00	0.18	0.20
	Total	**0.00**	**0.00**	**0.18**	**0.20**	**0.00**	**0.00**	**0.18**	**0.20**
	Foxtail Millet/ Tenai								
	CO (Te) 7	0.00	0.00	0.92	0.95	0.00	0.00	0.92	0.95
	Total	**0.00**	**0.00**	**0.92**	**0.95**	**0.00**	**0.00**	**0.92**	**0.95**
	Total Cereal Crops	**31.26**	**32.73**	**1098.70**	**1165.50**	**0.00**	**0.00**	**1129.96**	**1198.23**
Pulse Crops	**Pigeon Pea**								
	VBN 3	0.00	0.00	1.20	0.85	0.00	0.00	1.20	0.85
	CO (Rg) 7	0.10	0.10	2.40	2.95	0.00	0.00	2.50	3.05
	Total	**0.10**	**0.10**	**3.60**	**3.80**	**0.00**	**0.00**	**3.70**	**3.90**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Urd								
	VBN 3	0.00	0.00	7.30	7.64	0.00	0.00	7.30	7.64
	VBN (Bg) 4	0.00	0.00	7.00	6.70	0.00	0.00	7.00	6.70
	VBN (Bg) 5	0.00	0.00	11.70	11.35	0.00	0.00	11.70	11.35
	VBN (Bg) 6	0.00	0.00	23.80	22.91	0.00	0.00	23.80	22.91
	VBN (Bg) 7	2.10	0.00	0.00	0.00	0.00	0.00	2.10	0.00
	CO 6	2.00	2.00	2.74	1.80	0.00	0.00	4.74	3.80
	MDU 1	0.00	0.00	2.40	2.37	0.00	0.00	2.40	2.37
	ADT 3	0.00	0.00	4.20	4.20	0.00	0.00	4.20	4.20
	ADT 5	0.00	0.00	16.00	15.36	0.00	0.00	16.00	15.36
	Total	**4.10**	**2.00**	**75.14**	**72.33**	**0.00**	**0.00**	**79.24**	**74.33**
	Mung								
	VBN 2	0.00	0.00	5.70	5.20	0.00	0.00	5.70	5.20
	VBN (Gg) 3	0.00	0.00	8.05	7.12	0.00	0.00	8.05	7.12
	CO 6	0.00	0.00	0.80	0.75	0.00	0.00	0.80	0.75
	CO (Gg) 912 (CO 7)	3.00	3.00	6.43	6.43	0.00	0.00	9.43	9.43
	CO (GG) 8	0.00	0.00	11.10	11.10	0.00	0.00	11.10	11.10
	Total	**3.00**	**3.00**	**32.08**	**30.60**	**0.00**	**0.00**	**35.08**	**33.60**
	Cowpea								
	CO (CP) 7	0.00	0.00	3.85	6.80	0.00	0.00	3.85	6.80
	Total	**0.00**	**0.00**	**3.85**	**6.80**	**0.00**	**0.00**	**3.85**	**6.80**
	Horsegram								
	Paiyur 2	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00
	Total	**0.00**	**0.00**	**5.00**	**5.00**	**0.00**	**0.00**	**5.00**	**5.00**
	Total Pulses Crops	**7.20**	**5.10**	**119.67**	**118.53**	**0.00**	**0.00**	**126.87**	**123.63**
Oilseed Crops	**Groundnut**								
	VRI 2	100.00	33.30	0.00	0.00	0.00	0.00	100.00	33.30
	VRI (Gn) 6	0.00	0.00	130.00	55.40	0.00	0.00	130.00	55.40
	VRI (Gn) 7	0.00	0.00	70.00	15.70	0.00	0.00	70.00	15.70
	CO 6	0.00	0.00	150.36	98.70	0.00	0.00	150.36	98.70
	CO 7	0.00	0.00	4.00	5.10	0.00	0.00	4.00	5.10
	TMV (Gn) 13	0.00	0.00	192.00	347.30	0.00	0.00	192.00	347.30
	ICGV 00348	40.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
	Total	**140.00**	**33.30**	**546.36**	**522.20**	**0.00**	**0.00**	**686.36**	**555.50**
	Sesame								
	VRI Sv. 2	0.00	0.00	1.18	1.15	0.00	0.00	1.18	1.15
	SVPR 1	0.00	0.00	0.27	0.40	0.00	0.00	0.27	0.40
	TMV 3	0.00	0.00	0.50	0.44	0.00	0.00	0.50	0.44
	TMV 4	0.00	0.00	1.10	1.10	0.00	0.00	1.10	1.10
	TMV 5	0.00	0.00	0.25	0.23	0.00	0.00	0.25	0.23
	TMV 7	0.00	0.00	3.10	3.30	0.00	0.00	3.10	3.30
	Total	**0.00**	**0.00**	**6.40**	**6.62**	**0.00**	**0.00**	**6.40**	**6.62**
	Sunflower								
	CO (SFV) 5	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.25
	Total	**0.00**	**0.00**	**0.25**	**0.25**	**0.00**	**0.00**	**0.25**	**0.25**
	Castor								
	TMV 5	0.00	0.00	0.50	0.62	0.00	0.00	0.50	0.62
	Total	**0.00**	**0.00**	**0.50**	**0.62**	**0.00**	**0.00**	**0.50**	**0.62**
	Total Oilseed crops	**140.00**	**33.30**	**553.51**	**529.69**	**0.00**	**0.00**	**693.51**	**562.99**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Fibre Crops	**COTTON**								
	MCU 5	0.00	0.00	0.15	0.15	0.00	0.00	0.15	0.15
	MCU 7	0.00	0.00	0.49	0.49	0.00	0.00	0.49	0.49
	SVPR 2	0.00	0.00	0.85	0.72	0.00	0.00	0.85	0.72
	SVPR 3	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	SVPR 4	0.00	0.00	0.35	0.50	0.00	0.00	0.35	0.50
	Total	**0.00**	**0.00**	**1.89**	**1.91**	**0.00**	**0.00**	**1.89**	**1.91**
	Total Fibre Crops	**0.00**	**0.00**	**1.89**	**1.91**	**0.00**	**0.00**	**1.89**	**1.91**
Grand Total (Coimbatore)		**178.46**	**71.13**	**1773.77**	**1815.63**	**0.00**	**0.00**	**1952.23**	**1886.76**
	** Production and lifting constraints has been addressed to the DC (Seeds) and project coordinator, Junagadh by RRS, Vridhachalam								
28. KAU, Pattambi									
Cereal Crops	**Rice**								
	Jyothi	6.60	10.00	2.30	24.53	0.00	0.00	8.90	34.53
	Uma	0.00	0.00	0.00	2.50	0.00	0.00	0.00	2.50
	Harsha	0.00	0.00	0.02	3.26	0.00	0.00	0.02	3.26
	Matta Triveni	0.00	0.00	1.20	5.32	0.00	0.00	1.20	5.32
	Varsha	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.44
	Aiswarya	0.00	0.00	1.20	2.70	0.00	0.00	1.20	2.70
	K.K.Varna	0.00	0.00	0.00	2.18	0.00	0.00	0.00	2.18
	Annapoorna	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.79
	Kanchana	0.00	0.00	0.80	2.10	0.00	0.00	0.80	2.10
	Vaishak	0.00	0.00	0.02	2.98	0.00	0.00	0.02	2.98
	Swarnaprabha	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.84
	Samyuktha	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.68
	Aathira	0.00	0.00	0.45	3.37	0.00	0.00	0.45	3.37
	Anaswara	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.85
	Karuna	0.00	0.00	0.00	1.37	0.00	0.00	0.00	1.37
	Neeraja	0.00	0.00	0.00	4.19	0.00	0.00	0.00	4.19
	Jaya	0.00	0.00	0.00	9.50	0.00	0.00	0.00	9.50
	Ponmani	0.00	0.00	0.00	2.26	0.00	0.00	0.00	2.26
	Mangalamahsuri	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.63
	Prathyasa	0.00	0.00	0.00	2.27	0.00	0.00	0.00	2.27
	Sampada	0.00	0.00	0.00	1.52	0.00	0.00	0.00	1.52
	Jeerakasala	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.53
	Makaram	0.00	0.00	0.02	4.02	0.00	0.00	0.02	4.02
	Swetha	0.00	0.00	0.00	1.48	0.00	0.00	0.00	1.48
	Thavalakannan	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.11
	Thekkancheera	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.07
	ThekkanChitteni	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09
	Chenkayama	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09
	Shreyas	0.00	0.00	0.00	1.72	0.00	0.00	0.00	1.72
	Total	**6.60**	**10.00**	**6.01**	**82.39**	**0.00**	**0.00**	**12.61**	**92.39**
	Total Cereal Crops	**6.60**	**10.00**	**6.01**	**82.39**	**0.00**	**0.00**	**12.61**	**92.39**
	Grand Total Pattambi	**6.60**	**10.00**	**6.01**	**82.39**	**0.00**	**0.00**	**12.61**	**92.39**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
29. PAJANCOA&RI, Karaikal									
Cereal Crops	**Rice**								
	ADT 37	0.00	0.00	0.00	0.00	1.00	2.65	1.00	2.65
	ADT 43	0.00	0.00	0.00	0.00	0.40	2.50	0.40	2.50
	ADT (R) 45	0.00	0.00	0.00	0.00	1.00	4.72	1.00	4.72
	CR1009	0.00	0.00	0.00	0.00	1.30	5.00	1.30	5.00
	KKL (R) 1	0.00	0.00	0.00	0.00	0.30	4.37	0.30	4.37
	ADT (R) 50	0.00	0.00	0.00	0.00	0.40	4.80	0.40	4.80
	I.W.Ponni	0.00	0.00	0.00	0.00	1.30	3.45	1.30	3.45
	ADT (R) 46	0.00	0.00	0.00	0.00	0.30	4.33	0.30	4.33
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**31.82**	**6.00**	**31.82**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**31.82**	**6.00**	**31.82**
	Grand Total Karaikal	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**31.82**	**6.00**	**31.82**
30. DBSKKV, Dapoli									
Cereal Crops	**Rice**								
	Ratnagiri 1	1.00	10.00	0.00	0.00	2.00	8.00	3.00	18.00
	Ratnagiri 2	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	Ratnagiri 3	0.00	0.00	0.00	0.00	1.50	1.50	1.50	1.50
	Ratnagiri 4	0.50	1.00	0.00	0.00	1.00	2.00	1.50	3.00
	Ratnagiri 5	0.00	0.00	0.60	2.50	1.00	5.00	1.60	7.50
	Ratnagiri 73	0.00	0.00	0.00	0.00	1.00	1.50	1.00	1.50
	Ratnagiri 24	3.50	5.00	3.00	7.00	3.00	5.00	9.50	17.00
	Ratnagiri 711	0.00	0.00	0.00	0.00	3.00	12.00	3.00	12.00
	Karjat 2	1.00	3.50	0.00	0.00	1.00	4.00	2.00	7.50
	Karjat 3	2.50	10.00	0.00	0.00	2.00	9.00	4.50	19.00
	Karjat 4	0.00	0.00	0.00	0.00	2.00	6.60	2.00	6.60
	Karjat 5	1.50	4.00	0.00	0.00	1.00	2.30	2.50	6.30
	Karjat 6	0.60	1.00	1.20	2.10	1.00	2.00	2.80	5.10
	Karjat 7	3.00	5.20	0.00	0.00	2.00	5.00	5.00	10.20
	Karjat 8	0.00	0.00	0.75	5.10	2.00	3.00	2.75	8.10
	Karjat 9	0.00	0.00	0.00	0.00	5.00	12.00	5.00	12.00
	Karjat 184	1.20	3.70	0.00	0.00	1.00	2.00	2.20	5.70
	Palghar 1	0.00	0.00	0.00	0.00	1.00	5.10	1.00	5.10
	Palghar 2	0.00	0.00	0.00	0.00	1.50	4.50	1.50	4.50
	Panvel 1	0.00	0.00	0.00	0.00	1.00	4.00	1.00	4.00
	Panvel 2	0.00	0.00	0.00	0.00	1.00	3.00	1.00	3.00
	Panvel 3	0.00	0.00	0.00	0.00	1.00	3.00	1.00	3.00
	Total	**14.80**	**43.40**	**5.55**	**16.70**	**37.00**	**102.50**	**57.35**	**162.60**
	Hybrid Paddy								
	Sahyadri								
	A Line	0.15	1.00	0.00	0.00	0.50	1.00	0.65	2.00
	B Line	0.05	0.20	0.00	0.00	0.10	0.30	0.15	0.50
	R Line	0.05	0.20	0.00	0.00	0.10	0.30	0.15	0.50
	Total	**0.25**	**1.40**	**0.00**	**0.00**	**0.70**	**1.60**	**0.95**	**3.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Sahyadri 2								
	A Line	0.15	0.50	0.00	0.00	0.00	0.00	0.15	0.50
	B Line	0.05	0.20	0.00	0.00	0.00	0.00	0.05	0.20
	R Line	0.05	0.20	0.00	0.00	0.00	0.00	0.05	0.20
	Total	**0.25**	**0.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.90**
	Sahyadri 3								
	A Line	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	B Line	0.07	0.20	0.00	0.00	0.00	0.00	0.07	0.20
	R Line	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	Total	**0.37**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**	**1.00**
	Sahyadri 4								
	A Line	0.15	0.50	0.00	0.00	0.00	0.00	0.15	0.50
	B Line	0.05	0.20	0.00	0.00	0.00	0.00	0.05	0.20
	R Line	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20
	Total	**0.20**	**0.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**0.90**
	Sahyadri 5								
	A Line	0.00	0.00	0.15	0.60	0.00	0.00	0.15	0.60
	B Line	0.00	0.00	0.05	0.40	0.00	0.00	0.05	0.40
	R Line	0.00	0.00	0.10	0.80	0.00	0.00	0.10	0.80
	Total	**0.00**	**0.00**	**0.30**	**1.80**	**0.00**	**0.00**	**0.30**	**1.80**
	Total Rice + H. Rice	**15.87**	**47.60**	**5.85**	**18.50**	**37.70**	**104.10**	**59.42**	**170.20**
	Finger Millet								
	Dapoli 1	0.02	1.00	0.00	0.00	1.00	2.00	1.02	3.00
	Dapoli Safed 1	0.00	0.00	0.02	0.25	1.00	1.00	1.02	1.25
	Total	**0.02**	**1.00**	**0.02**	**0.25**	**2.00**	**3.00**	**2.04**	**4.25**
	Total Cereal Crops	**15.89**	**48.60**	**5.87**	**18.75**	**39.70**	**107.10**	**61.46**	**174.45**
Pulse Crops	**Pigeon Pea**								
	Konkan Tur	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**1.00**	**1.00**
	Horse Gram								
	Kulthi Dapoli 1	0.00	0.00	0.00	0.00	4.50	5.00	4.50	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**4.50**	**5.00**	**4.50**	**5.00**
	Lablab bean								
	Konkan Wal 2	0.00	0.00	0.00	0.00	4.00	5.00	4.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**5.00**	**4.00**	**5.00**
	Cowpea								
	Konkan Sadabahar	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
	Konkan Safed	0.00	0.00	0.00	0.00	1.00	2.00	1.00	2.00
	Tatal	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**6.00**	**4.00**	**6.00**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**13.50**	**17.00**	**13.50**	**17.00**
Oilseed Crops	**Groundnut**								
	TKG Bold	0.00	0.00	0.00	0.00	3.00	4.60	3.00	4.60
	Konkan Gaurav	0.00	0.00	0.00	0.00	2.00	3.10	2.00	3.10
	Kankan Tapora	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**11.70**	**8.00**	**11.70**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**11.70**	**8.00**	**11.70**
	Grand Total (Dapoli)	**15.89**	**48.60**	**5.87**	**18.75**	**61.20**	**135.80**	**82.96**	**203.15**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
31. BCKV, West Bengal									
Cereal Crops	**Rice**								
	Gontra Bidhan 1	37.20	21.00	10.00	10.00	0.00	0.00	47.20	31.00
	Gontra Bidhan 3	0.00	0.00	0.00	18.00	0.00	0.00	0.00	18.00
	Total	**37.20**	**21.00**	**10.00**	**28.00**	**0.00**	**0.00**	**47.20**	**49.00**
	Total Cereal Crops	**37.20**	**21.00**	**10.00**	**28.00**	**0.00**	**0.00**	**47.20**	**49.00**
	Grand Total (West Bengal)	**37.20**	**21.00**	**10.00**	**28.00**	**0.00**	**0.00**	**47.20**	**49.00**
32. UAS, Raichur									
Cereal Crops	**Paddy**								
	GGV 05-01	0.00	20.50	0.00	0.00	0.00	0.00	0.00	20.50
	Total	**0.00**	**20.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.50**
	Total Cereal Crops	**0.00**	**20.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.50**
Pulse Crops	**Mung**								
	BGS 9	0.00	7.50	0.00	0.00	0.00	0.00	0.00	7.50
	Total	**0.00**	**7.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.50**
	Urd								
	DU 1	0.00	2.50	0.00	0.00	0.00	0.00	0.00	2.50
	Total	**0.00**	**2.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.50**
	Pigeonpea								
	TS3R	2.50	20.25	0.00	0.00	0.00	0.00	2.50	20.25
	Maruthi (ICP 8863)	20.00	20.60	0.00	0.00	0.00	0.00	20.00	20.60
	Asha (ICPL 87119)	6.00	6.15	0.00	0.00	0.00	0.00	6.00	6.15
	Total	**28.50**	**47.00**	**0.00**	**0.00**	**0.00**	**0.00**	**28.50**	**47.00**
	Chickpea								
	JG 11	100.00	22.50	0.00	0.00	0.00	0.00	100.00	22.50
	BGD 103	0.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00
	MNK 1	0.00	10.25	0.00	0.00	0.00	0.00	0.00	10.25
	Total	**100.00**	**37.75**	**0.00**	**0.00**	**0.00**	**0.00**	**100.00**	**37.75**
	Total Pulse Crops	**128.50**	**94.75**	**0.00**	**0.00**	**0.00**	**0.00**	**128.50**	**94.75**
Oilseed Crops	**Soybean**								
	JS 335	100.00	84.00	0.00	0.00	0.00	0.00	100.00	84.00
	DSB 21	0.00	108.60	0.00	0.00	0.00	0.00	0.00	108.60
	Total	**100.00**	**192.60**	**0.00**	**0.00**	**0.00**	**0.00**	**100.00**	**192.60**
	Total Oilseed Crops	**100.00**	**192.60**	**0.00**	**0.00**	**0.00**	**0.00**	**100.00**	**192.60**
	Grand Total (Raichur)	**228.50**	**307.85**	**0.00**	**0.00**	**0.00**	**0.00**	**228.50**	**307.85**
33.SBPUA&T, Meerut									
Cereal Crops	**Paddy**								
	VB 21	0.00	0.00	0.00	0.00	7.15	6.28	7.15	6.28
	VB 22	10.50	9.53	0.00	0.00	0.00	0.00	10.50	9.53
	Total	**10.50**	**9.53**	**0.00**	**0.00**	**7.15**	**6.28**	**17.65**	**15.81**
	Total Cereal Crops	**10.50**	**9.53**	**0.00**	**0.00**	**7.15**	**6.28**	**17.65**	**15.81**
	Grand Total (Meerut)	**10.50**	**9.53**	**0.00**	**0.00**	**7.15**	**6.28**	**17.65**	**15.81**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
34. NAU, Navsari									
Cereal Crops	**Rice**								
	NAUR 1	0.00	0.00	0.00	0.00	3.50	8.60	3.50	8.60
	GNR 2	0.00	0.00	0.00	0.00	1.40	8.80	1.40	8.80
	GNR 3	0.00	0.00	0.00	0.00	7.00	27.10	7.00	27.10
	GNR 4	0.00	0.00	0.00	0.00	3.50	4.70	3.50	4.70
	GV 2	0.00	0.00	0.00	0.00	0.50	0.60	0.50	0.60
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**15.90**	**49.80**	**15.90**	**49.80**
	Wheat								
	Lok -1	860.80	930.00	0.00	0.00	0.00	0.00	860.80	930.00
	Total	**860.80**	**930.00**	**0.00**	**0.00**	**0.00**	**0.00**	**860.80**	**930.00**
	Sorghum								
	GJ 38	0.00	0.00	0.00	0.00	2.00	2.10	2.00	2.10
	GJ 42	0.00	0.00	0.00	0.00	2.00	2.25	2.00	2.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**4.35**	**4.00**	**4.35**
	Finger Millet								
	GN 4	0.00	0.00	0.00	0.00	0.55	0.60	0.55	0.60
	GN 5	0.00	0.00	0.00	0.00	0.50	0.80	0.50	0.80
	GNN 6	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.05**	**1.90**	**1.05**	**1.90**
	Total Cereal Crops	**860.80**	**930.00**	**0.00**	**0.00**	**20.95**	**56.05**	**881.75**	**986.05**
Pulse Crops	**Pigeonpea**								
	Vaishali	0.00	0.00	0.00	0.00	7.00	9.00	7.00	9.00
	GT 1	0.00	0.00	0.00	0.00	6.00	6.20	6.00	6.20
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**13.00**	**15.20**	**13.00**	**15.20**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**13.00**	**15.20**	**13.00**	**15.20**
Oilseed Crops	**Castor**								
	SKP 84	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
	VP 1	0.00	0.00	0.00	0.00	3.00	7.80	3.00	7.80
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**7.80**	**5.00**	**7.80**
	Niger								
	GN 1	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00
	GN 2 (NRS 96)	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.50**	**1.00**	**0.50**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**8.30**	**6.00**	**8.30**
Forage crops	**Sorghum Fodder**								
	CSV- 21F	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00
	GSF -5	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**2.00**	**0.00**
	Total Forage Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**2.00**	**0.00**
	Grand Total (Navsari)	**860.80**	**930.00**	**0.00**	**0.00**	**41.95**	**79.55**	**902.75**	**1009.55**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
35.BAU, Sabour									
Cereal Crops	**Rice**								
	Baidehi	0.00	0.00	0.00	0.00	0.50	0.70	0.50	0.70
	Sugandha	0.00	0.00	0.00	0.00	2.00	0.30	2.00	0.30
	R.Bhagwati-1	0.00	0.00	0.00	0.00	8.00	6.90	8.00	6.90
	RAU-724	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	Swarna Sub -1	0.00	0.00	0.00	0.00	2.50	2.70	2.50	2.70
	P.Sugandh-5	0.00	0.00	0.00	0.00	10.50	11.40	10.50	11.40
	Satyam	0.00	0.00	0.00	0.00	0.80	0.90	0.80	0.90
	Sudha	0.00	0.00	0.00	0.00	0.85	0.90	0.85	0.90
	MTU-7029	0.00	0.00	0.00	0.00	5.00	2.70	5.00	2.70
	MTU-1001	0.00	0.00	0.00	0.00	5.00	0.90	5.00	0.90
	Shahbhagi	0.00	0.00	0.00	0.00	10.00	10.80	10.00	10.80
	R.Kastruri	0.00	0.00	0.00	0.00	10.00	10.80	10.00	10.80
	R.Suwasini	0.00	0.00	0.00	0.00	14.50	15.00	14.50	15.00
	R.Mahsuri	0.00	0.00	0.00	0.00	31.00	32.40	31.00	32.40
	MTU-1010	0.00	0.00	0.00	0.00	5.50	5.70	5.50	5.70
	R.Sweta	0.00	0.00	0.00	0.00	40.00	45.00	40.00	45.00
	S.Surbhit	0.00	0.00	0.00	0.00	8.40	7.20	8.40	7.20
	S.Ardhjal	0.00	0.00	0.00	0.00	18.00	20.00	18.00	20.00
	RAU-3055	0.00	0.00	0.00	0.00	6.50	6.90	6.50	6.90
	Sita	0.00	0.00	0.00	0.00	19.50	20.40	19.50	20.40
	Prabhat	0.00	0.00	0.00	0.00	1.50	1.80	1.50	1.80
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**210.05**	**213.40**	**210.05**	**213.40**
	Wheat								
	HD-2733	0.00	0.00	0.00	0.00	0.00	890.00	0.00	890.00
	HD-2824	0.00	0.00	0.00	0.00	0.00	225.00	0.00	225.00
	HI-1563	0.00	0.00	0.00	0.00	0.00	245.00	0.00	245.00
	PBW-343	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
	HD-2985	0.00	0.00	0.00	0.00	0.00	900.00	0.00	900.00
	HD-2967	0.00	0.00	0.00	0.00	0.00	775.00	0.00	775.00
	PBW-373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	NW-2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DBW-14	0.00	0.00	0.00	0.00	0.00	525.00	0.00	525.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3660.00**	**0.00**	**3660.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**210.05**	**3873.40**	**210.05**	**3873.40**
Pulse Crops	**Mung**								
	Samrat	0.00	0.00	0.00	0.00	2.00	1.10	2.00	1.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**1.10**	**2.00**	**1.10**
	Chickpea								
	BG 256	0.00	0.00	0.00	0.00	0.00	330.00	0.00	330.00
	PG 186	0.00	0.00	0.00	0.00	0.00	160.00	0.00	160.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**490.00**	**0.00**	**490.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Field Pea								
	Azad Pea 1	0.00	0.00	0.00	0.00	0.00	26.00	0.00	26.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**26.00**	**0.00**	**26.00**
	Lentil								
	HUL 57	0.00	0.00	0.00	0.00	0.00	198.00	0.00	198.00
	Arun	0.00	0.00	0.00	0.00	0.00	144.00	0.00	144.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**342.00**	**0.00**	**342.00**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**859.10**	**2.00**	**859.10**
Oilseed Crops	**Groundnut**								
	R 20	0.00	0.00	0.00	0.00	0.6	0.71	0.60	0.71
	ICGV 9346	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03
	ICGV 2266	0.00	0.00	0.00	0.00	0.07	0.08	0.07	0.08
	JL 24	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
	DH 86	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03
	ICGV 91114	0.00	0.00	0.00	0.00	0.04	0.05	0.04	0.05
	ICGV 89280	0.00	0.00	0.00	0.00	0.2	0.24	0.20	0.24
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.98**	**1.16**	**0.98**	**1.16**
	Mustard								
	RAU TS-17	0.00	0.00	0.00	0.00	0.00	7.00	0.00	7.00
	P.Mahak	0.00	0.00	0.00	0.00	0.00	50.00	0.00	50.00
	Varuna	0.00	0.00	0.00	0.00	0.00	10.50	0.00	10.50
	P. Bold	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
	Suflam	0.00	0.00	0.00	0.00	0.00	56.00	0.00	56.00
	YS 66-197-3	0.00	0.00	0.00	0.00	0.00	15.00	0.00	15.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**148.50**	**0.00**	**148.50**
	Til								
	Shekhar	0.00	0.00	0.00	0.00	2.00	0.78	2.00	0.78
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.78**	**2.00**	**0.78**
	Linseed								
	Garima	0.00	0.00	0.00	0.00	0.00	56.00	0.00	56.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**56.00**	**0.00**	**56.00**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.98**	**206.44**	**2.98**	**206.44**
	Grand Total (BAU, Sabour)	**0.00**	**0.00**	**0.00**	**0.00**	**215.03**	**4938.94**	**215.03**	**4938.94**
36. UAHS, Shivamogga									
Cereal Crops	**Rice**								
	Tunga	0.00	0.00	0.00	0.00	5.00	3.60	5.00	3.60
	Mo 4	0.00	0.00	0.00	0.00	10.00	5.00	10.00	5.00
	JGL 1798	0.00	0.00	0.00	0.00	20.00	13.25	20.00	13.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**35.00**	**21.85**	**35.00**	**21.85**
	Maize								
	SA Tall	0.00	0.00	0.00	0.00	15.00	12.50	15.00	12.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**15.00**	**12.50**	**15.00**	**12.50**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**50.00**	**34.35**	**50.00**	**34.35**
Pulse Crops	**Pigeonpea**								
	BRG 1	0.00	0.00	0.00	0.00	10.00	**6.00**	10.00	6.00
	BRG 2	0.00	0.00	0.00	0.00	5.00	**2.00**	5.00	2.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**15.00**	**8.00**	**15.00**	**8.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Urd								
	Rashmi	0.00	0.00	0.00	0.00	5.00	3.10	5.00	3.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**3.10**	**5.00**	**3.10**
	Cowpea								
	KBC 2	0.00	0.00	0.00	0.00	2.00	1.00	2.00	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**1.00**	**2.00**	**1.00**
	Rajmash								
	HA 4	0.00	0.00	0.00	0.00	1.00	0.33	1.00	0.33
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.33**	**1.00**	**0.33**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**23.00**	**12.43**	**23.00**	**12.43**
Oilseed Crops	**Groundnut**								
	JL 24	0.00	0.00	0.00	0.00	10.00	9.00	10.00	9.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**9.00**	**10.00**	**9.00**
	Soybean								
	DSB 21	0.00	0.00	0.00	0.00	45.00	40.00	45.00	40.00
	JS 335	0.00	0.00	0.00	0.00	35.00	30.00	35.00	30.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**80.00**	**70.00**	**80.00**	**70.00**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**90.00**	**79.00**	**90.00**	**79.00**
	Grand Total (UAHS, Shivamogga)	**0.00**	**0.00**	**0.00**	**0.00**	**163.00**	**125.78**	**163.00**	**125.78**
37. UBKV, Pundibari									
Cereal Crops	**Wheat**								
	HD 2967	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**4.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**4.00**
	Grand Total (Pundibari)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**4.00**
38. MPUAT, Udaipur									
Cereal Crops	**Maize**								
	HKI 163-1(Male of HQPM-1)	0.00	0.00	0.00	0.00	0.00	26.86	0.00	26.86
	HQPM-HY-1	0.00	0.00	0.00	0.00	0.00	14.40	0.00	14.40
	DMRQPM 106	0.00	0.00	0.00	0.00	0.00	13.20	0.00	13.20
	Pratapkanchan 2	0.00	0.00	0.00	0.00	0.00	4.03	0.00	4.03
	Mahidhawal	0.00	0.00	0.00	0.00	0.00	12.50	0.00	12.50
	PratapHy. 3(Male)	3.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00
	Pratap Hy.3(Female)	6.00	6.00	0.00	0.00	0.00	0.00	6.00	6.00
	Total	**9.00**	**9.00**	**0.00**	**0.00**	**0.00**	**70.99**	**9.00**	**79.99**
	Wheat								
	Raj 4037	0.00	0.00	0.00	0.00	0.00	6.59	0.00	6.59
	Raj 4079	0.00	0.00	0.00	0.00	0.00	158.42	0.00	158.42
	Raj 4083	0.00	0.00	0.00	0.00	0.00	59.86	0.00	59.86
	Raj 4120	0.00	0.00	0.00	0.00	0.00	6.33	0.00	6.33
	Raj 4238	0.00	0.00	0.00	0.00	0.00	3.33	0.00	3.33
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**234.53**	**0.00**	**234.53**
	Sorghum								
	CSV 23	5.20	5.50	0.00	0.00	0.00	0.00	5.20	5.50
	CSV17	5.20	5.50	0.00	0.00	0.00	0.00	5.20	5.50
	Total	**10.40**	**11.00**	**0.00**	**0.00**	**0.00**	**0.00**	**10.40**	**11.00**
	Total Cereal Crops	**19.40**	**20.00**	**0.00**	**0.00**	**0.00**	**305.52**	**19.40**	**325.52**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Urd**								
	Pratap Urd 1	0.00	4.40	0.00	0.00	0.00	0.00	0.00	4.40
	Total	**0.00**	**4.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.40**
	Chickpea								
	Pratap Chana 1	5.00	10.50	0.00	0.00	0.00	102.63	5.00	113.13
	GNG 1581	90.70	74.00	0.00	0.00	0.00	0.00	90.70	74.00
	Total	**95.70**	**84.50**	**0.00**	**0.00**	**0.00**	**102.63**	**95.70**	**187.13**
	Mung								
	IPM 02-03	0.00	4.75	0.00	0.00	0.00	0.00	0.00	4.75
	Total	**0.00**	**4.75**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.75**
	Total Pulse Crops	**95.70**	**93.65**	**0.00**	**0.00**	**0.00**	**102.63**	**95.70**	**196.28**
Oilseed Crops	**Groundnut**								
	UG 5	0.00	0.00	0.00	0.00	0.00	13.00	0.00	13.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**13.00**	**0.00**	**13.00**
	Soybean								
	JS 93-05	0.00	0.00	0.00	0.00	0.00	7.00	0.00	7.00
	JS 95-60	0.00	0.00	0.00	0.00	0.00	15.50	0.00	15.50
	RSK 24	0.00	0.00	0.00	0.00	0.00	40.97	0.00	40.97
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**63.47**	**0.00**	**63.47**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**76.47**	**0.00**	**76.47**
	Grand Total (Udaipur)	**115.10**	**113.65**	**0.00**	**0.00**	**0.00**	**484.62**	**115.10**	**598.27**
39. RVSKVV, Gwalior									
Cereal Crops	**Rice**								
	Kranti	0.00	0.00	0.00	0.00	750.00	970.00	750.00	970.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**750.00**	**970.00**	**750.00**	**970.00**
	Wheat								
	MP4010	62.00	78.00	0.00	0.00	0.00	0.00	62.00	78.00
	LOK 1	0.00	0.00	0.00	0.00	0.00	154.00	0.00	154.00
	RVW 4106	75.00	745.00	0.00	0.00	0.00	0.00	75.00	745.00
	GW 366	0.00	0.00	0.00	0.00	0.00	629.00	0.00	629.00
	GW 322	0.00	0.00	0.00	0.00	0.00	127.00	0.00	127.00
	GW1203	0.00	0.00	0.00	0.00	0.00	903.00	0.00	903.00
	SUJATA	0.00	0.00	0.00	0.00	0.00	4.25	0.00	4.25
	Total	**137.00**	**823.00**	**0.00**	**0.00**	**0.00**	**1817.25**	**137.00**	**2640.25**
	Pearl millets								
	JBV 3	6.00	0.05	0.00	0.00	0.00	0.00	6.00	0.05
	Total	**6.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**0.05**
	Total Cereal Crops	**143.00**	**823.05**	**0.00**	**0.00**	**750.00**	**2787.25**	**893.00**	**3610.30**
Pulse Crops	**Pigeonpea**								
	TJT 501	22.00	7.00	0.00	0.00	0.00	0.00	22.00	7.00
	JKM189	10.50	18.00	0.00	0.00	0.00	0.00	10.50	18.00
	Total	**32.50**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**32.50**	**25.00**
	Mung								
	TJM 3	0.00	121.40	0.00	0.00	0.00	0.00	0.00	121.40
	Total	**0.00**	**121.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**121.40**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Urd								
	T 9	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.63
	Total	**0.00**	**0.63**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.63**
	Chickpea								
	JG 6	182.40	20.00	0.00	0.00	0.00	0.00	182.40	20.00
	JG 16	127.40	67.00	0.00	0.00	0.00	0.00	127.40	67.00
	JG 11	275.00	44.00	0.00	0.00	0.00	0.00	275.00	44.00
	JAKI 9218	273.00	429.00	0.00	0.00	0.00	0.00	273.00	429.00
	JG 130	344.20	462.00	0.00	0.00	0.00	0.00	344.20	462.00
	RVG 201	42.00	81.00	0.00	0.00	0.00	0.00	42.00	81.00
	RVG 202	90.00	102.00	0.00	0.00	0.00	0.00	90.00	102.00
	RVG 203	35.00	11.00	0.00	0.00	0.00	0.00	35.00	11.00
	RVKG 101	15.00	10.00	0.00	0.00	0.00	0.00	15.00	10.00
	JGK 3	32.00	35.00	0.00	0.00	0.00	0.00	32.00	35.00
	Total	**1416.00**	**1261.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1416.00**	**1261.00**
	Total Pulse Crops	**1448.50**	**1408.03**	**0.00**	**0.00**	**0.00**	**0.00**	**1448.50**	**1408.03**
Oilseed Crops	**Soybean**								
	JS95-60	2500.00	539.19	0.00	0.00	0.00	0.00	2500.00	539.19
	JS93-05	1000.00	316.26	0.00	0.00	0.00	0.00	1000.00	316.26
	JS 335	500.00	226.00	0.00	0.00	0.00	0.00	500.00	226.00
	RVS2001-4	150.00	447.51	0.00	0.00	0.00	0.00	150.00	447.51
	Total	**4150.00**	**1528.96**	**0.00**	**0.00**	**0.00**	**0.00**	**4150**	**1528.96**
	Groundnut								
	JGN 23	6.00	0.70	0.00	0.00	0.00	0.00	6.00	0.70
	Total	**6.00**	**0.70**	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**0.70**
	Mustard								
	JM3	15.65	15.94	0.00	0.00	0.00	0.00	15.65	15.94
	RVM 2	4.00	33.00	0.00	0.00	0.00	0.00	4.00	33.00
	PM 30	0.00	4.40	0.00	0.00	0.00	0.00	0.00	4.40
	PM 28	0.00	1.77	0.00	0.00	0.00	0.00	0.00	1.77
	Total	**19.65**	**55.11**	**0.00**	**0.00**	**0.00**	**0.00**	**19.65**	**55.11**
	Toria								
	JMT 689	3.00	8.87	0.00	0.00	0.00	0.00	3.00	8.87
	Total	**3.00**	**8.87**	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**8.87**
	Safflower								
	JSF 99	2.50	1.40	0.00	0.00	0.00	0.00	2.50	1.40
	JSF 1	3.30	2.80	0.00	0.00	0.00	0.00	3.30	2.80
	Total	**5.80**	**4.20**	**0.00**	**0.00**	**0.00**	**0.00**	**5.80**	**4.20**
	Total Oilseed Crops	**4184.45**	**1597.84**	**0.00**	**0.00**	**0.00**	**0.00**	**4184.45**	**1597.84**
Fibre Crops	**Cotton**								
	K 2 MB	0.25	0.09	0.00	0.00	0.00	0.00	0.25	0.09
	RIBA B 50 (P)	0.25	0.02	0.00	0.00	0.00	0.00	0.25	0.02
	VIKRAM	0.25	0.07	0.00	0.00	0.00	0.00	0.25	0.07
	JK 5	0.25	2.62	0.00	0.00	0.00	0.00	0.25	2.62
	JAWAHAR TAPTI	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.41
	KH 11 (P)	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.05
	JK 4	0.00	1.86	0.00	0.00	0.00	0.00	0.00	1.86
	Suraj	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.61
	Total	**1.00**	**5.73**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**5.73**
	Total Fibre Crops	**1.00**	**5.73**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**5.73**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Forage crops	**Sorghum**								
	MP Chari	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**4.00**	**3.00**	**4.00**
	Total Forage Crops	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**4.00**	**3.00**	**4.00**
	Grand Total (Gwalior)	**5776.95**	**3834.65**	**0.00**	**0.00**	**753.00**	**2791.25**	**6529.95**	**6625.90**
ICAR Institute									
40. VPKAS, Almora									
Cereal Crops	**Rice**								
	Vivek Dhan 62	0.90	1.50	0.00	0.00	0.00	0.00	0.90	1.50
	VL Dhan 65	0.90	1.55	0.00	0.00	0.00	0.00	0.90	1.55
	VL Dhan 85	1.35	2.25	0.00	0.00	0.00	0.00	1.35	2.25
	VL Dhan 86	0.05	1.75	0.00	0.00	0.00	0.00	0.05	1.75
	VL Dhan 208	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.60
	VL Dhan 209	0.00	0.00	0.00	0.00	0.00	1.30	0.00	1.30
	Total	**3.20**	**7.05**	**0.00**	**0.00**	**0.00**	**1.90**	**3.20**	**8.95**
	Wheat								
	VL Gehun 616	3.00	2.00	0.00	0.00	0.00	0.00	3.00	2.00
	VL Gehun 892	18.00	20.40	0.00	0.00	0.00	0.00	18.00	20.40
	VL Genhu 829	33.00	23.10	0.00	0.00	0.00	0.00	33.00	23.10
	VL Gehun 907	33.00	35.00	0.00	0.00	0.00	0.00	33.00	35.00
	VL Genhu 802	9.00	2.00	0.00	0.00	0.00	0.00	9.00	2.00
	Total	**96.00**	**82.50**	**0.00**	**0.00**	**0.00**	**0.00**	**96.00**	**82.50**
	Maize								
	Vivek Sankul Makka 31	0.60	1.20	0.00	0.00	0.00	0.00	0.60	1.20
	Vivek Sankul Makka 35	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	VL Amber Poprorn	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.60
	V 373	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
	VQL 2	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	Total	**0.60**	**1.20**	**0.00**	**0.00**	**0.00**	**2.25**	**0.60**	**3.45**
	Finger Millet								
	VL Mandua 324	0.10	0.70	0.00	0.00	0.00	0.00	0.10	0.70
	VL Mandua 347	0.30	0.60	0.00	0.00	0.00	0.00	0.30	0.60
	VL Mandua 352	6.00	4.50	0.00	0.00	0.00	0.00	6.00	4.50
	Total	**6.40**	**5.80**	**0.00**	**0.00**	**0.00**	**0.00**	**6.40**	**5.80**
	Barley								
	VL Jan 118	5.00	5.50	0.00	0.00	0.00	0.00	5.00	5.50
	Total	**5.00**	**5.50**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**5.50**
	Barnyard millet								
	VL Madira 181	0.12	0.15	0.00	0.00	0.00	0.00	0.12	0.15
	VL Madira 207	0.05	0.70	0.00	0.00	0.00	0.00	0.05	0.70
	Total	**0.17**	**0.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.17**	**0.85**
	Amaranth								
	VL Chau 44	0.04	0.15	0.00	0.00	0.00	0.00	0.04	0.15
	Total	**0.04**	**0.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.15**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Buckwheat								
	VL Ugal 7	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**0.00**	**0.15**
	Total Cereal Crops	**111.41**	**103.05**	**0.00**	**0.00**	**0.00**	**4.30**	**111.41**	**107.35**
Pulse Crops	**Lentil**								
	VL Masoor 125	3.00	1.80	0.00	0.00	0.00	0.00	3.00	1.80
	VL Masoor 126	0.00	0.00	0.00	0.00	0.00	4.10	0.00	4.10
	VL Masoor 133	0.50	0.80	0.00	0.00	0.00	0.00	0.50	0.80
	VL Masoor 507	3.00	2.55	0.00	0.00	0.00	0.00	3.00	2.55
	VL Masoor 514	4.00	2.50	0.00	0.00	0.00	0.00	4.00	2.50
	Total	**10.50**	**7.65**	**0.00**	**0.00**	**0.00**	**4.10**	**10.50**	**11.75**
	Pigeonpea								
	VL Arhar 1	3.40	3.00	0.00	0.00	0.00	0.00	3.40	3.00
	Total	**3.40**	**3.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.40**	**3.00**
	Horsegram								
	VL Gahat 19	0.20	1.20	0.00	0.00	0.00	0.00	0.20	1.20
	Total	**0.20**	**1.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**1.20**
	Rajmash								
	VL Rajmash 63	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.00**	**0.07**
	Total Pulse Crops	**14.10**	**11.85**	**0.00**	**0.00**	**0.00**	**4.17**	**14.10**	**16.02**
Oilseed Crops	**Soybean**								
	VL Soya 47	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	VL Soya (Bhatt) 65	3.68	7.50	0.00	0.00	0.00	0.00	3.68	7.50
	VL Soya 63	0.00	0.00	0.00	0.00	0.00	1.50	0.00	1.50
	Total	**3.68**	**7.50**	**0.00**	**0.00**	**0.00**	**3.50**	**3.68**	**11.00**
	Toria								
	LV Toria 3	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	Total	**0.10**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**
	Total Oilseed Crops	**3.78**	**7.60**	**0.00**	**0.00**	**0.00**	**3.50**	**3.78**	**11.10**
	Grand Total (Almora)	**129.29**	**122.50**	**0.00**	**0.00**	**0.00**	**11.97**	**129.29**	**134.47**
41. IIPR, Kanpur									
Pulse Crops	**Chickpea**								
	Shubhra	30.00	30.00	0.00	0.00	2.00	5.25	32.00	35.25
	Ujjwala	30.00	30.00	0.00	0.00	2.00	5.30	32.00	35.30
	DCP 92-3	0.00	0.00	0.00	0.00	2.00	2.78	2.00	2.78
	JG 16	0.00	0.00	0.00	0.00	5.00	55.50	5.00	55.50
	Total	**60.00**	**60.00**	**0.00**	**0.00**	**11.00**	**68.83**	**71.00**	**128.83**
	Field pea								
	Aman	15.00	36.00	0.00	0.00	5.00	5.00	20.00	41.00
	Adarsh	10.00	17.20	0.00	0.00	5.00	5.00	15.00	22.20
	Prakash	22.00	40.00	0.00	0.00	2.00	4.00	24.00	44.00
	Vikash	23.60	57.50	0.00	0.00	0.00	0.00	23.60	57.50
	IPF 4-9	10.00	30.00	0.00	0.00	0.00	0.00	10.00	30.00
	IPFD 10-12	10.00	23.00	0.00	0.00	0.00	0.00	10.00	23.00
	Total	**90.60**	**203.70**	**0.00**	**0.00**	**12.00**	**14.00**	**102.60**	**217.70**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Pigeonpea								
	IPA 203	6.00	15.00	0.00	0.00	2.00	6.50	8.00	21.50
	Total	**6.00**	**15.00**	**0.00**	**0.00**	**2.00**	**6.50**	**8.00**	**21.50**
	Lentil								
	DPL 62 (Sheri)	5.00	5.10	0.00	0.00	0.00	0.00	5.00	5.10
	IPL 406 (Angoori)	5.00	5.25	0.00	0.00	0.00	0.00	5.00	5.25
	IPL 316	15.00	15.00	0.00	0.00	3.00	3.00	18.00	18.00
	Total	**25.00**	**25.35**	**0.00**	**0.00**	**3.00**	**3.00**	**28.00**	**28.35**
	Mung								
	Samrat	10.00	10.00	0.00	0.00	2.00	5.50	12.00	15.50
	IPM 02-3	18.00	18.10	0.00	0.00	2.00	5.00	20.00	23.10
	IPM 02-14	10.00	10.40	0.00	0.00	2.00	4.00	12.00	14.40
	Meha	8.42	11.00	0.00	0.00	2.00	2.80	10.42	13.80
	Total	**46.42**	**49.50**	**0.00**	**0.00**	**8.00**	**17.30**	**54.42**	**66.80**
	Urd								
	Uttara	7.00	10.00	0.00	0.00	2.00	8.25	9.00	18.25
	IPU 02-43	10.00	11.00	0.00	0.00	2.00	5.30	12.00	16.30
	Total	**17.00**	**21.00**	**0.00**	**0.00**	**4.00**	**13.55**	**21.00**	**34.55**
	Rajmash								
	Amber	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.10
	Utkarsh	1.00	0.55	0.00	0.00	0.00	0.00	1.00	0.55
	PDR 14	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.10
	Total	**1.00**	**0.75**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.75**
	Total Pulse Crops	**246.02**	**375.30**	**0.00**	**0.00**	**40.00**	**123.18**	**286.02**	**498.48**
	Grand Total (Kanpur)	**246.02**	**375.30**	**0.00**	**0.00**	**40.00**	**123.18**	**286.02**	**498.48**
42. IGFRI , Jhansi									
Forage crops	**Berseem**								
	BB 3	3.50	3.00	0.00	0.00	0.00	0.00	3.50	3.00
	BB	0.45	2.00	0.00	0.00	0.00	0.00	0.45	2.00
	Wardan	2.35	4.50	0.00	0.00	0.00	0.00	2.35	4.50
	Total	**6.30**	**9.50**	**0.00**	**0.00**	**0.00**	**0.00**	**6.30**	**9.50**
	Oat								
	JHO 2000-4	5.00	5.30	0.00	0.00	0.00	0.00	5.00	5.30
	JHO 99 2	22.40	20.60	0.00	0.00	0.00	0.00	22.40	20.60
	JHO 99-1	4.00	4.00	0.00	0.00	0.00	0.00	4.00	4.00
	JHO 882	30.00	26.24	0.00	0.00	0.00	0.00	30.00	26.24
	JHO 851	6.00	7.74	0.00	0.00	0.00	0.00	6.00	7.74
	Kent	101.60	107.25	0.00	0.00	0.00	0.00	101.60	107.25
	Total	**169.00**	**171.13**	**0.00**	**0.00**	**0.00**	**0.00**	**169.00**	**171.13**
	Sorghum								
	MP Chari	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**0.00**	**5.00**
	Cowpea								
	EC 4216	0.65	1.75	0.00	0.00	0.00	0.00	0.65	1.75
	BL 1	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.32
	BL 2	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.22
	Total	**0.65**	**1.75**	**0.00**	**0.00**	**0.00**	**0.54**	**0.65**	**2.29**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Gur								
	BG 1	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25
	BG 2	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.60
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.85**	**0.00**	**0.85**
	Maize								
	African Tall	0.00	0.00	0.00	0.00	0.00	1.75	0.00	1.75
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.75**	**0.00**	**1.75**
	Total Forage Crops	**175.95**	**182.38**	**0.00**	**0.00**	**0.00**	**8.14**	**175.95**	**190.52**
	Grand Total (Jhansi)	**175.95**	**182.38**	**0.00**	**0.00**	**0.00**	**8.14**	**175.95**	**190.52**
43. CRIJAF, Barrackpore									
Fibre Crops	**Jute**								
	JRO 2407	0.20	0.22	0.00	0.00	0.00	0.00	0.20	0.22
	CO 58	0.20	0.26	0.00	0.00	0.00	0.00	0.20	0.26
	JROG-1	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	JRC 517	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	IRA (JBO 2003 H)	0.30	0.35	0.00	0.00	0.00	0.00	0.30	0.35
	JRO 204	2.16	2.40	0.00	0.00	0.00	0.00	2.16	2.40
	S 19 (SUBALA)	0.15	0.20	0.00	0.00	0.00	0.00	0.15	0.20
	JRO 128	1.00	1.40	0.00	0.00	0.00	0.00	1.00	1.40
	JRO 8432	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	JRO 66	0.25	0.30	0.00	0.00	0.00	0.00	0.25	0.30
	JRO 524	5.87	5.90	0.00	0.00	0.00	0.00	5.87	5.90
	JRO 878	0.28	0.32	0.00	0.00	0.00	0.00	0.28	0.32
	JRC 212	0.03	0.10	0.00	0.00	0.00	0.00	0.03	0.10
	JRC 321	0.20	0.26	0.00	0.00	0.00	0.00	0.20	0.26
	Total	**10.84**	**12.01**	**0.00**	**0.00**	**0.00**	**0.00**	**10.84**	**12.01**
	Mesta								
	M.T. 150	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.24
	AMC 108	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.25
	HC 583	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.16
	HS 7910	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.18
	HS 4288	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.15
	Total	**0.00**	**0.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.98**
	Sunnhemp								
	SUIN 037	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.05
	K 12 (yellow)	0.00	0.1	0.00	0.00	0.00	0.00	0.00	0.10
	Total	**0.00**	**0.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**
	Total Fibre Crops	**10.84**	**13.14**	**0.00**	**0.00**	**0.00**	**0.00**	**10.84**	**13.14**
	Grand Total (Barrackpore)	**10.84**	**13.14**	**0.00**	**0.00**	**0.00**	**0.00**	**10.84**	**13.14**
44. CAZRI, Jodhpur									
Pulse Crops	**Mothbean**								
	CAZRI Moth 2	5.00	2.88	0.00	0.00	0.00	0.00	5.00	2.88
	Total	**5.00**	**2.88**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**2.88**
	Total Cereal Crops	**5.00**	**2.88**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**2.88**
	Grand Total (Jodhpur)	**5.00**	**2.88**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**2.88**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
45. CRRI, Cuttack									
Cereal Crops	**Rice**								
	CR Dhan 401	3.50	4.20	0.00	0.00	0.00	0.00	3.50	4.20
	CR Dhan 404	0.00	0.00	0.00	0.00	2.00	2.10	2.00	2.10
	CR Dhan 407	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30
	CR Dhan 502	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30
	CR Dhan 505	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	CR Dhan 907	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30
	CR Dhan 500	3.20	4.00	0.00	0.00	5.00	6.00	8.20	10.00
	CR Dhan 70 (Hanseswari)	0.30	0.20	0.00	0.00	0.00	0.00	0.30	0.20
	CR Sugand dhan 3	3.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00
	CR 1014	0.30	3.00	0.00	0.00	0.00	0.00	0.30	3.00
	Dharitri	7.20	5.40	0.00	0.00	0.00	0.00	7.20	5.40
	Durga	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	Gayatri	5.20	5.40	0.00	0.00	6.00	6.00	11.20	11.40
	Geetanjali	12.60	15.00	0.00	0.00	0.00	0.00	12.60	15.00
	Ketakijoha	0.00	0.00	0.00	0.00	2.50	2.70	2.50	2.70
	Luna Sampad	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Luna Suvarna	1.00	1.50	0.00	0.00	0.00	0.00	1.00	1.50
	Lunishree	2.00	5.10	0.00	0.00	0.00	0.00	2.00	5.10
	Moti	0.00	1.80	0.00	0.00	0.00	0.00	0.00	1.80
	Nua Chinikamini	0.60	2.70	0.00	0.00	0.00	0.00	0.60	2.70
	Nua Kalajeera	3.00	1.00	0.00	0.00	0.00	0.00	3.00	1.00
	Padmini	0.00	0.00	0.00	0.00	2.50	2.50	2.50	2.50
	Pooja	8.70	10.00	0.00	0.00	20.00	20.00	28.70	30.00
	Poorna Bhog	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Ranjit	0.00	0.00	0.00	0.00	3.30	3.30	3.30	3.30
	Sarala	0.30	2.40	0.00	0.00	0.00	0.00	0.30	2.40
	Savitri	5.50	5.50	0.00	0.00	10.00	10.00	15.50	15.50
	Swarna Sub 1	336.00	340.00	0.00	0.00	0.00	0.00	336.00	340.00
	Utkalprava	2.00	4.00	0.00	0.00	0.00	0.00	2.00	4.00
	Varshadhan	29.00	33.00	0.00	0.00	4.00	4.00	33.00	37.00
	Annada	10.50	10.50	0.00	0.00	0.00	0.00	10.50	10.50
	CR Boro Dhan 2	20.50	21.00	0.00	0.00	0.00	0.00	20.50	21.00
	CR Dhan 10	20.70	21.00	0.00	0.00	0.00	0.00	20.70	21.00
	CR Dhan 405	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	CR Dhan 601	21.50	21.50	0.00	0.00	0.00	0.00	21.50	21.50
	Jaldi Dhan 6	3.00	0.60	0.00	0.00	0.00	0.00	3.00	0.60
	Khitish	16.00	16.10	0.00	0.00	0.00	0.00	16.00	16.10
	Naveen	115.00	114.00	0.00	0.00	0.00	0.00	115.00	114.00
	Ratna	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30
	Shatabdi	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	Sahabhagidhan	0.00	0.00	0.00	0.00	4.50	4.50	4.50	4.50
	Improved Tapaswani	0.00	0.00	0.00	0.00	1.50	1.50	1.50	1.50
	Improved Lalat	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	Total	**682.10**	**703.40**	**0.00**	**0.00**	**64.10**	**65.40**	**746.20**	**768.80**
	Total Cereal Crops	**682.10**	**703.40**	**0.00**	**0.00**	**64.10**	**65.40**	**746.20**	**768.80**
	Grand Total (Cuttack)	**682.10**	**703.40**	**0.00**	**0.00**	**64.10**	**65.40**	**746.20**	**768.80**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
46. ICAR-IIRR, Hyderabad									
Cereal Crops	**Rice**								
	DRR Dhan 44	10.00	80.00	0.00	0.00	0.00	0.00	10.00	80.00
	DRR Dhan 41	10.00	10.00	0.00	0.00	10.00	85.00	20.00	95.00
	IET-23832 (RP 5886 HP3 IR 80463-B39)	1.50	1.50	0.00	0.00	0.00	0.00	1.50	1.50
	IET 23420 (RP 533-41-2-3-IR-83383-B)	1.50	1.50	0.00	0.00	0.00	0.00	1.50	1.50
	IR-64 (DROUGHT)	16.00	50.00	0.00	0.00	10.00	15.00	26.00	65.00
	Akshayadhan (IET 19367)	0.70	1.00	0.00	0.00	0.00	0.00	0.70	1.00
	Basmati Kasturi (IET 8580)	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Dhanrasi (IET 15358)	0.30	1.00	0.00	0.00	0.00	0.00	0.30	1.00
	Improved Samba Mahsuri	33.10	65.00	0.00	0.00	5.00	10.00	38.10	75.00
	Jarava(IET 15420)	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Jaya	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Krishna Hamsa	0.50	2.40	0.00	0.00	0.00	0.00	0.50	2.40
	Masuri	3.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00
	Rasi (IET 1444)	1.50	3.00	0.00	0.00	0.00	0.00	1.50	3.00
	Sampada (IET 19424)	33.00	33.00	0.00	0.00	0.00	0.00	33.00	33.00
	Varadhan (IET 18940)	3.00	4.20	0.00	0.00	0.00	0.00	3.00	4.20
	Total	**126.10**	**267.60**	**0.00**	**0.00**	**25.00**	**110.00**	**151.10**	**377.60**
	Total Cereal Crops	**126.10**	**267.60**	**0.00**	**0.00**	**25.00**	**110.00**	**151.10**	**377.60**
	Grand Total (Hyderabad)	**126.10**	**267.60**	**0.00**	**0.00**	**25.00**	**110.00**	**151.10**	**377.60**
47. IIMR, Hyderabad									
Cereal Crops	**Sorghum**								
	296A	0.80	2.00	0.00	0.00	0.00	0.00	0.80	2.00
	296B	0.50	1.00	0.00	0.00	0.00	0.00	0.50	1.00
	CS 3541	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	C 43	0.30	6.00	0.00	0.00	0.00	0.00	0.30	6.00
	CSV 15	2.50	5.00	0.00	0.00	0.00	0.00	2.50	5.00
	CSV 20	5.50	20.00	0.00	0.00	20.00	81.00	25.50	101.00
	CSV 24SS	5.50	6.00	0.00	0.00	0.00	0.00	5.50	6.00
	CSV 27	0.15	1.00	0.00	0.00	10.00	40.00	10.15	41.00
	38 A	0.70	1.00	0.00	0.00	0.00	0.00	0.70	1.00
	38 B	0.10	0.50	0.00	0.00	0.00	0.00	0.10	0.50
	SSV 84	0.10	2.00	0.00	0.00	0.00	0.00	0.10	2.00
	279A	0.60	1.00	0.00	0.00	0.00	0.00	0.60	1.00
	279B	0.50	1.00	0.00	0.00	0.00	0.00	0.50	1.00
	CB 11	0.50	1.00	0.00	0.00	0.00	0.00	0.50	1.00
	415A	0.80	1.00	0.00	0.00	0.00	0.00	0.80	1.00
	415B	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	CB 33	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Bundela	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.00
	CSV 29R	0.00	5.00	0.00	0.00	15.00	25.00	15.00	30.00
	CSV 23	0.00	5.00	0.00	0.00	15.00	56.00	15.00	61.00
	P Suchitra	0.00	5.00	0.00	0.00	5.00	12.00	5.00	17.00

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	P Revati	0.00	5.00	0.00	0.00	5.00	10.00	5.00	15.00
	MP Chari	0.00	5.00	0.00	0.00	5.00	5.00	5.00	10.00
	CSV 26	0.20	1.00	0.00	0.00	0.00	0.00	0.20	1.00
	CSH 13	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	CSH 24MF	0.00	0.00	0.00	0.00	14100.00	13500.00	14100.00	13500.00
	CSV 17	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
	CSV 13	0.30	0.40	0.00	0.00	0.00	0.00	0.30	0.40
	Total	**21.15**	**77.90**	**0.00**	**0.00**	**14180.00**	**13834.00**	**14201.15**	**13911.90**
	Total Cereal Crops	**21.15**	**77.90**	**0.00**	**0.00**	**14180.00**	**13834.00**	**14201.15**	**13911.90**
	Grand Total (Hyderabad)	**21.15**	**77.90**	**0.00**	**0.00**	**14180.00**	**13834.00**	**14201.15**	**13911.90**
	* Production through licensing and commercialization by licensee through MoU								
48. CICR, Nagpur (Coimbatore)									
Fiber Crops	**Cotton**								
	Suraj (CCH 510-4)	0.15	0.30	0.00	0.00	0.00	0.00	0.15	0.30
	Sumangala (CWROK 165)	0.01	0.05	0.00	0.00	0.00	0.00	0.01	0.05
	Surabhi (VRS 7)	0.11	0.50	0.00	0.00	0.00	0.00	0.11	0.50
	MCU 5 -VT	0.10	0.50	0.00	0.00	0.00	0.00	0.10	0.50
	Total	**0.37**	**1.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**	**1.35**
	Total Fiber Crops	**0.37**	**1.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**	**1.35**
	Grand Total (Nagpur)	**0.37**	**1.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**	**1.35**
49. IARI, Karnal									
Cereal Crops	**Rice**								
	Pusa 44	36.50	40.00	0.00	0.00	0.00	0.00	36.50	40.00
	Pusa Basmati 1	21.00	24.00	0.00	0.00	0.00	0.00	21.00	24.00
	Improved PB 1	18.00	21.00	0.00	0.00	0.00	0.00	18.00	21.00
	PB 1121	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	PB 1509	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	Pusa Basmati 6	20.00	22.00	0.00	0.00	0.00	0.00	20.00	22.00
	Pusa Sugandh 5	20.00	22.00	0.00	0.00	0.00	0.00	20.00	22.00
	Pusa Sugandh 2	4.50	5.00	0.00	0.00	0.00	0.00	4.50	5.00
	Pusa Sugandh 3	1.60	4.00	0.00	0.00	0.00	0.00	1.60	4.00
	Pusa 6 (Pusa 1612)	1.50	1.50	0.00	0.00	0.00	0.00	1.50	1.50
	Pusa 1592	14.00	14.00	0.00	0.00	0.00	0.00	14.00	14.00
	Total	**237.10**	**253.50**	**0.00**	**0.00**	**0.00**	**0.00**	**237.10**	**253.50**
	Wheat								
	HD 2851	121.60	122.00	0.00	0.00	0.00	0.00	121.60	122.00
	HD 2894	87.40	87.40	0.00	0.00	0.00	0.00	87.40	87.40
	HD 2967	405.00	410.00	0.00	0.00	0.00	0.00	405.00	410.00
	HD 3086	269.40	500.00	0.00	0.00	0.00	0.00	269.40	500.00
	HD 3059	32.80	35.00	0.00	0.00	0.00	0.00	32.80	35.00
	WR 544	28.00	30.00	0.00	0.00	0.00	0.00	28.00	30.00
	HS 490	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	HS 507	65.00	70.00	0.00	0.00	0.00	0.00	65.00	70.00
	HS 375	0.00	20.00	0.00	0.00	0.00	0.00	0.00	20.00
	Total	**1019.20**	**1284.40**	**0.00**	**0.00**	**0.00**	**0.00**	**1019.20**	**1284.40**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
	Pearlmillet								
	PC 443	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	PC 701	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	PC 612	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	Total	**0.30**	**0.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.90**
	Barley								
	BHS 400	1.00	3.00	0.00	0.00	0.00	**0.00**	1.00	3.00
	Total	**1.00**	**3.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**3.00**
	Total Cereal Crops	**1257.60**	**1541.80**	**0.00**	**0.00**	**0.00**	**0.00**	**1257.60**	**1541.80**
Pulse Crops	**Lentil**								
	L 4147	3.75	4.75	0.00	0.00	0.00	0.00	3.75	4.75
	L 4076	2.50	5.00	0.00	0.00	0.00	0.00	2.50	5.00
	Total	**6.25**	**9.75**	**0.00**	**0.00**	**0.00**	**0.00**	**6.25**	**9.75**
	Mung								
	Pusa 9531	1.50	4.64	0.00	0.00	0.00	0.00	1.50	4.64
	Pusa Vishal	9.00	12.30	0.00	0.00	0.00	0.00	9.00	12.30
	Pusa 0672	9.00	6.17	0.00	0.00	0.00	0.00	9.00	6.17
	Total	**19.50**	**23.11**	**0.00**	**0.00**	**0.00**	**0.00**	**19.50**	**23.11**
	Pigeon pea								
	Pusa 2001	0.50	1.00	0.00	0.00	0.00	0.00	0.50	1.00
	Pusa 2002	3.90	3.00	0.00	0.00	0.00	0.00	3.90	3.00
	Total	**4.40**	**4.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.40**	**4.00**
	Lathyrus								
	Bio L 212 (Rattan)	2.00	2.80	0.00	0.00	0.00	0.00	2.00	2.80
	Total	**2.00**	**2.80**	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**2.80**
	Total Pulse Crops	**32.15**	**39.66**	**0.00**	**0.00**	**0.00**	**0.00**	**32.15**	**39.66**
Oilseed Crops	**Mustard**								
	P.Bold	7.91	25.34	0.00	0.00	0.00	0.00	7.91	25.34
	P.Jaikisan	2.43	2.61	0.00	0.00	0.00	0.00	2.43	2.61
	P.Mahak	5.20	5.20	0.00	0.00	0.00	0.00	5.20	5.20
	P.Vijay	2.05	4.00	0.00	0.00	0.00	0.00	2.05	4.00
	P.Bahar	0.00	1.63	0.00	0.00	0.00	0.00	0.00	1.63
	P.M.-24	1.00	2.10	0.00	0.00	0.00	0.00	1.00	2.10
	P.M.-21	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	P.M.-22	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	P.Agrani	0.00	1.26	0.00	0.00	0.00	0.00	0.00	1.26
	P.Jaganath	0.10	1.95	0.00	0.00	0.00	0.00	0.10	1.95
	Total	**18.69**	**46.09**	**0.00**	**0.00**	**0.00**	**0.00**	**18.69**	**46.09**
	Total Oilseed Crops	**18.69**	**46.09**	**0.00**	**0.00**	**0.00**	**0.00**	**18.69**	**46.09**
Forage Corps	**Sorghum**								
	PC 9	0.50	5.00	0.00	0.00	0.00	0.00	0.50	5.00
	PC 23	0.00	6.15	0.00	0.00	0.00	0.00	0.00	6.15
	Total	**0.50**	**11.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**11.15**
	Total Forage Crops	**0.50**	**11.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**11.15**
	Grand Total (Karnal)	**1308.94**	**1638.70**	**0.00**	**0.00**	**0.00**	**0.00**	**1308.94**	**1638.70**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
50. IARI, New Delhi									
Cereal Crops	**Paddy**								
	Pusa Basmati-1	20.00	20.60	0.00	0.00	0.00	0.00	20.00	20.60
	Pusa Basmati 1121	50.00	61.60	0.00	0.00	0.00	0.00	50.00	61.60
	Pusa Basmati 6 (Pusa 401)	17.00	26.40	0.00	0.00	0.00	0.00	17.00	26.40
	Pusa Basmati - 1509	50.00	60.20	0.00	0.00	0.00	0.00	50.00	60.20
	Pusa – 6 (Pusa -1612)	0.00	0.00	0.00	0.00	5.00	7.90	5.00	7.90
	Pusa Sugandh 5	20.00	21.00	0.00	0.00	0.00	0.00	20.00	21.00
	Total	**157.00**	**189.80**	**0.00**	**0.00**	**5.00**	**7.90**	**162.00**	**197.70**
	Wheat								
	HD 2864	20.00	14.80	0.00	0.00	0.00	0.00	20.00	14.80
	HD 2967	659.60	670.60	0.00	0.00	0.00	0.00	659.60	670.60
	HD 3043	183.80	66.80	0.00	0.00	0.00	0.00	183.80	66.80
	HD 3059	0.00	0.00	0.00	0.00	10.00	13.70	10.00	13.70
	HD 3086	0.00	0.00	0.00	0.00	350.00	400.00	350.00	400.00
	HD 3118	0.00	0.00	0.00	0.00	20.00	19.40	20.00	19.40
	Total	**863.40**	**752.20**	**0.00**	**0.00**	**380.00**	**433.10**	**1243.40**	**1185.30**
	Total Cereal Crops	**1020.40**	**942.00**	**0.00**	**0.00**	**385.00**	**441.00**	**1405.40**	**1383.00**
Pulse Crops	**Mung**								
	Pusa Vishal	9.00	22.30	0.00	0.00	0.00	0.00	9.00	22.30
	P 9531	1.50	5.60	0.00	0.00	0.00	0.00	1.50	5.60
	P 672	9.00	13.20	0.00	0.00	0.00	0.00	9.00	13.20
	Total	**19.50**	**41.10**	**0.00**	**0.00**	**0.00**	**0.00**	**19.50**	**41.10**
	Pigeon pea								
	P 991	0.00	0.00	0.00	0.00	10.00	10.90	10.00	10.90
	P 992	0.00	0.00	0.00	0.00	12.00	12.55	12.00	12.55
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**22.00**	**23.45**	**22.00**	**23.45**
	Lentil								
	Pusa Vaibhav	3.80	4.50	0.00	0.00	0.00	0.00	3.80	4.50
	Pusa Shivalik	2.50	3.00	0.00	0.00	0.00	0.00	2.50	3.00
	Total	**6.30**	**7.50**	**0.00**	**0.00**	**0.00**	**0.00**	**6.30**	**7.50**
	Total Pulse Crops	**25.80**	**48.60**	**0.00**	**0.00**	**22.00**	**23.45**	**47.80**	**72.05**
Oilseed Crops	**Soybean**								
	P 9712	15.00	0.70	0.00	0.00	0.00	0.00	15.00	0.70
	Total	**15.00**	**0.70**	**0.00**	**0.00**	**0.00**	**0.00**	**15.00**	**0.70**
	Mustard								
	PM 25	8.90	8.90	0.00	0.00	0.00	0.00	8.90	8.90
	PM 26	0.22	2.85	0.00	0.00	0.00	0.00	0.22	2.85
	PM 27	1.52	1.39	0.00	0.00	0.00	0.00	1.52	1.39
	PM 28	3.20	8.39	0.00	0.00	0.00	0.00	3.20	8.39
	PM 29	0.07	0.10	0.00	0.00	0.00	0.00	0.07	0.10
	PM 30	0.41	6.00	0.00	0.00	0.00	0.00	0.41	6.00
	Pusa Vijay	2.05	4.00	0.00	0.00	0.00	0.00	2.05	4.00
	Pusa Tarak	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Total	**17.37**	**33.63**	**0.00**	**0.00**	**0.00**	**0.00**	**17.37**	**33.63**
	Total Oilseed Crops	**32.37**	**34.33**	**0.00**	**0.00**	**0.00**	**0.00**	**32.37**	**34.33**
Grand Total (IARI, New Delhi)		**1078.57**	**1024.93**	**0.00**	**0.00**	**407.00**	**464.45**	**1485.57**	**1489.38**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
51. ICAR RC NEH, Manipur									
Cereal Crops	**Paddy**								
	RC Maniphou 4	0.00	0.00	0.00	0.00	0.60	0.80	0.60	0.80
	RC Maniphou 5	0.00	0.00	0.00	0.00	0.80	1.00	0.80	1.00
	RC Maniphou 6	0.00	0.00	0.00	0.00	0.45	0.50	0.45	0.50
	RC Maniphou 7	0.00	0.00	0.00	0.00	11.00	12.00	11.00	12.00
	RC Maniphou 10	0.00	0.00	0.00	0.00	6.00	8.00	6.00	8.00
	RC Maniphou 11	0.00	0.00	0.00	0.00	0.80	1.00	0.80	1.00
	RC Maniphou 12	0.00	0.00	0.00	0.00	12.00	15.00	12.00	15.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**31.65**	**38.30**	**31.65**	**38.30**
	Maize								
	Pusa composite 3	0.00	0.00	0.00	0.00	0.80	1.00	0.80	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.80**	**1.00**	**0.80**	**1.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**32.45**	**39.30**	**32.45**	**39.30**
Oilseed Crops	**Groundnut**								
	ICGS 76	0.00	0.00	0.00	0.00	0.45	0.50	0.45	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.45**	**0.50**	**0.45**	**0.50**
	Soybean								
	JS 335	0.00	0.00	0.00	0.00	0.25	0.30	0.25	0.30
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.30**	**0.25**	**0.30**
	Toria								
	M27	0.00	0.00	0.00	0.00	0.85	1.00	0.85	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.85**	**1.00**	**0.85**	**1.00**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**1.55**	**1.80**	**1.55**	**1.80**
Grand Total (ICAR RC, Manipur)		**0.00**	**0.00**	**0.00**	**0.00**	**34.00**	**41.10**	**34.00**	**41.10**
52. ICAR RC NEH, Meghalaya									
Cereal Crops	**Rice**								
	Bhalum-2	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
	Bhalum-3	0.00	0.00	0.00	0.00	0.00	2.50	0.00	2.50
	Bhalum-4	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25
	Bhalum-5	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	Shasarang	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	Lampnah	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.70
	Megha rice 1	0.00	0.00	0.00	0.00	0.00	2.90	0.00	2.90
	Megha rice 2	0.00	0.00	0.00	0.00	0.00	2.90	0.00	2.90
	Megha rice 3	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25
	Megha SA-1	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.40
	Megha SA-2	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.48
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.68**	**0.00**	**14.68**
	Maize								
	RCM 1-76	0.00	0.00	0.00	0.00	0.00	3.00	0.00	3.00
	RCM 1-75	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	RCM 1-2	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25
	RCM 1-1	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25
	RCM 1-3	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	Vijay	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Sweet corn	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.70**	**0.00**	**7.70**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.38**	**0.00**	**22.38**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Lentil**								
	PL-6	0.00	0.00	0.00	0.00	0.20	0.15	0.20	0.15
	NDL-1	0.00	0.00	0.00	0.00	0.50	0.20	0.50	0.20
	Moitree	0.00	0.00	0.00	0.00	0.20	0.15	0.20	0.15
	DPL-62	0.00	0.00	0.00	0.00	0.20	0.15	0.20	0.15
	IPL-81	0.00	0.00	0.00	0.00	0.20	0.15	0.20	0.15
	L-4174	0.00	0.00	0.00	0.00	0.50	0.30	0.50	0.30
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.80**	**1.10**	**1.80**	**1.10**
	Field pea								
	Prakash	0.00	0.00	0.00	0.00	0.50	0.25	0.50	0.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.25**	**0.50**	**0.25**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.30**	**1.35**	**2.30**	**1.35**
Oilseed Crops	**Soybean**								
	RCS 1-1	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	RCS 1-9	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
	RCS 1-10	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	JS 335	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.60**	**0.00**	**0.60**
	Mustard								
	PM-27	0.00	0.00	0.00	0.00	1.00	0.70	1.00	0.70
	PM-26	0.00	0.00	0.00	0.00	0.50	0.30	0.50	0.30
	PM-25	0.00	0.00	0.00	0.00	0.50	0.25	0.50	0.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**1.25**	**2.00**	**1.25**
	Toria								
	TS-67	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**	**0.50**	**0.50**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.50**	**2.35**	**2.50**	**2.35**
	Grand Total (Meghalaya)	**0.00**	**0.00**	**0.00**	**0.00**	**4.80**	**26.08**	**4.80**	**26.08**
53. ICAR RC NEH, Tripura									
Cereal Crops	**Paddy**								
	Gomatidhan	0.00	0.00	0.00	0.00	6.50	50.00	6.50	50.00
	Tripura Khara 1 (IET 22837)	0.00	0.00	0.00	0.00	7.10	5.00	7.10	5.00
	Tripura Khara 2 (IET 22835)	0.00	0.00	0.00	0.00	3.40	5.00	3.40	5.00
	Tripura Jala 1 (IET 22167)	0.00	0.00	0.00	0.00	2.30	5.00	2.30	5.00
	Tripura Chikan Dhan	0.00	0.00	0.00	0.00	16.00	10.00	16.00	10.00
	Tripura Sarat (IET 22113)	0.00	0.00	0.00	0.00	12.40	10.00	12.40	10.00
	Tripura Nirog (IET 22580)	0.00	0.00	0.00	0.00	12.10	10.00	12.10	10.00
	Tripura Hakuchuk 1	0.00	0.00	0.00	0.00	6.00	5.00	6.00	5.00
	Tripura Hakuchuk 2	0.00	0.00	0.00	0.00	6.30	5.00	6.30	5.00
	Tripura Aush (TRC 2013-12)	0.00	0.00	0.00	0.00	4.20	5.00	4.20	5.00
	TRCP-8 (Fieldpea)	0.00	0.00	0.00	0.00	10.00	8.00	10.00	8.00
	Tripura Maskolai 1	0.00	0.00	0.00	0.00	2.00	1.50	2.00	1.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**88.30**	**119.50**	**88.30**	**119.50**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**88.30**	**119.50**	**88.30**	**119.50**
Grand Total (ICAR RC, Tripura)		**0.00**	**0.00**	**0.00**	**0.00**	**88.30**	**119.50**	**88.30**	**119.50**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
54. ICAR-IISS, Mau									
Cereal Crops	**Rice**								
	PBT 5204	5.00	15.00	0.00	0.00	0.00	0.00	5.00	15.00
	MTU 7029	0.00	8.00	0.00	0.00	0.00	0.00	0.00	8.00
	IR 36	6.70	7.00	0.00	0.00	0.00	0.00	6.70	7.00
	IR 64	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Total	**21.70**	**40.00**	**0.00**	**0.00**	**0.00**	**0.00**	**21.70**	**40.00**
	Wheat								
	HD 2733	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	HI 1563	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	HD 3059	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	Total	**20.00**	**22.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**22.00**
	Total Cereal Crops	**41.70**	**62.00**	**0.00**	**0.00**	**0.00**	**0.00**	**41.70**	**62.00**
	Grand Total (MAU)	**41.70**	**62.00**	**0.00**	**0.00**	**0.00**	**0.00**	**41.70**	**62.00**
55. CAU, Imphal									
Cereal Crops	**Paddy**								
	CAU R 1	15.00	15.00	0.00	0.00	0.00	0.00	15.00	15.00
	VAU R 3	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	CAU R 4	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Total	**19.00**	**19.00**	**0.00**	**0.00**	**0.00**	**0.00**	**19.00**	**19.00**
	Total Cereal Crops	**19.00**	**19.00**	**0.00**	**0.00**	**0.00**	**0.00**	**19.00**	**19.00**
	Grand Total (CAU, Imphal)	**19.00**	**19.00**	**0.00**	**0.00**	**0.00**	**0.00**	**19.00**	**19.00**
56. IIWBR, Karnal									
Cereal Crops	**Wheat**								
Wheat	CBW 38	100.00	75.00	0.00	0.00	0.00	0.00	100.00	75.00
	DBW 14	4.00	4.00	0.00	0.00	0.00	0.00	4.00	4.00
	DBW 16	205.20	110.00	0.00	0.00	0.00	0.00	205.20	110.00
	DBW 17	61.00	120.00	0.00	0.00	0.00	0.00	61.00	120.00
	DBW 39	350.40	230.00	0.00	0.00	0.00	0.00	350.40	230.00
	DBW 71	29.20	45.00	0.00	0.00	0.00	0.00	29.20	45.00
	DBW 88	31.40	95.00	0.00	0.00	0.00	0.00	31.40	95.00
	DBW 90	24.40	26.00	0.00	0.00	0.00	0.00	24.40	26.00
	DBW 110	30.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
	DPW 621-50	102.00	185.00	0.00	0.00	0.00	0.00	102.00	185.00
	HD 2967	0.00	222.00	0.00	0.00	0.00	0.00	0.00	222.00
	HD 3086	0.00	200.00	0.00	0.00	0.00	0.00	0.00	200.00
	Total	**937.60**	**1312.00**	**0.00**	**0.00**	**0.00**	**0.00**	**937.60**	**1312.00**
	Barley								
	DWRUB 52	105.00	97.72	0.00	0.00	0.00	0.00	105.00	97.72
	DWRUB 64	11.20	14.48	0.00	0.00	0.00	0.00	11.20	14.48
	DWRB 73	5.00	11.70	0.00	0.00	0.00	0.00	5.00	11.70
	DWRB 91	29.40	0.00	0.00	0.00	0.00	0.00	29.40	0.00
	DWRB 92	4.00	1.20	0.00	0.00	0.00	0.00	4.00	1.20
	DWRB 101	0.00	10.38	0.00	0.00	0.00	0.00	0.00	10.38
	Total	**154.60**	**135.48**	**0.00**	**0.00**	**0.00**	**0.00**	**154.60**	**135.48**
	Total Cereal Crops	**154.60**	**135.48**	**0.00**	**0.00**	**0.00**	**0.00**	**154.60**	**135.48**
Grand Total (IIWBR, Karnal)		**1092.20**	**1447.48**	**0.00**	**0.00**	**0.00**	**0.00**	**1092.20**	**1447.48**
57. IISR, Indore									
Oilseed Crops	**Soybean**								
	NRC 37	150.00	10.80	0.00	0.00	0.00	0.00	150.00	10.80
	NRC 7	50.00	2.50	0.00	0.00	0.00	0.00	50.00	2.50
	NRC 86	30.00	7.00	0.00	0.00	0.00	0.00	30.00	7.00
	JS 95-60	100.00	12.70	0.00	0.00	0.00	0.00	100.00	12.70
	Total	**330.00**	**33.00**	**0.00**	**0.00**	**0.00**	**0.00**	**330.00**	**33.00**
	Total Oilseed Crops	**330.00**	**33.00**	**0.00**	**0.00**	**0.00**	**0.00**	**330.00**	**33.00**
	Grand Total (IISR, Indore)	**330.00**	**33.00**	**0.00**	**0.00**	**0.00**	**0.00**	**330.00**	**33.00**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
58. IIOR, Hyderabad									
Oilseed Crops	**Castor**								
	48-1 (Jwala)	0.20	0.40	0.00	0.00	0.00	0.00	0.20	0.40
	DCS-107	0.20	0.40	0.00	0.00	0.00	0.00	0.20	0.40
	DCS-9	0.40	0.60	0.00	0.00	0.00	0.00	0.40	0.60
	DCS-78	0.30	0.50	0.00	0.00	0.00	0.00	0.30	0.50
	DPC-9	0.50	2.50	0.00	0.00	0.00	0.00	0.50	2.50
	M-574	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	Total	**1.80**	**4.90**	**0.00**	**0.00**	**0.00**	**0.00**	**1.80**	**4.90**
	Sunflower								
	DRSF 108	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	DRSF 113	0.20	0.60	0.00	0.00	0.00	0.00	0.20	0.60
	243 A	0.20	0.60	0.00	0.00	0.00	0.00	0.20	0.60
	243 B	0.15	0.30	0.00	0.00	0.00	0.00	0.15	0.30
	6 D-1	0.04	0.06	0.00	0.00	0.00	0.00	0.04	0.06
	Total	**0.64**	**1.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.64**	**1.66**
	Total Oilseed Crops	**2.44**	**6.56**	**0.00**	**0.00**	**0.00**	**0.00**	**2.44**	**6.56**
Grand Total (IIOR, Hyderabad)		**2.44**	**6.56**	**0.00**	**0.00**	**0.00**	**0.00**	**2.44**	**6.56**
59. IIMR, New Delhi									
Cereal Crops	**Maize**								
	HKI-193-1	15.00	16.00	0.00	0.00	0.00	0.00	15.00	16.00
	HKI-163	5.00	4.00	0.00	0.00	0.00	0.00	5.00	4.00
	BML-6	1.00	2.50	0.00	0.00	0.00	0.00	1.00	2.50
	BML-7	1.00	2.50	0.00	0.00	0.00	0.00	1.00	2.50
	Total	**22.00**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.00**	**25.00**
	Total Cereal Crops	**22.00**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.00**	**25.00**
Grand Total (IIMR, New Delhi)		**22.00**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.00**	**25.00**
60. CCARI, Goa									
Pulse Crops	**Cowpea**								
	Goa Cowpea 3	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
	Total Pulse Crops	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
	Grand Total (CCARI, Goa)	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
61. CIARI, Port Blair									
Cereal Crops	**Rice**								
	CARI Dhan 1	0.06	0.10	0.00	0.00	0.00	0.00	0.06	0.10
	CARI Dhan 2	0.15	0.20	0.00	0.00	0.00	0.00	0.15	0.20
	CARI Dhan 3	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	CARI Dhan 4	0.35	0.40	0.00	0.00	0.00	0.00	0.35	0.40
	CARI Dhan 5	0.25	0.26	0.00	0.00	0.00	0.00	0.25	0.26
	CARI Dhan 6	0.50	0.65	0.00	0.00	0.00	0.00	0.50	0.65
	CARI Dhan 7	0.50	0.47	0.00	0.00	0.00	0.00	0.50	0.47
	CIARI Dhan 8	0.35	0.40	0.00	0.00	0.00	0.00	0.35	0.40
	CIARI Dhan 9	0.90	0.87	0.00	0.00	0.00	0.00	0.90	0.87
	Raneet	0.10	0.20	0.00	0.00	0.00	0.00	0.10	0.20
	SPS26	0.10	0.20	0.00	0.00	0.00	0.00	0.10	0.20
	CSR36	0.30	0.40	0.00	0.00	0.00	0.00	0.30	0.40
	Gaytri	0.25	0.20	0.00	0.00	0.00	0.00	0.25	0.20
	Total	**3.86**	**4.45**	**0.00**	**0.00**	**0.00**	**0.00**	**3.86**	**4.45**
	Total Cereal Crops	**3.86**	**4.45**	**0.00**	**0.00**	**0.00**	**0.00**	**3.86**	**4.45**

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
Pulse Crops	**Mung**								
	CIARI Mung 1	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	CIARI Mung 2	0.10	0.15	0.00	0.00	0.00	0.00	0.10	0.15
	CIARI Mung 3	0.10	0.12	0.00	0.00	0.00	0.00	0.10	0.12
	Total	**0.30**	**0.37**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.37**
	Total Pulse Crops	**0.30**	**0.37**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.37**
	Grand Total (Port Blair)	**4.16**	**4.82**	**0.00**	**0.00**	**0.00**	**0.00**	**4.16**	**4.82**
62. IARI, Pusa, Bihar									
Cereal Crops	**Wheat**								
	HD 2967	280.00	172.10	0.00	0.00	0.00	0.00	280.00	172.10
	HD 2733	280.00	144.60	0.00	0.00	0.00	0.00	280.00	144.60
	HD 2824	90.00	47.40	0.00	0.00	0.00	0.00	90.00	47.40
	HD 2985	105.00	30.60	0.00	0.00	0.00	0.00	105.00	30.60
	HI 1563	500.00	171.00	0.00	0.00	0.00	0.00	500.00	171.00
	HD 3118	0.00	19.50	0.00	0.00	0.00	0.00	0.00	19.50
	HD 1633	0.00	1.20	0.00	0.00	0.00	0.00	0.00	1.20
	HD 2888	0.00	1.20	0.00	0.00	0.00	0.00	0.00	1.20
	Total	**1255.00**	**587.60**	**0.00**	**0.00**	**0.00**	**0.00**	**1255.00**	**587.60**
	Total Cereal Crops	**1255.00**	**587.60**	**0.00**	**0.00**	**0.00**	**0.00**	**1255.00**	**587.60**
	Grand Total (Pusa Bihar)	**1255.00**	**587.60**	**0.00**	**0.00**	**0.00**	**0.00**	**1255.00**	**587.60**
63. IARI, Indore									
Cereal Crops	**Wheat**								
	HD 2932	100.00	180.50	0.00	0.00	0.00	0.00	100.00	180.50
	HD 2987	50.00	45.50	0.00	0.00	0.00	0.00	50.00	45.50
	HI 1500	102.00	99.00	0.00	0.00	0.00	0.00	102.00	99.00
	HI 1531	108.00	153.00	0.00	0.00	0.00	0.00	108.00	153.00
	HI 1544	400.00	402.00	0.00	0.00	0.00	0.00	400.00	402.00
	HI 8498	225.00	315.00	0.00	0.00	0.00	0.00	225.00	315.00
	HI 8627	30.00	49.00	0.00	0.00	0.00	0.00	30.00	49.00
	HI 8663	201.40	331.00	0.00	0.00	0.00	0.00	201.40	331.00
	HI 8713	65.00	165.00	0.00	0.00	0.00	0.00	65.00	165.00
	HI 8737	20.00	126.00	0.00	0.00	0.00	0.00	20.00	126.00
	HD 4728	0.00	36.00	0.00	0.00	0.00	0.00	0.00	36.00
	Total	**1301.40**	**1902.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1301.40**	**1902.00**
	Total Cereal Crops	**1301.40**	**1902.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1301.40**	**1902.00**
	Grand Total (IARI, Indore)	**1301.40**	**1902.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1301.40**	**1902.00**
64. DGR, Junagadh									
Oilseed Crops	**Groundnut**								
	Gimar 2	13.00	13.00	0.00	0.00	0.00	0.00	13.00	13.00
	Gimar 3	279.50	25.70	0.00	0.00	0.00	0.00	279.50	25.70
	Total	**292.50**	**38.70**	**0.00**	**0.00**	**0.00**	**0.00**	**292.50**	**38.70**
	Total Oilseed Crops	**292.50**	**38.70**	**0.00**	**0.00**	**0.00**	**0.00**	**292.50**	**38.70**
	Grand Tota (DGR, Junagadh)	**292.50**	**38.70**	**0.00**	**0.00**	**0.00**	**0.00**	**292.50**	**38.70**
	Total Grand Total	**57036.35**	**62100.74**	**12702.38**	**13892.16**	**52428.88**	**51838.46**	**122159.61**	**127823.36**

Table 2: Crop-wise and centre-wise breeder seed production during 2015-16

(Figures in quintals)

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
CEREAL CROPS								
Rice								
Srinagar	0.00	0.00	14.00	16.30	0.00	0.00	14.00	16.30
Palampur	23.00	12.60	1.50	8.50	28.00	32.10	52.50	53.20
Ludhiana	133.70	159.00	10.12	43.00	0.00	0.00	143.82	202.00
Hisar	17.60	69.99	0.00	0.00	0.00	0.00	17.60	69.99
Pantnagar	30.90	94.30	1.90	3.30	1152.50	1310.80	1185.30	1408.40
Faizabad	88.30	139.97	0.00	0.00	405.00	641.85	493.30	781.82
Varanasi	37.00	50.30	41.20	66.98	30.25	60.62	108.45	177.90
Jorhat	104.50	107.50	0.00	323.10	0.00	0.00	104.50	430.60
Ranchi	26.00	10.90	41.80	113.70	0.00	0.00	67.80	124.60
Dholi	100.00	113.00	346.80	537.30	3038.94	1476.35	3485.74	2126.65
Bhubaneswar	482.00	483.15	166.76	139.56	0.00	0.00	648.76	622.71
Kota	1.00	18.00	0.00	0.00	0.00	0.00	1.00	18.00
Anand	0.00	0.00	0.00	0.00	200.00	172.05	200.00	172.05
Raipur	514.10	567.30	7.00	21.30	70.00	92.70	591.10	681.30
Jabalpur	193.30	193.30	2391.41	2391.41	3260.86	3260.86	5845.57	5845.57
Akola	122.20	65.00	0.60	0.60	0.00	66.50	122.80	132.10
Rahuri	28.00	97.40	2.25	2.00	0.00	0.00	30.25	99.40
Bangalore	6.50	15.00	6.50	10.25	0.00	0.00	13.00	25.25
Dharwad	3.30	3.80	1.00	1.00	1173.75	1130.25	1178.05	1135.05
ANGRAU, Hyderabad	1115.00	1144.00	710.20	802.82	472.70	989.70	2297.90	2936.52
PJTSAU, Hyderabad	274.50	277.50	627.00	644.50	655.50	671.50	1557.00	1593.50
Coimbatore	29.10	30.60	1085.39	1151.94	0.00	0.00	1114.49	1182.54
Raichur	0.00	20.50	0.00	0.00	0.00	0.00	0.00	20.50
Navsari	0.00	0.00	0.00	0.00	15.90	49.80	15.90	49.80
Sabour	0.00	0.00	0.00	0.00	210.05	213.40	210.05	213.40
Shivamogga	0.00	0.00	0.00	0.00	35.00	21.85	35.00	21.85
Gwalior	0.00	0.00	0.00	0.00	750.00	970.00	750.00	970.00
Almora	3.20	7.05	0.00	0.00	0.00	1.90	3.20	8.95
Cuttack	682.10	703.40	0.00	0.00	64.10	65.40	746.20	768.80
ICAR-IIRR, Hyderabad	126.10	267.60	0.00	0.00	25.00	110.00	151.10	377.60
IARI, Karnal	237.10	253.50	0.00	0.00	0.00	0.00	237.10	253.50
KAU, Pattambi	6.60	10.00	6.01	82.39	0.00	0.00	12.61	92.39
PAJANCOA&RI, Karaikal	0.00	0.00	0.00	0.00	6.00	31.82	6.00	31.82
KKV, Dapoli	15.87	47.60	5.85	18.50	37.70	104.10	59.42	170.20
West Bengal	37.20	21.00	10.00	28.00	0.00	0.00	47.20	49.00
SBPUA&T, Meerut	10.50	9.53	0.00	0.00	7.15	6.28	17.65	15.81
IARI, New Delhi	157.00	189.80	0.00	0.00	5.00	7.90	162.00	197.70
Manipur	0.00	0.00	0.00	0.00	31.65	38.30	31.65	38.30
Meghalaya	0.00	0.00	0.00	0.00	0.00	14.68	0.00	14.68
Tripura	0.00	0.00	0.00	0.00	88.30	119.50	88.30	119.50
CAU, Imphal	19.00	19.00	0.00	0.00	0.00	0.00	19.00	19.00
IISS, Mau	21.70	40.00	0.00	0.00	0.00	0.00	21.70	40.00
Port Blair	3.86	4.45	0.00	0.00	0.00	0.00	3.86	4.45
Total	**4650.23**	**5246.04**	**5477.29**	**6406.45**	**11763.35**	**11660.21**	**21890.87**	**23312.70**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Wheat								
Srinagar	0.00	0.00	10.78	13.00	0.00	0.00	10.78	13.00
Palampur	109.00	118.60	220.00	215.80	64.00	76.60	393.00	411.00
Ludhiana	2516.30	3818.20	400.00	691.00	0.00	0.00	2916.30	4509.20
Hisar	912.40	1247.60	602.00	627.30	0.00	0.00	1514.40	1874.90
Pantnagar	836.20	1834.53	113.50	188.20	1219.00	1708.19	2168.70	3730.92
Faizabad	271.00	232.91	0.00	0.00	307.50	419.86	578.50	652.77
Kanpur	856.10	386.00	942.00	813.40	0.00	0.00	1798.10	1199.40
Varanasi	63.60	119.12	5.00	5.90	0.00	3.52	68.60	128.54
Ranchi	0.00	0.00	20.00	31.20	0.00	0.00	20.00	31.20
Dholi	450.00	650.00	197.00	41.20	1951.00	1165.45	2598.00	1856.65
Kota	841.30	2741.71	0.00	0.00	0.00	0.00	841.30	2741.71
Bikaner	2206.00	2078.00	0.00	0.00	260.00	0.00	2466.00	2078.00
S.K. Nagar	599.40	650.20	835.30	1357.42	0.00	0.00	1434.70	2007.62
Anand	0.00	0.00	0.00	0.00	300.00	258.45	300.00	258.45
Jamnagar	172.40	285.00	0.00	0.00	0.00	0.00	172.40	285.00
Raipur	215.60	199.00	0.00	0.00	40.00	32.60	255.60	231.60
Jabalpur	1350.00	5674.00	220.55	220.55	254.86	254.86	1825.41	6149.41
Rahuri	150.40	410.00	2.00	20.00	0.00	10.00	152.40	440.00
Akola	9.00	28.60	10.00	12.00	0.00	0.00	19.00	40.60
Parbhani	0.00	0.00	0.00	0.00	118.00	69.80	118.00	69.80
Dharwad	21.80	21.60	0.00	0.00	35.00	34.00	56.80	55.60
Navsari	860.80	930.00	0.00	0.00	0.00	0.00	860.80	930.00
Sabour	0.00	0.00	0.00	0.00	0.00	3660.00	0.00	3660.00
MPUAT, Udaipur	0.00	0.00	0.00	0.00	0.00	234.53	0.00	234.53
Pundibari	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
Gwalior	137.00	823.00	0.00	0.00	0.00	1817.25	137.00	2640.25
Almora	96.00	82.50	0.00	0.00	0.00	0.00	96.00	82.50
IARI, Karnal	1019.20	1284.40	0.00	0.00	0.00	0.00	1019.20	1284.40
IARI, New Delhi	863.40	752.20	0.00	0.00	380.00	433.10	1243.40	1185.30
IISS, Mau	20.00	22.00	0.00	0.00	0.00	0.00	20.00	22.00
IIWBR, Karnal	937.60	1312.00	0.00	0.00	0.00	0.00	937.60	1312.00
IARI, Pusa, Bihar	1255.00	587.60	0.00	0.00	0.00	0.00	1255.00	587.60
IARI, Indore	1301.40	1902.00	0.00	0.00	0.00	0.00	1301.40	1902.00
Total	**18070.90**	**28190.77**	**3578.13**	**4236.97**	**4929.36**	**10182.21**	**26578.39**	**42609.95**
Maize								
Srinagar	0.00	0.00	5.72	11.16	0.00	0.00	5.72	11.16
Palampur	0.00	0.00	0.00	2.00	2.90	3.65	2.90	5.65
Ludhiana	0.00	0.00	37.50	43.85	0.00	0.00	37.50	43.85
Pantnagar	0.20	1.74	0.00	0.00	0.50	0.00	0.70	1.74
Hisar	18.12	4.19	0.00	0.00	0.00	0.00	18.12	4.19
Kanpur	0.20	1.12	5.00	6.83	0.00	0.00	5.20	7.95
Ranchi	0.30	0.30	0.30	2.40	0.00	0.00	0.60	2.70
Anand	0.00	0.00	0.00	0.00	25.00	30.79	25.00	30.79
Jabalpur	0.00	0.00	20.00	20.00	25.00	25.00	45.00	45.00

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Rahuri	0.60	7.50	0.00	0.00	0.00	6.50	0.60	14.00
Bangalore	7.00	5.00	7.00	10.20	0.00	0.00	14.00	15.20
Dharwad	1.65	4.10	5.40	5.25	106.05	104.55	113.10	113.90
PJTSAU, Hyderabad	9.18	9.18	0.30	0.30	0.00	0.00	9.48	9.48
Coimbatore	0.16	0.13	7.80	7.82	0.00	0.00	7.96	7.95
Shivamogga	0.00	0.00	0.00	0.00	15.00	12.50	15.00	12.50
MPUAT, Udaipur	9.00	9.00	0.00	0.00	0.00	70.99	9.00	79.99
Almora	0.60	1.20	0.00	0.00	0.00	2.25	0.60	3.45
Manipur	0.00	0.00	0.00	0.00	0.80	1.00	0.80	1.00
Meghalaya	0.00	0.00	0.00	0.00	0.00	7.70	0.00	7.70
IIMR, New Delhi	22.00	25.00	0.00	0.00	0.00	0.00	22.00	25.00
Total	**69.01**	**68.46**	**89.02**	**109.81**	**175.25**	**264.93**	**333.28**	**443.20**
Sorghum								
Kanpur	0.00	0.00	4.00	3.58	0.00	0.00	4.00	3.58
Rahuri	11.30	20.92	1.20	4.84	0.00	5.13	12.50	30.89
Akola	0.60	5.35	0.44	0.44	0.00	2.00	1.04	7.79
Parbhani	5.85	19.00	0.00	0.00	630.00	473.69	635.85	492.69
Dharwad	6.70	10.50	0.00	0.00	1.20	0.00	7.90	10.50
PJTSAU, Hyderabad	0.90	5.10	1.30	2.00	0.00	0.00	2.20	7.10
Coimbatore	2.00	2.00	0.64	0.73	0.00	0.00	2.64	2.73
Navsari	0.00	0.00	0.00	0.00	4.00	4.35	4.00	4.35
MPUAT, Udaipur	10.40	11.00	0.00	0.00	0.00	0.00	10.40	11.00
IIMR, Hyderabad	21.15	77.90	0.00	0.00	14180.00	13834.00	14201.15	13911.90
Total	**58.90**	**151.77**	**7.58**	**11.59**	**14815.20**	**14319.17**	**14881.68**	**14482.53**
Barley								
Palampur	0.00	0.00	0.00	7.00	9.50	12.50	9.50	19.50
Ludhiana	80.00	130.27	0.35	35.57	0.00	0.00	80.35	165.84
Hisar	171.50	207.90	25.00	8.20	0.00	0.00	196.50	216.10
Pantnagar	3.50	3.00	0.00	0.00	0.00	0.00	3.50	3.00
Faizabad	163.41	46.54	0.00	0.00	7.00	31.91	170.41	78.45
Kanpur	22.33	8.50	1.60	1.60	0.00	0.00	23.93	10.10
Varanasi	1.20	1.67	5.00	5.00	0.00	19.05	6.20	25.72
Bikaner	0.00	70.00	0.00	0.00	0.00	45.67	0.00	115.67
Jabalpur	81.00	59.80	0.00	0.00	0.00	0.00	81.00	59.80
Almora	5.00	5.50	0.00	0.00	0.00	0.00	5.00	5.50
IARI, Karnal	1.00	3.00	0.00	0.00	0.00	0.00	1.00	3.00
IIWBR, Karnal	154.60	135.48	0.00	0.00	0.00	0.00	154.60	135.48
Total	**683.54**	**671.66**	**31.95**	**57.37**	**16.50**	**109.13**	**731.99**	**838.16**
Finger Millet								
Ranchi	1.00	1.00	0.30	1.25	0.00	0.00	1.30	2.25
Dholi	0.00	0.00	3.00	1.98	0.00	0.00	3.00	1.98
Rahuri	0.06	1.50	0.00	0.00	0.00	0.00	0.06	1.50
Bangalore	25.42	33.81	1.90	27.23	0.00	0.00	27.32	61.04
Coimbatore	0.00	0.00	0.94	0.94	0.00	0.00	0.94	0.94
Navsari	0.00	0.00	0.00	0.00	1.05	1.90	1.05	1.90
Almora	6.40	5.80	0.00	0.00	0.00	0.00	6.40	5.80
KKV, Dapoli	0.02	1.00	0.02	0.25	2.00	3.00	2.04	4.25
Total	**32.90**	**43.11**	**6.16**	**31.65**	**3.05**	**4.90**	**42.11**	**79.66**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Pear Millet								
Rahuri	0.00	0.19	0.16	0.67	0.00	0.56	0.16	1.42
Jamnagar	0.00	0.00	0.00	11.30	0.00	0.00	0.00	11.30
Parbhani	0.05	10.50	0.00	0.00	0.00	0.00	0.05	10.50
Akola	0.22	0.67	0.00	0.00	0.00	0.00	0.22	0.67
Coimbatore	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20
Gwalior	6.00	0.05	0.00	0.00	0.00	0.00	6.00	0.05
IARI, Karnal	0.30	0.90	0.00	0.00	0.00	0.00	0.30	0.90
Total	**6.57**	**12.31**	**0.36**	**12.17**	**0.00**	**0.56**	**6.93**	**25.04**
Littile Millet								
Coimbatore	0.00	0.00	0.72	0.81	0.00	0.00	0.72	0.81
Jabalpur	0.00	0.00	1.24	1.24	2.00	2.00	3.24	3.24
Rahuri	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Total	**0.00**	**0.00**	**1.96**	**2.05**	**2.00**	**2.02**	**3.96**	**4.07**
Kodo								
Raipur	1.00	1.00	0.00	0.00	0.40	0.50	1.40	1.50
Coimbatore	0.00	0.00	0.18	0.20	0.00	0.00	0.18	0.20
Jabalpur	1.05	1.57	9.27	9.27	0.00	0.00	10.32	10.84
Total	**2.05**	**2.57**	**9.45**	**9.47**	**0.40**	**0.50**	**11.90**	**12.54**
Foxtail Millet								
ANGRAU, Hyderabad	13.00	72.00	0.00	0.00	16.00	121.00	21.00	185.00
Coimbatore	0.00	0.00	0.92	0.95	0.00	0.00	0.92	0.95
Total	**13.00**	**72.00**	**0.92**	**0.95**	**16.00**	**121.00**	**21.92**	**185.95**
Barnyard millet								
Coimbatore	0.00	0.00	1.91	1.91	0.00	0.00	1.91	1.91
Almora	0.17	0.85	0.00	0.00	0.00	0.00	0.17	0.85
Total	**0.17**	**0.85**	**1.91**	**1.91**	**0.00**	**0.00**	**2.08**	**2.76**
Buckwheat								
Almora	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**0.00**	**0.15**
Amaranth								
Almora	0.04	0.15	0.00	0.00	0.00	0.00	0.04	0.15
Total	**0.04**	**0.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.15**
Total Cereal Crops	**23587.31**	**34459.69**	**9204.73**	**10880.39**	**31721.11**	**36664.78**	**64505.15**	**81996.86**
PULSE CROPS								
Chick Pea								
Palampur	6.00	3.00	4.00	0.58	0.00	0.60	10.00	4.18
Ludhiana	18.14	13.40	0.00	0.00	0.00	0.00	18.14	13.40
Hisar	33.00	1.88	0.00	0.00	0.00	0.00	33.00	1.88
Pantnagar	3.00	6.00	5.53	5.75	20.50	24.00	29.03	35.75
Faizabad	0.00	0.00	0.00	0.00	20.00	21.82	20.00	21.82
Kanpur	0.00	0.00	77.80	81.98	0.00	0.00	77.80	81.98
Ranchi	0.00	0.00	1.75	0.76	0.00	0.00	1.75	0.76
Dholi	0.00	0.00	4.00	4.08	0.00	0.00	4.00	4.08
Kota	440.00	603.00	0.00	0.00	0.00	0.00	440.00	603.00
Anand	60.00	20.53	0.00	0.00	0.00	0.00	60.00	20.53

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Bikaner	404.00	615.00	0.00	0.00	110.00	157.00	514.00	772.00
Jamnagar	139.50	116.60	0.00	0.00	30.60	14.00	170.10	130.60
Raipur	36.00	27.00	0.00	0.00	60.00	42.00	96.00	69.00
Jabalpur	1257.34	1315.51	0.00	0.00	0.00	0.00	1257.34	1315.51
Rahuri	639.60	577.20	37.00	0.00	0.00	0.00	676.60	577.20
Akola	258.00	193.40	54.00	52.00	0.00	0.00	312.00	245.40
Parbhani	4.00	163.00	0.00	0.00	16.50	5.83	20.50	168.83
Dharwad	350.00	140.00	0.00	0.00	45.00	17.40	395.00	157.40
ANGRAU, Hyderabad	12.00	178.90	0.00	0.00	27.50	59.85	39.50	238.75
PJTSAU, Hyderabad	0.00	0.00	0.00	0.00	35.00	35.00	35.00	35.00
Raichur	100.00	37.75	0.00	0.00	0.00	0.00	100.00	37.75
Sabour	0.00	0.00	0.00	0.00	0.00	490.00	0.00	490.00
MPUAT, Udaipur	95.70	84.50	0.00	0.00	0.00	102.63	95.70	187.13
Gwalior	1416.00	1261.00	0.00	0.00	0.00	0.00	1416.00	1261.00
IIPR, Kanpur	60.00	60.00	0.00	0.00	11.00	68.83	71.00	128.83
Total	**5332.28**	**5417.67**	**184.08**	**145.15**	**376.10**	**1038.96**	**5892.46**	**6601.78**
Pigeon Pea								
Ludhiana	0.50	0.60	0.20	0.50	0.00	0.00	0.70	1.10
Hisar	1.45	1.55	0.00	0.00	0.00	0.00	1.45	1.55
Pantnagar	24.46	27.00	1.25	1.00	0.00	0.00	25.71	28.00
Faizabad	14.10	20.00	0.00	0.00	32.50	34.10	46.60	54.10
Varanasi	9.00	9.58	0.00	0.00	0.00	0.00	9.00	9.58
Ranchi	0.00	0.00	0.30	0.74	0.00	0.00	0.30	0.74
Dholi	25.00	28.00	16.00	8.27	40.00	4.40	81.00	40.67
S.K. Nagar	0.00	0.00	6.44	7.00	0.00	0.00	6.44	7.00
Anand	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
Raipur	9.40	9.80	2.00	2.00	14.00	14.70	25.40	26.50
Jabalpur	8.00	249.10	0.00	0.00	0.00	0.00	8.00	249.10
Rahuri	5.70	5.98	0.00	0.00	0.00	0.00	5.70	5.98
Akola	8.20	5.10	1.00	1.00	0.00	15.00	9.20	21.10
Parbhani	28.40	95.80	0.00	0.00	515.00	262.60	543.40	358.40
Bangalore	7.00	11.00	3.00	20.51	0.00	0.00	10.00	31.51
ANGRAU, Hyderabad	15.20	37.00	0.00	0.00	18.00	12.50	33.20	49.50
PJTSAU, Hyderabad	0.00	0.00	1.50	9.00	11.00	11.00	12.50	20.00
Coimbatore	0.10	0.10	3.60	3.80	0.00	0.00	3.70	3.90
KKV, Dapoli	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Raichur	28.50	47.00	0.00	0.00	0.00	0.00	28.50	47.00
Navsari	0.00	0.00	0.00	0.00	13.00	15.20	13.00	15.20
Shivamogga	0.00	0.00	0.00	0.00	15.00	8.00	15.00	8.00
Gwalior	32.50	25.00	0.00	0.00	0.00	0.00	32.50	25.00
Almora	3.40	3.00	0.00	0.00	0.00	0.00	3.40	3.00
IIPR, Kanpur	6.00	15.00	0.00	0.00	2.00	6.50	8.00	21.50
IARI, Karnal	4.40	4.00	0.00	0.00	0.00	0.00	4.40	4.00
IARI, New Delhi	0.00	0.00	0.00	0.00	22.00	23.45	22.00	23.45
Total	**231.31**	**594.61**	**35.29**	**53.82**	**683.50**	**413.45**	**950.10**	**1061.88**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Field Pea								
Srinagar	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
Hisar	25.00	1.65	0.00	0.00	0.00	0.00	25.00	1.65
Pantnagar	77.50	67.93	0.00	0.00	0.00	0.00	77.50	67.93
Faizabad	60.00	5.34	0.00	0.00	0.00	0.00	60.00	5.34
Kanpur	217.00	27.00	0.00	0.00	0.00	0.00	217.00	27.00
Varanasi	15.00	12.00	0.00	0.00	0.00	2.00	15.00	14.00
Dholi	45.00	10.00	2.00	0.20	2.00	2.95	49.00	13.15
Kota	20.00	8.00	0.00	0.00	0.00	0.00	20.00	8.00
S.K. Nagar	35.00	36.00	0.20	1.00	0.00	0.00	35.20	37.00
Raipur	9.00	12.00	3.00	10.95	4.00	12.05	16.00	35.00
Jabalpur	39.00	25.29	65.30	65.30	70.49	70.49	174.79	161.08
Sabour	0.00	0.00	0.00	0.00	0.00	26.00	0.00	26.00
IIPR, Kanpur	90.60	203.70	0.00	0.00	12.00	14.00	102.60	217.70
Meghalaya	0.00	0.00	0.00	0.00	0.50	0.25	0.50	0.25
Total	**633.10**	**408.91**	**71.00**	**77.95**	**88.99**	**127.74**	**793.09**	**614.60**
Mung								
Srinagar	0.00	0.00	0.50	0.48	0.00	0.00	0.50	0.48
Palampur	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
Ludhiana	37.00	40.00	0.00	0.00	0.00	0.00	37.00	40.00
Hisar	46.00	92.38	0.00	0.00	0.00	0.00	46.00	92.38
Pantnagar	34.11	39.50	0.10	1.00	9.00	11.00	43.21	51.50
Faizabad	0.00	0.00	0.00	0.00	0.50	0.35	0.50	0.35
Kanpur	70.00	71.50	10.00	11.33	0.00	0.00	80.00	82.83
Varanasi	20.00	21.00	0.00	0.00	0.00	0.00	20.00	21.00
Jorhat	0.00	4.00	0.00	0.00	0.00	0.00	0.00	4.00
Ranchi	0.00	0.00	2.60	5.91	0.00	0.00	2.60	5.91
Dholi	0.00	0.00	25.09	23.75	35.00	32.00	60.09	55.75
Bhubaneswar	53.00	26.73	0.00	0.00	0.00	0.00	53.00	26.73
Bikaner	30.00	58.30	0.00	0.00	10.00	12.00	40.00	70.30
Kota	60.00	15.00	0.00	0.00	0.00	0.00	60.00	15.00
S.K. Nagar	14.00	11.05	90.02	135.63	0.00	0.00	104.02	146.68
Anand	1.00	37.33	0.00	0.00	0.00	0.00	1.00	37.33
Raipur	9.51	10.75	5.00	5.00	0.00	0.00	14.51	15.75
Jabalpur	9.50	19.20	5.75	5.75	85.00	85.00	100.25	109.95
Akola	5.20	7.30	1.00	1.00	0.00	18.00	6.20	26.30
Rahuri	3.00	5.35	1.00	0.17	0.00	0.00	4.00	5.52
Parbhani	20.00	17.40	0.00	0.00	80.00	42.60	100.00	60.00
Dharwad	0.00	0.00	5.00	8.00	5.00	8.00	10.00	16.00
ANGRAU, Hyderabad	30.00	69.00	0.00	0.00	0.00	0.00	30.00	69.00
PJTSAU, Hyderabad	0.00	0.00	5.00	7.00	8.50	9.00	13.50	16.00
Coimbatore	3.00	3.00	32.08	30.60	0.00	0.00	35.08	33.60
Raichur	0.00	7.50	0.00	0.00	0.00	0.00	0.00	7.50
Sabour	0.00	0.00	0.00	0.00	2.00	1.10	2.00	1.10
MPUAT, Udaipur	0.00	4.75	0.00	0.00	0.00	0.00	0.00	4.75

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Gwalior	0.00	121.40	0.00	0.00	0.00	0.00	0.00	121.40
IIPR, Kanpur	46.42	49.50	0.00	0.00	8.00	17.30	54.42	66.80
IARI, Karnal	19.50	23.11	0.00	0.00	0.00	0.00	19.50	23.11
IARI, New Delhi	19.50	41.10	0.00	0.00	0.00	0.00	19.50	41.10
Port Blair	0.30	0.37	0.00	0.00	0.00	0.00	0.30	0.37
Total	**531.54**	**797.02**	**183.14**	**235.62**	**243.00**	**236.35**	**957.68**	**1268.99**
Urd								
Palampur	3.50	3.80	1.00	0.00	23.70	28.76	28.20	32.56
Hisar	7.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00
Pantnagar	73.00	63.00	3.50	4.00	9.00	13.00	85.50	80.00
Faizabad	0.00	0.00	0.00	0.00	3.00	3.12	3.00	3.12
Kanpur	48.20	45.98	13.00	12.47	0.00	0.00	61.20	58.45
Ranchi	3.00	2.50	0.30	0.50	0.00	0.00	3.30	3.00
Dholi	0.00	0.00	5.00	0.82	0.00	0.00	5.00	0.82
Bhubaneswar	70.00	14.40	0.00	0.00	0.00	0.00	70.00	14.40
Kota	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
S.K. Nagar	0.00	0.00	29.05	68.14	0.00	0.00	29.05	68.14
Raipur	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
Jabalpur	32.00	32.90	0.00	0.00	0.00	0.00	32.00	32.90
Akola	18.00	5.90	1.50	0.50	0.00	3.00	19.50	9.40
Rahuri	0.00	0.10	0.00	0.10	0.00	0.28	0.00	0.48
Parbhani	0.00	0.00	0.00	0.00	10.00	3.00	10.00	3.00
Dharwad	0.00	0.00	12.00	18.20	40.25	25.00	52.25	43.20
ANGRAU, Hyderabad	75.00	101.80	0.00	0.00	22.00	22.00	97.00	123.80
PJTSAU, Hyderabad	2.50	2.50	2.60	2.70	5.20	5.00	10.30	10.20
Coimbatore	4.10	2.00	75.14	72.33	0.00	0.00	79.24	74.33
Raichur	0.00	2.50	0.00	0.00	0.00	0.00	0.00	2.50
Shivamogga	0.00	0.00	0.00	0.00	5.00	3.10	5.00	3.10
MPUAT, Udaipur	0.00	4.40	0.00	0.00	0.00	0.00	0.00	4.40
Gwalior	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.63
IIPR, Kanpur	17.00	21.00	0.00	0.00	4.00	13.55	21.00	34.55
Total	**368.30**	**318.41**	**143.09**	**179.76**	**122.15**	**119.81**	**633.54**	**617.98**
Lentil								
Srinagar	0.00	0.00	1.50	1.50	0.00	0.00	1.50	1.50
Palampur	1.50	1.50	0.50	1.00	0.00	0.00	2.00	2.50
Ludhiana	0.60	0.60	0.00	0.00	0.00	0.00	0.60	0.60
Hisar	1.60	0.00	0.00	0.00	0.00	0.00	1.60	0.00
Pantnagar	74.00	81.05	2.00	4.00	40.00	50.00	116.00	135.05
Faizabad	9.00	14.60	0.00	0.00	20.00	22.70	29.00	37.30
Kanpur	68.62	47.90	24.00	24.14	0.00	0.00	92.62	72.04
Varanasi	23.00	10.00	0.00	0.00	0.00	12.53	23.00	22.53
Ranchi	0.00	0.00	1.00	2.50	0.00	0.00	1.00	2.50
Dholi	0.00	0.00	22.40	6.13	160.00	25.88	182.40	32.01
Jorhat	12.00	7.80	0.00	5.50	0.00	0.00	12.00	13.30
Jabalpur	40.00	51.00	0.00	0.00	0.00	0.00	40.00	51.00

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Sabour	0.00	0.00	0.00	0.00	0.00	342.00	0.00	342.00
Almora	10.50	7.65	0.00	0.00	0.00	4.10	10.50	11.75
IIPR, Kanpur	25.00	25.35	0.00	0.00	3.00	3.00	28.00	28.35
IARI, Karnal	6.25	9.75	0.00	0.00	0.00	0.00	6.25	9.75
IARI, New Delhi	6.30	7.50	0.00	0.00	0.00	0.00	6.30	7.50
Meghalaya	0.00	0.00	0.00	0.00	1.80	1.10	1.80	1.10
Total	**278.37**	**264.70**	**51.40**	**44.77**	**224.80**	**461.31**	**554.57**	**770.78**
Rajmash								
Srinagar	0.00	0.00	0.61	0.61	0.00	0.00	0.61	0.61
Palampur	0.00	0.00	18.00	11.87	3.50	2.50	21.50	14.37
Ludhiana	7.70	11.00	0.00	0.00	0.00	0.00	7.70	11.00
Rahuri	0.00	0.00	0.00	0.00	0.00	3.90	0.00	3.90
Shivamogga	0.00	0.00	0.00	0.00	1.00	0.33	1.00	0.33
Almora	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07
IIPR, Kanpur	1.00	0.75	0.00	0.00	0.00	0.00	1.00	0.75
Total	**8.70**	**11.75**	**18.61**	**12.48**	**4.50**	**6.80**	**31.81**	**31.03**
Horse Gram								
Palampur	0.00	0.00	0.00	0.00	1.20	1.00	1.20	1.00
Ranchi	0.00	0.00	1.00	0.75	0.00	0.00	1.00	0.75
Raipur	0.50	0.60	0.00	0.00	0.00	0.00	0.50	0.60
Coimbatore	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00
KKV, Dapoli	0.00	0.00	0.00	0.00	4.50	5.00	4.50	5.00
Almora	0.20	1.20	0.00	0.00	0.00	0.00	0.20	1.20
Total	**0.70**	**1.80**	**6.00**	**5.75**	**5.70**	**6.00**	**12.40**	**13.55**
Beans								
KKV, Dapoli	0.00	0.00	0.00	0.00	4.00	5.00	4.00	5.00
Bangalore	0.00	0.00	0.50	0.20	0.00	0.00	0.50	0.20
Total	**0.00**	**0.00**	**0.50**	**0.20**	**4.00**	**5.00**	**4.50**	**5.20**
Cowpea								
Srinagar	0.00	0.00	0.52	0.47	0.00	0.00	0.52	0.47
Bikaner	10.00	10.40	0.00	0.00	0.00	0.00	10.00	10.40
S.K. Nagar	82.00	94.82	0.00	0.00	0.00	0.00	82.00	94.82
Coimbatore	0.00	0.00	3.85	6.80	0.00	0.00	3.85	6.80
Bangalore	7.70	6.00	6.10	17.78	0.00	0.00	13.80	23.78
Dharwad	0.00	0.00	2.00	2.00	2.00	2.00	4.00	4.00
KKV, Dapoli	0.00	0.00	0.00	0.00	4.00	6.00	4.00	6.00
Shivamogga	0.00	0.00	0.00	0.00	2.00	1.00	2.00	1.00
CCARI, Goa	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
Total	**100.20**	**111.72**	**12.47**	**27.05**	**8.00**	**9.00**	**120.67**	**147.77**
Moth								
Bikaner	58.60	20.50	0.00	0.00	50.00	35.00	108.60	55.50
S.K. Nagar	0.00	0.00	1.00	0.70	0.00	0.00	1.00	0.70
Jodhpur	5.00	2.88	0.00	0.00	0.00	0.00	5.00	2.88
Total	**63.60**	**23.38**	**1.00**	**0.70**	**50.00**	**35.00**	**114.60**	**59.08**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Guar								
Hisar	167.00	23.75	0.00	0.00	0.00	0.00	167.00	23.75
S.K. Nagar	0.00	0.00	3.50	8.37	0.00	0.00	3.50	8.37
Total	**167.00**	**23.75**	**3.50**	**8.37**	**0.00**	**0.00**	**170.50**	**32.12**
Lathyrus								
Raipur	2.20	2.50	2.00	2.50	10.00	12.40	14.20	17.40
IARI, Karnal	2.00	2.80	0.00	0.00	0.00	0.00	2.00	2.80
Total	**4.20**	**5.30**	**2.00**	**2.50**	**10.00**	**12.40**	**16.20**	**20.20**
Total Pulse Crops	**7719.30**	**7979.02**	**712.08**	**794.12**	**1820.74**	**2471.82**	**10252.12**	**11244.96**
OILSEED CROPS								
Soybean								
Palampur	2.00	5.00	3.00	3.20	12.00	19.68	17.00	27.88
Ludhiana	0.35	0.70	0.50	0.90	0.00	0.00	0.85	1.60
Pantnagar	106.00	133.00	7.06	9.00	23.00	35.00	136.06	177.00
Ranchi	0.00	0.00	0.75	0.45	0.00	0.00	0.75	0.45
Kota	870.00	196.00	0.00	0.00	0.00	0.00	870.00	196.00
Anand	0.00	0.00	0.00	0.00	0.00	9.50	0.00	9.50
Raipur	300.00	413.20	5.00	2.10	75.00	75.60	380.00	490.90
Jabalpur	4270.00	709.00	0.00	0.00	0.00	0.00	4270.00	709.00
Akola	200.00	150.00	100.00	7.00	0.00	32.00	300.00	189.00
Rahuri	580.00	374.00	505.00	190.30	0.00	52.45	1085.00	616.75
Parbhani	1310.00	923.40	0.00	0.00	1104.50	287.47	2414.50	1210.87
Bangalore	200.00	245.00	0.00	0.00	0.00	0.00	200.00	245.00
Dharwad	5110.00	2736.70	600.00	600.00	12500.00	8000.00	18210.00	11336.70
PJTSAU, Hyderabad	0.00	0.00	425.00	265.00	0.00	0.00	425.00	265.00
Raichur	100.00	192.60	0.00	0.00	0.00	0.00	100.00	192.60
Shivamogga	0.00	0.00	0.00	0.00	80.00	70.00	80.00	70.00
MPUAT, Udaipur	0.00	0.00	0.00	0.00	0.00	63.47	0.00	63.47
Gwalior	4150.00	1528.96	0.00	0.00	0.00	0.00	4150.00	1528.96
Almora	3.68	7.50	0.00	0.00	0.00	3.50	3.68	11.00
IARI, New Delhi	15.00	0.70	0.00	0.00	0.00	0.00	15.00	0.70
Manipur	0.00	0.00	0.00	0.00	0.25	0.30	0.25	0.30
Meghalaya	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.60
IISR, Indore	330.00	33.00	0.00	0.00	0.00	0.00	330.00	33.00
Total	**17547.03**	**7648.76**	**1646.31**	**1077.95**	**13794.75**	**8649.57**	**32988.09**	**17376.28**
Sunflower								
Bangalore	0.71	10.30	0.76	5.00	0.00	0.00	1.47	15.30
Coimbatore	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.25
IIOR, Hyderabad	0.64	1.66	0.00	0.00	0.00	0.00	0.64	1.66
Total	**1.35**	**11.96**	**1.01**	**5.25**	**0.00**	**0.00**	**2.36**	**17.21**
Groundnut								
Ludhiana	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Kanpur	0.00	0.00	8.00	1.44	0.00	0.00	8.00	1.44
Bhubneswar	830.10	895.00	0.00	0.00	0.00	0.00	830.10	895.00
Bikaner	179.00	130.00	0.00	0.00	360.00	360.00	539.00	490.00

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Anand	0.00	0.00	0.00	0.00	0.00	37.50	0.00	37.50
Jamnagar	1526.10	1826.32	0.00	0.00	0.00	0.00	1526.10	1826.32
Jabalpur	0.00	0.00	2.00	2.00	2.50	2.50	4.50	4.50
Rahuri	42.00	0.00	52.00	6.00	0.00	16.12	94.00	22.12
Akola	11.80	10.20	10.00	3.00	0.00	0.00	21.80	13.20
Parbhani	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
Bangalore	400.00	14.00	0.00	0.00	0.00	0.00	400.00	14.00
Dharwad	960.40	1400.40	276.00	300.78	3282.00	2167.20	4518.40	3868.38
ANGRAU, Hyderabad	2988.50	6651.33	0.00	0.00	0.00	0.00	2988.50	6651.33
Coimbatore	140.00	33.30	546.36	522.20	0.00	0.00	686.36	555.50
KKV, Dapoli	0.00	0.00	0.00	0.00	8.00	11.70	8.00	11.70
Sabour	0.00	0.00	0.00	0.00	0.98	1.16	0.98	1.16
Shivamogga	0.00	0.00	0.00	0.00	10.00	9.00	10.00	9.00
MPUAT, Udaipur	0.00	0.00	0.00	0.00	0.00	13.00	0.00	13.00
Gwalior	6.00	0.70	0.00	0.00	0.00	0.00	6.00	0.70
Manipur	0.00	0.00	0.00	0.00	0.45	0.50	0.45	0.50
DGR, Junagadh	292.50	38.70	0.00	0.00	0.00	0.00	292.50	38.70
Total	**7378.40**	**11001.95**	**895.36**	**836.42**	**3663.93**	**2618.68**	**11937.69**	**14457.05**
Linseed								
Palampur	0.60	1.10	0.00	0.00	0.00	3.20	0.60	4.30
Kanpur	17.26	7.70	4.44	0.00	0.00	0.00	21.70	7.70
Ranchi	0.00	0.00	2.00	3.54	0.00	0.00	2.00	3.54
Raipur	20.89	22.20	4.00	10.30	15.00	30.00	39.89	62.50
Jabalpur	0.00	0.00	42.05	42.05	37.98	37.98	80.03	80.03
Akola	0.06	16.00	0.00	0.00	0.00	0.35	0.06	16.35
Sabour	0.00	0.00	0.00	0.00	0.00	56.00	0.00	56.00
Total	**38.81**	**47.00**	**52.49**	**55.89**	**52.98**	**127.53**	**144.28**	**230.42**
Mustard								
Hisar	6.01	9.40	18.00	21.45	0.00	0.00	24.01	30.85
Kanpur	6.89	6.93	30.58	29.79	0.00	0.00	37.47	36.72
Ranchi	0.00	0.00	0.30	0.80	0.00	0.00	0.30	0.80
Bhubneswar	3.50	1.25	0.00	0.00	0.00	0.00	3.50	1.25
Bikaner	1.46	7.20	0.00	0.00	10.00	3.50	11.46	10.70
S.K. Nagar	0.06	0.10	1.09	1.15	0.00	0.00	1.15	1.25
Raipur	0.26	0.60	0.00	0.00	0.00	0.00	0.26	0.60
Jabalpur	0.00	0.00	2.68	2.68	2.00	2.00	4.68	4.68
Akola	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
Sabour	0.00	0.00	0.00	0.00	0.00	148.50	0.00	148.50
Gwalior	19.65	55.11	0.00	0.00	0.00	0.00	19.65	55.11
IARI, Karnal	18.69	46.09	0.00	0.00	0.00	0.00	18.69	46.09
IARI, New Delhi	17.37	33.63	0.00	0.00	0.00	0.00	17.37	33.63
Meghalaya	0.00	0.00	0.00	0.00	2.00	1.25	2.00	1.25
Total	**73.89**	**160.31**	**52.65**	**55.87**	**14.00**	**155.45**	**140.54**	**371.63**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Toria								
Palampur	0.00	0.00	0.00	2.00	2.00	4.00	2.00	6.00
Ludhiana	0.10	3.90	0.00	0.00	0.00	0.00	0.10	3.90
Pantnagar	4.99	7.50	9.00	13.05	6.00	8.00	19.99	28.55
Kanpur	1.13	1.08	5.28	5.28	0.00	0.00	6.41	6.36
Jorhat	3.15	6.50	0.00	9.70	0.00	0.00	3.15	16.20
Gwalior	3.00	8.87	0.00	0.00	0.00	0.00	3.00	8.87
Almora	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
Meghalaya	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
Manipur	0.00	0.00	0.00	0.00	0.85	1.00	0.85	1.00
Total	**12.47**	**27.95**	**14.28**	**30.03**	**9.35**	**13.50**	**36.10**	**71.48**
Safflower								
Rahuri	3.60	5.33	0.20	0.60	0.00	0.32	3.80	6.25
Akola	2.08	3.75	0.60	0.60	0.00	7.32	2.68	11.67
Parbhani	1.40	51.00	0.00	0.00	521.92	167.81	523.32	218.81
Dharwad	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
Gwalior	5.80	4.20	0.00	0.00	0.00	0.00	5.80	4.20
Total	**12.88**	**64.28**	**0.80**	**1.20**	**522.02**	**175.55**	**535.70**	**241.03**
Sesamum								
Palampur	0.00	0.00	0.05	0.10	4.00	4.40	4.05	4.50
Ludhiana	0.02	0.05	0.04	0.40	0.00	0.00	0.06	0.45
Jamnagar	24.05	23.85	0.00	0.00	0.00	0.00	24.05	23.85
Jabalpur	6.03	19.69	0.35	0.35	1.00	1.00	7.38	21.04
Rahuri	0.05	0.12	0.02	0.08	0.00	0.08	0.07	0.28
Akola	0.02	0.40	0.02	0.02	0.00	0.00	0.04	0.42
Dharwad	0.00	0.00	1.00	1.00	6.00	4.00	7.00	5.00
ANGRAU, Hyderabad	0.00	0.00	0.00	0.00	18.50	13.50	18.50	13.50
PJTSAU, Hyderabad	0.00	0.00	0.60	0.60	0.00	0.00	0.60	0.60
Coimbatore	0.00	0.00	6.40	6.62	0.00	0.00	6.40	6.62
Total	**30.17**	**44.11**	**8.48**	**9.17**	**29.50**	**22.98**	**68.15**	**76.26**
Niger								
Ranchi	4.59	0.80	0.00	0.00	0.00	0.00	4.59	0.80
Bhubaneswar	3.50	4.50	0.00	0.00	0.00	0.00	3.50	4.50
Jabalpur	0.00	0.00	3.82	3.82	3.50	3.50	7.32	7.32
Rahuri	0.25	0.17	0.00	0.00	0.00	0.00	0.25	0.17
Navsari	0.00	0.00	0.00	0.00	1.00	0.50	1.00	0.50
Total	**8.34**	**5.47**	**3.82**	**3.82**	**4.50**	**4.00**	**16.66**	**13.29**
G. Sarson								
Palampur	0.20	0.20	1.22	0.05	4.00	5.01	5.42	5.26
Ludhiana	0.16	11.91	0.00	0.00	0.00	0.00	0.16	11.91
Total	**0.36**	**12.11**	**1.22**	**0.05**	**4.00**	**5.01**	**5.58**	**17.17**
Castor								
S.K. Nagar	4.64	5.48	15.78	30.04	0.00	0.00	20.42	35.52
PJTSAU, Hyderabad	0.00	0.00	1.50	3.00	0.00	0.00	1.50	3.00
Coimbatore	0.00	0.00	0.50	0.62	0.00	0.00	0.50	0.62
Navsari	0.00	0.00	0.00	0.00	5.00	7.80	5.00	7.80
IIOR, Hyderabad	1.80	4.90	0.00	0.00	0.00	0.00	1.80	4.90
Total	**6.44**	**10.38**	**17.78**	**33.66**	**5.00**	**7.80**	**29.22**	**51.84**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Brown Sarson								
Srinagar	0.00	0.00	1.20	1.20	0.00	0.00	1.20	1.20
Palampur	0.05	0.05	0.00	0.20	0.20	0.38	0.25	0.63
Total	**0.05**	**0.05**	**1.20**	**1.40**	**0.20**	**0.38**	**1.45**	**1.83**
Raya								
Palampur	0.05	0.05	0.00	0.05	0.20	0.19	0.25	0.29
Ludhiana	0.13	4.29	0.00	0.00	0.00	0.00	0.13	4.29
Total	**0.18**	**4.34**	**0.00**	**0.05**	**0.20**	**0.19**	**0.38**	**4.58**
Rai								
Pantnagar	5.00	6.00	0.50	1.00	2.00	3.50	7.50	10.50
Faizabad	0.50	6.25	0.00	0.00	9.00	10.84	9.50	17.09
Total	**5.50**	**12.25**	**0.50**	**1.00**	**11.00**	**14.34**	**17.00**	**27.59**
Karan Rai								
Palampur	0.00	0.00	0.00	0.30	0.20	0.36	0.20	0.66
Total	**0.00**	**0.00**	**0.00**	**0.30**	**0.20**	**0.36**	**0.20**	**0.66**
Til								
Hisar	0.04	0.22	0.00	0.00	0.00	0.00	0.04	0.22
Kanpur	6.25	1.54	10.00	2.38	0.00	0.00	16.25	3.92
Ranchi	0.00	0.00	0.20	0.26	0.00	0.00	0.20	0.26
Sabour	0.00	0.00	0.00	0.00	2.00	0.78	2.00	0.78
Total	**6.29**	**1.76**	**10.20**	**2.64**	**2.00**	**0.78**	**18.49**	**5.18**
Total Oilseed Crops	**25122.16**	**19052.68**	**2706.10**	**2114.70**	**18113.63**	**11796.12**	**45941.89**	**32963.50**
FIBRE CROPS								
Cotton								
Ludhiana	3.50	3.50	0.20	6.65	0.00	0.00	3.70	10.15
Hisar	3.93	5.17	20.65	24.53	0.00	0.00	24.58	29.70
Bikaner	8.05	5.40	0.00	0.00	0.00	0.00	8.05	5.40
Anand	0.00	0.00	0.00	0.00	30.00	46.01	30.00	46.01
Rahuri	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.82
Akola	3.30	2.75	1.80	1.80	0.00	2.30	5.10	6.85
Dharwad	0.04	0.04	0.00	0.00	0.45	0.45	0.49	0.49
Parbhani	0.26	1.27	0.00	0.00	30.00	3.31	30.26	4.58
Coimbatore	0.00	0.00	1.89	1.91	0.00	0.00	1.89	1.91
Gwalior	1.00	5.73	0.00	0.00	0.00	0.00	1.00	5.73
CICR, Nagpur	0.37	1.35	0.00	0.00	0.00	0.00	0.37	1.35
Total	**20.45**	**25.21**	**24.54**	**35.71**	**60.45**	**52.07**	**105.44**	**112.99**
Jute								
Jorhat	0.05	0.05	0.00	0.15	0.00	0.00	0.05	0.20
Faizabad	0.00	0.00	0.00	0.00	0.25	0.35	0.25	0.35
Barrackpore	10.84	12.01	0.00	0.00	0.00	0.00	10.84	12.01
Total	**10.89**	**12.06**	**0.00**	**0.15**	**0.25**	**0.35**	**11.14**	**12.56**
Mesta								
ANGRAU, Hyderabad	0.00	0.00	0.00	0.00	1.00	55.00	1.00	55.00
Barrackpore	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.98
Total	**0.00**	**0.98**	**0.00**	**0.00**	**1.00**	**55.00**	**1.00**	**55.98**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Sunnhemp								
Barrackpore	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.15
Total	**0.00**	**0.15**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**
Total Fibre Crops	**31.34**	**38.40**	**24.54**	**35.86**	**61.70**	**107.42**	**117.58**	**181.68**
FORAGE CROPS								
Oats								
Srinagar	2.50	2.50	49.00	55.49	0.00	0.00	51.50	57.99
Palampur	0.00	0.00	0.00	0.00	5.00	7.50	5.00	7.50
Ludhiana	54.00	61.00	0.00	0.00	0.00	0.00	54.00	61.00
Hisar	17.00	33.87	0.00	0.00	0.00	0.00	17.00	33.87
Bikaner	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
Anand	50.00	25.00	0.00	0.00	0.00	0.00	50.00	25.00
Jabalpur	0.00	0.00	5.00	5.00	5.00	5.00	10.00	10.00
Rahuri	25.00	10.20	0.00	0.00	0.00	2.00	25.00	12.20
Jhansi	169.00	171.13	0.00	0.00	0.00	0.00	169.00	171.13
Total	**317.50**	**303.70**	**54.00**	**60.49**	**10.00**	**24.50**	**381.50**	**388.69**
Maize								
Palampur	0.00	0.00	0.00	0.00	10.00	5.50	10.00	5.50
Ludhiana	31.80	35.00	0.00	0.00	0.00	0.00	31.80	35.00
Rahuri	18.19	22.00	0.00	0.00	0.00	0.00	18.19	22.00
Jhansi	0.00	0.00	0.00	0.00	0.00	1.75	0.00	1.75
Total	**49.99**	**57.00**	**0.00**	**0.00**	**10.00**	**7.25**	**59.99**	**64.25**
Sorghum								
Ludhiana	0.22	0.22	0.00	0.00	0.00	0.00	0.22	0.22
Hisar	1.55	1.55	0.00	0.00	0.00	0.00	1.55	1.55
Pantnagar	5.60	5.00	0.00	0.00	1.50	2.00	7.10	7.00
Navsari	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
Gwalior	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
Jhansi	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
IARI, Karnal	0.50	11.15	0.00	0.00	0.00	0.00	0.50	11.15
Total	**7.87**	**17.92**	**0.00**	**0.00**	**6.50**	**11.00**	**14.37**	**28.92**
Lucerne								
Anand	0.00	0.00	0.00	0.00	15.00	7.30	15.00	7.30
Rahuri	0.10	0.11	0.00	0.00	0.00	0.00	0.10	0.11
Total	**0.10**	**0.11**	**0.00**	**0.00**	**15.00**	**7.30**	**15.10**	**7.41**
Cowpea								
Hisar	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Pantnagar	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
Rahuri	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
Jhansi	0.65	1.75	0.00	0.00	0.00	0.54	0.65	2.29
Total	**6.65**	**3.75**	**0.00**	**0.05**	**0.00**	**0.54**	**6.65**	**4.34**
Grain Cowpea								
Pantnagar	71.00	0.25	0.00	0.00	0.00	0.00	71.00	0.25
Total	**71.00**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**71.00**	**0.25**

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
Berseem								
Ludhiana	35.38	37.80	0.00	0.00	0.00	0.00	35.38	37.80
Hisar	1.70	5.50	0.00	0.00	0.00	0.00	1.70	5.50
Jabalpur	3.25	16.87	0.00	0.00	0.00	0.00	3.25	16.87
Jhansi	6.30	9.50	0.00	0.00	0.00	0.00	6.30	9.50
Total	**46.63**	**69.67**	**0.00**	**0.00**	**0.00**	**0.00**	**46.63**	**69.67**
Guar								
Ludhiana	0.00	0.00	0.10	0.50	0.00	0.00	0.10	0.50
Bikaner	76.30	117.00	0.00	0.00	670.00	723.00	746.30	840.00
Jhansi	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.85
Total	**76.30**	**117.00**	**0.10**	**0.50**	**670.00**	**723.85**	**746.40**	**841.35**
Metha								
Ludhiana	0.00	0.00	0.15	1.00	0.00	0.00	0.15	1.00
Bikaner	0.00	0.00	0.00	0.00	0.00	23.38	0.00	23.38
Total	**0.00**	**0.00**	**0.15**	**1.00**	**0.00**	**23.38**	**0.15**	**24.38**
Guinea Grass								
Ludhiana	0.00	0.00	0.10	0.30	0.00	0.00	0.10	0.30
Total	**0.00**	**0.00**	**0.10**	**0.30**	**0.00**	**0.00**	**0.10**	**0.30**
Pearlmillet								
Ludhiana	0.20	1.50	0.08	4.00	0.00	0.00	0.28	5.50
Rahuri	0.00	0.05	0.00	0.15	0.00	0.00	0.00	0.20
Total	**0.20**	**1.55**	**0.08**	**4.15**	**0.00**	**0.00**	**0.28**	**5.70**
Rye Grass								
Ludhiana	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**
Stylo								
Rahuri	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10
Total	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.10**
Setaria								
Palampur	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.20**	**0.10**	**0.20**
Red Clover								
Palampur	0.00	0.00	0.00	0.00	0.10	0.30	0.10	0.30
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.30**	**0.10**	**0.30**
Total Forage Crops	**576.24**	**570.95**	**54.93**	**67.09**	**711.70**	**798.32**	**1342.87**	**1436.36**
Grand Total	**57036.35**	**62100.74**	**12702.38**	**13892.16**	**52428.88**	**51838.46**	**122159.61**	**127823.36**

Table 3: Centre-wise breeder seed production during 2015-16

(Figures in quintals)

Sl. No.	Centre	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
State Agricultural Universities									
1	SKUA &T, Srinagar	2.50	2.50	84.33	100.71	0.00	0.00	86.83	103.21
2	CSHHPKV, Palampur	146.40	146.40	249.27	252.65	170.60	208.43	566.27	607.48
3	PAU, Ludhiana	2919.80	4332.94	450.84	829.17	0.00	0.00	3370.64	5162.11
4	CCSHAU, Hisar	1435.90	1706.60	665.65	681.48	0.00	0.00	2101.55	2388.08
5	GBPUAT, Pantnagar	1350.46	2371.80	144.34	230.30	2483.00	3165.49	3977.80	5767.59
6	NDUA&T, Faizabad	606.31	465.61	0.00	0.00	804.75	1186.90	1411.06	1652.51
7	CSAUA&T, Kanpur	1313.98	605.25	1135.70	994.22	0.00	0.00	2449.68	1599.47
8	BHU, Varanasi	168.80	223.67	51.20	77.88	30.25	97.72	250.25	399.27
9	AAU, Jorhat	119.70	125.85	0.00	338.45	0.00	0.00	119.70	464.30
10	BAU, Ranchi	34.89	15.50	72.60	164.76	0.00	0.00	107.49	180.26
11	RAU, Dholi	620.00	801.00	621.29	623.73	5226.94	2707.03	6468.23	4131.76
12	OUA&T, Bhubaneswar	1442.10	1425.03	166.76	139.56	0.00	0.00	1608.86	1564.59
13	MAF, Kota	2242.30	3591.71	0.00	0.00	0.00	0.00	2242.30	3591.71
14	RAU, Bikaner	2973.41	3111.80	0.00	0.00	1470.00	1369.55	4443.41	4481.35
15	SDAU, S.K.Nagar	735.10	797.65	982.38	1609.45	0.00	0.00	1717.48	2407.10
16	AAU, Anand	111.00	82.86	0.00	0.00	570.00	566.60	681.00	649.46
17	JAU, Jamnagar	1862.05	2251.77	0.00	11.30	30.60	14.00	1892.65	2277.07
18	IGKV, Raipur	1123.46	1270.95	28.00	54.15	288.40	312.55	1439.86	1637.65
19	JNKVV, Jabalpur	7290.47	8367.23	2769.42	2769.42	3750.19	3750.19	13810.08	14886.84
20	MPKV, Rahuri	1507.85	1538.12	600.83	225.88	0.00	97.36	2108.68	1861.36
21	PDKV, Akola	638.68	494.42	180.96	79.96	0.00	146.67	819.64	721.05
22	MAU, Parbhani	1371.96	1283.37	0.00	0.00	3025.92	1316.11	4397.88	2599.48
23	UAS, Bangalore	654.33	340.11	25.76	91.17	0.00	0.00	680.09	431.28
24	UAS, Dharwad	6453.89	4317.14	902.40	936.23	17196.80	11492.95	24553.09	16746.32
25	ANGRAU, Hyderabad	4248.70	8254.03	710.20	802.82	575.70	1273.55	5526.60	10322.40
26	PJTSAU, Hyderabad	287.08	294.28	1064.80	934.10	715.20	731.50	2067.08	1959.88
27	TNAU, Coimbatore	178.46	71.13	1773.77	1815.63	0.00	0.00	1952.23	1886.76
28	KAU, Pattambi	6.60	10.00	6.01	82.39	0.00	0.00	12.61	92.39
29	PAJANCOA&RI, Karaikal	0.00	0.00	0.00	0.00	6.00	31.82	6.00	31.82
30	KKV, Dapoli	15.89	48.60	5.87	18.75	61.20	135.80	82.96	203.15
31	BCKV, West Bengal	37.20	21.00	10.00	28.00	0.00	0.00	47.20	49.00
32	UAS, Raichur	228.50	307.85	0.00	0.00	0.00	0.00	228.50	307.85
33	SBPUA&T, Meerut	10.50	9.53	0.00	0.00	7.15	6.28	17.65	15.81
34	NAU, Navsari	860.80	930.00	0.00	0.00	41.95	79.55	902.75	1009.55
35	BAU, Sabour	0.00	0.00	0.00	0.00	215.03	4938.94	215.03	4938.94

Sl. No.	Centre	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
36	UASH, Shivamogga	0.00	0.00	0.00	0.00	163.00	125.78	163.00	125.78
37	UBKV, Pundibari	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
38	MPUAT, Udaipur	115.10	113.65	0.00	0.00	0.00	484.62	115.10	598.27
39	RVSKVV, Gwalior	5776.95	3834.65	0.00	0.00	753.00	2791.25	6529.95	6625.90
	Total SAUs	**48891.12**	**53564.00**	**12702.38**	**13892.16**	**37585.68**	**37034.64**	**99171.18**	**104482.80**
	ICAR, Institute								
40	VPKAS, Almora	129.29	122.50	0.00	0.00	0.00	11.97	129.29	134.47
41	IIPR, Kanpur	246.02	375.30	0.00	0.00	40.00	123.18	286.02	498.48
42	IGFRI, Jhansi	175.95	182.38	0.00	0.00	0.00	8.14	175.95	190.52
43	CRIJAF, Barrackpore	10.84	13.14	0.00	0.00	0.00	0.00	10.84	13.14
44	CAZRI, Jodhpur	5.00	2.88	0.00	0.00	0.00	0.00	5.00	2.88
45	CRRI, Cuttack	682.10	703.40	0.00	0.00	64.10	65.40	746.20	768.80
46	ICAR-IIRR, Hyderabad	126.10	267.60	0.00	0.00	25.00	110.00	151.10	377.60
47	IIMR, Hyderabad	21.15	77.90	0.00	0.00	14180.00	13834.00	14201.15	13911.90
48	CICR, Nagpur	0.37	1.35	0.00	0.00	0.00	0.00	0.37	1.35
49	IARI, Karnal	1308.94	1638.70	0.00	0.00	0.00	0.00	1308.94	1638.70
50	IARI, New Delhi	1078.57	1024.93	0.00	0.00	407.00	464.45	1485.57	1489.38
51	ICAR RC NEH, Manipur	0.00	0.00	0.00	0.00	34.00	41.10	34.00	41.10
52	ICAR RC NEH, Meghalaya	0.00	0.00	0.00	0.00	4.80	26.08	4.80	26.08
53	ICAR RC NEH, Tripura	0.00	0.00	0.00	0.00	88.30	119.50	88.30	119.50
54	ICAR-IISS, Mau	41.70	62.00	0.00	0.00	0.00	0.00	41.70	62.00
55	CAU, Imphal	19.00	19.00	0.00	0.00	0.00	0.00	19.00	19.00
56	IIWBR, Karnal	1092.20	1447.48	0.00	0.00	0.00	0.00	1092.20	1447.48
57	IISR, Indore	330.00	33.00	0.00	0.00	0.00	0.00	330.00	33.00
58	IIMR, New Delhi	22.00	25.00	0.00	0.00	0.00	0.00	22.00	25.00
59	CCARI, Goa	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
60	IIOR, Hyderabad	2.44	6.56	0.00	0.00	0.00	0.00	2.44	6.56
61	CIARI, Port Blair	4.16	4.82	0.00	0.00	0.00	0.00	4.16	4.82
62	IARI, Pusa, Bihar	1255.00	587.60	0.00	0.00	0.00	0.00	1255.00	587.60
63	IARI, Indore	1301.40	1902.00	0.00	0.00	0.00	0.00	1301.40	1902.00
64	DGR, Junagadh	292.50	38.70	0.00	0.00	0.00	0.00	292.50	38.70
	Total ICAR Institute	**8145.23**	**8536.74**	**0.00**	**0.00**	**14843.20**	**14803.82**	**22988.43**	**23340.56**
	Total (SAU + ICAR)	**57036.35**	**62100.74**	**12702.38**	**13892.16**	**52428.88**	**51838.46**	**122159.61**	**127823.36**

Table 4: Crop- Wise (total) breeder seed production during 2015-16

(Figures in quintals)

Crop	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Indent	Production	Indent	Production
CEREAL CROPS								
Rice	4650.23	5246.04	5477.29	6406.45	11763.35	11660.21	21890.87	23312.70
Wheat	18070.90	28190.77	3578.13	4236.97	4929.36	10182.21	26578.39	42609.95
Maize	69.01	68.46	89.02	109.81	175.25	264.93	333.28	443.20
Pearlmillet	6.57	12.31	0.36	12.17	0.00	0.56	6.93	25.04
Sorghum	58.90	151.77	7.58	11.59	14815.20	14319.17	14881.68	14482.53
Barley	683.54	671.66	31.95	57.37	16.50	109.13	731.99	838.16
Finger Millet	32.90	43.11	6.16	31.65	3.05	4.90	42.11	79.66
Foxtel Millet /Navane	13.00	72.00	0.92	0.95	16.00	121.00	21.92	185.95
Barnyard millet	0.17	0.85	1.91	1.91	0.00	0.00	2.08	2.76
Kodo	2.05	2.57	9.45	9.47	0.40	0.50	11.90	12.54
Littile Millet	0.00	0.00	1.96	2.05	2.00	2.02	3.96	4.07
Buckwheat	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.15
Amaranth	0.04	0.15	0.00	0.00	0.00	0.00	0.04	0.15
Total Cereal Crops	**23587.31**	**34459.69**	**9204.73**	**10880.39**	**31721.11**	**36664.78**	**64505.15**	**81996.86**
PULSE CROPS								
Chickpea	5332.28	5417.67	184.08	145.15	376.10	1038.96	5892.46	6601.78
Pigeonpea	231.31	594.61	35.29	53.82	683.50	413.45	950.10	1061.88
Field Pea	633.10	408.91	71.00	77.95	88.99	127.74	793.09	614.60
Mung	531.54	797.02	183.14	235.62	243.00	236.35	957.68	1268.99
Urd	368.30	318.41	143.09	179.76	122.15	119.81	633.54	617.98
Lentil	278.37	264.70	51.40	44.77	224.80	461.31	554.57	770.78
Rajmash	8.70	11.75	18.61	12.48	4.50	6.80	31.81	31.03
Horse Gram	0.70	1.80	6.00	5.75	5.70	6.00	12.40	13.55
Beans	0.00	0.00	0.50	0.20	4.00	5.00	4.50	5.20
Cowpea	100.20	111.72	12.47	27.05	8.00	9.00	120.67	147.77
Lathyrus	4.20	5.30	2.00	2.50	10.00	12.40	16.20	20.20
Moth Bean	63.60	23.38	1.00	0.70	50.00	35.00	114.60	59.08
Guar/ Cluster bean	167.00	23.75	3.50	8.37	0.00	0.00	170.50	32.12
Total Pulse Crops	**7719.30**	**7979.02**	**712.08**	**794.12**	**1820.74**	**2471.82**	**10252.12**	**11244.96**
OILSEED CROPS								
Soybean	17547.03	7648.76	1646.31	1077.95	13794.75	8649.57	32988.09	17376.28
Sunflower	1.35	11.96	1.01	5.25	0.00	0.00	2.36	17.21
Groundnut	7378.40	11001.95	895.36	836.42	3663.93	2618.68	11937.69	14457.05
Linseed	38.81	47.00	52.49	55.89	52.98	127.53	144.28	230.42
Safflower	12.88	64.28	0.80	1.20	522.02	175.55	535.70	241.03
Sesamum	30.17	44.11	8.48	9.17	29.50	22.98	68.15	76.26
Niger	8.34	5.47	3.82	3.82	4.50	4.00	16.66	13.29
Castor	6.44	10.38	17.78	33.66	5.00	7.80	29.22	51.84
Rapseed Mustard								
Mustard	73.89	160.31	52.65	55.87	14.00	155.45	140.54	371.63
Toria	12.47	27.95	14.28	30.03	9.35	13.50	36.10	71.48
Ghobi Sarson	0.36	12.11	1.22	0.05	4.00	5.01	5.58	17.17

Crop	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Indent	Production	Indent	Production
Brown Sarson	0.05	0.05	1.20	1.40	0.20	0.38	1.45	1.83
Raya	0.18	4.34	0.00	0.05	0.20	0.19	0.38	4.58
Rai	5.50	12.25	0.50	1.00	11.00	14.34	17.00	27.59
Karan Rai	0.00	0.00	0.00	0.30	0.20	0.36	0.20	0.66
Til	6.29	1.76	10.20	2.64	2.00	0.78	18.49	5.18
Total Oilseed Crops	**25122.16**	**19052.68**	**2706.10**	**2114.70**	**18113.63**	**11796.12**	**45941.89**	**32963.50**
FIBRE CROPS								
Cotton	20.45	25.21	24.54	35.71	60.45	52.07	105.44	112.99
Jute	10.89	12.06	0.00	0.15	0.25	0.35	11.14	12.56
Mesta	0.00	0.98	0.00	0.00	1.00	55.00	1.00	55.98
Sunnhemp	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.15
Total Fibre Crops	**31.34**	**38.40**	**24.54**	**35.86**	**61.70**	**107.42**	**117.58**	**181.68**
FORAGE CROPS								
Oats	317.50	303.70	54.00	60.49	10.00	24.50	381.50	388.69
Maize	49.99	57.00	0.00	0.00	10.00	7.25	59.99	64.25
Sorghum	7.87	17.92	0.00	0.00	6.50	11.00	14.37	28.92
Pearl Millet	0.20	1.55	0.08	4.15	0.00	0.00	0.28	5.70
Lucerne	0.10	0.11	0.00	0.00	15.00	7.30	15.10	7.41
Cowpea	6.65	3.75	0.00	0.05	0.00	0.54	6.65	4.34
Grain Cowpea	71.00	0.25	0.00	0.00	0.00	0.00	71.00	0.25
Berseem	46.63	69.67	0.00	0.00	0.00	0.00	46.63	69.67
Guar	76.30	117.00	0.10	0.50	670.00	723.85	746.40	841.35
Metha	0.00	0.00	0.15	1.00	0.00	23.38	0.15	24.38
Guinea Grass	0.00	0.00	0.10	0.30	0.00	0.00	0.10	0.30
Rey Grass	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
Stylo	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10
Setaria	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
Red Clover	0.00	0.00	0.00	0.00	0.10	0.30	0.10	0.30
Total Forage Crops	**576.24**	**570.95**	**54.93**	**67.09**	**711.70**	**798.32**	**1342.87**	**1436.36**
Grand Total	**57036.35**	**62100.74**	**12702.38**	**13892.16**	**52428.88**	**51838.46**	**122159.61**	**127823.36**

Table 5: Centre-wise and crop-wise information on anticipated breeder seed production during 2016-17

(Figures in quintals)

Sl. No. Centre	Crop/Variety	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Indent	Production	Indent	Production
State Agricultural Universities									
1. SKUA &T, Srinagar									
Cereal Crops	**Rice**								
	Shalimar Rice 1	0.00	0.00	13.95	16.00	0.00	0.00	13.95	16.00
	Shalimar Rice 2								
	Shalimar Rice 3								
	Total	**0.00**	**0.00**	**13.95**	**16.00**	**0.00**	**0.00**	**13.95**	**16.00**
	Wheat								
	Shalimar wheat 1	0.00	0.00	10.78	13.00	0.00	0.00	10.78	13.00
	Shalimar wheat 2								
	Total	**0.00**	**0.00**	**10.78**	**13.00**	**0.00**	**0.00**	**10.78**	**13.00**
	Maize								
	C 3	0.00	0.00	5.72	6.00	0.00	0.00	5.72	6.00
	C 4								
	C 5								
	C 6								
	C 7								
	KG 1								
	KG 2								
	Total	**0.00**	**0.00**	**5.72**	**6.00**	**0.00**	**0.00**	**5.72**	**6.00**
	Total Cereal Crops	**0.00**	**0.00**	**30.45**	**35.00**	**0.00**	**0.00**	**30.45**	**35.00**
Pulse Crops	**Rajmash**								
	Shalimar Rajmash 1	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**
	Cowpea								
	Shalimar Cowpea 1	0.00	0.00	0.50	1.15	0.00	0.00	0.50	1.15
	Total	**0.00**	**0.00**	**0.50**	**1.15**	**0.00**	**0.00**	**0.50**	**1.15**
	Mung								
	Shalimar Mung 1	0.00	0.00	0.63	0.35	0.00	0.00	0.63	0.35
	Shalimar Mung 2								
	Total	**0.00**	**0.00**	**0.63**	**0.35**	**0.00**	**0.00**	**0.63**	**0.35**
	Pea								
	Shalimar Pea 1	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
	Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**
	Lentil								
	Shalimar Masoor 1	0.00	0.00	1.50	2.00	0.00	0.00	1.50	2.00
	Shalimar Masoor 2								
	Total	**0.00**	**0.00**	**1.50**	**2.00**	**0.00**	**0.00**	**1.50**	**2.00**
	Total pulse crops	**0.00**	**0.00**	**3.63**	**4.50**	**0.00**	**0.00**	**3.63**	**4.50**
Oilseed Crops	**Sarson**								
	KOS 101	0.00	0.00	1.20	1.50	0.00	0.00	1.20	1.50
	SBS 1								
	Total	**0.00**	**0.00**	**1.20**	**1.50**	**0.00**	**0.00**	**1.20**	**1.50**
	Total Oilseed Crops	**0.00**	**0.00**	**1.20**	**1.50**	**0.00**	**0.00**	**1.20**	**1.50**

Forage Crops	**Oat**								
	Sabzar	0.00	0.00	44.00	46.00	0.00	0.00	44.00	46.00
	Shalimar Fodder Oats 1								
	Shalimar Fodder Oats 2								
	Toal	**0.00**	**0.00**	**44.00**	**46.00**	**0.00**	**0.00**	**44.00**	**46.00**
	Total Forage Crops	**0.00**	**0.00**	**44.00**	**46.00**	**0.00**	**0.00**	**44.00**	**46.00**
	Grand Total (Srinagar)	**0.00**	**0.00**	**79.28**	**87.00**	**0.00**	**0.00**	**79.28**	**87.00**
2. SKUA &T, Jammu									
Cereal Crops	**Paddy**								
	Pusa-1121	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Basmati-370	2.00	3.50	0.00	0.00	0.00	0.00	2.00	3.50
	Jaya	0.50	1.50	0.00	0.00	0.00	0.00	0.50	1.50
	K-39	0.30	1.25	0.00	0.00	0.00	0.00	0.30	1.25
	K-343	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Giza-14	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	B 564	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	Total	**5.00**	**12.75**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**12.75**
	Wheat								
	VL 907	0.00	0.00	20.00	20.00	0.00	0.00	20.00	20.00
	HPW 349	0.00	0.00	16.00	8.00	0.00	0.00	16.00	8.00
	WH 1105	0.00	0.00	16.00	20.00	0.00	0.00	16.00	20.00
	WH 1080	0.00	0.00	20.00	15.00	0.00	0.00	20.00	15.00
	RSP 561	0.00	0.00	10.00	8.00	0.00	0.00	10.00	8.00
	Total	**0.00**	**0.00**	**82.00**	**71.00**	**0.00**	**0.00**	**82.00**	**71.00**
	Total Cereal Crops	**5.00**	**12.75**	**82.00**	**71.00**	**0.00**	**0.00**	**87.00**	**83.75**
Pulse Crops	**Moong**								
	ML 818	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
	Urd								
	Uttra	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Total	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**
	Total pulse crops	**1.50**	**1.50**	**0.00**	**0.00**	**0.00**	**0.00**	**1.50**	**1.50**
	Grand Total (Jammu)	**6.50**	**14.25**	**82.00**	**71.00**	**0.00**	**0.00**	**88.50**	**85.25**
3. CSKHPKV, Palampur									
Cereal Crops	**Rice**								
	HPR 2143	8.00	10.00	0.00	0.00	5.00	6.00	13.00	16.00
	HPR 1068	8.00	8.00	0.00	0.00	2.00	3.00	10.00	11.00
	HPR 1156	5.00	5.00	0.00	0.00	3.00	5.00	8.00	10.00
	RP 2421	2.00	2.00	0.00	0.00	1.00	2.00	3.00	4.00
	Kasturi Basmati	0.00	0.00	1.00	1.00	5.00	4.00	6.00	5.00
	VL Dhan 221	0.00	0.00	0.00	0.00	0.50	1.00	0.50	1.00
	PalamLalDhan 1	0.00	0.00	0.50	0.50	0.50	1.00	1.00	1.50
	HPR 2612	0.00	0.00	0.50	1.00	0.50	1.00	1.00	2.00
	HPR 2880	0.00	0.00	0.00	0.00	0.50	1.00	0.50	1.00
	HPR 2656	0.00	0.00	0.00	0.00	1.00	0.80	1.00	0.80
	Total	**23.00**	**25.00**	**2.00**	**2.50**	**19.00**	**24.80**	**44.00**	**52.30**

	Wheat								
	HPW 155	0.00	0.00	20.00	30.00	15.00	15.00	35.00	45.00
	HPW 236	0.00	0.00	0.00	30.00	60.00	60.00	60.00	90.00
	VL 829	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	DBW 88	0.00	0.00	0.00	30.00	20.00	20.00	20.00	50.00
	HPW 249	30.00	40.00	0.00	0.00	0.00	0.00	30.00	40.00
	HPW 349	65.00	100.00	0.00	0.00	20.00	20.00	85.00	120.00
	HPW 360	40.00	40.00	0.00	0.00	5.00	5.00	45.00	45.00
	HPW 368	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00
	VL 892	20.00	3.00	0.00	0.00	0.00	0.00	20.00	3.00
	HS 542	30.00	10.00	0.00	0.00	0.00	0.00	30.00	10.00
	HS 507	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	WH 1080	40.00	40.00	0.00	0.00	40.00	40.00	80.00	80.00
	VL 907	10.00	5.00	0.00	0.00	0.00	0.00	10.00	5.00
	Total	**245.00**	**248.00**	**20.00**	**90.00**	**192.00**	**192.00**	**457.00**	**530.00**
	Barley								
	HBL 276 (Harit)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	HBL 316 (Gopi)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	HBL 113 (Vimal)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	BHS 380 (Pusa Loser)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	BHS 400 (PusaSheetal	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	HBL 391 (Gokul)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	HBL 713 (Him PalamJoun 1)	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**17.00**	**17.00**	**17.00**	**17.00**
	Maize								
	Baj Makka	0.00	0.00	0.00	0.00	1.20	1.30	1.20	1.30
	Girija	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Early composite	0.00	0.00	0.00	0.00	1.00	1.25	1.00	1.25
	Total	**0.00**	**0.00**	**0.00**	**2.00**	**2.20**	**2.55**	**2.20**	**4.55**
	Total Cereal Crops	**268.00**	**273.00**	**22.00**	**94.50**	**230.20**	**236.35**	**520.20**	**603.85**
Pulse Crops	**Urd**								
	UG 218	0.00	0.00	1.00	1.50	0.00	0.00	1.00	1.50
	Kullu 4	0.00	0.00	0.00	0.00	0.10	0.25	0.10	0.25
	Palampur 93	0.00	0.00	0.00	2.00	1.00	4.00	1.00	6.00
	Pant U 19	0.00	0.00	2.00	2.30	0.00	0.00	2.00	2.30
	Him Mash 1	2.00	3.00	0.00	3.00	10.00	14.70	12.00	20.70
	Total	**2.00**	**3.00**	**3.00**	**8.80**	**11.10**	**18.95**	**16.10**	**30.75**
	Chickpea								
	HPG 17	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
	HC 1	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	HC 2	10.00	12.00	0.00	0.00	0.00	0.00	10.00	12.00
	GPF 2	10.00	12.00	0.00	0.00	0.00	0.00	10.00	12.00
	Total	**20.00**	**24.00**	**0.00**	**0.00**	**1.20**	**1.20**	**21.20**	**25.20**
	Lentil								
	Vipasha	1.00	1.00	0.00	0.00	1.50	1.50	2.50	2.50
	Markandey	1.00	1.00	0.00	0.00	1.00	1.00	2.00	2.00
	Total	**2.00**	**2.00**	**0.00**	**0.00**	**2.50**	**2.50**	**4.50**	**4.50**

	Rajmash								
	Baspa	0.00	0.00	1.00	1.30	0.50	0.70	1.50	2.00
	Jwala	0.00	0.00	9.00	6.10	0.00	3.50	9.00	9.60
	Kailash	0.00	0.00	2.00	1.80	2.00	0.00	4.00	1.80
	Kanchan	0.00	0.00	1.00	2.40	0.00	0.00	1.00	2.40
	Him 1	0.00	0.00	1.00	1.60	0.00	0.00	1.00	1.60
	Total	**0.00**	**0.00**	**14.00**	**13.20**	**2.50**	**4.20**	**16.50**	**17.40**
	Total Pulse Crops	**24.00**	**29.00**	**17.00**	**22.00**	**17.30**	**26.85**	**58.30**	**77.85**
Oilseed Crops	**Soybean**								
	Hara Soya	4.00	5.00	0.00	0.00	2.00	3.00	6.00	8.00
	Palam Soya	2.00	3.00	0.00	0.00	2.00	2.00	4.00	5.00
	Himso 1588	0.00	0.00	0.00	3.00	6.00	10.00	6.00	13.00
	Shivalik	3.00	4.00	0.00	0.00	1.00	1.00	4.00	5.00
	Total	**9.00**	**12.00**	**0.00**	**3.00**	**11.00**	**16.00**	**20.00**	**31.00**
	Linseed								
	Him alsi-2	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	Binwa	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
	Baner	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
	Himani	0.10	0.10	0.00	0.00	0.30	0.30	0.40	0.40
	Bhagsu	0.10	0.10	0.00	0.00	0.10	0.10	0.20	0.20
	Nagarkot	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**0.20**	**0.20**	**0.00**	**0.00**	**1.80**	**1.80**	**2.00**	**2.00**
	Brown Sarson								
	KBS 3	0.05	0.05	0.00	0.00	0.05	0.05	0.10	0.10
	BSH 1	0.05	0.05	0.00	0.00	0.05	0.05	0.10	0.10
	ONK 1	0.05	0.05	0.00	0.00	0.05	0.05	0.10	0.10
	Total	**0.15**	**0.15**	**0.00**	**0.00**	**0.15**	**0.15**	**0.30**	**0.30**
	Raya								
	Varuna	0.05	0.05	0.00	0.00	0.05	0.05	0.10	0.10
	RCC4	0.05	0.05	0.00	0.00	0.05	0.05	0.10	0.10
	Total	**0.10**	**0.10**	**0.00**	**0.00**	**0.10**	**0.10**	**0.20**	**0.20**
	G. Sarson								
	Him Sarson1	0.10	0.10	0.00	0.00	0.10	0.05	0.20	0.15
	Neelam	0.10	0.10	0.00	0.00	0.05	0.05	0.15	0.15
	Total	**0.20**	**0.20**	**0.00**	**0.00**	**0.15**	**0.10**	**0.35**	**0.30**
	Karan Rai								
	Jayanti 0	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.05**	**0.05**	**0.05**
	Sesame								
	LTK 4	0.00	0.00	0.05	0.10	2.00	2.20	2.05	2.30
	Total	**0.00**	**0.00**	**0.05**	**0.10**	**2.00**	**2.20**	**2.05**	**2.30**
	Toria								
	Bhawani	0.50	0.50	0.00	0.00	1.70	2.70	2.20	3.20
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**1.70**	**2.70**	**2.20**	**3.20**
	Total Oilseed Crops	**10.15**	**13.15**	**0.05**	**3.10**	**16.95**	**23.10**	**27.15**	**39.35**
Forage Crops	**Maize**								
	African Tall	0.00	0.00	0.00	0.00	10.00	16.00	10.00	16.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**16.00**	**10.00**	**16.00**

	Oats								
	P1p1	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**30.00**	**30.00**	**30.00**
	Setaria								
	PSS 1	0.00	0.00	0.00	0.00	0.10	0.25	0.10	0.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.25**	**0.10**	**0.25**
	Red Clover								
	Palampur 1	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.20**	**0.10**	**0.20**
	Total Forage Crops	**0.00**	**0.00**	**0.00**	**0.00**	**40.20**	**46.45**	**40.20**	**46.45**
	Grand Total (Palampur)	**302.15**	**315.15**	**39.05**	**119.60**	**304.65**	**332.75**	**645.85**	**767.50**
4. PAU, Ludhiana									
Cereal Crops	**Rice**								
	PR 111	6.50	14.90	0.00	0.00	0.00	0.00	6.50	14.90
	PR 113	12.50	15.50	0.00	0.00	0.00	0.00	12.50	15.50
	PR 114	16.00	20.00	0.00	0.00	0.00	0.00	16.00	20.00
	PR 116	2.00	10.00	0.00	0.00	0.00	0.00	2.00	10.00
	PR 118	17.50	22.00	0.00	0.00	0.00	0.00	17.50	22.00
	PR 121	27.50	40.00	0.00	0.00	0.00	0.00	27.50	40.00
	PR 122	6.50	12.00	0.00	0.00	0.00	0.00	6.50	12.00
	PR 123	7.00	38.00	0.00	0.00	0.00	0.00	7.00	38.00
	PR 124	21.00	40.00	0.00	0.00	0.00	0.00	21.00	40.00
	PAU 201	4.50	10.00	0.00	0.00	0.00	0.00	4.50	10.00
	Pb Bas. 2	0.50	3.00	0.00	0.00	0.00	0.00	0.50	3.00
	Pb Bas. 3	1.50	4.00	0.00	0.00	0.00	0.00	1.50	4.00
	Pusa 1121	0.00	0.00	10.00	25.00	0.00	0.00	10.00	25.00
	Total	**123.00**	**229.40**	**10.00**	**25.00**	**0.00**	**0.00**	**133.00**	**254.40**
	Wheat								
	PBW 343	79.40	30.00	0.00	0.00	0.00	0.00	79.40	30.00
	PBW 373	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
	PBW 443	56.50	60.00	0.00	0.00	0.00	0.00	56.50	60.00
	DBW 17	89.00	115.00	0.00	0.00	0.00	0.00	89.00	115.00
	PBW 502	80.00	115.00	0.00	0.00	0.00	0.00	80.00	115.00
	PBW 509	52.40	55.00	0.00	0.00	0.00	0.00	52.40	55.00
	PBW 533	6.00	12.00	0.00	0.00	0.00	0.00	6.00	12.00
	PBW 550	203.00	480.00	0.00	0.00	0.00	0.00	203.00	480.00
	PBW 590	139.40	190.00	0.00	0.00	0.00	0.00	139.40	190.00
	PBW 621	100.00	200.00	0.00	0.00	0.00	0.00	100.00	200.00
	PBW 644	96.00	100.00	0.00	0.00	0.00	0.00	96.00	100.00
	PBW 658	8.00	24.00	0.00	0.00	0.00	0.00	8.00	24.00
	PBW 660	6.00	11.00	0.00	0.00	0.00	0.00	6.00	11.00
	PBW 677	116.40	700.00	0.00	0.00	0.00	0.00	116.40	700.00
	PBW 725	121.40	1000.00	0.00	0.00	0.00	0.00	121.40	1000.00
	HD 2967	340.00	780.00	0.00	0.00	0.00	0.00	340.00	780.00
	WH 1105	775.00	850.00	0.00	0.00	0.00	0.00	775.00	850.00
	HD 3086	0.00	0.00	400.00	500.00	0.00	0.00	400.00	500.00
	PDW 291	0.00	0.00	5.00	15.00	0.00	0.00	5.00	15.00
	Total	**2273.50**	**4727.00**	**405.00**	**515.00**	**0.00**	**0.00**	**2678.50**	**5242.00**

	Barley								
	PL 426	96.15	100.00	0.00	0.00	0.00	0.00	96.15	100.00
	PL 751	1.00	10.00	0.00	0.00	0.00	0.00	1.00	10.00
	PL 807	2.00	11.00	0.00	0.00	0.00	0.00	2.00	11.00
	DWRUB 52	0.00	0.00	0.50	3.50	0.00	0.00	0.50	3.50
	Total	**99.15**	**121.00**	**0.50**	**3.50**	**0.00**	**0.00**	**99.65**	**124.50**
	Maize								
	LM 13	0.00	0.00	3.40	3.40	0.00	0.00	3.40	3.40
	LM 14	0.00	0.00	1.50	3.00	0.00	0.00	1.50	3.00
	LM 15	0.00	0.00	1.20	1.20	0.00	0.00	1.20	1.20
	LM 16	0.00	0.00	0.60	0.70	0.00	0.00	0.60	0.70
	LM 23	0.00	0.00	2.50	3.00	0.00	0.00	2.50	3.00
	LM 24	0.00	0.00	1.20	3.50	0.00	0.00	1.20	3.50
	Total	**0.00**	**0.00**	**10.40**	**14.80**	**0.00**	**0.00**	**10.40**	**14.80**
	Total Cereal Crops	**2495.65**	**5077.40**	**425.90**	**558.30**	**0.00**	**0.00**	**2921.55**	**5635.70**
Pulse Crops	**Arhar**								
	PAU 201	0.00	0.00	1.00	1.50	0.00	0.00	1.00	1.50
	PAU 881	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Total	**10.00**	**10.00**	**1.00**	**1.50**	**0.00**	**0.00**	**11.00**	**11.50**
	Mung								
	SML 668	75.00	75.00	0.00	0.00	0.00	0.00	75.00	75.00
	SML 832	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	PAU 911	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.00
	Summer							0.00	0.00
	SML 668	45.00	45.00	0.00	0.00	0.00	0.00	45.00	45.00
	Total	**130.50**	**130.00**	**0.00**	**0.00**	**0.00**	**0.00**	**130.50**	**130.00**
	Chickpea								
	GPF 2	13.00	13.00	0.00	0.00	0.00	0.00	13.00	13.00
	PBG 5	1.00	3.00	0.00	0.00	0.00	0.00	1.00	3.00
	L 556	5.00	6.00	0.00	0.00	0.00	0.00	5.00	6.00
	PBG 7	0.00	0.00	9.00	11.00	0.00	0.00	9.00	11.00
	L 552	0.00	0.00	1.00	2.00	0.00	0.00	1.00	2.00
	Total	**19.00**	**22.00**	**10.00**	**13.00**	**0.00**	**0.00**	**29.00**	**35.00**
	Lentil								
	LL 699	0.35	2.50	0.00	0.00	0.00	0.00	0.35	2.50
	LL 931	0.95	2.50	0.00	0.00	0.00	0.00	0.95	2.50
	Total	**1.30**	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.30**	**5.00**
	Rajmash								
	Mash 114	1.50	4.00	0.00	0.00	0.00	0.00	1.50	4.00
	Mash 479	25.00	26.00	0.00	0.00	0.00	0.00	25.00	26.00
	Mash 338	0.30	1.00	0.00	0.00	0.00	0.00	0.30	1.00
	Mash 1008	2.50	2.50	0.00	0.00	0.00	0.00	2.50	2.50
	Total	**29.30**	**33.50**	**0.00**	**0.00**	**0.00**	**0.00**	**29.30**	**33.50**
	Total Pulse Crops	**190.10**	**200.50**	**11.00**	**14.50**	**0.00**	**0.00**	**201.10**	**215.00**
Oilseed Crops	**Groundnut**								
	SG 99	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Total	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**0.00**	**1.00**	**1.00**

	Soybean								
	SL 525	0.00	0.00	1.00	2.50	0.00	0.00	1.00	2.50
	SL 744	0.00	0.00	0.35	2.00	0.00	0.00	0.35	2.00
	SL 958	0.00	0.00	5.00	7.50	0.00	0.00	5.00	7.50
	Total	**0.00**	**0.00**	**6.35**	**12.00**	**0.00**	**0.00**	**6.35**	**12.00**
	Gobhi Sarson								
	GSC 6	0.00	0.00	0.10	0.80	0.00	0.00	0.10	0.80
	GSC 7	1.50	8.00	0.00	0.00	0.00	0.00	1.50	8.00
	Total	**1.50**	**8.00**	**0.10**	**0.80**	**0.00**	**0.00**	**1.60**	**8.80**
	Linseed								
	LC 2063	0.00	0.00	0.20	0.60	0.00	0.00	0.20	0.60
	Total	**0.00**	**0.00**	**0.20**	**0.60**	**0.00**	**0.00**	**0.20**	**0.60**
	Raya Sarson								
	PBR 91	0.03	0.90	0.00	0.00	0.00	0.00	0.03	0.90
	PBR 357	0.20	0.80	0.00	0.00	0.00	0.00	0.20	0.80
	RLM 619	0.15	0.80	0.00	0.00	0.00	0.00	0.15	0.80
	RLC 3	0.00	0.00	0.10	4.00	0.00	0.00	0.10	4.00
	PBR 97	0.00	0.00	0.10	2.50	0.00	0.00	0.10	2.50
	Total	**0.38**	**2.50**	**0.20**	**6.50**	**0.00**	**0.00**	**0.58**	**9.00**
	Toria								
	TL 15	1.17	1.30	0.00	0.00	0.00	0.00	1.17	1.30
	Total	**1.17**	**1.30**	**0.00**	**0.00**	**0.00**	**0.00**	**1.17**	**1.30**
	Sesame								
	Pb Til No. 2	0.00	0.00	0.20	1.40	0.00	0.00	0.20	1.40
	RT 346	0.00	0.00	0.20	1.80	0.00	0.00	0.20	1.80
	Total	**0.00**	**0.00**	**0.40**	**3.20**	**0.00**	**0.00**	**0.40**	**3.20**
	Total Oilseed Crops	**3.05**	**11.80**	**8.25**	**24.10**	**0.00**	**0.00**	**11.30**	**35.90**
Fibre Crops	**Cotton**								
	FDK 124	0.10	10.00	0.00	0.00	0.00	0.00	0.10	10.00
	F 505	0.55	1.70	0.00	0.00	0.00	0.00	0.55	1.70
	F 846	0.75	1.75	0.00	0.00	0.00	0.00	0.75	1.75
	F 1054	0.35	1.78	0.00	0.00	0.00	0.00	0.35	1.78
	F 1378	1.15	4.20	0.00	0.00	0.00	0.00	1.15	4.20
	F 1861	1.05	2.50	0.00	0.00	0.00	0.00	1.05	2.50
	F 2228	2.20	8.60	0.00	0.00	0.00	0.00	2.20	8.60
	LH 2076	0.10	0.20	0.00	0.00	0.00	0.00	0.10	0.20
	LD 327	0.00	0.00	1.00	2.50	0.00	0.00	1.00	2.50
	LD 694	0.00	0.00	1.00	3.10	0.00	0.00	1.00	3.10
	LD 949	0.00	0.00	2.90	2.90	0.00	0.00	2.90	2.90
	LH 1556	0.00	0.00	0.10	0.40	0.00	0.00	0.10	0.40
	LH 2108	0.00	0.00	0.20	1.20	0.00	0.00	0.20	1.20
	Total	**6.25**	**30.73**	**5.20**	**10.10**	**0.00**	**0.00**	**11.45**	**40.83**
	Total Fibre Crops	**6.25**	**30.73**	**5.20**	**10.10**	**0.00**	**0.00**	**11.45**	**40.83**
Forage Crops	**Maize**								
	J 1006	38.15	45.00	0.00	0.00	0.00	0.00	38.15	45.00
	Total	**38.15**	**45.00**	**0.00**	**0.00**	**0.00**	**0.00**	**38.15**	**45.00**

	Berseem								
	BL 1	4.00	5.50	0.00	0.00	0.00	0.00	4.00	5.50
	BL 10	14.25	21.00	0.00	0.00	0.00	0.00	14.25	21.00
	BL 42	8.28	9.00	0.00	0.00	0.00	0.00	8.28	9.00
	BL 180	0.80	3.50	0.00	0.00	0.00	0.00	0.80	3.50
	Total	**27.33**	**39.00**	**0.00**	**0.00**	**0.00**	**0.00**	**27.33**	**39.00**
	Oats								
	Kent	177.10	180.00	0.00	0.00	0.00	0.00	177.10	180.00
	OL 9	2.25	6.00	0.00	0.00	0.00	0.00	2.25	6.00
	OL 10	6.00	18.00	0.00	0.00	0.00	0.00	6.00	18.00
	Total	**185.35**	**204.00**	**0.00**	**0.00**	**0.00**	**0.00**	**185.35**	**204.00**
	Rye Grass								
	PBRG 1	0.00	0.00	0.60	0.80	0.00	0.00	0.60	0.80
	Total	**0.00**	**0.00**	**0.60**	**0.80**	**0.00**	**0.00**	**0.60**	**0.80**
	Guinea Grass								
	PGG 518	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
	Total	**0.00**	**0.00**	**0.30**	**0.30**	**0.00**	**0.00**	**0.30**	**0.30**
	Guar								
	HG 365	0.00	0.00	0.60	1.00	0.00	0.00	0.60	1.00
	Total	**0.00**	**0.00**	**0.60**	**1.00**	**0.00**	**0.00**	**0.60**	**1.00**
	Sorghum								
	A Line	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	B Line	0.15	0.15	0.00	0.00	0.00	0.00	0.15	0.15
	R Line	0.15	0.15	0.00	0.00	0.00	0.00	0.15	0.15
	Total	**0.60**	**0.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.60**	**0.60**
	Bajra								
	FBC 16	0.55	2.00	0.00	0.00	0.00	0.00	0.55	2.00
	PCB 164	0.00	0.00	1.00	4.00	0.00	0.00	1.00	4.00
	Total	**0.55**	**2.00**	**1.00**	**4.00**	**0.00**	**0.00**	**1.55**	**6.00**
	Total Forage Crops	**251.98**	**290.60**	**2.50**	**6.10**	**0.00**	**0.00**	**254.48**	**296.70**
	Grand Total (Ludhiana)	**2947.03**	**5611.03**	**452.85**	**613.10**	**0.00**	**0.00**	**3399.88**	**6224.13**
5. CCSHAU, Hisar									
Cereal Crops	**Rice**								
	HKR-127	8.50	8.50	1.00	1.50	0.00	0.00	9.50	10.00
	HKR-47	11.00	12.00	0.00	0.00	0.00	0.00	11.00	12.00
	Taraori Basmati	4.50	5.00	0.00	0.00	0.00	0.00	4.50	5.00
	Basmati-370	4.00	5.00	0.00	0.00	0.00	0.00	4.00	5.00
	HKR-48	7.00	8.00	0.00	0.00	0.00	0.00	7.00	8.00
	HKR-128	13.50	13.50	1.00	1.50	0.00	0.00	14.50	15.00
	HB-2	8.50	8.50	1.00	1.50	0.00	0.00	9.50	10.00
	Pusa Basmati 1121	9.50	10.00	0.00	0.00	0.00	0.00	9.50	10.00
	CSR-30	13.50	13.50	1.00	1.50	0.00	0.00	14.50	15.00
	PB-1	4.50	5.00	0.00	0.00	0.00	0.00	4.50	5.00
	Total	**84.50**	**89.00**	**4.00**	**6.00**	**0.00**	**0.00**	**88.50**	**95.00**
	Wheat								
	C-306	67.20	70.00	0.00	0.00	0.00	0.00	67.20	70.00
	WH-147	15.00	15.00	2.00	5.00	0.00	0.00	17.00	20.00

	WH-283	36.40	36.40	2.00	3.60	0.00	0.00	38.40	40.00
	WH-711	221.00	221.00	20.00	29.00	0.00	0.00	241.00	250.00
	WH-1021	30.00	30.00	0.00	0.00	0.00	0.00	30.00	30.00
	WH-1025	51.00	51.00	0.00	0.00	0.00	0.00	51.00	51.00
	WH-1080	77.00	80.00	0.00	0.00	0.00	0.00	77.00	80.00
	WH-1105	817.00	817.00	80.00	83.00	0.00	0.00	897.00	900.00
	PBW-343	32.00	32.00	5.00	8.00	0.00	0.00	37.00	40.00
	WH- 1124	239.20	239.20	8.00	10.08	0.00	0.00	247.20	249.28
	HD-2967	50.00	50.00	9.00	10.00	0.00	0.00	59.00	60.00
	HD-3086	60.00	60.00	8.00	10.00	0.00	0.00	68.00	70.00
	WHD-943	80.00	80.00	0.00	0.00	0.00	0.00	80.00	80.00
	WH-1142	59.40	60.00	0.00	0.00	0.00	0.00	59.40	60.00
	Total	**1835.20**	**1841.60**	**134.00**	**158.68**	**0.00**	**0.00**	**1969.20**	**2000.28**
	Maize								
	KHKI 193-1	1.87	1.87	0.00	0.00	0.00	0.00	1.87	1.87
	HKI 193-2	2.20	2.20	0.00	0.00	0.00	0.00	2.20	2.20
	HKI 163	1.69	1.50	0.00	0.00	0.00	0.00	1.69	1.50
	HKI 161	2.58	1.40	0.00	0.00	0.00	0.00	2.58	1.40
	HKI 1105	0.08	0.10	0.00	0.00	0.00	0.00	0.08	0.10
	HKI 323	0.04	0.11	0.00	0.00	0.00	0.00	0.04	0.11
	Total	**8.46**	**7.18**	**0.00**	**0.00**	**0.00**	**0.00**	**8.46**	**7.18**
	Barley								
	BH-393	75.90	75.90	12.00	14.10	0.00	0.00	87.90	90.00
	BH-902	30.90	30.90	3.00	4.10	0.00	0.00	33.90	35.00
	BH-959	16.00	16.00	1.50	2.00	0.00	0.00	17.50	18.00
	BH-885	0.30	0.30	0.50	0.70	0.00	0.00	0.80	1.00
	BH-946	8.00	8.00	1.50	2.00	0.00	0.00	9.50	10.00
	Total	**131.10**	**131.10**	**18.50**	**22.90**	**0.00**	**0.00**	**149.60**	**154.00**
	Pearl Millet								
	HMP 9102	0.02	0.02	0.02	0.03	0.00	0.00	0.04	0.05
	HBL 11(R line HHB 226 & 197)	0.02	0.02	1.20	1.30	0.00	0.00	1.22	1.32
	HMS 37A (A line HHB 216)	0.01	0.01	0.02	0.02	0.00	0.00	0.03	0.03
	HMS 37B (B line HHB 216)	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02
	HTP 3/13 (R line HHB 216)	0.01	0.15	0.00	0.00	0.00	0.00	0.01	0.15
	HMS 47 A (A line HHB 272)	0.55	0.55	0.20	0.22	0.00	0.00	0.75	0.77
	HMS 47 B (B line HHB 272)	0.22	0.22	0.05	0.08	0.00	0.00	0.27	0.30
	AC 04/13 (R line HHB 272)	0.22	0.22	0.75	0.91	0.00	0.00	0.97	1.13
	H 77/833-2-202(R line HHB 67 Imp.)	0.12	0.30	0.00	0.00	0.00	0.00	0.12	0.30
	Total	**1.18**	**1.51**	**2.24**	**2.56**	**0.00**	**0.00**	**3.42**	**4.07**
	Total Cereal Crops	**2060.44**	**2070.39**	**158.74**	**190.14**	**0.00**	**0.00**	**2219.18**	**2260.53**
Pulse Crops	**Arhar**								
	Manak	3.88	3.88	1.00	1.22	0.00	0.00	4.88	5.10
	Paras	0.80	0.80	0.10	0.20	0.00	0.00	0.90	1.00
	Total	**4.68**	**4.68**	**1.10**	**1.42**	**0.00**	**0.00**	**5.78**	**6.10**

	Chickpea								
	C-235	4.52	5.00	0.00	0.00	0.00	0.00	4.52	5.00
	HC-1	1.40	2.00	0.00	0.00	0.00	0.00	1.40	2.00
	HK-2	21.33	25.00	0.00	0.00	0.00	0.00	21.33	25.00
	HC-5	0.80	1.00	0.00	0.00	0.00	0.00	0.80	1.00
	Total	**28.05**	**33.00**	**0.00**	**0.00**	**0.00**	**0.00**	**28.05**	**33.00**
	Mung								
	MH-421	34.00	34.00	2.00	2.00	0.00	0.00	36.00	36.00
	Basanti (M-125)	4.50	4.50	0.50	0.50	0.00	0.00	5.00	5.00
	Sattya (M 2-15)	17.00	11.25	0.00	0.00	0.00	0.00	17.00	11.25
	Total	**55.50**	**49.75**	**2.50**	**2.50**	**0.00**	**0.00**	**58.00**	**52.25**
	Guar								
	HG 365	18.00	18.00	1.50	2.00	0.00	0.00	19.50	20.00
	HG 563	15.00	15.00	1.50	2.00	0.00	0.00	16.50	17.00
	HG 2-20	50.00	55.00	4.00	5.00	0.00	0.00	54.00	60.00
	HG 884	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
	Total	**84.00**	**88.00**	**7.00**	**9.00**	**0.00**	**0.00**	**91.00**	**97.00**
	Urd								
	UH 1	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
	HFP 529	20.00	20.00	4.00	5.00	0.00	0.00	24.00	25.00
	Total	**21.00**	**20.00**	**4.00**	**5.00**	**0.00**	**0.00**	**25.00**	**25.00**
	Lentil								
	HM-1	0.50	0.75	0.00	0.00	0.00	0.00	0.50	0.75
	Sapna	0.50	0.75	0.00	0.00	0.00	0.00	0.50	0.75
	Garima	0.50	0.75	0.00	0.00	0.00	0.00	0.50	0.75
	Total	**1.50**	**2.25**	**0.00**	**0.00**	**0.00**	**0.00**	**1.50**	**2.25**
	Total Pulse Crops	**194.73**	**197.68**	**14.60**	**17.92**	**0.00**	**0.00**	**209.33**	**215.60**
Oilseed Crops	**Til**								
	HT 1	0.02	0.02	0.02	0.03	0.00	0.00	0.04	0.05
	HT 2	0.07	0.07	0.03	0.03	0.00	0.00	0.10	0.10
	Total	**0.09**	**0.09**	**0.05**	**0.06**	**0.00**	**0.00**	**0.14**	**0.15**
	Raya								
	RH-30	2.67	2.67	1.50	2.33	0.00	0.00	4.17	5.00
	(Luxmi) RH 8812	2.35	2.35	2.00	2.65	0.00	0.00	4.35	5.00
	Vasundra (RH-9304)	0.60	0.60	1.00	1.40	0.00	0.00	1.60	2.00
	RH-0749	0.83	0.83	4.00	4.67	0.00	0.00	4.83	5.50
	RH-9801	0.05	0.05	0.15	0.20	0.00	0.00	0.20	0.25
	RH-0406	0.60	1.00	0.00	0.00	0.00	0.00	0.60	1.00
	YSH- 0401	1.30	1.80	0.00	0.00	0.00	0.00	1.30	1.80
	BSH -1	0.05	0.15	0.00	0.00	0.00	0.00	0.05	0.15
	Total	**8.45**	**9.45**	**8.65**	**11.25**	**0.00**	**0.00**	**17.10**	**20.70**
	Total Oilseed Crops	**8.54**	**9.54**	**8.70**	**11.31**	**0.00**	**0.00**	**17.24**	**20.85**
Forage Crops	**Sorghum**								
	HJ 513	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	HC 136	0.30	0.30	0.15	0.20	0.00	0.00	0.45	0.50
	SSG 59-3	0.10	0.10	0.05	0.05	0.00	0.00	0.15	0.15
	Total	**1.40**	**1.40**	**0.20**	**0.25**	**0.00**	**0.00**	**1.60**	**1.65**

	Cowpea								
	HC 46	11.00	0.00	0.00	0.00	0.00	0.00	11.00	0.00
	Total	**11.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.00**	**0.00**
	Total Forage Crops	**12.40**	**1.40**	**0.20**	**0.25**	**0.00**	**0.00**	**12.60**	**1.65**
Fibre Crops	**Cotton**								
	HD-123	2.55	3.00	4.00	5.00	0.00	0.00	6.55	8.00
	HD-432	0.35	0.50	16.00	17.50	0.00	0.00	16.35	18.00
	HD-324	0.00	0.00	0.25	0.30	0.00	0.00	0.25	0.30
	H-1098i	1.25	2.00	20.00	22.00	0.00	0.00	21.25	24.00
	H-1300	0.00	0.00	0.15	0.18	0.00	0.00	0.15	0.18
	H-1226	0.00	0.00	0.05	0.06	0.00	0.00	0.05	0.06
	H-1236	0.00	0.00	0.10	0.12	0.00	0.00	0.10	0.12
	H-1117	0.00	0.00	0.10	0.12	0.00	0.00	0.10	0.12
	H-1353	0.00	0.00	0.10	0.12	0.00	0.00	0.10	0.12
	AAH-1 (Male)	0.06	0.20	0.00	0.00	0.00	0.00	0.06	0.20
	AAH-1 (Female)	0.12	0.09	0.00	0.00	0.00	0.00	0.12	0.09
	Total	**4.33**	**5.79**	**40.75**	**45.40**	**0.00**	**0.00**	**45.08**	**51.19**
	Total Fibre Crops	**4.33**	**5.79**	**40.75**	**45.40**	**0.00**	**0.00**	**45.08**	**51.19**
	Grand Total (Hisar)	**2280.44**	**2284.80**	**222.99**	**265.02**	**0.00**	**0.00**	**2503.43**	**2549.82**
6. GBPUA&T, Pantnagar									
Cereal Crops	**Rice**								
	Pant Dhan 10	0.50	4.00	0.00	0.00	0.00	0.00	0.50	4.00
	Pant Dhan 12	1.50	5.00	0.00	0.00	0.00	0.00	1.50	5.00
	Pant Dhan 18	1.50	7.00	0.00	0.00	0.00	0.00	1.50	7.00
	Pant Dhan 19	0.50	4.00	0.00	0.00	0.00	0.00	0.50	4.00
	Pant Sugandh Dhan 15	1.00	3.00	0.00	0.00	0.00	0.00	1.00	3.00
	Pant Dhan 11	0.50	10.00	0.00	0.00	0.00	0.00	0.50	10.00
	Pant Sugandh Dhan 17	1.00	5.00	0.00	0.00	0.00	0.00	1.00	5.00
	Govind	1.00	12.00	0.00	0.00	0.00	0.00	1.00	12.00
	UPRI 95-17A (IR 58025A)	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	UPRI 95-17B (IR 58025B)	0.10	1.00	0.00	0.00	0.00	0.00	0.10	1.00
	UPRI 92-287 R	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	Pusa 44	0.00	0.00	0.00	0.00	20.00	35.00	20.00	35.00
	PR 113	0.00	0.00	0.00	0.00	50.00	100.00	50.00	100.00
	Pant Basmati 1	0.00	0.00	0.00	0.00	15.00	25.00	15.00	25.00
	Pant Basmati 2	0.00	0.00	0.00	0.00	10.00	15.00	10.00	15.00
	Pant Dhan 16	0.00	0.00	0.00	0.00	1.00	2.00	1.00	2.00
	Pant Dhan 24	0.00	0.00	0.00	0.00	20.00	50.00	20.00	50.00
	Pusa Sugandh 4 (Pusa 1121)	0.00	0.00	0.00	0.00	50.00	85.00	50.00	85.00
	NDR 359	0.00	0.00	0.00	0.00	35.00	50.00	35.00	50.00
	PR 121	0.00	0.00	0.00	0.00	25.00	40.00	25.00	40.00
	Pant Basmati 1	0.00	0.00	0.00	0.00	2.00	4.00	2.00	4.00
	HKR 47	0.00	0.00	0.00	0.00	50.00	75.00	50.00	75.00
	Total	**8.00**	**51.60**	**0.00**	**0.00**	**278.00**	**481.00**	**286.00**	**532.60**

	Wheat								
	CBW 38	27.00	45.00	0.00	0.00	0.00	0.00	27.00	45.00
	DBW 17	10.00	25.00	0.00	0.00	100.00	175.00	110.00	200.00
	DPW 621-50	10.00	25.00	0.00	0.00	20.00	35.00	30.00	60.00
	HD 2329	32.20	50.00	0.00	0.00	10.00	20.00	42.20	70.00
	PBW 154	151.80	200.00	0.00	0.00	150.00	225.00	301.80	425.00
	PBW 343	50.00	75.00	0.00	0.00	150.00	200.00	200.00	275.00
	PBW 373	10.00	25.00	0.00	0.00	150.00	225.00	160.00	250.00
	PBW 502	99.30	110.00	0.00	0.00	25.00	75.00	124.30	185.00
	PBW 550	20.00	30.00	0.00	0.00	50.00	70.00	70.00	100.00
	UP 262	9.60	15.00	0.00	0.00	75.00	110.00	84.60	125.00
	UP 2338	12.40	20.00	0.00	0.00	25.00	40.00	37.40	60.00
	UP 2425	2.40	5.00	0.00	0.00	5.00	10.00	7.40	15.00
	UP 2526	12.40	15.00	0.00	0.00	15.00	20.00	27.40	35.00
	UP 2554	10.00	15.00	0.00	0.00	15.00	25.00	25.00	40.00
	UP 2565	4.80	5.00	0.00	0.00	5.00	10.00	9.80	15.00
	UP 2572	36.40	40.00	0.00	0.00	5.00	5.00	41.40	45.00
	UP 2628	90.00	100.00	0.00	0.00	0.00	0.00	90.00	100.00
	WH 1105	15.00	25.00	0.00	0.00	3.00	450.00	18.00	475.00
	HD 2894	17.20	25.00	0.00	0.00	0.00	0.00	17.20	25.00
	WH 1021	10.00	25.00	0.00	0.00	0.00	0.00	10.00	25.00
	DBW 88	0.00	0.00	0.00	0.00	50.00	75.00	50.00	75.00
	HD 2733	0.00	0.00	0.00	0.00	50.00	65.00	50.00	65.00
	HD 2967	0.00	0.00	0.00	0.00	500.00	910.00	500.00	910.00
	PBW 226	0.00	0.00	0.00	0.00	100.00	160.00	100.00	160.00
	WH 711	0.00	0.00	0.00	0.00	100.00	150.00	100.00	150.00
	UP 2784	0.00	0.00	0.00	0.00	10.00	15.00	10.00	15.00
	Total	**630.50**	**875.00**	**0.00**	**0.00**	**1613.00**	**3070.00**	**2243.50**	**3945.00**
	Maize								
	CM 300	0.05	0.05	0.00	0.00	0.00	0.00	0.05	0.05
	CM 400	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
	CM 600	0.11	0.12	0.00	0.00	0.00	0.00	0.11	0.12
	Pant Sankul Makka 3	2.20	4.50	0.00	0.00	0.00	0.00	2.20	4.50
	Total	**2.42**	**4.73**	**0.00**	**0.00**	**0.00**	**0.00**	**2.42**	**4.73**
	Barley								
	PRB 502	1.20	0.00	0.00	0.00	0.00	0.00	1.20	0.00
	UPB 1008	2.00	5.00	0.00	0.00	0.00	0.00	2.00	5.00
	Total	**3.20**	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.20**	**5.00**
	Total Cereal Crops	**644.12**	**936.33**	**0.00**	**0.00**	**1891.00**	**3551.00**	**2535.12**	**4487.33**
Pulse Crops	**Pigeonpea**								
	UPAS 120	36.63	37.00	0.00	0.00	25.00	25.00	61.63	62.00
	PA 291	6.95	7.00	0.00	0.00	0.00	0.00	6.95	7.00
	Total	**43.58**	**44.00**	**0.00**	**0.00**	**25.00**	**25.00**	**68.58**	**69.00**
	Urd								
	PU 31	31.80	45.00	0.00	0.00	100.00	110.00	131.80	155.00
	PU 40	11.10	12.00	0.00	0.00	0.00	0.00	11.10	12.00
	PU 35	0.40	5.00	0.00	0.00	0.00	0.00	0.40	5.00
	PU 19	0.55	0.00	0.00	0.00	0.00	0.00	0.55	0.00
	Total	**43.85**	**62.00**	**0.00**	**0.00**	**100.00**	**110.00**	**143.85**	**172.00**

	Moong								
	PM 5	15.44	25.00	0.00	0.00	50.00	55.00	65.44	80.00
	PM 6	5.00	9.00	0.00	0.00	0.00	0.00	5.00	9.00
	Total	**20.44**	**34.00**	**0.00**	**0.00**	**50.00**	**55.00**	**70.44**	**89.00**
	Chickpea								
	PG 186	10.00	15.00	0.00	0.00	100.00	120.00	110.00	135.00
	Pant Kabuli Chana 1	3.00	5.00	0.00	0.00	5.00	5.00	8.00	10.00
	Total	**13.00**	**20.00**	**0.00**	**0.00**	**105.00**	**125.00**	**118.00**	**145.00**
	Pea								
	Pant Pea 13	24.00	27.00	0.00	0.00	0.00	0.00	24.00	27.00
	Pant Pea 14	11.00	15.00	0.00	0.00	10.00	10.00	21.00	25.00
	Pant Pea 42	7.50	10.00	0.00	0.00	5.00	5.00	12.50	15.00
	Total	**42.50**	**52.00**	**0.00**	**0.00**	**15.00**	**15.00**	**57.50**	**67.00**
	Lentil								
	PL 6	22.50	30.00	0.00	0.00	0.00	0.00	22.50	30.00
	PL 7	13.00	25.00	0.00	0.00	0.00	0.00	13.00	25.00
	PL 8	13.00	15.00	0.00	0.00	10.00	10.00	23.00	25.00
	PL 406	4.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00
	PL 639	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.00
	Total	**52.75**	**70.00**	**0.00**	**0.00**	**10.00**	**10.00**	**62.75**	**80.00**
	Total Pulse Crops	**216.12**	**282.00**	**0.00**	**0.00**	**305.00**	**340.00**	**521.12**	**622.00**
Oilseed Crops	**Soybean**								
	PS 1092	2.00	5.00	5.00	5.00	0.00	0.00	7.00	10.00
	PS 1225	30.00	40.00	0.00	0.00	15.00	20.00	45.00	60.00
	PS 1042	2.00	0.50	0.00	0.00	0.00	0.00	2.00	0.50
	PS 1347	16.00	8.00	0.00	0.00	0.00	0.00	16.00	8.00
	Total	**50.00**	**53.50**	**5.00**	**5.00**	**15.00**	**20.00**	**70.00**	**78.50**
	Rai								
	PR 19	0.40	2.00	0.00	0.00	10.00	12.00	10.40	14.00
	Pant Pili Sarson 1	3.25	5.00	0.00	0.00	25.00	30.00	28.25	35.00
	Total	**3.65**	**7.00**	**0.00**	**0.00**	**35.00**	**42.00**	**38.65**	**49.00**
	Toria								
	PT 303	0.38	3.00	0.00	0.00	10.00	15.00	10.38	18.00
	Uttara	4.54	5.00	0.00	0.00	15.00	20.00	19.54	25.00
	Total	**4.92**	**8.00**	**0.00**	**0.00**	**25.00**	**35.00**	**29.92**	**43.00**
	Total Oilseed Crops	**58.57**	**68.50**	**5.00**	**5.00**	**75.00**	**97.00**	**138.57**	**170.50**
Forage Crops	**Sorghum**								
	Pant Chari 5	2.50	3.00	0.00	0.00	0.00	0.00	2.50	3.00
	Pant Chari 6	1.18	3.00	0.00	0.00	0.00	0.00	1.18	3.00
	467A	0.41	0.45	0.00	0.00	0.00	0.00	0.41	0.45
	467B	0.23	0.25	0.00	0.00	0.00	0.00	0.23	0.25
	Total	**4.32**	**6.70**	**0.00**	**0.00**	**0.00**	**0.00**	**4.32**	**6.70**
	Forage Cowpea								
	UPC 8705	1.35	1.50	0.00	0.00	0.00	0.00	1.35	1.50
	Total	**1.35**	**1.50**	**0.00**	**0.00**	**0.00**	**0.00**	**1.35**	**1.50**
	Grain Cowpea								
	Pant Lobia 1	4.25	5.00	0.00	0.00	0.00	0.00	4.25	5.00
	Total	**4.25**	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.25**	**5.00**
	Total Forage Crops	**9.92**	**13.20**	**0.00**	**0.00**	**0.00**	**0.00**	**9.92**	**13.20**
Grand Total (Pantnagar)		**928.73**	**1300.03**	**5.00**	**5.00**	**2271.00**	**3988.00**	**3204.73**	**5293.03**

7. NDUA&T, Faizabad									
Cereal Crops	**Rice**								
	Narendra Dhan 3112-1	13.00	50.00	0.00	0.00	75.00	78.00	88.00	128.00
	NDR 359	6.00	20.00	0.00	0.00	45.00	50.00	51.00	70.00
	NDR 97	11.00	20.00	0.00	0.00	5.00	10.00	16.00	30.00
	Narendra lalmati	1.50	5.00	0.00	0.00	5.00	7.50	6.50	12.50
	N D 2008	7.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00
	NDR 2064	10.00	12.50	0.00	0.00	0.00	0.00	10.00	12.50
	NDR 2065	24.00	50.00	0.00	0.00	75.00	120.00	99.00	170.00
	Sarjoo 52	16.50	40.00	0.00	0.00	40.00	60.00	56.50	100.00
	Shusk Samrat	0.50	10.00	0.00	0.00	15.00	30.00	15.50	40.00
	Samba Sub 1	100.00	150.00	0.00	0.00	25.00	50.00	125.00	200.00
	NDR 8002	0.00	10.00	0.00	0.00	25.00	25.00	25.00	35.00
	Swarna Sub 1	0.00	10.00	0.00	0.00	30.00	30.00	30.00	40.00
	Baranideep	0.00	0.00	0.00	0.00	4.00	5.00	4.00	5.00
	Total	**189.50**	**377.50**	**0.00**	**0.00**	**344.00**	**465.50**	**533.50**	**843.00**
	Wheat								
	NW-1014	0.00	0.00	0.00	0.00	75.00	75.00	75.00	75.00
	NW-1067	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00
	NW-1076	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00
	NW-2036	0.00	0.00	0.00	0.00	60.00	60.00	60.00	60.00
	PBW-154	0.00	0.00	0.00	0.00	125.00	125.00	125.00	125.00
	DBW-107	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00
	PBW-373	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PBW-502	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PBW-550	0.00	0.00	0.00	0.00	125.00	125.00	125.00	125.00
	NW-5054	0.00	0.00	0.00	0.00	25.00	25.00	25.00	25.00
	Halana	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	HD-2967	0.00	0.00	0.00	0.00	45.00	45.00	45.00	45.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**665.00**	**665.00**	**665.00**	**665.00**
	Barley								
	NB-2	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
	NDB-1173	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
	NDB-943	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00
	NB-1465	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**190.00**	**190.00**	**190.00**	**190.00**
	Total Cereal Crops	**189.50**	**377.50**	**0.00**	**0.00**	**1199.00**	**1320.50**	**1388.50**	**1698.00**
Pulse Crops	**Pigeonpea**								
	NDA 1	21.50	25.00	0.00	0.00	40.00	52.00	61.50	77.00
	NDA 2	5.36	7.50	0.00	0.00	15.00	18.00	20.36	25.50
	Total	**26.86**	**32.50**	**0.00**	**0.00**	**55.00**	**70.00**	**81.86**	**102.50**
	Chickpea								
	Udai	0.00	0.00	0.00	0.00	40.00	40.00	40.00	40.00
	Pusa 362	0.00	0.00	0.00	0.00	40.00	40.00	40.00	40.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**80.00**	**80.00**	**80.00**	**80.00**
	Lentil								
	NDL 1	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	HUL 57	0.00	0.00	0.00	0.00	25.00	25.00	25.00	25.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**75.00**	**75.00**	**75.00**	**75.00**

	Pea								
	HUDP 15	0.00	0.00	0.00	0.00	25.00	25.00	25.00	25.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**25.00**	**25.00**	**25.00**	**25.00**
	Total Pulse Crops	**26.86**	**32.50**	**0.00**	**0.00**	**235.00**	**250.00**	**261.86**	**282.50**
Oilseed Crops	**Mustard**								
	NDR 8501	0.00	0.00	0.00	0.00	7.00	7.00	7.00	7.00
	NDRE 4	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	Pitambari	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**17.00**	**17.00**	**17.00**	**17.00**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**17.00**	**17.00**	**17.00**	**17.00**
	Grand Total (Faizabad)	**216.36**	**410.00**	**0.00**	**0.00**	**1451.00**	**1587.50**	**1667.36**	**1997.50**
8. CSAUA&T, Kanpur									
Cereal Crops	**Wheat**								
	DBW 39	40.00	40.00	0.00	0.00	0.00	20.00	40.00	60.00
	DBW 107	55.00	55.00	0.00	0.00	0.00	45.00	55.00	100.00
	HUW 234	12.20	12.20	0.00	0.00	0.00	43.80	12.20	56.00
	K 307	97.00	97.00	0.00	0.00	0.00	15.00	97.00	112.00
	K 402	107.50	107.50	0.00	0.00	0.00	0.00	107.50	107.50
	K 607	130.00	130.00	0.00	0.00	0.00	30.00	130.00	160.00
	HD 2967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	K 1006	35.00	35.00	0.00	0.00	0.00	85.00	35.00	120.00
	K 7903	12.60	12.60	0.00	0.00	0.00	11.40	12.60	24.00
	K 9107	12.58	12.58	0.00	0.00	0.00	2.42	12.58	15.00
	K 9423	8.80	8.80	0.00	0.00	0.00	31.20	8.80	40.00
	PBW 343	100.00	100.00	0.00	0.00	0.00	20.00	100.00	120.00
	PBW 550	105.00	105.00	0.00	0.00	0.00	55.00	105.00	160.00
	DBW 17	0.00	0.00	0.00	0.00	0.00	30.00	0.00	30.00
	WH147	0.00	0.00	0.00	0.00	0.00	20.00	0.00	20.00
	Total	**715.68**	**715.68**	**0.00**	**0.00**	**0.00**	**408.82**	**715.68**	**1124.50**
	Barley								
	K 409	1.20	1.20	0.00	0.00	0.00	6.80	1.20	8.00
	K 508	1.80	1.80	0.00	0.00	0.00	0.00	1.80	1.80
	K 551	0.40	0.40	0.00	0.00	0.00	11.60	0.40	12.00
	K 1149 (Geetanjali)	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	K 560	0.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00
	Prakash	0.00	0.00	0.00	0.00	0.00	20.00	0.00	20.00
	Total	**3.40**	**3.40**	**0.00**	**0.00**	**0.00**	**48.40**	**3.40**	**51.80**
	Sorghum								
	CSV 15	0.00	0.00	0.00	0.00	0.00	1.70	0.00	1.70
	Bundela	0.00	0.00	0.00	0.00	0.00	1.50	0.00	1.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.20**	**0.00**	**3.20**
	Maize								
	Azad Kamal	0.20	0.20	0.00	0.00	0.00	0.60	0.20	0.80
	Total	**0.20**	**0.20**	**0.00**	**0.00**	**0.00**	**0.60**	**0.20**	**0.80**
	Total Cereal Crops	**719.28**	**719.28**	**0.00**	**0.00**	**0.00**	**461.02**	**719.28**	**1180.30**
Pulse Crops	**Mung**								
	IPM 2-3	0.00	0.00	0.00	0.00	0.00	47.00	0.00	47.00
	Sweta	0.00	0.00	0.00	0.00	0.00	7.10	0.00	7.10
	Swati	6.90	5.40	0.00	0.00	0.00	0.00	6.90	5.40
	Total	**6.90**	**5.40**	**0.00**	**0.00**	**0.00**	**54.10**	**6.90**	**59.50**

	Urd								
	Shekar 1	0.18	0.18	0.00	0.00	0.00	3.20	0.18	3.38
	Shekar 2	14.40	14.40	0.00	0.00	0.00	16.60	14.40	31.00
	Azad 2	0.20	0.20	0.00	0.00	0.00	4.50	0.20	4.70
	Azad 3	18.30	18.30	0.00	0.00	0.00	10.20	18.30	28.50
	Total	**33.08**	**33.08**	**0.00**	**0.00**	**0.00**	**34.50**	33.08	67.58
	Chickpea								
	Udai (KPG-59)	5.33	5.33	0.00	0.00	0.00	24.67	5.33	30.00
	KGD 1168	0.00	0.00	0.00	0.00	0.00	25.00	0.00	25.00
	KWR 108	10.67	10.67	0.00	0.00	0.00	14.33	10.67	25.00
	Radhey	0.50	0.50	0.00	0.00	0.00	3.50	0.50	4.00
	Pragati	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	Avrodhi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**16.50**	**16.50**	**0.00**	**0.00**	**0.00**	**68.50**	**16.50**	**85.00**
	Field pea								
	KPMR 400(Indra)	0.80	0.80	0.00	0.00	0.00	100.00	0.80	100.80
	KPMR 522 (Jai)	1.00	1.00	0.00	0.00	0.00	100.00	1.00	101.00
	Sapana	10.00	2.00	0.00	0.00	0.00	0.00	10.00	2.00
	Sikha	5.00	0.50	0.00	0.00	0.00	0.00	5.00	0.50
	Rachana	27.00	27.00	0.00	0.00	0.00	5.00	27.00	32.00
	Total	**43.80**	**31.30**	**0.00**	**0.00**	**0.00**	**205.00**	**43.80**	**236.30**
	Lentil								
	Azad Masoor (KLS 218)	20.00	20.00	0.00	0.00	0.00	**20.00**	20.00	40.00
	K-75	10.05	10.05	0.00	0.00	0.00	**19.95**	10.05	30.00
	Shekhar 3 (KL 320)	26.00	26.00	0.00	0.00	0.00	**20.00**	26.00	46.00
	Shekhar 2 (KLB 303)	22.00	10.00	0.00	0.00	0.00	**0.00**	22.00	10.00
	DPL 62	0.00	0.00	0.00	0.00	0.00	**9.00**	0.00	9.00
	KLS 9-02	0.00	0.00	0.00	0.00	0.00	**9.00**	0.00	9.00
	Total	**78.05**	**66.05**	**0.00**	**0.00**	**0.00**	**77.95**	**78.05**	**144.00**
	Total Pulse Crops	**178.33**	**152.33**	**0.00**	**0.00**	**0.00**	**440.05**	**178.33**	**592.38**
Oilseed Crops	**Groundnut**								
	Divya	20.00	2.10	0.00	0.00	0.00	0.00	20.00	2.10
	Total	**20.00**	**2.10**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**2.10**
	Til								
	Shekhar	0.20	0.20	0.00	0.00	0.00	0.60	0.20	0.80
	Pragati	0.20	0.15	0.00	0.00	0.00	0.15	0.20	0.30
	Total	**0.40**	**0.35**	**0.00**	**0.00**	**0.00**	**0.75**	**0.40**	**1.10**
	Toria								
	T. 9	1.06	1.06	0.00	0.00	0.00	1.75	1.06	2.81
	Bhawani	0.60	0.60	0.00	0.00	0.00	0.60	0.60	1.20
	Tapeswari	0.50	0.50	0.00	0.00	0.00	0.70	0.50	1.20
	Total	**2.16**	**2.16**	**0.00**	**0.00**	**0.00**	**3.05**	**2.16**	**5.21**
	Rai								
	Varuna (T.59)	2.98	2.98	0.00	0.00	0.00	5.02	2.98	8.00
	Rohini	2.40	2.40	0.00	0.00	0.00	5.60	2.40	8.00
	Vardan	0.50	0.50	0.00	0.00	0.00	0.50	0.50	1.00
	Vaibhav	0.50	0.50	0.00	0.00	0.00	0.50	0.50	1.00
	Urwashi	0.50	0.50	0.00	0.00	0.00	4.30	0.50	4.80

	Maya	0.50	0.50	0.00	0.00	0.00	7.50	0.50	8.00
	Kanti	0.50	0.50	0.00	0.00	0.00	7.50	0.50	8.00
	Ashirwad	0.50	0.50	0.00	0.00	0.00	3.50	0.50	4.00
	Pitambari	0.75	0.75	0.00	0.00	0.00	3.25	0.75	4.00
	Basanti	0.50	0.50	0.00	0.00	0.00	0.50	0.50	1.00
	Total	**9.63**	**9.63**	**0.00**	**0.00**	**0.00**	**38.17**	**9.63**	**47.80**
	Linseed								
	Shekhar	2.00	2.00	0.00	0.00	0.00	6.00	2.00	8.00
	T. 97	0.88	0.88	0.00	0.00	0.00	0.62	0.88	1.50
	Padmini	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Parwati	0.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00
	Azad Alsi 1	1.75	1.75	0.00	0.00	0.00	2.25	1.75	4.00
	Azad Alsi 2	2.00	2.00	0.00	0.00	0.00	2.00	2.00	4.00
	Ruchi	3.50	3.50	0.00	0.00	0.00	3.50	3.50	7.00
	Total	**10.13**	**10.13**	**0.00**	**0.00**	**0.00**	**26.37**	**10.13**	**36.50**
	Total Oilseed Crops	**42.32**	**24.37**	**0.00**	**0.00**	**0.00**	**68.34**	**42.32**	**92.71**
	Grand Total (Kanpur)	**939.93**	**895.98**	**0.00**	**0.00**	**0.00**	**969.41**	**939.93**	**1865.39**
9. BHU, Varanasi									
Cereal Crops	**Rice**								
	HUBR 2-1	1.00	2.00	1.50	3.00	2.50	4.00	5.00	9.00
	HUR 4-3	7.00	7.50	1.00	1.50	2.00	6.00	10.00	15.00
	HUR 3022	4.00	4.75	1.00	1.00	1.00	2.00	6.00	7.75
	Shabhagi Dhan	0.00	0.00	5.00	8.00	1.00	4.50	6.00	12.50
	Sawarna Sub-1	0.00	0.00	3.00	9.50	2.50	4.50	5.50	14.00
	HUR 105	4.50	5.00	2.00	5.00	6.50	12.00	13.00	22.00
	HUR 36	0.00	1.00	1.00	1.00	1.20	2.00	2.20	4.00
	HUBR 10-9	0.00	1.00	1.00	1.00	2.50	12.50	3.50	14.50
	BPT 5204	0.00	0.00	10.00	12.00	8.00	9.50	18.00	21.50
	Total	**16.50**	**21.25**	**25.50**	**42.00**	**27.20**	**57.00**	**69.20**	**120.25**
	Wheat								
	HUW 234	12.34	14.00	15.00	16.20	25.00	28.00	52.34	58.20
	HUW 468	12.98	13.50	4.00	5.00	17.40	19.00	34.38	37.50
	HUW 510	0.00	3.00	9.50	10.30	15.00	17.00	24.50	30.30
	Total	**25.32**	**30.50**	**28.50**	**31.50**	**57.40**	**64.00**	**111.22**	**126.00**
	Barley								
	HUB 113	63.00	65.00	0.00	0.00	0.00	0.00	63.00	65.00
	Total	**63.00**	**65.00**	**0.00**	**0.00**	**0.00**	**0.00**	**63.00**	**65.00**
	Total Cereal Crops	**104.82**	**116.75**	**54.00**	**73.50**	**84.60**	**121.00**	**243.42**	**311.25**
Pulse Crops	**Pea**								
	HUDP 15	12.00	15.00	0.80	1.00	3.10	3.25	15.90	19.25
	Total	**12.00**	**15.00**	**0.80**	**1.00**	**3.10**	**3.25**	**15.90**	**19.25**
	Mung								
	HUM 12	10.00	12.50	0.00	0.00	0.00	0.00	10.00	12.50
	HUM 12	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	HMU 16	16.00	18.00	1.10	1.25	3.00	3.25	20.10	22.50
	Total	**26.00**	**31.50**	**1.10**	**1.25**	**3.00**	**3.25**	**30.10**	**36.00**

	Lentil								
	HUL 57	15.00	17.50	1.20	1.40	2.60	3.00	18.80	21.90
	Total	**15.00**	**17.50**	**1.20**	**1.40**	**2.60**	**3.00**	**18.80**	**21.90**
	Total Pulse Crops	**53.00**	**64.00**	**3.10**	**3.65**	**8.70**	**9.50**	**64.80**	**77.15**
Grand Total (Varanasi)		**157.82**	**180.75**	**57.10**	**77.15**	**93.30**	**130.50**	**308.22**	**388.40**
10. AAU, Jorhat									
Cereal Crops	**Rice**								
	Bahadur	0.50	3.30	0.00	35.00	0.00	0.00	0.50	38.30
	Ketekijoha	3.00	3.50	0.00	15.00	0.00	0.00	3.00	18.50
	Ranjit	12.00	15.00	0.00	206.00	0.00	0.00	12.00	221.00
	Swarna Sub-1	35.00	35.00	0.00	0.00	0.00	0.00	35.00	35.00
	Ciherang Sub-1	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Masuri	0.00	0.00	0.00	8.25	0.00	0.00	0.00	8.25
	Manoharsali	0.00	0.00	0.00	3.30	0.00	0.00	0.00	3.30
	Giotsh	0.00	0.00	0.00	25.00	0.00	0.00	0.00	25.00
	Lachit	0.00	0.00	0.00	1.40	0.00	0.00	0.00	1.40
	Liut	0.00	0.00	0.00	44.00	0.00	0.00	0.00	44.00
	Swarna	0.00	0.00	0.00	1.80	0.00	0.00	0.00	1.80
	Aghoni	0.00	0.00	0.00	1.50	0.00	0.00	0.00	1.50
	Jaymati	0.00	0.00	0.00	52.50	0.00	0.00	0.00	52.50
	Konoklata	0.00	0.00	0.00	26.25	0.00	0.00	0.00	26.25
	Disang	0.00	0.00	0.00	8.75	0.00	0.00	0.00	8.75
	Total	**60.50**	**66.80**	**0.00**	**428.75**	**0.00**	**0.00**	**60.50**	**495.55**
	Total Cereal Crops	**60.50**	**66.80**	**0.00**	**428.75**	**0.00**	**0.00**	**60.50**	**495.55**
Pulse Crops	**Mung**								
	Pratap (SG 1)	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**0.00**	**0.00**	**4.00**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**0.00**	**0.00**	**4.00**
Oilseed Crops	**Rapeseed/Mustard**								
	M 27	3.00	5.00	0.00	0.00	0.00	0.00	3.00	5.00
	TS 36	5.00	8.00	0.00	0.00	0.00	0.00	5.00	8.00
	TS 38	6.00	4.00	0.00	0.00	0.00	0.00	6.00	4.00
	TS 46	7.00	3.20	0.00	0.00	0.00	0.00	7.00	3.20
	TS 67	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
	Binoy	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	Total	**21.00**	**20.20**	**0.00**	**7.00**	**0.00**	**0.00**	**21.00**	**27.20**
	Total Oilseed Crops	**21.00**	**20.20**	**0.00**	**7.00**	**0.00**	**0.00**	**21.00**	**27.20**
Fibre Crops	**Jute**								
	Tarun	0.06	0.06	0.00	0.10	0.00	0.00	0.06	0.16
	Total	**0.06**	**0.06**	**0.00**	**0.10**	**0.00**	**0.00**	**0.06**	**0.16**
	Total Fibre Crops	**0.06**	**0.06**	**0.00**	**0.10**	**0.00**	**0.00**	**0.06**	**0.16**
Grand Total (Jorhat)		**81.56**	**87.06**	**0.00**	**439.85**	**0.00**	**0.00**	**81.56**	**526.91**
11. BAU, Ranchi									
Cereal Crops	**Rice**								
	Birsa Vikas Dhan 109*	20.00	8.00	0.00	0.00	0.00	0.00	20.00	8.00
	Birsa Vikas Dhan 110	3.50	8.00	0.00	0.00	0.00	0.00	3.50	8.00
	Birsa Vikas Dhan 203	1.00	1.10	0.00	0.00	0.00	0.00	1.00	1.10
	Birsa Vikas Dhan 111*	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00

	Birsamati	1.50	2.00	0.00	0.00	0.00	0.00	1.50	2.00
	Lalat (IET9947)	0.00	0.00	2.00	20.00	0.00	0.00	2.00	20.00
	Naveen	0.00	0.00	2.00	30.00	0.00	0.00	2.00	30.00
	Sahbhagi	0.00	0.00	2.00	35.00	0.00	0.00	2.00	35.00
	MTU1010	0.00	0.00	2.00	38.00	0.00	0.00	2.00	38.00
	Rajendera Mahsuri	0.00	0.00	2.00	5.00	0.00	0.00	2.00	5.00
	Swarna(MTU7029)	0.00	0.00	1.00	8.00	0.00	0.00	1.00	8.00
	Abhishek	0.00	0.00	2.00	5.00	0.00	0.00	2.00	5.00
	Total	**27.00**	**19.10**	**13.00**	**141.00**	**0.00**	**0.00**	**40.00**	**160.10**
	Wheat								
	K9107	0.00	0.00	5.00	30.00	0.00	0.00	5.00	30.00
	K307	0.00	0.00	5.00	10.00	0.00	0.00	5.00	10.00
	K1007	0.00	0.00	5.00	10.00	0.00	0.00	5.00	10.00
		0.00	**0.00**	**15.00**	**50.00**	**0.00**	**0.00**	**15.00**	**50.00**
	Maize								
	Suwan	0.00	0.00	0.20	0.50	0.00	0.00	0.20	0.50
	Total	**0.00**	**0.00**	**0.20**	**0.50**	**0.00**	**0.00**	**0.20**	**0.50**
	Ragi								
	Birsa Marua 2	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	A 404	0.10	0.15	0.10	0.10	0.00	0.00	0.20	0.25
	Total	**0.20**	**0.25**	**0.10**	**0.10**	**0.00**	**0.00**	**0.30**	**0.35**
	Total Cereal Crops	**27.20**	**19.35**	**28.30**	**191.60**	**0.00**	**0.00**	**55.50**	**210.95**
Pulse Crops	**Urd**								
	Birsa urd 1	0.00	0.00	0.25	1.50	0.00	0.00	0.25	1.50
	Shekhar	0.00	0.00	0.50	1.30	0.00	0.00	0.50	1.30
	Total	**0.00**	**0.00**	**0.75**	**2.80**	**0.00**	**0.00**	**0.75**	**2.80**
	Chickpea								
	KPG 59	0.00	0.00	1.50	3.00	0.00	0.00	1.50	3.00
	KWR 108	0.00	0.00	0.75	2.00	0.00	0.00	0.75	2.00
	Total	**0.00**	**0.00**	**2.25**	**5.00**	**0.00**	**0.00**	**2.25**	**5.00**
	Pigeonpea								
	Birsa Arhar 1	0.00	1.00	0.30	0.20	0.00	0.00	0.30	1.20
	Total	**0.00**	**1.00**	**0.30**	**0.20**	**0.00**	**0.00**	**0.30**	**1.20**
	Mung								
	Pusa Vishal	0.00	0.00	1.00	3.00	0.00	0.00	1.00	3.00
	Total	**0.00**	**0.00**	**1.00**	**3.00**	**0.00**	**0.00**	**1.00**	**3.00**
	Lentil								
	KLS 218	0.00	0.00	0.50	0.75	0.00	0.00	0.50	0.75
	Total	**0.00**	**0.00**	**0.50**	**0.75**	**0.00**	**0.00**	**0.50**	**0.75**
	Horse Gram								
	Birsa Kulthi 1	0.00	0.00	0.60	1.00	0.00	0.00	0.60	1.00
	Total	**0.00**	**0.00**	**0.60**	**1.00**	**0.00**	**0.00**	**0.60**	**1.00**
	Total Pulse Crops	**0.00**	**1.00**	**5.40**	**12.75**	**0.00**	**0.00**	**5.40**	**13.75**
Oilseed Crops	**Groundnut**								
	Birsa Bold	5.95	3.00	0.00	0.00	0.00	0.00	5.95	3.00
	Total	**5.95**	**3.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.95**	**3.00**
	Mustard								
	Shivani	0.00	0.00	0.20	1.00	0.00	0.00	0.20	1.00
	Pusa Bold	0.00	0.00	0.20	1.00	0.00	0.00	0.20	1.00
	Total	**0.00**	**0.00**	**0.40**	**2.00**	**0.00**	**0.00**	**0.40**	**2.00**

	Linseed								
	T 397	0.00	0.00	0.25	0.50	0.00	0.00	0.25	0.50
	BAU 06-03	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
	Surbhi	0.00	0.00	0.20	0.50	0.00	0.00	0.20	0.50
	Total	**0.00**	**0.00**	**0.95**	**2.00**	**0.00**	**0.00**	**0.95**	**2.00**
	Soybean								
	Birsa Soya	4.00	1.00	0.00	0.00	0.00	0.00	4.00	1.00
	Total	**4.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**1.00**
	Niger								
	Pooja (BNS 10)	0.02	0.50	0.10	0.10	0.00	0.00	0.12	0.60
	Birsa Niger 3	3.53	0.60	0.10	0.10	0.00	0.00	3.63	0.70
	Total	**3.55**	**1.10**	**0.20**	**0.20**	**0.00**	**0.00**	**3.75**	**1.30**
	Til								
	Shekhar 2	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	Total	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.00**	**0.05**	**0.05**
	Total Oilseed Crops	**13.50**	**5.10**	**1.60**	**4.25**	**0.00**	**0.00**	**15.10**	**9.35**
	Grand Total (Ranchi)	**40.70**	**25.45**	**35.30**	**208.60**	**0.00**	**0.00**	**76.00**	**234.05**
12. RPCAU, Pusa Dholi									
Cereal Crops	**Rice**								
	R. Sweta	76.20	76.20	15.00	79.40	140.00	190.10	231.20	345.70
	R. Mahsuri	93.00	93.00	21.00	118.50	535.00	535.94	649.00	747.44
	Rajshree	0.40	0.40	14.60	25.60	945.00	252.80	960.00	278.80
	Prabhat	15.00	15.00	11.70	5.00	480.00	220.72	506.70	240.72
	CSR-36	0.00	0.00	2.00	7.00	0.00	0.00	2.00	7.00
	Sahbhagi Dhan	0.00	0.00	6.00	24.00	75.00	38.80	81.00	62.80
	R. Bhagwati	75.50	69.00	17.00	6.50	720.00	229.30	812.50	304.80
	R. Kasturi	6.00	6.00	4.50	5.50	75.00	49.00	85.50	60.50
	R. Suwasini	6.00	6.00	2.00	2.25	50.00	40.00	58.00	48.25
	Swerna Sub1	0.00	0.00	2.00	3.00	70.00	29.20	72.00	32.20
	Sudha	0.00	0.00	1.00	0.70	15.00	3.15	16.00	3.85
	Vaidehi	0.00	0.00	1.30	0.75	15.00	2.14	16.30	2.89
	Total	**272.10**	**265.60**	**98.10**	**278.20**	**3120.00**	**1591.15**	**3490.20**	**2134.95**
	Wheat								
	HD-2733	41.00	41.00	69.00	56.00	900.00	739.00	1010.00	836.00
	HD-2824	0.00	0.00	0.00	0.00	150.00	93.00	150.00	93.00
	HD-2967	87.00	87.00	15.00	16.00	400.00	103.00	502.00	206.00
	K-307	58.00	58.00	17.00	20.00	125.00	78.00	200.00	156.00
	DBW-14	16.00	16.00	45.00	66.50	100.00	80.50	161.00	163.00
	HI-1563	0.00	0.00	2.00	2.00	275.00	68.75	277.00	70.75
	HD-2985	228.00	57.50	32.00	32.00	0.00	0.00	260.00	89.50
	WR-544	0.00	0.00	130.00	0.00	0.00	0.00	130.00	0.00
	Total	**430.00**	**259.50**	**310.00**	**192.50**	**1950.00**	**1162.25**	**2690.00**	**1614.25**
	Ragi								
	RAU 8	3.00	3.00	1.10	1.10	0.00	0.00	4.10	4.10
	Total	**3.00**	**3.00**	**1.10**	**1.10**	**0.00**	**0.00**	**4.10**	**4.10**

Pulse Crops	**Pigeonpea**								
	Bahar	0.00	0.00	8.00	1.55	8.00	7.37	16.00	8.92
	NDA-1	0.00	0.00	8.00	6.72	10.00	9.60	18.00	16.32
	Pusa 9	0.00	0.00	3.50	3.50	0.00	0.00	3.50	3.50
	Total	**0.00**	**0.00**	**19.50**	**11.77**	**18.00**	**16.97**	**37.50**	**28.74**
	Urd								
	PU 31	0.00	0.00	2.03	2.03	0.00	0.00	2.03	2.03
	Toal	**0.00**	**0.00**	**2.03**	**2.03**	**0.00**	**0.00**	**2.03**	**2.03**
	Mung								
	PDM-139	0.00	0.00	4.00	5.00	2.00	1.94	6.00	6.94
	TMB 37	0.00	0.00	5.00	1.00	5.00	1.00	10.00	2.00
	Pusa Vishal	0.00	0.00	2.34	10.45	0.00	0.00	2.34	10.45
	MEHA	0.00	0.00	5.00	2.30	3.00	3.28	8.00	5.58
	SML-668	0.00	0.00	8.75	5.10	25.00	25.78	33.75	30.88
	Total	**0.00**	**0.00**	**25.09**	**23.85**	**35.00**	**32.00**	60.09	55.85
	Chickpea								
	BG 372	0.00	0.00	4.00	4.08	0.00	0.00	4.00	4.08
	Total	**0.00**	**0.00**	**4.00**	**4.08**	**0.00**	**0.00**	**4.00**	**4.08**
	Pea								
	Kashinandni	0.00	0.00	1.00	0.20	1.00	2.95	2.00	3.15
	HUDP 15	0.00	0.00	1.00	0.57	1.00	4.50	2.00	5.07
	Total	**0.00**	**0.00**	**2.00**	**0.77**	**2.00**	**7.45**	**4.00**	**8.22**
	Lentil								
	Arun	0.00	0.00	10.00	1.58	64.00	10.43	74.00	12.01
	HUL 57	0.00	0.00	10.00	2.68	80.00	9.40	90.00	12.08
	KLS 218	0.00	0.00	2.40	1.87	16.00	6.05	18.40	7.92
	Total	**0.00**	**0.00**	**22.40**	**6.13**	**160.00**	**25.88**	**182.40**	**32.01**
	Total Pulse Crops	**0.00**	**0.00**	**75.02**	**48.63**	**215.00**	**82.30**	**290.02**	**130.93**
	Grand Total (Dholi)	**705.10**	**528.10**	**484.22**	**520.43**	**5285.00**	**2835.70**	**6474.32**	**3884.23**
13. OUA&T, Bhubaneswar									
Cereal Crops	**Rice**								
	Parijat	7.00	6.00	0.00	0.00	0.00	0.00	7.00	6.00
	Khandagiri	30.00	31.00	12.00	11.60	0.00	0.00	42.00	42.60
	Lalat	83.00	83.00	16.00	11.60	0.00	0.00	99.00	94.60
	Surendra	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Mrunalini	10.00	10.00	22.00	22.00	0.00	0.00	32.00	32.00
	Tejaswini	5.00	5.50	0.00	0.00	0.00	0.00	5.00	5.50
	Pratikshya	0.00	0.00	150.00	150.00	0.00	0.00	150.00	150.00
	Bhuban	1.00	1.80	0.00	0.00	0.00	0.00	1.00	1.80
	Ranidhan	17.50	17.50	23.00	23.00	0.00	0.00	40.50	40.50
	Upahar	10.00	11.60	0.00	0.00	0.00	0.00	10.00	11.60
	Manaswini	24.00	24.00	20.00	20.00	0.00	0.00	44.00	44.00
	Mandakini	15.00	15.00	27.00	27.00	0.00	0.00	42.00	42.00
	Total	**203.50**	**207.40**	**270.00**	**265.20**	**0.00**	**0.00**	**473.50**	**472.60**
	Total Cereal Crops	**203.50**	**207.40**	**270.00**	**265.20**	**0.00**	**0.00**	**473.50**	**472.60**

Oilseed Crops	**Groundnut**								
	ICGV 91114 (Devi)	380.00	380.00	0.00	0.00	0.00	0.00	380.00	380.00
	OG 52-1 Smuti	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	TAG 24	123.00	123.00	0.00	0.00	0.00	0.00	123.00	123.00
	Total	**523.00**	**523.00**	**0.00**	**0.00**	**0.00**	**0.00**	**523.00**	**523.00**
	Niger								
	Utkal Niger 150	0.00	0.00	0.00	0.00	2.50	4.50	2.50	4.50
	Deomali	0.00	0.00	0.00	0.00	1.50	2.50	1.50	2.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**7.00**	**4.00**	**7.00**
	Sesame								
	Amrita	0.00	0.00	0.00	0.00	1.00	0.61	1.00	0.61
	Nirmala	0.00	0.00	0.00	0.00	0.75	0.25	0.75	0.25
	Prachi	0.00	0.00	0.00	0.00	1.50	1.00	1.50	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.25**	**1.86**	**3.25**	**1.86**
	Rapseed Mustard								
	Parbati	0.00	0.00	0.00	0.00	3.00	1.40	3.00	1.40
	Anuradha	0.00	0.00	0.00	0.00	2.50	0.40	2.50	0.40
	Sushree	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.50**	**2.30**	**5.50**	**2.30**
	Total Oilseed Crops	**523.00**	**523.00**	**0.00**	**0.00**	**12.75**	**11.16**	**535.75**	**534.16**
	Grand Total (Bhubaneswar)	**726.50**	**730.40**	**270.00**	**265.20**	**12.75**	**11.16**	**1009.25**	**1006.76**
14. MAF, Kota									
Cereal Crops	**Rice**								
	Pratap 1	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.50**
	Wheat								
	Raj-4079	487.90	570.00	0.00	0.00	0.00	0.00	487.90	570.00
	Raj-4120	207.80	300.00	0.00	0.00	0.00	0.00	207.80	300.00
	Raj-4238	200.00	300.00	0.00	0.00	0.00	0.00	200.00	300.00
	WH-147	189.30	300.00	0.00	0.00	0.00	0.00	189.30	300.00
	C-306	115.00	320.00	0.00	0.00	0.00	0.00	115.00	320.00
	Raj-3765	62.40	210.00	0.00	0.00	0.00	0.00	62.40	210.00
	Raj-4083	50.00	100.00	0.00	0.00	0.00	0.00	50.00	100.00
	HI-1544	180.05	280.00	0.00	0.00	0.00	0.00	180.05	280.00
	HD-2987	34.20	34.00	0.00	0.00	0.00	0.00	34.20	34.00
	HD-2932	50.00	32.00	0.00	0.00	0.00	0.00	50.00	32.00
	HI-8713	148.80	58.00	0.00	0.00	0.00	0.00	148.80	58.00
	HI-8498	50.00	150.00	0.00	0.00	0.00	0.00	50.00	150.00
	DBW-110	0.00	12.00	0.00	0.00	0.00	0.00	0.00	12.00
	Raj-4037	0.00	440.00	0.00	0.00	0.00	0.00	0.00	440.00
	GW-496	0.00	70.00	0.00	0.00	0.00	0.00	0.00	70.00
	GW-173	0.00	70.00	0.00	0.00	0.00	0.00	0.00	70.00
	GW-273	0.00	70.00	0.00	0.00	0.00	0.00	0.00	70.00
	Lok-1	0.00	220.00	0.00	0.00	0.00	0.00	0.00	220.00
	Raj-1482	0.00	150.00	0.00	0.00	0.00	0.00	0.00	150.00
	PBW-502	0.00	140.00	0.00	0.00	0.00	0.00	0.00	140.00
	PBW-343	0.00	200.00	0.00	0.00	0.00	0.00	0.00	200.00
	Raj-3077	0.00	150.00	0.00	0.00	0.00	0.00	0.00	150.00
	Total	**1775.45**	**4176.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1775.45**	**4176.00**
	Total Cereal Crops	**1775.95**	**4176.50**	**0.00**	**0.00**	**0.00**	**0.00**	**1775.95**	**4176.50**

Pulse Crops	**Mung**								
	IPM 02 03	45.00	40.00	0.00	0.00	0.00	0.00	45.00	40.00
	IPM 02 14	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.40
	Total	**45.00**	**40.40**	**0.00**	**0.00**	**0.00**	**0.00**	**45.00**	**40.40**
	Urd								
	Pratap U 1	25.00	110.00	0.00	0.00	0.00	0.00	25.00	110.00
	MU 2	4.00	5.00	0.00	0.00	0.00	0.00	4.00	5.00
	Total	**29.00**	**115.00**	**0.00**	**0.00**	**0.00**	**0.00**	**29.00**	**115.00**
,	**Chickpea**								
	GNG-1581	122.00	300.00	0.00	0.00	0.00	0.00	122.00	300.00
	GNG-1958	128.00	280.00	0.00	0.00	0.00	0.00	128.00	280.00
	JG-14	248.00	350.00	0.00	0.00	0.00	0.00	248.00	350.00
	GNG-469	12.00	15.00	0.00	0.00	0.00	0.00	12.00	15.00
	Pratap Chana-1	0.00	10.00	0.00	0.00	0.00	0.00	0.00	10.00
	Total	**510.00**	**955.00**	**0.00**	**0.00**	**0.00**	**0.00**	**510.00**	**955.00**
	Pea								
	Prakash	0.00	25.00	0.00	0.00	0.00	0.00	0.00	25.00
	IPFD 10-12	0.00	20.00	0.00	0.00	0.00	0.00	0.00	20.00
	Vikas	0.00	10.00	0.00	0.00	0.00	0.00	0.00	10.00
	Total	**0.00**	**55.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**55.00**
	Lentil								
	IPL 316	0.00	20.00	0.00	0.00	0.00	0.00	0.00	20.00
	Total	**0.00**	**20.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**
	Total Pulse Crops	**584.00**	**1185.40**	**0.00**	**0.00**	**0.00**	**0.00**	**584.00**	**1185.40**
Oilseed Crops	**Soybean**								
	JS-335	50.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00
	JS 93-05	100.00	84.00	0.00	0.00	0.00	0.00	100.00	84.00
	JS 95-60	150.00	84.00	0.00	0.00	0.00	0.00	150.00	84.00
	RKS 45	400.00	4.00	0.00	0.00	0.00	0.00	400.00	4.00
	RKS-24	300.00	36.00	0.00	0.00	0.00	0.00	300.00	36.00
	Total	**1000.00**	**208.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1000.00**	**208.00**
	Linseed								
	Kota Barani 4	1.80	6.00	0.00	0.00	0.00	0.00	1.80	6.00
	Pratap Alsi 2	1.32	6.00	0.00	0.00	0.00	0.00	1.32	6.00
	Total	**3.12**	**12.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.12**	**12.00**
	Total Oilseed Crops	**1003.12**	**220.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1003.12**	**220.00**
	Grand Total (Kota)	**3363.07**	**5581.90**	**0.00**	**0.00**	**0.00**	**0.00**	**3363.07**	**5581.90**
15. RAU, Bikaner									
Cereal Crops	**Wheat**								
	Raj-3077	137.00	170.00	0.00	0.00	0.00	0.00	137.00	170.00
	Raj-3765	55.00	70.00	0.00	0.00	0.00	0.00	55.00	70.00
	Raj-4037	50.00	70.00	0.00	0.00	0.00	0.00	50.00	70.00
	Raj-4079	150.00	200.00	0.00	0.00	0.00	0.00	150.00	200.00
	Raj-4120	50.00	70.00	0.00	0.00	0.00	0.00	50.00	70.00
	Raj-4238	150.00	200.00	0.00	0.00	300.00	350.00	450.00	550.00
	Raj-1482	216.00	260.00	0.00	0.00	0.00	0.00	216.00	260.00
	Total	**808.00**	**1040.00**	**0.00**	**0.00**	**300.00**	**350.00**	**1108.00**	**1390.00**

	Barley								
	RD 2715	0.00	0.00	0.00	0.00	150.00	160.00	150.00	160.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**150.00**	**160.00**	**150.00**	**160.00**
	Total Cereal Crops	**808.00**	**1040.00**	**0.00**	**0.00**	**450.00**	**510.00**	**1258.00**	**1550.00**
Pulse Crops	**Mung**								
	Ganga 1	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.15
	SML 668	0.00	11.00	0.00	0.00	20.00	18.00	20.00	29.00
	IPM 02-3	0.00	13.48	0.00	0.00	2.00	3.00	2.00	16.48
	MH 421	0.00	0.00	0.00	0.00	2.00	1.50	2.00	1.50
	Total	**0.00**	**24.63**	**0.00**	**0.00**	**24.00**	**22.50**	**24.00**	**47.13**
	Chickpea								
	GNG-2144	94.00	100.00	0.00	0.00	15.00	20.00	109.00	120.00
	GNG-2171	50.00	60.00	0.00	0.00	0.00	0.00	50.00	60.00
	GNG-1581	122.00	150.00	0.00	0.00	50.00	70.00	172.00	220.00
	GNG-1958	127.00	150.00	0.00	0.00	60.00	50.00	187.00	200.00
	GNG-663	10.00	15.00	0.00	0.00	0.00	0.00	10.00	15.00
	GNG-1969	5.00	7.00	0.00	0.00	0.00	0.00	5.00	7.00
	GNG-1499	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	RSG-888	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	Total	**409.00**	**484.00**	**0.00**	**0.00**	**135.00**	**150.00**	**544.00**	**634.00**
	Urd								
	T 9	0.00	0.00	0.00	0.00	2.00	3.00	2.00	3.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**3.00**	**2.00**	**3.00**
	Mothbean								
	RMO 257	35.91	32.00	0.00	0.00	0.00	0.00	35.91	32.00
	RMO 435	15.20	25.00	0.00	0.00	0.00	0.00	15.20	25.00
	RMO 225	0.40	3.75	0.00	0.00	0.00	0.00	0.40	3.75
	RMO 40	0.00	0.00	0.00	0.00	20.00	16.50	20.00	16.50
	RMB 25	0.00	0.00	0.00	0.00	0.50	0.25	0.50	0.25
	Total	**51.51**	**60.75**	**0.00**	**0.00**	**20.50**	**16.75**	**72.01**	**77.50**
	Cowpea								
	RC 19	0.00	7.00	0.00	0.00	20.00	24.46	20.00	31.46
	Total	**0.00**	**7.00**	**0.00**	**0.00**	**20.00**	**24.46**	**20.00**	**31.46**
	Total Pulse Crops	**460.51**	**576.38**	**0.00**	**0.00**	**201.50**	**216.71**	**662.01**	**793.09**
Oilseed Crops	**Groundnut**								
	HNG 123	80.00	110.00	0.00	0.00	0.00	0.00	80.00	110.00
	HNG 69	10.00	26.00	0.00	0.00	0.00	0.00	10.00	26.00
	Mallika	114.00	83.50	0.00	0.00	0.00	0.00	114.00	83.50
	HNG 10	0.00	0.00	0.00	0.00	100.00	120.00	100.00	120.00
	TG 37A	0.00	0.00	0.00	0.00	25.00	20.00	25.00	20.00
	Girnar 2	0.00	0.00	0.00	0.00	5.00	4.00	5.00	4.00
	Girnar 3	0.00	0.00	0.00	0.00	5.00	4.00	5.00	4.00
	GG 20	0.00	0.00	0.00	0.00	5.00	4.00	5.00	4.00
	Total	**204.00**	**219.50**	**0.00**	**0.00**	**140.00**	**152.00**	**344.00**	**371.50**
	Mustard								
	RGN-48	0.16	0.40	0.00	0.00	0.00	0.00	0.16	0.40
	RGN-73	0.18	0.40	0.00	0.00	0.00	0.00	0.18	0.40
	RGN-145	0.10	0.20	0.00	0.00	0.00	0.00	0.10	0.20
	RGN-229	0.27	0.40	0.00	0.00	0.00	0.00	0.27	0.40
	RGN-236	0.22	0.40	0.00	0.00	0.00	0.00	0.22	0.40
	RGN-298	0.85	2.00	0.00	0.00	0.00	0.00	0.85	2.00
	RGN-303	0.13	0.30	0.00	0.00	0.00	0.00	0.13	0.30
		1.91	**4.10**	**0.00**	**0.00**	**0.00**	**0.00**	**1.91**	**4.10**
	Total Oilseed Crops	**205.91**	**223.60**	**0.00**	**0.00**	**140.00**	**152.00**	**345.91**	**375.60**

Forage crop	**Guar**								
	RGC 1033	22.00	11.00	0.00	0.00	0.00	0.00	22.00	11.00
	RGC 936	9.00	12.00	0.00	0.00	100.00	94.00	109.00	106.00
	HG 2-20	25.00	25.00	0.00	0.00	0.00	0.00	25.00	25.00
	RGC 1055	0.00	0.00	0.00	0.00	20.00	18.00	20.00	18.00
	RGC 1066	0.00	0.00	0.00	0.00	25.00	32.27	25.00	32.27
	RGC 1038	0.00	0.00	0.00	0.00	10.00	15.00	10.00	15.00
	Total	**56.00**	**48.00**	**0.00**	**0.00**	**155.00**	**159.27**	**211.00**	**207.27**
	Total Forage crops	**56.00**	**48.00**	**0.00**	**0.00**	**155.00**	**159.27**	**211.00**	**207.27**
Fibre Crops	**Cotton**								
	RG 542	2.20	4.00	0.00	0.00	0.00	0.00	2.20	4.00
	RS 2013	0.35	0.70	0.00	0.00	0.00	0.00	0.35	0.70
	RS 810	0.45	0.00	0.00	0.00	0.00	0.00	0.45	0.00
	RG 8	4.60	5.00	0.00	0.00	4.00	5.00	8.60	10.00
	RST 9	1.40	1.25	0.00	0.00	0.00	0.00	1.40	1.25
	Total	**9.00**	**10.95**	**0.00**	**0.00**	**4.00**	**5.00**	**13.00**	**15.95**
	Total Fibre Crops	**9.00**	**10.95**	**0.00**	**0.00**	**4.00**	**5.00**	**13.00**	**15.95**
	Grand Total (Bikaner)	**1539.42**	**1898.93**	**0.00**	**0.00**	**950.50**	**1042.98**	**2489.92**	**2941.91**
16. MPUAT, Udaipur									
Cereal Crops	**Wheat**								
	Raj 4037	45.00	47.00	0.00	0.00	0.00	0.00	45.00	47.00
	Raj 4120	40.00	40.00	0.00	0.00	0.00	0.00	40.00	40.00
	Raj 4079	40.00	45.00	0.00	0.00	0.00	0.00	40.00	45.00
	Total	**125.00**	**132.00**	**0.00**	**0.00**	**0.00**	**0.00**	**125.00**	**132.00**
	Maize								
	EI 586-2	8.00	8.20	0.00	0.00	0.00	0.00	8.00	8.20
	EI 670-2	10.00	8.15	0.00	0.00	0.00	0.00	10.00	8.15
	BML 6	2.00	0.89	0.00	0.00	0.00	0.00	2.00	0.89
	Summer								
	EI 586-2 (Female)	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	EI 670-2 (Male)	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
	Pratap Kanchan 2	0.40	0.40	0.00	0.00	0.00	0.00	0.40	0.40
	Total	**35.40**	**32.64**	**0.00**	**0.00**	**0.00**	**0.00**	**35.40**	**32.64**
	Sorghum								
	CSV 23	5.36	0.10	0.00	0.00	0.00	0.00	5.36	0.10
	CSV 17	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	PC 1080	10.00	7.10	0.00	0.00	0.00	0.00	10.00	7.10
	Total	**15.66**	**7.50**	**0.00**	**0.00**	**0.00**	**0.00**	**15.66**	**7.50**
	Total Cereal Crops	**176.06**	**172.14**	**0.00**	**0.00**	**0.00**	**0.00**	**176.06**	**172.14**
Pulse Crops	**Urd**								
	PU 1	4.00	4.60	0.00	0.00	0.00	0.00	4.00	4.60
	PU 31	1.00	0.60	0.00	0.00	0.00	0.00	1.00	0.60
	Total	**5.00**	**5.20**	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**5.20**
	Chickpea								
	PC 1080	31.00	31.00	0.00	0.00	0.00	0.00	31.00	31.00
	GNG 1581	121.00	121.00	0.00	0.00	0.00	0.00	121.00	121.00
	Total	**152.00**	**152.00**	**0.00**	**0.00**	**0.00**	**0.00**	**152.00**	**152.00**

	Horse Gram								
	AK 42	4.00	3.70	0.00	0.00	0.00	0.00	4.00	3.70
	Total	**4.00**	**3.70**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**3.70**
	Total Oilseed Crops	**161.00**	**160.90**	**0.00**	**0.00**	**0.00**	**0.00**	**161.00**	**160.90**
Oilseed Crops	**Groundnut**								
	Pratap Raj Mungfali (UG 5)	10.00	12.60	0.00	0.00	0.00	0.00	10.00	12.60
	Total	**10.00**	**12.60**	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**12.60**
	Soybean								
	RKS 24	15.00	15.00	0.00	0.00	0.00	0.00	15.00	15.00
	JS 9305	12.00	13.00	0.00	0.00	0.00	0.00	12.00	13.00
	Total	**27.00**	**28.00**	**0.00**	**0.00**	**0.00**	**0.00**	**27.00**	**28.00**
	Total Oilseed Crops	**37.00**	**40.60**	**0.00**	**0.00**	**0.00**	**0.00**	**37.00**	**40.60**
	Grand Total Udaipur	**374.06**	**373.64**	**0.00**	**0.00**	**0.00**	**0.00**	**374.06**	**373.64**
17. SKNAU, Jobner									
Cereal Crops	**Pearlmillet**								
	RIB 494(Pollinator of RHB177)	0.11	2.20	0.00	0.00	0.00	0.00	0.11	2.20
	RIB 192(Pollinator of RHB173)	0.11	3.68	0.00	0.00	0.00	0.00	0.11	3.68
	Raj 171	0.20	10.40	0.00	0.00	0.00	0.00	0.20	10.40
	Total	**0.42**	**16.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.42**	**16.28**
	Total Cereal Crops	**0.42**	**16.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.42**	**16.28**
Oilseed Crops	**Groundnut**								
	RG 510 (Raj Mungfali 1)	45.00	61.50	0.00	0.00	0.00	0.00	45.00	61.50
	RG 425 (Raj Durga)	33.00	21.00	0.00	0.00	0.00	0.00	33.00	21.00
	RG 578 (Raj Mungfali 2)	10.00	8.50	0.00	0.00	0.00	0.00	10.00	8.50
	Total	**88.00**	**91.00**	**0.00**	**0.00**	**0.00**	**0.00**	**88.00**	**91.00**
	Total Oilseed Crops	**88.00**	**91.00**	**0.00**	**0.00**	**0.00**	**0.00**	**88.00**	**91.00**
Forage Crops	**Guar**								
	RGC 1033	44.00	36.83	0.00	0.00	0.00	0.00	44.00	36.83
	RGC 1066	23.30	39.99	0.00	0.00	0.00	0.00	23.30	39.99
	RGC 1055	13.45	31.00	0.00	0.00	0.00	0.00	13.45	31.00
	RGC 1038	30.00	39.98	0.00	0.00	0.00	0.00	30.00	39.98
	RGC 1003	2.50	5.87	0.00	0.00	0.00	0.00	2.50	5.87
	RGC 936	9.90	8.79	0.00	0.00	0.00	0.00	9.90	8.79
	Total	**123.15**	**162.46**	**0.00**	**0.00**	**0.00**	**0.00**	**123.15**	**162.46**
	Cowpea								
	RC 19	3.00	0.50	0.00	0.00	0.00	0.00	3.00	0.50
	RC 101	16.00	24.26	0.00	0.00	0.00	0.00	16.00	24.26
	Total	**19.00**	**24.76**	**0.00**	**0.00**	**0.00**	**0.00**	**19.00**	**24.76**
	Total Forage Crops	**142.15**	**187.22**	**0.00**	**0.00**	**0.00**	**0.00**	**142.15**	**187.22**
	Grand Total (Jobner)	**230.57**	**294.50**	**0.00**	**0.00**	**0.00**	**0.00**	**230.57**	**294.50**
18. SDAU, S.K.Nagar									
Cereals Crops	**Wheat**								
	GW 496	162.00	170.00	577.80	600.00	0.00	0.00	739.80	770.00
	GW 322	467.00	500.00	39.20	50.00	0.00	0.00	506.20	550.00
	GW 273	0.00	0.00	88.80	100.00	0.00	0.00	88.80	100.00
	GW 173	37.60	40.00	106.60	110.00	0.00	0.00	144.20	150.00

	GW 503	0.00	0.00	6.20	10.00	0.00	0.00	6.20	10.00
	GW 11	0.00	0.00	47.40	50.00	0.00	0.00	47.40	50.00
	GDW 1255	3.00	5.00	106.00	110.00	0.00	0.00	109.00	115.00
	LOK 1	0.00	0.00	313.10	320.00	0.00	0.00	313.10	320.00
	GW 451	0.00	0.00	75.00	100.00	0.00	0.00	75.00	100.00
	Total	**669.60**	**715.00**	**1360.10**	**1450.00**	**0.00**	**0.00**	**2029.70**	**2165.00**
	Total Cereal Crops	**669.60**	**715.00**	**1360.10**	**1450.00**	**0.00**	**0.00**	**2029.70**	**2165.00**
Oilseed Crops	**Castor**								
	VP 1 (C)	0.00	0.00	0.82	0.11	0.00	0.00	0.82	0.11
	VI 9	0.00	0.00	0.46	0.73	0.00	0.00	0.46	0.73
	48 1	1.04	1.12	1.43	4.12	0.00	0.00	2.47	5.24
	JI 35	0.00	0.00	1.58	4.28	0.00	0.00	1.58	4.28
	SH 72	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
	JI 96	0.00	0.00	0.04	0.84	0.00	0.00	0.04	0.84
	SKI 215	0.09	0.50	1.58	5.33	0.00	0.00	1.67	5.83
	JP 65	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
	VP 1 (M)	0.00	0.00	9.50	14.23	0.00	0.00	9.50	14.23
	SKP 84	1.80	2.00	6.69	9.27	0.00	0.00	8.49	11.27
	Total	**2.93**	**3.62**	**22.18**	**38.91**	**0.00**	**0.00**	**25.11**	**42.53**
	Mustard								
	GM 1	0.00	0.00	0.45	0.50	0.00	0.00	0.45	0.50
	GM 2	0.02	0.02	0.58	0.58	0.00	0.00	0.60	0.60
	GM 3	0.04	0.06	0.39	0.44	0.00	0.00	0.43	0.50
	GDM 4	0.00	0.00	0.72	2.00	0.00	0.00	0.72	2.00
	Total	**0.06**	**0.08**	**2.14**	**3.52**	**0.00**	**0.00**	**2.20**	**3.60**
	Total Oilseed Crops	**2.99**	**3.70**	**24.32**	**42.43**	**0.00**	**0.00**	**27.31**	**46.13**
	Grand Total (S. K. Nagar)	**672.59**	**718.70**	**1384.42**	**1492.43**	**0.00**	**0.00**	**2057.01**	**2211.13**
19. AAU, Anand									
Cereal Crops	**Rice**								
	Gurjari	0.50	1.00	39.06	64.00	0.00	0.00	39.56	65.00
	GR-3	0.00	0.00	2.01	3.00	0.00	0.00	2.01	3.00
	GR-4	0.00	0.00	4.01	8.00	0.00	0.00	4.01	8.00
	GR-7	0.00	0.00	4.01	9.50	0.00	0.00	4.01	9.50
	Jaya	15.00	15.00	25.26	25.00	0.00	0.00	40.26	40.00
	GR-11	0.50	1.00	8.06	14.00	0.00	0.00	8.56	15.00
	Masuri	0.00	0.00	2.50	8.00	0.00	0.00	2.50	8.00
	IR-28	0.00	0.00	1.01	2.50	0.00	0.00	1.01	2.50
	GAR-13	0.00	0.00	17.56	25.00	0.00	0.00	17.56	25.00
	Total	**16.00**	**17.00**	**103.48**	**159.00**	**0.00**	**0.00**	**119.48**	**176.00**
	Maize								
	GM-3	0.00	0.00	10.00	13.90	0.00	0.00	**10.00**	**13.90**
	IGI 1103	0.00	0.00	2.00	2.01	0.00	0.00	**2.00**	**2.01**
	Total	**0.00**	**0.00**	**12.00**	**15.91**	**0.00**	**0.00**	**12.00**	**15.91**
	Total Cereal Crops	**16.00**	**17.00**	**115.48**	**174.91**	**0.00**	**0.00**	**131.48**	**191.91**
Pulse Crops	**Greengram**								
	GAM 5	0.00	0.00	0.00	0.00	1.00	2.31	**1.00**	**2.31**
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**2.31**	**1.00**	**2.31**

	Pigeonpea								
	AGT 2	0.00	0.00	0.00	0.00	8.00	8.50	8.00	8.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**8.50**	**8.00**	**8.50**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**9.00**	**10.81**	**9.00**	**10.81**
Oilseed Crops	**Soybean**								
	NRC 37	0.00	0.00	0.00	0.00	6.00	6.50	6.00	6.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**6.50**	**6.00**	**6.50**
	Groundnut								
	GJG 19	0.00	0.00	0.00	0.00	15.00	15.60	15.00	15.60
	GG 20	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**21.00**	**21.60**	**21.00**	**21.60**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**27.00**	**28.10**	**27.00**	**28.10**
Fibre Crops	**Cotton**								
	V-797	0.00	0.00	0.00	0.00	3.00	3.50	**3.00**	**3.50**
	G. Cot – 13	0.00	0.00	0.00	0.00	5.21	5.50	**5.21**	**5.50**
	A.D.C. – 1	0.00	0.00	0.00	0.00	0.50	0.70	**0.50**	**0.70**
	G. Cot 21	0.00	0.00	0.00	0.00	48.30	53.00	**48.30**	**53.00**
	GADC-2	0.00	0.00	0.00	0.00	2.00	2.00	**2.00**	**2.00**
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**59.01**	**64.70**	**59.01**	**64.70**
	Total Fibre Crops	**0.00**	**0.00**	**0.00**	**0.00**	**59.01**	**64.70**	**59.01**	**64.70**
	Grand Total (AAU, Anand)	**16.00**	**17.00**	**115.48**	**174.91**	**95.01**	**103.61**	**226.49**	**295.52**
20. JAU, Jamnagar									
Cereal Crops	**Wheat**								
	GW 336	314.40	316.00	21.60	22.00	0.00	0.00	336.00	338.00
	Total	**314.40**	**316.00**	**21.60**	**22.00**	**0.00**	**0.00**	**336.00**	**338.00**
	Pearlmillet								
	J 2454	0.01	0.08	0.54	1.97	0.00	0.00	0.55	2.05
	J 2372	0.01	0.04	0.00	0.00	0.00	0.00	0.01	0.04
	ICMA 04999	0.00	0.00	0.20	2.95	0.00	0.00	0.20	2.95
	ICMB 04999	0.00	0.00	0.05	0.10	0.00	0.00	0.05	0.10
	Total	**0.02**	**0.12**	**0.79**	**5.02**	**0.00**	**0.00**	**0.81**	**5.14**
	Total Cereal Crops	**314.42**	**316.12**	**22.39**	**27.02**	**0.00**	**0.00**	**336.81**	**343.14**
Pulse Crops	**Chickpea**								
	GG 1	0.00	0.00	13.00	15.00	0.00	0.00	13.00	15.00
	GG 2	0.00	0.00	24.00	24.00	0.00	0.00	24.00	24.00
	GJG 3	15.00	24.00	42.00	45.00	0.00	0.00	57.00	69.00
	GG 4	39.00	53.00	0.00	0.00	0.00	0.00	39.00	53.00
	Total	**54.00**	**77.00**	**79.00**	**84.00**	**0.00**	**0.00**	**133.00**	**161.00**
	Total Pulse Crops	**54.00**	**77.00**	**79.00**	**84.00**	**0.00**	**0.00**	**133.00**	**161.00**
Oilseed Crops	**Groundnut**								
	GG 2	0.00	0.00	34.61	45.90	0.00	0.00	34.61	45.90
	GG 5	0.00	0.00	23.60	27.00	0.00	0.00	23.60	27.00
	GG 7	0.00	0.00	23.20	25.00	0.00	0.00	23.20	25.00
	GJG 9	10.00	20.00	40.00	60.00	0.00	0.00	50.00	80.00
	GJG 31	60.00	62.00	0.00	0.00	0.00	0.00	60.00	62.00
	GG 8	0.00	28.00	0.00	0.00	0.00	0.00	0.00	28.00
	GG 20	8.00	9.00	939.41	1200.00	0.00	0.00	947.41	1209.00

	GJG 22	0.00	0.00	111.16	142.00	0.00	0.00	111.16	142.00
	GJG-HPS 1	0.00	0.00	5.00	8.00	0.00	0.00	5.00	8.00
	GG 11	0.00	0.00	109.60	90.00	0.00	0.00	109.60	90.00
	GJG 17	0.00	0.00	59.60	60.00	0.00	0.00	59.60	60.00
	GAUG 10	0.00	0.00	54.00	55.00	0.00	0.00	54.00	55.00
	GJG 19	20.00	25.00	0.00	0.00	0.00	0.00	20.00	25.00
	GJG 18	110.00	20.00	0.00	0.00	0.00	0.00	110.00	20.00
	GG 16	0.00	12.00	0.00	0.00	0.00	0.00	0.00	12.00
	GG 21	24.00	25.00	0.00	0.00	0.00	0.00	24.00	25.00
	Total	**232.00**	**201.00**	**1400.18**	**1712.90**	**0.00**	**0.00**	**1632.18**	**1913.90**
	Sesame								
	GT 1	0.20	0.20	2.60	2.65	0.00	0.00	2.80	2.85
	GT 2	3.17	3.20	12.46	9.30	0.00	0.00	15.63	12.50
	GT 3	1.07	2.00	5.81	10.91	0.00	0.00	6.88	12.91
	GT 4	0.40	0.40	2.02	2.10	0.00	0.00	2.42	2.50
	GT 10	2.00	2.00	1.30	1.30	0.00	0.00	3.30	3.30
	GJT 5	0.00	0.00	1.00	0.15	0.00	0.00	1.00	0.15
	Total	**6.84**	**7.80**	**25.19**	**26.41**	**0.00**	**0.00**	**32.03**	**34.21**
	Total Oilseed Crops	**238.84**	**208.80**	**1425.37**	**1739.31**	**0.00**	**0.00**	**1664.21**	**1948.11**
	Grand Total (Jamnagar)	**607.26**	**601.92**	**1526.76**	**1850.33**	**0.00**	**0.00**	**2134.02**	**2452.25**
21. IGKV, Raipur									
Cereal Crops	**Rice**								
	IGKV R 1	87.00	90.00	0.00	0.00	10.00	22.00	97.00	112.00
	IGKV R 1244	57.50	59.00	0.00	0.00	0.00	0.00	57.50	59.00
	Jaldubi	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	CGZR 1	0.00	0.00	0.00	0.00	2.00	4.50	2.00	4.50
	Dubraj Selection 1	0.00	0.00	0.00	0.00	2.00	17.68	2.00	17.68
	Badshabhog Selection 1	0.00	0.00	0.00	0.00	2.00	11.05	2.00	11.05
	Tarunbhog Selection 1	0.00	0.00	0.00	0.00	2.00	15.22	2.00	15.22
	Vishnubhog Selection 1	0.00	0.00	0.00	0.00	2.00	2.75	2.00	2.75
	Indira Aerobic 1	17.00	23.10	0.00	0.00	0.00	0.00	17.00	23.10
	Karma Mahsuri	40.00	49.20	0.00	0.00	0.00	0.00	40.00	49.20
	Indira Barani Dhan 1	31.50	38.40	0.00	0.00	0.00	0.00	31.50	38.40
	IR 64	0.00	0.00	0.00	0.00	20.00	31.20	20.00	31.20
	Poornima	5.00	5.40	0.00	0.00	0.00	0.00	5.00	5.40
	IR 36	20.00	20.50	0.00	0.00	0.00	0.00	20.00	20.50
	Danteshwari	35.00	36.00	0.00	0.00	0.00	0.00	35.00	36.00
	Samleshwari	30.50	39.00	0.00	0.00	0.00	0.00	30.50	39.00
	DRR Dhan 42 (IR 64 D)	35.00	26.20	0.00	0.00	0.00	0.00	35.00	26.20
	Chandrahasini	71.50	79.50	0.00	0.00	0.00	0.00	71.50	79.50
	Mahamaya	29.50	57.60	0.00	0.00	0.00	0.00	29.50	57.60
	IGKV R 2	0.00	0.00	0.00	0.00	52.00	69.60	52.00	69.60
	Dubraj Selection 1	0.00	0.00	1.00	1.80	0.00	0.00	1.00	1.80
	Badshabhog Selection 1	0.00	0.00	1.00	2.10	0.00	0.00	1.00	2.10
	Tarunbhog Selection 1	0.00	0.00	1.00	2.10	0.00	0.00	1.00	2.10
	Vishnubhog Selection 1	0.00	0.00	0.10	0.20	0.00	0.00	0.10	0.20
	Total	**460.00**	**524.40**	**3.10**	**6.20**	**92.00**	**174.00**	**555.10**	**704.60**

	Wheat								
	Ratan	170.00	200.00	0.00	0.00	0.00	0.00	170.00	200.00
	GW 366	0.00	0.00	0.00	0.00	92.55	120.00	92.55	120.00
	GW 273	0.00	0.00	0.00	0.00	50.00	90.00	50.00	90.00
	MP 1203	0.00	0.00	0.00	0.00	40.00	45.00	40.00	45.00
	DBW 110	25.00	65.00	0.00	0.00	0.00	0.00	25.00	65.00
	Sujata	0.00	0.00	30.00	50.00	0.00	0.00	30.00	50.00
	Total	**195.00**	**265.00**	**30.00**	**50.00**	**182.55**	**255.00**	**407.55**	**570.00**
	Kodo								
	Indira Kodo 1	2.50	2.60	0.00	0.00	0.00	0.00	2.50	2.60
	Total	**2.50**	**2.60**	**0.00**	**0.00**	**0.00**	**0.00**	**2.50**	**2.60**
	Finger millet								
	Indira Ragi 1	2.30	2.50	0.00	0.00	0.00	0.00	2.30	2.50
	CG Ragi 2	1.60	1.70	0.00	0.00	0.00	0.00	1.60	1.70
	Total	**3.90**	**4.20**	**0.00**	**0.00**	**0.00**	**0.00**	**3.90**	**4.20**
	Total Cereal Crops	**661.40**	**796.20**	**33.10**	**56.20**	**274.55**	**429.00**	**969.05**	**1281.40**
Pulse Crops	**Urd**								
	Indira Urd	0.00	0.00	2.00	2.20	0.00	0.00	2.00	2.20
	Total	**0.00**	**0.00**	**2.00**	**2.20**	**0.00**	**0.00**	**2.00**	**2.20**
	Arhar								
	Asha	0.00	0.00	0.00	0.00	4.40	17.00	4.40	17.00
	Rajeev Lochan	0.00	0.00	0.00	0.00	9.80	21.00	9.80	21.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**14.20**	**38.00**	**14.20**	**38.00**
	Fieldpea								
	Paras	15.00	25.00	0.00	0.00	0.00	0.00	15.00	25.00
	Indira Matar 1	0.00	0.00	0.00	0.00	5.00	1.00	5.00	1.00
	Total	**15.00**	**25.00**	**0.00**	**0.00**	**5.00**	**1.00**	**20.00**	**26.00**
	Chickpea								
	Vaibhav	0.00	0.00	0.00	0.00	40.00	60.00	40.00	60.00
	JG 14	0.00	0.00	15.00	20.00	0.00	0.00	15.00	20.00
	Total	**0.00**	**0.00**	**15.00**	**20.00**	**40.00**	**60.00**	**55.00**	**80.00**
	Horse Gram								
	Indira Kolthi 1	2.50	8.00	0.00	0.00	0.00	0.00	2.50	8.00
	Chhattisgarh Kulthi 2	0.00	0.00	0.50	0.60	0.00	0.00	0.50	0.60
	Chhattisgarh Kulthi 3	0.00	0.00	0.50	0.60	0.00	0.00	0.50	0.60
	Total	**2.50**	**8.00**	**1.00**	**1.20**	**0.00**	**0.00**	**3.50**	**9.20**
	Lathyrus								
	Prateek	77.00	90.00	0.00	0.00	0.00	0.00	77.00	90.00
	Maha Teora	0.00	0.00	0.00	0.00	29.00	50.00	29.00	50.00
	Total	**77.00**	**90.00**	**0.00**	**0.00**	**29.00**	**50.00**	**106.00**	**140.00**
	Total Pulse Crops	**94.50**	**123.00**	**18.00**	**23.40**	**88.20**	**149.00**	**200.70**	**295.40**
Oilseed Crops	**Soybean**								
	JS 335	0.00	0.00	0.00	0.00	50.00	27.20	50.00	27.20
	JS 93-05	0.00	0.00	0.00	0.00	100.00	202.80	100.00	202.80
	JS 97-52	200.00	149.20	0.00	0.00	0.00	0.00	200.00	149.20
	Total	**200.00**	**149.20**	**0.00**	**0.00**	**150.00**	**230.00**	**350.00**	**379.20**

	Mustard								
	Chhattisgarh Sarson	1.70	2.00	0.00	0.00	0.00	0.00	1.70	2.00
	Total	**1.70**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.70**	**2.00**
	Linseed								
	Deepika	3.10	13.00	0.00	0.00	0.00	0.00	3.10	13.00
	Indira Alsi 32	5.00	30.00	0.00	0.00		0.00	5.00	30.00
	RLC 92	0.00	0.00	0.00	0.00	5.15	20.00	5.15	20.00
	Kartika	0.00	0.00	0.00	0.00	6.00	15.00	6.00	15.00
	Total	**8.10**	**43.00**	**0.00**	**0.00**	**11.15**	**35.00**	**19.25**	**78.00**
	Total Oilseed Crops	**209.80**	**194.20**	**0.00**	**0.00**	**161.15**	**265.00**	**370.95**	**459.20**
	Grand Total (Raipur)	**965.70**	**1113.40**	**51.10**	**79.60**	**523.90**	**843.00**	**1540.70**	**2036.00**
22. JNKVV, Jabalpur									
Cereal Crops	**Rice**								
	MTU 1010	0.00	0.00	2349.45	2349.45	0.00	0.00	2349.45	2349.45
	Kranti	8.50	8.50	1982.50	1982.50	0.00	0.00	1991.00	1991.00
	IR 36	60.00	60.00	0.00	0.00	0.00	0.00	60.00	60.00
	IR 64	0.00	0.00	1539.90	1539.90	0.00	0.00	1539.90	1539.90
	Sahbhagi	0.00	0.00	58.50	58.50	0.00	0.00	58.50	58.50
	JR 81	0.00	0.00	85.50	85.50	0.00	0.00	85.50	85.50
	JR 201	50.00	50.00	7.60	7.60	0.00	0.00	57.60	57.60
	WGL 32100	0.00	0.00	30.60	30.60	0.00	0.00	30.60	30.60
	JRH 5	0.00	0.00	3.60	3.60	0.00	0.00	3.60	3.60
	JRH 8	0.00	0.00	0.45	0.45	0.00	0.00	0.45	0.45
	JRH 19	0.00	0.00	0.40	0.40	0.00	0.00	0.40	0.40
	Danteshwari	0.00	0.00	197.10	202.00	0.00	0.00	197.10	202.00
	JR 503	0.00	0.00	5.40	5.40	0.00	0.00	5.40	5.40
	PS 3	0.00	0.00	11.70	11.70	0.00	0.00	11.70	11.70
	PS 4	0.00	0.00	92.60	92.60	0.00	0.00	92.60	92.60
	PS 5	0.00	0.00	48.60	48.60	0.00	0.00	48.60	48.60
	P 1460	0.00	0.00	42.30	42.30	0.00	0.00	42.30	42.30
	JR 767	0.00	0.00	18.00	18.00	0.00	0.00	18.00	18.00
	JRV 1	0.00	0.00	17.10	17.10	0.00	0.00	17.10	17.10
	Improved Chinoor	0.00	0.00	30.60	30.60	0.00	0.00	30.60	30.60
	Total	**118.50**	**118.50**	**6521.90**	**6526.80**	**0.00**	**0.00**	**6640.40**	**6645.30**
	Wheat								
	GW-366	100.00	100.00	240.00	240.00	0.00	0.00	340.00	340.00
	GW-322	745.80	745.80	2329.20	2329.20	0.00	0.00	3075.00	3075.00
	JW 3173	140.00	140.00	100.00	100.00	0.00	0.00	240.00	240.00
	JW-3211	260.00	260.00	1484.00	1484.00	0.00	0.00	1744.00	1744.00
	JW 3336	55.00	55.00	515.00	515.00	0.00	0.00	570.00	570.00
	JW 3288	200.00	200.00	1950.00	1950.00	0.00	0.00	2150.00	2150.00
	GW 173	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00
	GW 273	120.00	120.00	130.00	130.00	0.00	0.00	250.00	250.00
	LOK-1	0.00	0.00	950.00	950.00	0.00	0.00	950.00	950.00
	HD2932	0.00	0.00	50.00	50.00	0.00	0.00	50.00	50.00

	MP-3382	0.00	0.00	600.00	600.00	0.00	0.00	600.00	600.00
	JW-3269	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00
	HI 8498 (MS)	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00
	MP 1201	110.00	110.00	40.00	40.00	0.00	0.00	150.00	150.00
	MP 1202	125.00	125.00	125.00	125.00	0.00	0.00	250.00	250.00
	MP 1203	210.00	210.00	590.00	590.00	0.00	0.00	800.00	800.00
	MPO 1215	135.00	135.00	65.00	65.00	0.00	0.00	200.00	200.00
	MPO 1106	20.00	20.00	20.00	20.00	0.00	0.00	40.00	40.00
	MP 1142	214.20	214.20	35.80	35.80	0.00	0.00	250.00	250.00
	JW17	15.00	15.00	25.00	25.00	0.00	0.00	40.00	40.00
	C-306	0.00	0.00	25.00	25.00	0.00	0.00	25.00	25.00
	Sujata	0.00	0.00	80.00	80.00	0.00	0.00	80.00	80.00
	JW3020	150.00	150.00	90.00	90.00	0.00	0.00	240.00	240.00
	Total	**2600.00**	**2600.00**	**9564.00**	**9564.00**	**0.00**	**0.00**	**12164.00**	**12164.00**
	Barley								
	JB 58	41.00	41.00	59.00	59.00	0.00	0.00	100.00	100.00
	JB 1	15.00	15.00	35.00	35.00	0.00	0.00	50.00	50.00
	Total	**56.00**	**56.00**	**94.00**	**94.00**	**0.00**	**0.00**	**150.00**	**150.00**
	Maize								
	JM 2016	0.00	0.00	80.00	80.00	0.00	0.00	80.00	80.00
	Total	**0.00**	**0.00**	**80.00**	**80.00**	**0.00**	**0.00**	**80.00**	**80.00**
	Kutki								
	JK 8	0.00	0.00	4.91	4.91	0.00	0.00	4.91	4.91
	JK 36	0.00	0.00	1.46	1.46	0.00	0.00	1.46	1.46
	Total	**0.00**	**0.00**	**6.37**	**6.37**	**0.00**	**0.00**	**6.37**	**6.37**
	Kodo								
	JK 439	1.50	1.50	2.55	2.55	0.00	0.00	4.05	4.05
	JK 48	0.00	0.00	1.25	1.25	0.00	0.00	1.25	1.25
	JK 41	0.00	0.00	4.50	4.50	0.00	0.00	4.50	4.50
	JK 137	0.00	0.00	2.02	2.02	0.00	0.00	2.02	2.02
	JK 155	1.50	0.12	0.00	0.00	0.00	0.00	1.50	0.12
	JK 13	1.40	0.15	0.00	0.00	0.00	0.00	1.40	0.15
	JK 106	1.00	1.00	2.00	2.00	0.00	0.00	3.00	3.00
	Total	**5.40**	**2.77**	**12.32**	**12.32**	**0.00**	**0.00**	**17.72**	**15.09**
	Total Cereal Crops	**2779.90**	**2777.27**	**16278.59**	**16283.49**	**0.00**	**0.00**	**19058.49**	**19060.76**
Pulse Crops	**Pigeonpea**								
	TJT 501	35.20	35.20	293.30	293.30	0.00	0.00	328.50	328.50
	ICPL 87119	4.85	4.85	5.95	5.95	0.00	0.00	10.80	10.80
	Total	**40.05**	**40.05**	**299.25**	**299.25**	**0.00**	**0.00**	**339.30**	**339.30**
	Chickpea								
	JG-63	417.00	417.00	780.00	780.00	0.00	0.00	1197.00	1197.00
	JG-322	418.00	418.00	1637.00	1637.00	0.00	0.00	2055.00	2055.00
	JG-315	465.00	465.00	30.00	30.00	0.00	0.00	495.00	495.00
	JG-11	0.00	0.00	195.00	195.00	0.00	0.00	195.00	195.00
	JG-12	120.00	120.00	255.00	255.00	0.00	0.00	375.00	375.00
	JG 14	396.80	396.00	548.20	548.20	0.00	0.00	945.00	944.20

	JG 16	0.00	0.00	105.00	105.00	0.00	0.00	105.00	105.00
	JG 74	80.00	80.00	10.00	10.00	0.00	0.00	90.00	90.00
	JAKI 9218	0.00	0.00	60.00	60.00	0.00	0.00	60.00	60.00
	JG 36	0.00	0.00	1.50	1.50	0.00	0.00	1.50	1.50
	JG 130	0.00	0.00	165.00	165.00	0.00	0.00	165.00	165.00
	Total	**1896.80**	**1896.00**	**3786.70**	**3786.70**	**0.00**	**0.00**	**5683.50**	**5682.70**
	Pea								
	PSM-3	0.00	0.00	606.00	606.00	0.00	0.00	606.00	606.00
	Arkel	0.00	0.00	18.00	18.00	0.00	0.00	18.00	18.00
	Kashi Nandani	0.00	0.00	75.00	75.00	0.00	0.00	75.00	75.00
	IPF 99-25	0.00	0.00	129.00	129.00	0.00	0.00	129.00	129.00
	JP -885	1.00	1.00	59.00	59.00	0.00	0.00	60.00	60.00
	JM -6	0.00	0.00	90.00	90.00	0.00	0.00	90.00	90.00
	Total	**1.00**	**1.00**	**977.00**	**977.00**	**0.00**	**0.00**	**978.00**	**978.00**
	Mung								
	TJM 3	7.50	0.90	0.00	0.00	0.00	0.00	7.50	0.90
	Total	**7.50**	**0.90**	**0.00**	**0.00**	**0.00**	**0.00**	**7.50**	**0.90**
	Urdbean								
	TU 94-2	27.00	0.90	0.00	0.00	0.00	0.00	27.00	0.90
	TU 3	18.00	2.25	0.00	0.00	0.00	0.00	18.00	2.25
	Total	**45.00**	**3.15**	**0.00**	**0.00**	**0.00**	**0.00**	**45.00**	**3.15**
	Lentil								
	JL 3	25.00	25.00	230.00	230.00	0.00	0.00	255.00	255.00
	Total	**25.00**	**25.00**	**230.00**	**230.00**	**0.00**	**0.00**	**255.00**	**255.00**
	Total Pulse Crop	**2015.35**	**1966.10**	**5292.95**	**5292.95**	**0.00**	**0.00**	**7308.30**	**7259.05**
Oilseed Crops	**Soybean**								
	JS 20-69	100.00	100.00	152.00	152.00	0.00	0.00	252.00	252.00
	JS 20-29	3000.00	1228.85	0.00	0.00	0.00	0.00	3000.00	1228.85
	JS 97-52	600.00	93.00	0.00	0.00	0.00	0.00	600.00	93.00
	JS 95-60	250.00	12.85	0.00	0.00	0.00	0.00	250.00	12.85
	JS 93-05	360.00	24.00	0.00	0.00	0.00	0.00	360.00	24.00
	JS 335	315.00	31.58	0.00	0.00	0.00	0.00	315.00	31.58
	Total	**4625.00**	**1490.28**	**152.00**	**152.00**	**0.00**	**0.00**	**4777.00**	**1642.28**
	Groundnut								
	TG 37 A	0.00	0.00	3.50	3.50	0.00	0.00	3.50	3.50
	Total	**0.00**	**0.00**	**3.50**	**3.50**	**0.00**	**0.00**	**3.50**	**3.50**
	Linseed								
	JLS 27	0.00	0.00	160.00	160.00	0.00	0.00	160.00	160.00
	JLS -66	0.00	0.00	20.00	20.00	0.00	0.00	20.00	20.00
	JLS-67	0.00	0.00	84.00	84.00	0.00	0.00	84.00	84.00
	JLS 9	0.00	0.00	15.00	15.00	0.00	0.00	15.00	15.00
	PKDL 41	0.00	0.00	50.00	50.00	0.00	0.00	50.00	50.00
	Total	**0.00**	**0.00**	**329.00**	**329.00**	**0.00**	**0.00**	**329.00**	**329.00**
	Mustard								
	Pusa Tarak	0.00	0.00	8.00	8.00	0.00	0.00	8.00	8.00
	P. Jai Kisan	0.00	0.00	32.00	32.00	0.00	0.00	32.00	32.00
	Total	**0.00**	**0.00**	**40.00**	**40.00**	**0.00**	**0.00**	**40.00**	**40.00**

	Niger								
	JNC 6	0.00	0.00	7.40	7.40	0.00	0.00	7.40	7.40
	JNC 9	0.00	0.00	3.60	3.60	0.00	0.00	3.60	3.60
	JNC 1	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Total	**0.00**	**0.00**	**12.00**	**12.00**	**0.00**	**0.00**	**12.00**	**12.00**
	Sesame								
	TKG 55	0.00	0.00	1.82	1.82	0.00	0.00	1.82	1.82
	TKG 21	0.75	0.55	0.00	0.00	0.00	0.00	0.75	0.55
	TKG 22	0.75	0.75	2.38	2.38	0.00	0.00	3.13	3.13
	JTS 8	0.00	0.00	0.81	0.81	0.00	0.00	0.81	0.81
	TKG 306	2.90	0.16	0.00	0.00	0.00	0.00	2.90	0.16
	TKG 308	1.20	0.42	0.00	0.00	0.00	0.00	1.20	0.42
	Total	**5.60**	**1.88**	**5.01**	**5.01**	**0.00**	**0.00**	**10.61**	**6.89**
	Total Oilseed Crop	**4630.60**	**1492.16**	**541.51**	**541.51**	**0.00**	**0.00**	**5172.11**	**2033.67**
Forage Crops	**Berseem**								
	JB 1	0.00	0.00	2.00	2.00	0.00	0.00	2.00	2.00
	JB 5	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00
	Total	**0.00**	**0.00**	**7.00**	**7.00**	**0.00**	**0.00**	**7.00**	**7.00**
	Oat								
	JO 1	0.00	0.00	52.00	52.00	0.00	0.00	52.00	52.00
	Kent	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00
	Total	**0.00**	**0.00**	**92.00**	**92.00**	**0.00**	**0.00**	**92.00**	**92.00**
	Total Forage Crops	**0.00**	**0.00**	**99.00**	**99.00**	**0.00**	**0.00**	**99.00**	**99.00**
	Grant Total (Jabalpur)	**9425.85**	**6235.53**	**22212.05**	**22216.95**	**0.00**	**0.00**	**31637.90**	**28452.48**
23. MPKV, Rahuri									
Cereal Crops	**Rice**								
	Indrayani	21.40	23.00	0.00	0.00	17.00	21.00	38.40	44.00
	P. Radha	4.50	8.00	0.00	0.00	3.00	3.00	7.50	11.00
	Bhogawati	10.50	11.00	0.00	0.00	5.00	6.00	15.50	17.00
	P. Samrudhi	1.20	7.00	0.00	0.00	5.00	7.00	6.20	14.00
	RDN.06	0.00	0.00	0.30	0.00	0.00	0.00	0.30	0.00
	Total	**37.60**	**49.00**	**0.30**	**0.00**	**30.00**	**37.00**	**67.90**	**86.00**
	Wheat								
	HD-2189	0.00	0.00	0.00	12.00	6.00	6.00	6.00	18.00
	Trimbak	57.60	60.00	0.00	0.00	0.00	0.00	57.60	60.00
	Tapowan	7.00	10.00	0.00	0.00	0.00	0.00	7.00	10.00
	Godawari	25.20	28.00	0.00	0.00	0.00	0.00	25.20	28.00
	NIAW-34	10.00	14.00	0.00	0.00	0.00	0.00	10.00	14.00
	Netrawati	75.00	80.00	0.00	2.00	0.00	0.00	75.00	82.00
	P. Samadhan	0.00	0.00	4.00	130.00	80.00	121.00	84.00	251.00
	Total	**174.80**	**192.00**	**4.00**	**144.00**	**86.00**	**127.00**	**264.80**	**463.00**
	Sorghum								
	P. Chitra	1.00	1.20	0.00	0.00	0	0	1.00	1.20
	P. Amruta	0.00	0.00	0.00	0.00	0.10	0.70	0.10	0.70
	P. Anuradha	1.20	2.80	0.00	0.00	0.50	0.70	1.70	3.50
	P. Panchami	0.00	0.00	0.00	0.00	0.10	0.70	0.10	0.70
	P. Ruchira	0.00	0.00	0.00	0.00	0.50	0.70	0.50	0.70

	P. Revati	4.00	7.00	0.00	1.00	0.50	1.00	4.50	9.00
	P. Vasudha	1.50	2.00	0.00	0.00	1.00	0.30	2.50	2.30
	P. Godhan	0.00	0.00	0.00	1.00	1.00	1.80	1.00	2.80
	P. Suchitra	1.10	2.00	0.00	0.00	0.50	0.80	1.60	2.80
	P. Rohini	1.00	1.10	0.00	0.00	0.30	0.30	1.30	1.40
	P. Madhur	1.00	1.00	0.00	0.00	0.50	0.40	1.50	1.40
	185 A	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	185 B	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.03
	RSSV-260 (R)	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.03
	P. Maulee	0.01	0.10	0.00	0.00	0.00	0.00	0.01	0.10
	P. Yashoda	0.15	0.20	0.00	0.00	0.00	0.00	0.15	0.20
	Total	**10.96**	**17.40**	**0.00**	**2.00**	**5.04**	**7.53**	**16.00**	**26.93**
	Bajra								
	DHLB-8A	0.00	0.00	0.06	0.30	0.04	0.07	0.10	0.37
	DHLB-8B	0.00	0.00	0.03	0.10	0.02	0.04	0.05	0.14
	DHLBI-967	0.00	0.00	0.02	0.04	0.02	0.02	0.04	0.06
	Dhanshakti	0.00	0.00	0.00	0.00	0.07	0.26	0.07	0.26
	Total	**0.00**	**0.00**	**0.11**	**0.44**	**0.15**	**0.39**	**0.26**	**0.83**
	Maize								
	GPM 456 (F)	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	GPM 342 (M)	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**3.00**	**3.00**	**3.00**
	Finger Millet								
	P Nachani	0.06	1.00	0.00	0.00	0.10	0.50	0.16	1.50
	Total	**0.06**	**1.00**	**0.00**	**0.00**	**0.10**	**0.50**	**0.16**	**1.50**
	Little millet								
	P. Ekadashi	0.00	0.00	0.00	0.00	0.60	0.15	0.60	0.15
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.60**	**0.15**	**0.60**	**0.15**
	Amaranthus								
	P. Kartiki	0.00	0.00	0.00	0.20	0.20	0.80	0.20	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.20**	**0.20**	**0.80**	**0.20**	**1.00**
	Total Cereal Crops	**223.42**	**259.40**	**4.41**	**146.64**	**125.09**	**176.37**	**352.92**	**582.41**
Pulse Crops	**Urd**								
	TAU 1	0.00	0.00	0.00	0.00	3.00	0.00	3.00	0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**0.00**	**3.00**	**0.00**
	Chickpea								
	Vijay	238.00	241.00	0.00	0.00	0.00	0.00	238.00	241.00
	Vishal	241.00	242.00	0.00	0.00	5.00	5.00	246.00	247.00
	Virat	384.00	393.00	0.00	0.00	0.00	0.00	384.00	393.00
	Digvijay	721.00	700.00	0.00	0.00	5.00	0.00	726.00	700.00
	Kripa	4.00	11.00	0.00	0.00	2.00	6.00	6.00	17.00
	Vikram	0.00	0.00	0.00	4.00	5.00	8.00	5.00	12.00
	Total	**1588.00**	**1587.00**	**0.00**	**4.00**	**17.00**	**19.00**	**1605.00**	**1610.00**
	Rajmash								
	Varun	0.00	0.00	0.00	4.00	**0.00**	**3.00**	0.00	7.00
	Total	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**3.00**	**0.00**	**7.00**

	Mung								
	Vaibhav	2.00	2.00	0.00	0.00	5.00	2.00	7.00	4.00
	Kop 1	0.00	0.00	0.00	0.00	0.20	0.02	0.20	0.02
	Total	**2.00**	**2.00**	**0.00**	**0.00**	**5.20**	**2.02**	**7.20**	**4.02**
	Pigeonpea								
	ICPL 87	0.00	0.00	0.00	0.00	0.50	10.00	0.50	10.00
	Vipula	5.50	0.00	0.00	0.00	0.00	0.00	5.50	0.00
	Rajeshwari	2.50	0.00	1.00	0.00	0.00	0.00	3.50	0.00
	Total	**8.00**	**0.00**	**1.00**	**0.00**	**0.50**	**10.00**	**9.50**	**10.00**
	Horse Gram								
	P. Sakas	0.00	0.00	0.00	0.00	0.20	0.50	0.20	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**0.50**	**0.20**	**0.50**
	Total Pulse Crops	**1598.00**	**1589.00**	**1.00**	**8.00**	**25.90**	**34.52**	**1624.90**	**1631.52**
Oilseed Crops	**Soybean**								
	JS-335	400.00	420.00	100.00	110.00	50.00	20.00	550.00	550.00
	JS-9305	0.00	0.00	0.00	0.00	8.00	23.00	8.00	23.00
	Phule Kalyani	50.00	40.00	0.00	0.00	3.00	0.00	53.00	40.00
	Phule Agarni	200.00	200.00	20.00	20.00	100.00	90.00	320.00	310.00
	KDS 726 (P. Sangam)	0.00	0.00	0.00	0.00	5.00	12.00	5.00	12.00
	Total	**650.00**	**660.00**	**120.00**	**130.00**	**166.00**	**145.00**	**936.00**	**935.00**
	Groundnut								
	SB-XI	0.00	0.00	50.00	17.00	0.00	0.00	50.00	17.00
	P. Bharti	0.00	0.00	0.00	0.00	4.00	2.00	4.00	2.00
	P.Morana	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	P.Unatti	5.00	2.00	0.00	0.00	2.00	0.00	7.00	2.00
	P.Warana	0.00	0.00	0.00	0.00	4.00	8.00	4.00	8.00
	JL-501	0.00	0.00	0.00	0.00	5.00	2.00	5.00	2.00
	Total	**5.00**	**2.00**	**50.00**	**17.00**	**20.00**	**17.00**	**75.00**	**36.00**
	Niger								
	P. Karala	0.00	0.00	0.00	0.00	0.05	0.07	0.05	0.07
	P. Vaitarna	0.00	0.00	0.00	0.00	0.10	0.05	0.10	0.05
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**0.12**	**0.15**	**0.12**
	Sunflower								
	P. Bhaskar	0.00	0.00	0.00	0.00	0.40	1.00	0.40	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.40**	**1.00**	**0.40**	**1.00**
	Sesame								
	PT 1	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03
	JLT 408	0.00	0.00	0.00	0.00	0.10	0.18	0.10	0.18
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.12**	**0.21**	**0.12**	**0.21**
	Safflower								
	P. Kusuma	0.10	0.35	0.00	0.00	0.00	0.00	0.10	0.35
	SSF 708	0.20	6.00	0.00	3.00	3.00	5.00	3.20	14.00
	Chandrabhaga	0.00	0.00	0.10	0.50	0.10	0.10	0.20	0.60
	Total	**0.30**	**6.35**	**0.10**	**3.50**	**3.10**	**5.10**	**3.50**	**14.95**
	Total Oilseed Crops	**655.30**	**668.35**	**170.10**	**150.50**	**189.77**	**168.43**	**1015.17**	**987.28**

Forage Crops	**Cowpea**								
	Sweta	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	P. Vitkai	5.00	1.00	0.00	0.00	0.00	0.00	5.00	1.00
	Total	**5.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.50**	**5.00**	**1.50**
	Maize								
	African Tall	30.00	26.00	0.00	0.00	0.00	0.00	30.00	26.00
	Total	**30.00**	**26.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**26.00**
	Bajra								
	Giant bajra	0.00	0.00	0.00	0.00	0.25	0.06	0.25	0.06
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.06**	**0.25**	**0.06**
	Stylo								
	P. Kranti	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.10**	**0.10**
	Lucerne								
	RL 88	0.30	1.00	0.00	0.00	0.00	1.50	0.30	2.50
	Total	**0.30**	**1.00**	**0.00**	**0.00**	**0.00**	**1.50**	**0.30**	**2.50**
	Berseem								
	Vardan	0.00	0.00	0.00	0.00	0.10	0.00	0.10	0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.10**	**0.00**
	Oat								
	Harita	5.00	6.50	0.00	0.00	0.50	0.50	5.50	7.00
	Kent	0.00	5.00	0.00	3.00	3.00	5.00	3.00	13.00
	RO 11-1	0.00	0.00	0.00	5.00	0.00	3.00	0.00	8.00
	Total	**5.00**	**11.50**	**0.00**	**8.00**	**3.50**	**8.50**	**8.50**	**28.00**
	Total Forage Crops	**40.30**	**39.50**	**0.00**	**8.00**	**3.95**	**10.66**	**44.25**	**58.16**
Fibre Crops	**Cotton**								
	JLA-794	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
	JLA-505	0.00	0.00	0.00	0.00	0.80	1.00	0.80	1.00
	RHC-004	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	RHC-014	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	P. Dhanvantary	0.00	0.00	0.00	0.00	0.04	0.07	0.04	0.07
	Phule 688	0.00	0.00	0.00	0.00	0.03	0.07	0.03	0.07
	P.Anmol	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	RHC-717	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	RHCb-011 (P. Rukhmai)	0.00	0.00	0.00	0.00	0.02	0.07	0.02	0.07
	RHCr-515	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03
	Giza-7	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03
	RHC-208	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**2.01**	**2.58**	**2.01**	**2.58**
	Total Fiber Crops	**0.00**	**0.00**	**0.00**	**0.00**	**2.01**	**2.58**	**2.01**	**2.58**
	Grand Total (Rahuri)	**2517.02**	**2556.25**	**175.51**	**313.14**	**346.72**	**392.56**	**3039.25**	**3261.95**
24. PDKV, Akola									
Cereal Crops	**Rice**								
	PKV-HMT	120.00	210.00	0.00	0.00	80.00	80.00	200.00	290.00
	PKV Kisan	0.00	0.00	0.60	0.60	0.00	0.00	0.60	0.60
	Total	**120.00**	**210.00**	**0.60**	**0.60**	**80.00**	**80.00**	**200.60**	**290.60**

	Wheat								
	AKAW 4627	25.00	36.00	0.00	0.00	0.00	0.00	25.00	36.00
	AKAW 3722	0.00	0.00	0.00	0.00	6.00	24.00	6.00	24.00
	PKV Washim	2.00	4.00	0.00	0.00	6.00	6.00	8.00	10.00
	HD 2189	0.00	0.00	10.00	28.00	0.00	0.00	10.00	28.00
	Total	**27.00**	**40.00**	**10.00**	**28.00**	**12.00**	**30.00**	**49.00**	**98.00**
	Sorghum								
	MS 14 A	0.16	0.16	0.00	0.00	0.00	0.00	0.16	0.16
	MS 14 B	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	AKR 150 R	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	PKV Ashwini	0.05	0.05	0.00	0.00	0.00	0.00	0.05	0.05
	AKR 456	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	MS 30A	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.07
	MS 30B	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	PKV Kranti	6.80	2.00	0.00	0.00	0.00	0.00	6.80	2.00
	Total	**7.21**	**2.41**	**0.17**	**0.17**	**0.00**	**0.00**	**7.38**	**2.58**
	Pearlmillet								
	PKV (Raj) A line	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02
	B Line	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
	R Line	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
	Total	**0.04**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.04**
	Total Cereal Crops	**154.25**	**252.45**	**10.77**	**28.77**	**92.00**	**110.00**	**257.02**	**391.22**
Pulse Crops	**Mung**								
	Kopargaon	5.00	5.00	0.00	0.00	18.00	9.00	23.00	14.00
	PKVM 8802	2.00	4.00	0.00	0.00	0.00	0.00	2.00	4.00
	PKV AKM 4	3.00	7.00	0.00	0.00	0.00	0.00	3.00	7.00
	PKV Green Gold	0.20	12.00	0.00	0.00	0.00	0.00	0.20	12.00
	Total	**10.20**	**28.00**	**0.00**	**0.00**	**18.00**	**9.00**	**28.20**	**37.00**
	Chickpea								
	JAKI 9218	586.00	586.00	50.00	50.00	40.00	75.00	676.00	711.00
	PKV Kabuli 2	203.00	46.00	2.00	2.00	0.00	0.00	205.00	48.00
	PKV Kabuli 4	66.00	1.00	2.00	0.00	0.00	0.00	68.00	1.00
		855.00	**633.00**	**54.00**	**52.00**	**40.00**	**75.00**	**949.00**	**760.00**
	Pigeonpea								
	ICPL 87 119	35.00	10.00	0.00	0.00	14.00	2.00	49.00	12.00
	PKV Tara	15.00	24.00	0.00	0.00	0.00	0.00	15.00	24.00
	Total	**50.00**	**34.00**	**0.00**	**0.00**	**14.00**	**2.00**	**64.00**	**36.00**
	Urd								
	TAU 1	32.00	32.00	0.00	0.00	12.00	12.00	44.00	44.00
	TKU 10-1	0.00	0.00	1.50	2.50	6.00	2.50	7.50	5.00
	AKU 15	15.00	16.00	0.00	0.00	12.00	12.00	27.00	28.00
	Total	**47.00**	**48.00**	**1.50**	**2.50**	**30.00**	**26.50**	**78.50**	**77.00**
	Total Pulse Crops	**962.20**	**743.00**	**55.50**	**54.50**	**102.00**	**112.50**	**1119.70**	**910.00**
Oilseed Crops	**Soybean**								
	JS 335	300.00	400.00	100.00	220.00	54.00	100.00	454.00	720.00
	JS 9305	50.00	30.00	0.00	0.00	0.00	0.00	50.00	30.00
		0.00	0.00	0.00	0.00	9.00	80.00	9.00	80.00
	Total	**350.00**	**430.00**	**100.00**	**220.00**	**63.00**	**180.00**	**513.00**	**830.00**

	Groundnut								
	TAG-24	5.00	1.50	0.00	0.00	9.00	1.50	14.00	3.00
	AK 159	5.00	3.00	0.00	0.00	9.00	0.75	14.00	3.75
	Total	**10.00**	**4.50**	**0.00**	**0.00**	**18.00**	**2.25**	**28.00**	**6.75**
	Safflower								
	AKS 207	0.00	0.00	0.50	0.50	3.50	1.30	4.00	1.80
	PKV Pink	0.00	0.00	0.10	20.00	0.00	0.00	0.10	20.00
	Total	**0.00**	**0.00**	**0.60**	**20.50**	**3.50**	**1.30**	**4.10**	**21.80**
	Linseed								
	NL-260	0.05	0.50	0.00	0.00	0.00	0.00	0.05	0.50
	NL-97	0.05	0.30	0.00	0.00	0.00	0.00	0.05	0.30
	Total	**0.10**	**0.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.80**
	Sesame								
	PKV-NT 11	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02
	Total	**0.02**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**
	Total Oilseed Crops	**360.12**	**435.32**	**100.60**	**240.50**	**84.50**	**183.55**	**545.22**	**859.37**
Fiber Crops	**Cotton**								
	Improved cotton								
	AKA 5	1.00	1.00	0.50	0.50	0.00	0.00	1.50	1.50
	AKA 7	1.00	2.50	1.00	2.50	0.00	0.00	2.00	5.00
	AKA 8	0.75	0.75	0.00	0.00	0.00	0.00	0.75	0.75
	AKH 081	0.25	3.50	0.00	0.00	0.00	0.00	0.25	3.50
	Total	**3.00**	**7.75**	**1.50**	**3.00**	**0.00**	**0.00**	**4.50**	**10.75**
	Total Fiber Crops	**3.00**	**7.75**	**1.50**	**3.00**	**0.00**	**0.00**	**4.50**	**10.75**
	Grand Total (Akola)	**1479.57**	**1438.52**	**168.37**	**326.77**	**278.50**	**406.05**	**1926.44**	**2171.34**
25. MAU, Parbhani									
Cereal Crops	**Sorghum**								
	PMS 28 A	0.05	0.07	0.00	0.00	0.00	0.00	0.05	0.07
	PMS 28 B	0.03	0.05	0.00	0.00	0.00	0.00	0.03	0.05
	C 43	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	PVK 809	0.04	0.10	0.00	0.00	0.00	0.00	0.04	0.10
	CSV 18	1.60	2.00	0.00	0.00	0.00	0.00	1.60	2.00
	Parbhani Moti	10.50	12.00	0.00	0.00	0.00	0.00	10.50	12.00
	Total	**12.32**	**14.32**	**0.00**	**0.00**	**0.00**	**0.00**	**12.32**	**14.32**
	Pearlmillet								
	ABPC 4 3	0.05	0.10	0.00	0.00	0.00	0.90	0.05	1.00
	Total	**0.05**	**0.10**	**0.00**	**0.00**	**0.00**	**0.90**	**0.05**	**1.00**
	Total Cereal Crops	**12.37**	**14.42**	**0.00**	**0.00**	**0.00**	**0.90**	**12.37**	**15.32**
Pulse Crops	**Urd**								
	TAU 1	0.00	0.00	0.00	0.00	25.00	45.00	25.00	45.00
	BDU 1	0.00	0.00	0.00	0.00	25.00	10.00	25.00	10.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**50.00**	**55.00**	**50.00**	**55.00**
	Pigeonpea								
	BDN 711	12.80	15.00	0.00	0.00	25.00	75.00	37.80	90.00
	BDN 708	4.50	5.00	0.00	0.00	10.00	5.00	14.50	10.00
	BSMR 853	0.10	1.00	0.00	0.00	25.00	7.00	25.10	8.00
	BSMR 736	5.58	6.00	0.00	0.00	25.00	184.00	30.58	190.00
	Total	**22.98**	**27.00**	**0.00**	**0.00**	**85.00**	**271.00**	**107.98**	**298.00**

	Mung								
	BM 2003-2	12.00	14.00	0.00	0.00	30.00	100.00	42.00	114.00
	BM 2002-1	1.50	2.00	0.00	0.00	25.00	52.00	26.50	54.00
	BM 4	0.00	0.00	0.00	0.00	25.00	12.00	25.00	12.00
	Total	**13.50**	**16.00**	**0.00**	**0.00**	**80.00**	**164.00**	**93.50**	**180.00**
	Chickpea								
	BDNG 797	254.00	300.00	0.00	0.00	90.00	200.00	344.00	500.00
	Total	**254.00**	**300.00**	**0.00**	**0.00**	**90.00**	**200.00**	**344.00**	**500.00**
	Total Pulse Crops	**290.48**	**343.00**	**0.00**	**0.00**	**305.00**	**690.00**	**595.48**	**1033.00**
Oilseed Crops	**Soybean**								
	MAUS 162	65.95	70.00	0.00	0.00	0.00	45.00	65.95	115.00
	MAUS 158	445.40	450.00	0.00	0.00	0.00	955.00	445.40	1405.00
	MAUS 71	500.00	500.00	0.00	0.00	0.00	1372.00	500.00	1872.00
	JS 335	300.00	90.00	0.00	0.00	0.00	0.00	300.00	90.00
	JS 93-05	100.00	45.00	0.00	0.00	0.00	0.00	100.00	45.00
	Total	**1411.35**	**1155.00**	**0.00**	**0.00**	**0.00**	**2372.00**	**1411.35**	**3527.00**
	Safflower								
	PBNS 12	4.59	10.00	0.00	0.00	0.00	200.00	4.59	210.00
	PBNS 40	0.40	1.00	0.00	0.00	0.00	10.00	0.40	11.00
	Total	**4.99**	**11.00**	**0.00**	**0.00**	**0.00**	**210.00**	**4.99**	**221.00**
	Total Oilseed Crops	**1416.34**	**1166.00**	**0.00**	**0.00**	**0.00**	**2582.00**	**1416.34**	**3748.00**
Fibre Crops	**Cotton**								
	NH 615	0.25	0.25	0.00	0.00	0.00	0.00	0.25	0.25
	NH 545	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
	NH 452	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
	NHH 44 Male	0.06	0.06	0.00	0.00	0.00	0.00	0.06	0.06
	NHH 44 Female	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03
	Total	**0.46**	**0.46**	**0.00**	**0.00**	**0.00**	**0.00**	**0.46**	**0.46**
	Total Fibre Crops	**0.46**	**0.46**	**0.00**	**0.00**	**0.00**	**0.00**	**0.46**	**0.46**
	Grand Total (Parbhani)	**1719.65**	**1523.88**	**0.00**	**0.00**	**305.00**	**3272.90**	**2024.65**	**4796.78**
26. UAS, Bangalore									
Cereal Crops	**Rice**								
	Thanu (KMP 101)	2.75	5.00	2.25	35.00	0.00	0.00	5.00	40.00
	BR-2655	3.50	5.00	40.00	10.00	0.00	0.00	43.50	15.00
	Aerobic Rice								
	MAS 26	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	MAS 946-1	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	Total	**6.25**	**10.00**	**42.25**	**46.00**	**0.00**	**0.00**	**48.50**	**56.00**
	Maize								
	African Tall	0.00	0.00	30.00	15.00	0.00	0.00	30.00	15.00
	NAI 137	0.00	0.00	0.00	7.00	0.00	0.00	0.00	7.00
	MAI 105	0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00
	Total	**0.00**	**0.00**	**30.00**	**27.00**	**0.00**	**0.00**	**30.00**	**27.00**
	Finger Millet								
	L 5	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	MR 1	0.10	2.00	0.00	1.00	0.00	0.00	0.10	3.00
	MR 6	0.30	2.00	0.00	3.00	0.00	0.00	0.30	5.00
	KMR 301	0.10	2.00	1.00	3.00	0.00	0.00	1.10	5.00

	KMR 204	0.00	0.00	0.20	5.00	0.00	0.00	0.20	5.00
	GPU 45	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	GPU 48	0.30	2.00	0.20	2.92	0.00	0.00	0.50	4.92
	GPU 67	5.07	8.00	0.25	9.15	0.00	0.00	5.32	17.15
	Indaf 5	0.00	0.00	0.10	0.50	0.00	0.00	0.10	0.50
	Indaf 8	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	ML 365	4.50	6.00	1.00	0.00	0.00	0.00	5.50	6.00
	Indaf 7	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
	Indaf 9	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
	GPU 28	1.39	3.00	0.15	7.00	0.00	0.00	1.54	10.00
	Total	**11.76**	**25.00**	**3.90**	**35.07**	**0.00**	**0.00**	**15.66**	**60.07**
	Total Cereal Crops	**18.01**	**35.00**	**76.15**	**108.07**	**0.00**	**0.00**	**94.16**	**143.07**
Pulse Crops	**Pigeonpea**								
	BRG 1	0.55	2.00	0.45	6.00	0.00	0.00	1.00	8.00
	BRG 2	1.95	5.00	0.55	32.00	0.00	0.00	2.50	37.00
	BRG 4	4.50	6.00	2.00	6.00	0.00	0.00	6.50	12.00
	BRG 5	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00
	Total	**7.00**	**13.00**	**3.00**	**64.00**	**0.00**	**0.00**	**10.00**	**77.00**
	Cowpea								
	KBC 2	0.00	0.00	2.00	2.00	0.00	0.00	2.00	2.00
	C 152	6.00	7.15	2.00	0.00	0.00	0.00	8.00	7.15
	IT 38956-1	0.00	0.00	0.00	2.20	0.00	0.00	0.00	2.20
	MFC 08-14	0.00	0.00	0.00	9.00	0.00	0.00	0.00	9.00
	KM 5	0.00	0.00	0.00	2.70	0.00	0.00	0.00	2.70
	MFC 09-01	0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00
	Total	**6.00**	**7.15**	**4.00**	**20.90**	**0.00**	**0.00**	**10.00**	**28.05**
	Mung								
	KKM 3	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**4.00**	**0.00**	**0.00**	**0.00**	**4.00**
	Urd								
	Rashmi	0.00	0.00	0.00	5.92	0.00	0.00	0.00	5.92
	Total	**0.00**	**0.00**	**0.00**	**5.92**	**0.00**	**0.00**	**0.00**	**5.92**
	Chickpea								
	JG 11	0.00	0.00	100.00	110.00	0.00	**0.00**	100.00	110.00
	Total	**0.00**	**0.00**	**100.00**	**110.00**	**0.00**	**0.00**	**100.00**	**110.00**
	Fieldbean								
	HA 3	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
	HA 4	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
	Total	**0.00**	**0.00**	**0.50**	**5.00**	**0.00**	**0.00**	**0.50**	**5.00**
	Horsegram								
	PHG 9	0.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00
	Total	**0.00**	**0.00**	**3.00**	**3.00**	**0.00**	**0.00**	**3.00**	**3.00**
	Total Pulse Crops	**13.00**	**20.15**	**110.50**	**212.82**	**0.00**	**0.00**	**123.50**	**232.97**
Oilseed Crops	**Soybean**								
	JS 335	200.00	155.20	300.00	0.00	0.00	0.00	500.00	155.20
	JS 9560	0.00	66.00	0.00	0.00	0.00	0.00	0.00	66.00
	DSB 21	0.00	0.00	0.00	40.00	0.00	0.00	0.00	40.00
	Total	**200.00**	**221.20**	**300.00**	**40.00**	**0.00**	**0.00**	**500.00**	**261.20**

	Sunflower								
	CMS-234A	0.14	1.00	5.50	6.00	0.00	0.00	5.64	7.00
	CMS-234B	0.06	0.20	0.04	1.80	0.00	0.00	0.10	2.00
	RHA 6D-1	0.00	0.00	1.05	2.16	0.00	0.00	1.05	2.16
	RHA 95C 1	0.24	1.00	0.12	2.00	0.00	0.00	0.36	3.00
	CMS 17A	0.02	1.00	1.50	2.00	0.00	0.00	1.52	3.00
	CMS 17B	0.01	0.02	0.10	0.40	0.00	0.00	0.11	0.42
	CMS 335A	0.34	1.00	1.30	3.00	0.00	0.00	1.64	4.00
	CMS 335B	0.21	0.50	0.00	1.50	0.00	0.00	0.21	2.00
	Total	**1.02**	**4.72**	**9.61**	**18.86**	**0.00**	**0.00**	**10.63**	**23.58**
	Groundnut								
	ICGV 91114	0.00	0.00	50.00	20.00	0.00	0.00	50.00	20.00
	Total	**0.00**	**0.00**	**50.00**	**20.00**	**0.00**	**0.00**	**50.00**	**20.00**
	Total Oilseed Crops	**201.02**	**225.92**	**359.61**	**78.86**	**0.00**	**0.00**	**560.63**	**304.78**
	Grand Total (Bangalore)	**232.03**	**281.07**	**546.26**	**399.75**	**0.00**	**0.00**	**778.29**	**680.82**
27. UAS, Dharwad									
Cereal Crops	**Paddy**								
	Abhilash	1.25	1.25	0.00	0.00	0.00	0.00	1.25	1.25
	Jaya	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
	Siri 1253	0.20	0.20	0.00	0.00	0.00	0.00	0.20	0.20
	Total	**1.45**	**1.45**	**0.00**	**0.00**	**1.00**	**1.00**	**2.45**	**2.45**
	Wheat								
	DWR 162	8.75	6.00	0.75	0.50	6.00	3.00	15.50	9.50
	UAS 304	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00
	UAS 415	2.80	2.80	0.30	0.30	1.50	1.50	4.60	4.60
	UAS 428	10.00	10.00	0.80	0.30	2.00	2.00	12.80	12.30
	UAS 446	0.00	0.00	0.00	0.00	3.00	3.00	3.00	3.00
	DDK 1025	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	DDK 1029	0.00	0.00	0.00	0.00	25.00	25.00	25.00	25.00
	Total	**21.55**	**18.80**	**1.85**	**1.10**	**53.50**	**50.50**	**76.90**	**70.40**
	Sorghum								
	M 35-1	3.00	2.00	0.25	0.25	1.20	0.50	4.45	2.75
	CSV 29R	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	BJV 44	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.50
	SPV 2217	0.00	0.00	0.00	0.00	6.00	6.00	6.00	6.00
	Muguti 5-4-1	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**3.00**	**2.00**	**0.25**	**0.25**	**8.30**	**7.60**	**11.55**	**9.85**
	Maize								
	KDMI 15	0.00	0.00	0.00	0.00	0.20	0.50	0.20	0.50
	KDMI 16	0.00	0.00	0.00	0.00	0.20	2.90	0.20	2.90
	African Tall	0.00	0.00	0.00	0.00	5.00	11.10	5.00	11.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.40**	**14.50**	**5.40**	**14.50**
	Total Cereal Crops	**26.00**	**22.25**	**2.10**	**1.35**	**68.20**	**73.60**	**96.30**	**97.20**
Pulse Crops	**Mung**								
	DGGV-2	0.00	0.00	0.00	0.00	30.00	26.25	30.00	26.25
	DGGV 1	0.00	0.00	0.00	0.00	10.00	1.70	10.00	1.70
	IPM 2-14	77.00	4.70	0.00	0.00	6.00	4.70	83.00	9.40

	Summer								
	IPM 2-14	77.00	77.00	12.00	4.00	4.00	3.25	93.00	84.25
	Total	**154.00**	**81.70**	**12.00**	**4.00**	**50.00**	**35.90**	**216.00**	**121.60**
	Urd								
	TAU-1	0.00	0.00	0.00	0.00	2.00	1.80	2.00	1.80
	DU-1	0.00	0.00	0.00	0.00	20.00	5.35	20.00	5.35
	DBGV-05	17.50	17.50	3.00	2.25	13.00	12.55	33.50	32.30
	Total	**17.50**	**17.50**	**3.00**	**2.25**	**35.00**	**19.70**	**55.50**	**39.45**
	Cowpea								
	DCS 47-1	0.00	0.00	0.00	0.00	5.00	1.95	5.00	1.95
	DC 15	17.50	9.70	0.00	0.00	5.00	0.00	22.50	9.70
	Summer								
	DC 15	22.00	6.00	2.50	1.75	2.00	1.00	26.50	8.75
	Total	**39.50**	**15.70**	**2.50**	**1.75**	**12.00**	**2.95**	**54.00**	**20.40**
	Pigeonpea								
	TS 3R	32.15	14.00	0.00	0.00	3.00	2.00	35.15	16.00
	Total	**32.15**	**14.00**	**0.00**	**0.00**	**3.00**	**2.00**	**35.15**	**16.00**
	Chickpea								
	Vijay	0.00	5.75	0.00	0.00	0.00	0.00	0.00	5.75
	JG 11	500.00	200.00	8.00	6.00	25.00	30.00	533.00	236.00
	Jaki 9218	586.00	0.00	10.00	0.00	25.00	0.00	621.00	0.00
	Total	**1086.00**	**205.75**	**18.00**	**6.00**	**50.00**	**30.00**	**1154.00**	**241.75**
	Total Pulse Crops	**1329.15**	**334.65**	**35.50**	**14.00**	**150.00**	**90.55**	**1514.65**	**439.20**
Oilseed Crops	**Soybean**								
	JS-335	2000.00	1900.00	0.00	0.00	100.00	100.00	2100.00	2000.00
	JS-9305	1500.00	500.00	0.00	0.00	0.00	0.00	1500.00	500.00
	DSb-21	300.00	300.00	0.00	0.00	700.00	450.00	1000.00	750.00
	JS 9560	300.00	65.00	0.00	0.00	0.00	0.00	300.00	65.00
	Summer								
	JS-9305	400.00	350.00	30.00	20.00	40.00	35.00	470.00	405.00
	Total	**4500.00**	**3115.00**	**30.00**	**20.00**	**840.00**	**585.00**	**5370.00**	**3720.00**
	Groundnut								
	GPBD-4	570.00	700.00	0.00	0.00	150.00	137.00	720.00	837.00
	TAG-24	300.00	31.00	0.00	0.00	50.00	0.00	350.00	31.00
	TG-37A	399.00	250.00	0.00	0.00	50.00	34.00	449.00	284.00
	TDG-39 (TGLPS-3)	80.00	11.78	0.00	0.00	5.00	0.00	85.00	11.78
	G 2-52	0.00	0.00	0.00	0.00	150.00	216.00	150.00	216.00
	GPBD-5	23.76	27.00	0.00	0.00	30.00	0.00	53.76	27.00
	Dh-101	4.00	3.80	0.00	0.00	5.00	0.00	9.00	3.80
	ICGV-91114	200.00	0.00	0.00	0.00	20.00	0.00	220.00	0.00
	Dh-86	0.00	0.00	0.00	0.00	5.00	3.80	5.00	3.80
	Summer								
	TAG-24	300.00	200.00	7.00	5.00	30.00	30.00	337.00	235.00
	TG 37-A	300.00	300.00	12.00	4.00	0.00	0.00	312.00	304.00
	TGLPS 3	80.00	80.00	3.00	3.00	0.00	0.00	83.00	83.00
	GPBD 5	30.00	30.00	7.00	5.00	0.00	0.00	37.00	35.00
	DH 101	5.00	5.00	2.00	1.00	0.00	0.00	7.00	6.00
	Total	**2291.76**	**1638.58**	**31.00**	**18.00**	**495.00**	**420.80**	**2817.76**	**2077.38**

	Sesame								
	DS-5	0.10	0.10	0.00	0.00	1.00	1.00	1.10	1.10
	Total	**0.10**	**0.10**	**0.00**	**0.00**	**1.00**	**1.00**	**1.10**	**1.10**
	Niger								
	DNS-4	0.50	0.50	0.00	0.00	0.10	0.10	0.60	0.60
	Total	**0.50**	**0.50**	**0.00**	**0.00**	**0.10**	**0.10**	**0.60**	**0.60**
	Castor								
	48-1	0.00	0.00	0.00	0.00	5.00	1.00	5.00	1.00
	GC 3	0.00	0.00	0.00	0.00	5.00	0.50	5.00	0.50
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**1.50**	**10.00**	**1.50**
	Safflower								
	A 1	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	A 2	0.14	0.14	0.00	0.00	0.00	0.00	0.14	0.14
	A 300	0.24	0.24	0.00	0.00	0.00	0.00	0.24	0.24
	Total	**0.38**	**0.38**	**0.00**	**0.00**	**0.20**	**0.20**	**0.58**	**0.58**
	Total Oilseed Crops	**6792.74**	**4754.56**	**61.00**	**38.00**	**1346.30**	**1008.60**	**8200.04**	**5801.16**
	Grand Total (Dharwad)	**8147.89**	**5111.46**	**98.60**	**53.35**	**1564.50**	**1172.75**	**9810.99**	**6337.56**
28. PJTSAU, Hyderabad									
Cereal Crops	**Rice**								
	BPT-5204	0.00	0.00	207.40	208.00	42.60	43.00	250.00	251.00
	MTU-1001 (Vijetha)	0.00	0.00	39.00	39.00	11.00	11.00	50.00	50.00
	MTU-1010	45.00	50.00	176.80	180.00	28.20	40.00	250.00	270.00
	MTU-7029 (Swarna)	0.00	0.00	35.60	36.00	14.40	15.00	50.00	51.00
	JGL-11118 (Anjana)	2.10	2.20	0.00	0.00	9.90	2.21	12.00	4.41
	JGL-11470	5.00	8.00	0.00	0.00	30.00	38.20	35.00	46.20
	JGL-1798 (Jagtial Sannalu)	7.00	7.00	60.00	44.60	23.00	0.00	90.00	51.60
	JGL-384 (Polasa Prabha)	5.00	5.00	33.60	32.20	11.40	0.00	50.00	37.20
	JGL-11727	0.00	0.00	0.00	0.00	0.00	39.30	0.00	39.30
	KNM-118 (Kunaram Sannalu)	0.00	0.00	34.50	35.00	100.50	100.00	135.00	135.00
	RNR-15048 (Telangana Sona)	17.00	25.00	88.30	90.00	94.70	95.00	200.00	210.00
	RNR-2465 (Sugandasamba)	0.00	0.00	1.80	3.00	0.20	3.00	2.00	6.00
	RNR-2458 (Krishna)	2.00	2.00	3.00	3.00	0.00	0.00	5.00	5.00
	RNR-1446 (Satya)	0.00	0.00	12.00	6.00	0.00	0.00	12.00	6.00
	RNR-2354(Shobini)	0.00	0.00	0.00	0.00	0.00	9.75	0.00	9.75
	RNR-18833(Sumathi)	0.00	0.00	0.00	0.00	0.00	12.25	0.00	12.25
	WGL-347 (Somnath)	0.00	0.00	5.60	5.60	4.40	4.40	10.00	10.00
	WGL-44 (Siddi)	0.00	0.00	2.40	5.00	7.60	19.00	10.00	24.00
	IR 64	0.00	0.00	7.50	8.00	0.00	0.00	7.50	8.00
	JGL 17004 (Prathymna)	0.00	0.00	0.90	1.00	4.10	4.52	5.00	5.52
	JGL-3844 (Jagtial Samba)	0.00	0.00	3.00	3.00	5.00	5.00	8.00	8.00
	JGL-18047 (Bathukamma)	9.00	10.00	50.70	51.00	90.30	91.00	150.00	152.00
	RNR-10754 (Tellahamsa)	1.50	1.50	35.50	23.00	0.00	0.00	37.00	24.50
	WGL-13400 (Surekha)	0.00	0.00	4.50	4.50	0.50	0.50	5.00	5.00
	WGL-14	2.50	3.00	19.20	20.00	8.30	8.50	30.00	31.50

	WGL-20471 (Erramallelu)	10.00	10.00	15.80	15.80	4.20	4.20	30.00	30.00
	WGL-283 (Sheethal)	8.00	8.00	2.10	2.30	0.40	0.50	10.50	10.80
	WGL-32100	53.00	53.00	10.20	10.20	11.80	11.80	75.00	75.00
	WGL-3962 (Bhadrakali)	0.00	0.00	7.50	7.50	2.50	2.50	10.00	10.00
	WGL-48684 (Kavya)	0.00	0.00	4.00	4.00	0.00	0.00	4.00	4.00
	Total	**167.10**	**184.70**	**860.90**	**837.70**	**505.00**	**560.63**	**1533.00**	**1583.03**
	Maize								
	Amber Popcorn	0.00	0.00	0.03	0.03	0.00	0.00	0.03	0.03
	Madhuri	0.00	0.00	0.03	0.03	0.00	0.00	0.03	0.03
	Priya	0.01	0.01	0.03	0.03	0.00	0.00	0.04	0.04
	BML-6	4.85	4.85	0.02	0.02	0.00	0.00	4.87	4.87
	BML-7	2.04	2.04	0.02	0.02	0.00	0.00	2.06	2.06
	DHM-121 (Female)	0	6.05	0.00	0.00	0.00	0.00	0.00	6.05
	DHM-121 (Male)	2.03	2.03	0.00	0.00	0.00	0.00	2.03	2.03
	Total	**8.93**	**14.98**	**0.13**	**0.13**	**0.00**	**0.00**	**9.06**	**15.11**
	Sorghum								
	MJ 278	0.00	0.00	0.24	0.50	0.00	0.00	0.24	0.50
	PSV 462	0.00	0.00	0.04	0.20	0.00	0.00	0.04	0.20
	PSV 56	0.00	0.00	0.24	1.00	0.00	0.00	0.24	1.00
	Total	**0.00**	**0.00**	**0.52**	**1.70**	**0.00**	**0.00**	**0.52**	**1.70**
	Total Cereal Crops	**176.03**	**199.68**	**861.55**	**839.53**	**505.00**	**560.63**	**1542.58**	**1599.84**
Pulse Crops	**Mung**								
	MGG-295	10.00	25.00	2.85	5.00	82.15	80.00	95.00	110.00
	MGG-347	17.00	33.00	2.05	2.20	10.95	0.00	30.00	35.20
	MGG-351	0.00	2.00	0.15	1.00	9.85	10.00	10.00	13.00
	WGG 37	0.00	0.00	0.07	4.50	0.00	0.00	0.07	4.50
	WGG 42	0.00	0.00	1.67	2.00	0.00	0.00	1.67	2.00
	Total	**27.00**	**60.00**	**6.79**	**14.70**	**102.95**	**90.00**	**136.74**	**164.70**
	Urd								
	MBG 207	2.50	2.50	2.20	2.20	5.30	1.00	10.00	5.70
	PU 31	0.00	0.00	0.50	0.50	4.50	5.00	5.00	5.50
	LBG 752	10.00	8.00	0.00	0.00	0.00	0.00	10.00	8.00
	MBG 207	10.00	8.00	0.00	0.00	0.00	0.00	10.00	8.00
	Total	**22.50**	**18.50**	**2.70**	**2.70**	**9.80**	**6.00**	**35.00**	**27.20**
	Pigeonpea								
	ICPL-84031	0.00	0.00	0.05	0.20	0.95	1.00	1.00	1.20
	ICPL-87119	3.50	4.00	4.59	5.00	6.91	6.00	15.00	15.00
	ICPL-8863	0.00	0.00	0.44	0.50	0.56	0.50	1.00	1.00
	PRG-158	0.00	0.00	0.40	1.00	19.60	20.00	20.00	21.00
	PRG-176	1.50	28.00	0.38	1.00	98.12	100.00	100.00	129.00
	TDRG-4	0.65	1.00	0.03	1.00	1.32	3.00	2.00	5.00
	RGT-1	0.50	0.50	0.00	0.00	0.50	0.00	1.00	0.50
	WRG-53	0.00	0.00	0.02	0.20	0.03	0.00	0.05	0.20
	WRG-65	1.25	20.00	0.22	0.50	3.53	0.00	5.00	20.50
	WRG-27	1.25	15.00	0.00	0.00	0.75	0.00	2.00	15.00
	Total	**8.65**	**68.50**	**6.13**	**9.40**	**132.27**	**130.50**	**147.05**	**208.40**
	Total Pulse Crops	**58.15**	**147.00**	**15.62**	**26.80**	**245.02**	**226.50**	**318.79**	**400.30**

Oilseed Crops	**Soybean**								
	Basara	0.00	0.00	0.30	0.30	199.70	179.70	200.00	180.00
	JS 335	0.00	0.00	687.60	440.00	112.40	0.00	800.00	440.00
	Total	**0.00**	**0.00**	**687.90**	**440.30**	**312.10**	**179.70**	**1000.00**	**620.00**
	Castor								
	Haritha	0.00	0.00	0.05	0.10	0.00	0.00	0.05	0.10
	Kiran	0.00	0.00	0.04	0.05	0.01		0.05	0.05
	Kranti	0.00	0.00	0.45	0.50	0.55	0.55	1.00	1.05
	Pragathi (PCS-226)	0.00	0.00	0.00	0.00	50.00	50.00	50.00	50.00
	Total	**0.00**	**0.00**	**0.54**	**0.65**	**50.56**	**50.55**	**51.10**	**51.20**
	Sesame								
	Hima	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	Rajeswari	0.00	0.00	0.05	0.10	0.00	0.00	0.05	0.10
	Swetha	0.00	0.00	1.35	1.35	0.65	0.65	2.00	2.00
	Total	**0.00**	**0.00**	**1.45**	**1.50**	**0.65**	**0.65**	**2.10**	**2.15**
	Total Oilseed Crops	**0.00**	**0.00**	**689.89**	**442.45**	**363.31**	**230.90**	**1053.20**	**673.35**
Forage Crops	**Pearlmillet**								
	Moti Bajra	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
	Total	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.00**	**0.05**	**0.05**
	Total Forage Crops	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.00**	**0.05**	**0.05**
	Grand Total (PJTSAU)	**234.18**	**346.68**	**1567.11**	**1308.83**	**1113.33**	**1018.03**	**2914.62**	**2673.54**
29. ANGRAU, Guntur									
Cereal Crops	**Rice**								
	MTU 7229	360.00	360.00	235.12	203.00	0.00	0.00	595.12	563.00
	MTU 1064	5.00	34.00	0.00	0.00	0.00	0.00	5.00	34.00
	PLA 1100	0.00	28.00	0.00	0.00	0.00	0.00	0.00	28.00
	MTU 2077	0.00	3.38	0.00	0.00	0.00	0.00	0.00	3.38
	MTU 1031	1.00	0.95	0.20	0.00	0.00	0.00	1.20	0.95
	MTU 1032	1.00	0.43	0.20	0.00	0.00	0.00	1.20	0.43
	MTU 2067	0.00	0.52	0.36	1.50	0.00	0.00	0.36	2.02
	MTU 4870	0.00	0.64	1.08	1.50	0.00	0.00	1.08	2.14
	MTU 2716	0.00	1.02	0.40	3.00	0.00	0.00	0.40	4.02
	MTU 1121	0.00	32.00	34.46	42.00	0.00	0.00	34.46	74.00
	MTU 1153	10.00	15.40	2.00	40.00	0.00	0.00	12.00	55.40
	MTU 1156	0.00	17.70	9.74	54.00	0.00	0.00	9.74	71.70
	BPT-5204	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.74
	MTU 1075	5.00	5.00	33.34	62.00	0.00	0.00	38.34	67.00
	MTU 1061	5.00	5.00	50.43	55.00	0.00	0.00	55.43	60.00
	MTU 1010	428.00	428.00	213.16	232.00	0.00	0.00	641.16	660.00
	MTU 1001	210.50	210.50	113.36	139.50	0.00	0.00	323.86	350.00
	MTU 3626	20.00	20.00	19.00	40.00	0.00	0.00	39.00	60.00
	MTU 1006	1.50	1.50	0.30	4.50	0.00	0.00	1.80	6.00
	MTU 7029 Sub 1	0.00	0.00	2.40	2.50	0.00	0.00	2.40	2.50
	IR 64	0.00	0.00	66.70	68.00	0.00	0.00	66.70	68.00
	Total	**1047.00**	**1164.78**	**782.25**	**948.50**	**0.00**	**0.00**	**1829.25**	**2113.28**

	Foxtail Millet								
	KDR	0.12	0.12	0.12	0.12	0.00	0.00	0.24	0.24
	NSR	0.12	0.12	0.12	0.12	0.00	0.00	0.24	0.24
	Suryanandi	0.12	0.12	0.12	0.12	0.00	0.00	0.24	0.24
	Total	**0.36**	**0.36**	**0.36**	**0.36**	**0.00**	**0.00**	**0.72**	**0.72**
	Total Cereal Crops	**1047.36**	**1165.14**	**782.61**	**948.86**	**0.00**	**0.00**	**1829.97**	**2114.00**
Pulse Crops	**Pigeonpea**								
	LRG 30	0.00	0.00	0.30	1.50	0.00	0.00	0.30	1.50
	LRG 41	27.00	27.00	25.74	25.74	25.00	112.26	77.74	165.00
	LRG 52	2.00	2.00	3.63	3.63	0.00	0.00	5.63	5.63
	ICPL 85063	17.00	17.00	10.00	10.00	25.00	116.50	52.00	143.50
	ICPL 87119	0.00	0.00	2.40	2.40	0.00	0.00	2.40	2.40
	Total	**46.00**	**46.00**	**42.07**	**43.27**	**50.00**	**228.76**	**138.07**	**318.03**
	Chickpea								
	NBeG 7	7.50	7.50	2.40	92.50	40.00	40.00	49.90	140.00
	NBeG 119	5.00	5.00	0.00	0.00	70.00	0.00	75.00	5.00
	NBeG 47	0.00	0.00	2.40	95.00	55.00	55.00	57.40	150.00
	NBeG 49	0.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	Total	**12.50**	**12.50**	**4.80**	**287.50**	**165.00**	**95.00**	**182.30**	**395.00**
	Mung								
	LGG 407	0.00	0.00	1.00	0.25	0.00	0.00	1.00	0.25
	LGG 450	0.00	0.00	0.20	0.20	0.00	0.00	0.20	0.20
	LGG 460	17.00	17.00	23.00	23.00	15.00	10.00	55.00	50.00
	TM 96-2	1.50	1.50	0.62	1.50	0.00	0.00	2.12	3.00
	Total	**18.50**	**18.50**	**24.82**	**24.95**	**15.00**	**10.00**	**58.32**	**53.45**
	Urd								
	LBG 402	0.00	0.00	0.06	0.02	0.00	0.00	0.06	0.02
	LBG 623	3.00	3.00	2.76	2.76	7.50	3.24	13.26	9.00
	LBG 645	0.00	0.00	1.38	1.38	0.00	0.00	1.38	1.38
	LBG 648	0.00	0.00	1.56	1.56	0.00	0.00	1.56	1.56
	LBG 752	38.00	38.00	36.00	36.00	25.00	9.50	99.00	83.50
	LBG 787	2.00	2.00	3.00	1.00	0.00	0.00	5.00	3.00
	PU 31	26.00	26.00	39.00	39.00	25.50	22.50	90.50	87.50
	Total	**69.00**	**69.00**	**83.76**	**81.72**	**58.00**	**35.24**	**210.76**	**185.96**
	Total Pulse Crops	**146.00**	**146.00**	**155.45**	**437.44**	**288.00**	**369.00**	**589.45**	**952.44**
Oilseed Crops	**Groundnut**								
	Kadiri 6	3943.00	3280.00	2057.00	1500.00	0.00	0.00	6000.00	4780.00
	Kadiri 7 Bold	200.00	1000.00	40.00	200.00	0.00	0.00	240.00	1200.00
	Kadiri 9	972.00	852.81	278.00	200.00	0.00	0.00	1250.00	1052.81
	Kadiri Harithandra	240.00	949.50	10.00	100.00	0.00	0.00	250.00	1049.50
	Total	**5355.00**	**6082.31**	**2385.00**	**2000.00**	**0.00**	**0.00**	**7740.00**	**8082.31**
	Total Oilseed Crops	**5355.00**	**6082.31**	**2385.00**	**2000.00**	**0.00**	**0.00**	**7740.00**	**8082.31**
	Grand Total (ANGRAU)	**6548.36**	**7393.45**	**3323.06**	**3386.30**	**288.00**	**369.00**	**10159.42**	**11148.75**
30. TNAU, Coimbatore									
Cereal Crops	**Rice**								
	ADT 36	0.00	0.00	41.70	50.00	35.45	31.70	77.15	81.70
	ADT 37	10.10	10.10	107.70	120.00	116.70	103.75	234.50	233.85

	ADT 38	0.00	0.00	50.40	50.40	65.95	14.15	116.35	64.55
	ADT 39	5.00	5.00	74.65	70.00	100.30	63.76	179.95	138.76
	ADT 42	0.00	0.00	7.50	7.50	7.50	4.30	15.00	11.80
	ADT 43	5.80	5.80	135.65	170.00	166.10	124.15	307.55	299.95
	ADT (R) 45	0.50	0.50	145.75	145.00	174.50	132.15	320.75	277.65
	ADT (R) 46	0.00	0.00	45.15	45.00	58.40	0.00	103.55	45.00
	ADT (R) 49	0.00	0.00	23.55	25.00	27.10	25.76	50.65	50.76
	ADT (R) 50	0.00	0.00	11.50	20.00	16.80	15.60	28.30	35.60
	CO 43	0.00	0.00	22.30	22.30	33.80	5.80	56.10	28.10
	CO (R) 48	0.00	0.00	0.00	0.00	2.30	2.50	2.30	2.50
	CO (R) 49	0.00	0.00	1.00	1.00	13.40	11.45	14.40	12.45
	CO (R) 50	0.00	0.00	71.90	71.90	20.30	18.80	92.20	90.70
	CO (R) 51	6.60	6.60	153.25	120.00	61.60	78.00	221.45	204.60
	IR 20	22.50	22.50	29.60	30.00	43.00	35.80	95.10	88.30
	IR 36	0.00	0.00	1.00	1.00	7.50	4.50	8.50	5.50
	IR 50	0.00	0.00	17.00	17.00	25.00	23.80	42.00	40.80
	ASD 16	0.00	0.00	95.05	95.00	91.70	83.60	186.75	178.60
	ASD 19	0.00	0.00	8.00	8.00	51.75	13.25	59.75	21.25
	Anna (R) 4	0.00	0.00	6.00	6.00	6.90	12.20	12.90	18.20
	CR 1009	0.00	0.00	101.95	100.00	123.69	94.35	225.64	194.35
	CR 1009 Sub 1	45.25	45.25	24.50	24.50	50.30	36.77	120.05	106.52
	I.W.Ponni	0.00	0.00	47.75	50.00	40.15	29.60	87.90	79.60
	MDU 6	0.00	0.00	8.00	8.00	2.00	2.00	10.00	10.00
	TPS 5	0.00	0.00	3.00	7.50	1.50	3.53	4.50	11.03
	TRY 1	0.00	0.00	19.00	19.00	17.10	10.50	36.10	29.50
	TRY 3	0.00	0.00	10.50	10.50	6.10	10.10	16.60	20.60
	TKM 9	0.00	0.00	43.40	43.40	25.00	19.60	68.40	63.00
	TKM 13	0.00	0.00	30.50	30.50	5.15	25.27	35.65	55.77
	Total	**95.75**	**95.75**	**1337.25**	**1368.50**	**1397.04**	**1036.74**	**2830.04**	**2500.99**
	Sorghum								
	CO (S) 30	0.00	0.00	0.25	0.25	0.06	0.15	0.31	0.40
	K 12	0.00	0.00	0.10	0.10	0.12	0.16	0.22	0.26
	K 11	0.00	0.00	0.00	0.00	0.46	0.45	0.46	0.45
	Total	**0.00**	**0.00**	**0.35**	**0.35**	**0.64**	**0.76**	**0.99**	**1.11**
	Maize								
	COH (M) 6 PL								
	Female Line	3.00	3.00	4.20	5.00	4.80	4.10	12.00	12.10
	Male Line	1.50	1.50	2.00	2.00	2.40	3.55	5.90	7.05
	COH (M) 7 PL								
	Female Line	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	Male Line	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	COH (M) 8 PL								
	Female Line	3.00	2.40	0.00	0.00	0.25	0.25	3.25	2.65
	Male Line	1.53	1.53	0.00	0.00	0.13	0.33	1.66	1.86
	Total	**9.03**	**8.43**	**6.20**	**7.00**	**7.88**	**8.53**	**23.11**	**23.96**
	Finger Millet / Ragi								
	CO (Ra) 14	0.00	0.00	0.10	0.10	0.18	0.18	0.28	0.28
	CO (Ra) 15	0.00	0.00	0.40	0.40	0.66	0.66	1.06	1.06

	Paiyur 2	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**0.00**	**0.00**	**0.50**	**0.50**	**0.94**	**0.94**	**1.44**	**1.44**
	Cumbu								
	CO (Cu) 9	0.10	0.10	0.50	0.90	0.20	0.10	0.80	1.10
	Total	**0.10**	**0.10**	**0.50**	**0.90**	**0.20**	**0.10**	**0.80**	**1.10**
	Barnyard Millet/ Kudiraivali								
	CO (Kv) 2	0.00	0.00	1.00	1.00	1.91	1.91	2.91	2.91
	Total	**0.00**	**0.00**	**1.00**	**1.00**	**1.91**	**1.91**	**2.91**	**2.91**
	Samai/ Kutki								
	CO4	0.00	0.00	0.30	0.30	0.72	0.81	1.02	1.11
	Total	**0.00**	**0.00**	**0.30**	**0.30**	**0.72**	**0.81**	**1.02**	**1.11**
	Foxtail Millet/ Tenai								
	CO (Te) 7	0.00	0.00	0.30	0.30	0.92	0.95	1.22	1.25
	Total	**0.00**	**0.00**	**0.30**	**0.30**	**0.92**	**0.95**	1.22	1.25
	Proso Miller								
	CO (PV) 5	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
	Total	**0.00**	**0.00**	**0.10**	**0.10**	**0.00**	**0.00**	**0.10**	**0.10**
	Kodo millet								
	CO 3	0.00	0.00	0.00	0.00	0.18	0.20	0.18	0.20
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.18**	**0.20**	**0.18**	**0.20**
	Total Cereal Crops	**104.88**	**104.28**	**1346.50**	**1378.95**	**1410.43**	**1050.94**	**2861.81**	**2534.17**
Pulse Crops	**Pigeon Pea**								
	VBN 3	0.00	0.00	1.30	1.30	1.20	0.82	2.50	2.12
	CO (Rg) 7	0.01	0.01	2.40	2.40	2.50	2.50	4.91	4.91
	Total	**0.01**	**0.01**	**3.70**	**3.70**	**3.70**	**3.32**	**7.41**	**7.03**
	Urd								
	VBN (Bg) 4	0.20	0.20	5.80	5.80	8.30	6.60	14.30	12.60
	VBN (Bg) 5	0.00	0.00	10.90	10.00	18.70	5.63	29.60	15.63
	VBN (Bg) 6	0.00	0.00	11.38	12.00	27.30	14.79	38.68	26.79
	VBN (Bg) 7	6.00	0.00	0.00	0.00	2.10	0.00	8.10	0.00
	CO 6	22.00	22.00	0.00	0.00	4.74	3.80	26.74	25.80
	ADT 5	0.00	0.00	0.00	0.00	18.02	14.83	18.02	14.83
	VBN 3	0.00	0.00	0.00	0.00	7.30	10.20	7.30	10.20
	MDU 1	0.00	0.00	0.00	0.00	2.40	2.84	2.40	2.84
	ADT 3	0.00	0.00	0.00	0.00	12.25	7.00	12.25	7.00
	Total	**28.20**	**22.20**	**28.08**	**27.80**	**101.11**	**65.69**	**157.39**	**115.69**
	Mung								
	VBN (Gg) 2	0.00	0.00	10.20	9.00	0.00	0.00	10.20	9.00
	VBN (Gg) 3	0.00	0.00	3.00	3.00	8.05	6.12	11.05	9.12
	CO 6	0.00	0.00	1.13	1.13	1.50	0.30	2.63	1.43
	CO (Gg)912 (CO7)	3.00	3.00	2.30	2.30	12.20	7.50	17.50	12.80
	CO (GG) 8	0.00	0.00	2.00	2.00	12.90	9.08	14.90	11.08
	Total	**3.00**	**3.00**	**18.63**	**17.43**	**34.65**	**23.00**	**56.28**	**43.43**
	Cowpea								
	CO (CP) 7	0.00	0.00	1.90	1.90	3.85	6.60	5.75	8.50
	Total	**0.00**	**0.00**	**1.90**	**1.90**	**3.85**	**6.60**	**5.75**	**8.50**

	Horsgram								
	Priyur 2	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**4.00**	6.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**6.00**	**4.00**	**6.00**	**4.00**
	Total Pulses Crops	**31.21**	**25.21**	**52.31**	**50.83**	**149.31**	**102.61**	**232.83**	**178.65**
Oilseed Crops	**Groundnut ***								
	VRI (Gn) 6	0.00	0.00	50.00	50.00	192.00	12.90	242.00	62.90
	VRI (Gn) 7	0.00	0.00	30.00	30.00	172.40	36.20	202.40	66.20
	VRI 8	0.00	0.00	25.00	25.00	0.00	0.00	25.00	25.00
	CO 6	0.00	0.00	70.00	70.00	195.60	76.40	265.60	146.40
	CO 7	10.00	10.00	0.00	0.00	4.00	4.00	14.00	14.00
	TMV (Gn) 13	0.00	0.00	70.00	70.00	192.00	347.30	262.00	417.30
	VRI 2 **	100.00	33.30	0.00	0.00	0.00	0.00	100.00	33.30
	ICGV 00348 **	40.00	0.00	0.00	0.00	0.00	0.00	40.00	0.00
	Total	**150.00**	**43.30**	**245.00**	**245.00**	**756.00**	**476.80**	**1151.00**	**765.10**
	Sunflower								
	CO (SFV) 5	0.00	0.00	0.00	0.00	0.30	0.25	0.30	0.25
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.25**	**0.30**	**0.25**
	Castor								
	TMV 5	0.00	0.00	0.00	0.00	0.63	0.60	0.63	0.60
	TMV 6	0.00	0.00	0.00	0.00	0.10	0.00	0.10	0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.73**	**0.60**	**0.73**	**0.60**
	Total Oilseed crops	**150.00**	**43.30**	**245.00**	**245.00**	**757.03**	**477.65**	**1152.03**	**765.95**
Fibre Crops	**COTTON**								
	MCU 5	0.10	0.10	0.40	0.40	0.00	0.00	0.50	0.50
	MCU 7	0.00	0.00	0.46	0.50	0.00	0.00	0.46	0.50
	SVPR 2	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	SVPR 4	0.00	0.00	0.35	0.35	0.00	0.00	0.35	0.35
	Total	**0.10**	**0.10**	**2.21**	**2.25**	**0.00**	**0.00**	**2.31**	**2.35**
	Total Fibre Crops	**0.10**	**0.10**	**2.21**	**2.25**	**0.00**	**0.00**	**2.31**	**2.35**
Forage Crops	**Sorghum**								
	CO (FS) 29	3.00	3.00	0.80	0.80	2.00	2.00	5.80	5.80
	CO (FS) 31	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
	SPV 2242	5.80	2.00	0.00	0.00	0.00	0.00	5.80	2.00
	Total	**9.80**	**5.00**	**0.80**	**0.80**	**2.00**	**2.00**	**12.60**	**7.80**
	Cowpea								
	CO 9	0.00	0.00	1.50	1.50	0.00	0.00	1.50	1.50
	Total	**0.00**	**0.00**	**1.50**	**1.50**	**0.00**	**0.00**	**1.50**	**1.50**
	Total Forage Crops	**9.80**	**5.00**	**2.30**	**2.30**	**2.00**	**2.00**	**14.10**	**9.30**
	Grand Total (Coimbatore)	**295.99**	**177.89**	**1648.32**	**1679.33**	**2318.77**	**1633.20**	**4263.08**	**3490.42**
31. KAU, Pattambi									
Cereal Crops	**Rice**								
	Jyothi	9.00	13.00	1.10	7.00	0.00	0.00	10.10	20.00
	Matta Triveni	1.00	2.00	0.40	0.55	0.00	0.00	1.40	2.55
	Uma	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	Harsha	0.00	0.00	0.02	1.00	0.00	0.00	0.02	1.00
	Matta Triveni	0.00	2.00	0.40	0.50	0.00	0.00	0.40	2.50
	Varsha	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50

	Aiswarya	0.00	0.00	0.40	2.50	0.00	0.00	0.40	2.50
	K.K.Varna	0.00	0.00	0.00	2.50	0.00	0.00	0.00	2.50
	Annapoorna	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.80
	Kanchana	0.00	0.00	0.40	1.50	0.00	0.00	0.40	1.50
	Vaishak	0.00	0.00	0.02	2.00	0.00	0.00	0.02	2.00
	Swarnaprabha	0.00	0.00	0.00	1.50	0.00	0.00	0.00	1.50
	Samyuktha	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.80
	Aathira	0.00	2.00	0.30	0.50	0.00	0.00	0.30	2.50
	Anaswara	0.00	0.00	0.00	1.50	0.00	0.00	0.00	1.50
	Karuna	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Neeraja	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	Jaya	0.00	0.00	0.00	5.00	0.00	0.00	0.00	5.00
	Ponmani	0.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00
	RedMahsuri	0.00	0.00	0.00	2.50	0.00	0.00	0.00	2.50
	Prathyasa	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Sampada	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Jeerakasala	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.50
	Makaram	0.00	0.00	0.02	1.50	0.00	0.00	0.02	1.50
	Swetha	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
	Thavalakkannan	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.30
	Thekkan cheera	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.30
	Thonnooran	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.30
	Chenkayama	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.30
	Shreyas	0.00	0.00	0.00	2.50	0.00	0.00	0.00	2.50
	Total	**10.00**	**19.50**	**3.06**	**51.85**	**0.00**	**0.00**	**13.06**	**71.35**
	Total Cereal Crops	**10.00**	**19.50**	**3.06**	**51.85**	**0.00**	**0.00**	**13.06**	**71.35**
Grand Total Pattambi		**10.00**	**19.50**	**3.06**	**51.85**	**0.00**	**0.00**	**13.06**	**71.35**
32. PAJANCOA&RI, Karaikal									
Cereal Crops	**Rice**								
	ADT 37	0.00	0.00	0.80	3.60	0.00	0.00	0.80	3.60
	ADT 43	0.00	0.00	0.50	4.80	0.00	0.00	0.50	4.80
	ADT (R) 45	0.00	0.00	0.20	4.10	0.00	0.00	0.20	4.10
	CR 1009	0.00	0.00	0.90	9.00	0.00	0.00	0.90	9.00
	I.W.Ponni	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
	ADT (R) 46	0.00	0.00	0.20	0.00	0.00	0.00	0.20	0.00
	ADT 39	0.00	0.00	0.10	0.00	0.00	0.00	0.10	0.00
	Total	**0.00**	**0.00**	**3.70**	**21.50**	**0.00**	**0.00**	**3.70**	**21.50**
	Total Cereal Crops	**0.00**	**0.00**	**3.70**	**21.50**	**0.00**	**0.00**	**3.70**	**21.50**
	Grand Total (Karaikal)	**0.00**	**0.00**	**3.70**	**21.50**	**0.00**	**0.00**	**3.70**	**21.50**
33. DBSKKV, Dapoli									
Cereal Crops	**Rice**								
	Ratnagiri 1	0.60	2.00	0.00	0.00	24.40	19.50	25.00	21.50
	Ratnagiri 2	0.00	0.00	0.00	0.00	0.40	0.70	0.40	0.70
	Ratnagiri 3	0.00	0.00	0.00	0.00	1.00	0.65	1.00	0.65
	Ratnagiri 4	0.00	0.00	0.00	0.00	5.00	4.50	5.00	4.50
	Ratnagiri 5	0.00	0.00	0.30	0.60	9.70	12.00	10.00	12.60
	Ratnagiri 73	0.00	0.00	0.00	0.00	1.00	1.10	1.00	1.10
	Ratnagiri 24	8.90	12.00	0.00	0.00	11.10	15.60	20.00	27.60

	Ratnagiri 711	0.00	0.00	0.00	0.00	12.00	13.00	12.00	13.00
	Karjat 2	0.00	0.00	0.00	0.00	10.00	8.00	10.00	8.00
	Karjat 3	1.50	4.50	0.00	0.00	18.50	17.00	20.00	21.50
	Karjat 4	0.00	0.00	0.00	0.00	6.00	6.60	6.00	6.60
	Karjat 5	1.00	3.00	0.00	0.00	5.50	8.40	6.50	11.40
	Karjat 6	0.30	0.50	0.00	0.00	4.70	7.00	5.00	7.50
	Karjat 7	5.40	7.50	0.00	0.00	6.60	11.10	12.00	18.60
	Karjat 8	0.20	0.40	0.00	0.00	7.80	9.00	8.00	9.40
	Karjat 9	0.00	0.00	0.30	0.60	9.70	9.37	10.00	9.97
	Karjat 184	2.00	5.00	0.00	0.00	4.00	6.00	6.00	11.00
	Palghar 1	0.00	0.00	0.00	0.00	4.00	8.00	4.00	8.00
	Palghar 2	0.00	0.00	0.00	0.00	3.00	7.20	3.00	7.20
	Panvel 1	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
	Panvel 2	0.00	0.00	0.00	0.00	2.00	3.00	2.00	3.00
	Panvel 3	0.00	0.00	0.00	0.00	2.00	3.50	2.00	3.50
	Total	**19.90**	**34.90**	**0.60**	**1.20**	**151.40**	**175.22**	**171.90**	**211.32**
	Hybrid Paddy								
	Sahyadri								
	A Line	0.10	0.30	0.00	0.00	0.50	1.00	0.60	1.30
	B Line	0.05	0.20	0.00	0.00	0.40	0.80	0.45	1.00
	R Line	0.05	0.20	0.00	0.00	0.40	0.75	0.45	0.95
	Total	**0.20**	**0.70**	**0.00**	**0.00**	**1.30**	**2.55**	**1.50**	**3.25**
	Sahyadri 2								
	A Line	0.15	0.45	0.00	0.00	0.05	0.20	0.20	0.65
	B Line	0.05	0.20	0.00	0.00	0.05	0.20	0.10	0.40
	R Line	0.05	0.20	0.00	0.00	0.00	0.00	0.05	0.20
	Total	**0.25**	**0.85**	**0.00**	**0.00**	**0.10**	**0.40**	**0.35**	**1.25**
	Sahyadri 3								
	A Line	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	B Line	0.07	0.20	0.00	0.00	0.00	0.00	0.07	0.20
	R Line	0.05	0.30	0.00	0.00	0.00	0.00	0.05	0.30
	Total	**0.32**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.32**	**1.00**
	Sahyadri 4								
	A Line	0.15	0.35	0.05	0.20	0.25	0.50	0.45	1.05
	B Line	0.05	0.30	0.00	0.00	0.20	0.40	0.25	0.70
	R Line	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**0.20**	**0.65**	**0.05**	**0.20**	**0.45**	**0.90**	**0.70**	**1.75**
	Sahyadri 5								
	A Line	0.15	0.50	0.00	0.00	0.30	0.60	0.45	1.10
	B Line	0.05	0.25	0.00	0.00	0.30	0.45	0.35	0.70
	R Line	0.05	0.30	0.00	0.00	0.25	0.50	0.30	0.80
	Total	**0.25**	**1.05**	**0.00**	**0.00**	**0.85**	**1.55**	**1.10**	**2.60**
	Total Rice + H. Rice	**21.12**	**39.15**	**0.65**	**1.40**	**154.10**	**180.62**	**175.87**	**221.17**
	Finger Millet								
	Dapoli 1	0.02	1.00	0.00	0.00	2.98	2.00	3.00	3.00
	Dapoli Safed 1	0.00	0.00	0.00	0.00	2.00	1.50	2.00	1.50
	Total	**0.02**	**1.00**	**0.00**	**0.00**	**4.98**	**3.50**	**5.00**	**4.50**
	Total Cereal Crops	**21.14**	**40.15**	**0.65**	**1.40**	**159.08**	**184.12**	**180.87**	**225.67**

Pulse Crops	**Pigeonpea**								
	Konkan Ture	0.00	0.00	0.00	0.00	0.50	0.10	0.50	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.50**	**0.10**	**0.50**	**0.10**
	Horsegram								
	Kulthi Dapoli 1	0.00	0.00	0.00	0.00	4.50	5.00	4.50	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**4.50**	**5.00**	**4.50**	**5.00**
	Lablab Bean								
	Kokan Wal 2	0.00	0.00	0.00	0.00	5.00	6.00	5.00	6.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**6.00**	**5.00**	**6.00**
	Cowpea								
	Konkan Sadabahar	0.00	0.00	0.00	0.00	7.00	9.00	7.00	9.00
	Konkan Safed	0.00	0.00	0.00	0.00	6.00	7.00	6.00	7.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**13.00**	**16.00**	**13.00**	**16.00**
	Total Pulse Crops	**0.00**	**0.00**	**0.00**	**0.00**	**23.00**	**27.10**	**23.00**	**27.10**
Oilseed Crops	**Groundnut**								
	TKG Bold	0.00	0.00	0.00	0.00	5.00	3.52	5.00	3.52
	Konkan Gaurav	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00
	Summer								
	Konkan Tapora	0.00	0.00	0.00	0.00	3.00	4.00	3.00	4.00
	Konkan Gaurav	0.00	0.00	0.00	0.00	1.00	1.60	1.00	1.60
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**11.00**	**11.12**	**11.00**	**11.12**
	Total Oilseed Crops	**0.00**	**0.00**	**0.00**	**0.00**	**11.00**	**11.12**	**11.00**	**11.12**
	Grand Total (Dapoli)	**21.14**	**40.15**	**0.65**	**1.40**	**193.08**	**222.34**	**214.87**	**263.89**
34. BCKV, West Bengal									
Cereal Crops	**Rice**								
	Gontra Bidhan 1	37.50	35.00	10.00	10.00	0.00	0.00	47.50	45.00
	Gontra Bidhan 3	0.50	7.50	0.00	0.00	0.00	0.00	0.50	7.50
	Total	**38.00**	**42.50**	**10.00**	**10.00**	**0.00**	**0.00**	**48.00**	**52.50**
	Total Cereal Crops	**38.00**	**42.50**	**10.00**	**10.00**	**0.00**	**0.00**	**48.00**	**52.50**
Pulse Crops	**Chickpea**								
	Bidisha (WBG 29)	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
	Total	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**0.00**	**1.00**	**1.00**
	Lathyrus								
	BioL 212 (Ratan)	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
	Total	**0.00**	**0.00**	**0.50**	**1.00**	**0.00**	**0.00**	**0.50**	**1.00**
	Total Pulse Crops	**0.00**	**0.00**	**1.50**	**2.00**	**0.00**	**0.00**	**1.50**	**2.00**
	Grand Total (West Bengal)	**38.00**	**42.50**	**11.50**	**12.00**	**0.00**	**0.00**	**49.50**	**54.50**
35. UAS, Raichur									
Cereal Crops	**Paddy**								
	GGV 05-01	0.00	0.00	0.00	66.25	0.00	0.00	0.00	66.25
	Total	**0.00**	**0.00**	**0.00**	**66.25**	**0.00**	**0.00**	**0.00**	**66.25**
	Foxtail Millet								
	HMT 100-1	0.00	0.00	0.00	3.50	0.00	0.00	0.00	3.50
	Total	**0.00**	**0.00**	**0.00**	**3.50**	**0.00**	**0.00**	**0.00**	**3.50**
	Sorghum								
	M 35-1	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**0.00**	0.00	2.00
	Total	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**0.00**	**0.00**	**2.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**71.75**	**0.00**	**0.00**	**0.00**	**71.75**

Pulse Crops	**Mung**								
	BGS 9	0.00	0.00	0.00	23.00	0.00	0.00	0.00	23.00
	Total	**0.00**	**0.00**	**0.00**	**23.00**	**0.00**	**0.00**	**0.00**	**23.00**
	Pigeonpea								
	TS3R	19.90	29.50	0.00	0.00	0.00	0.00	19.90	29.50
	Maruthi (ICP 8863)	32.55	35.00	0.00	0.00	0.00	0.00	32.55	35.00
	Asha (ICPL 87119)	6.88	15.00	0.00	0.00	0.00	0.00	6.88	15.00
	Total	**59.33**	**79.50**	**0.00**	**0.00**	**0.00**	**0.00**	**59.33**	**79.50**
	Chickpea								
	A 1	40.00	20.00	0.00	0.00	0.00	0.00	40.00	20.00
	JG 11	250.00	260.00	0.00	0.00	0.00	0.00	250.00	260.00
	MNK 1	5.00	10.00	0.00	15.00	0.00	0.00	5.00	25.00
	BDG 103	0.00	0.00	0.00	10.00	0.00	0.00	0.00	10.00
	GBM 2	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	Total	**295.00**	**290.00**	**0.00**	**27.00**	**0.00**	**0.00**	**295.00**	**317.00**
	Total Pulse Crops	**354.33**	**369.50**	**0.00**	**50.00**	**0.00**	**0.00**	**354.33**	**419.50**
Oilseed Crops	**Soybean**								
	JS 335	200.00	185.00	0.00	0.00	0.00	0.00	200.00	185.00
	DSB 21	0.00	0.00	0.00	20.00	0.00	0.00	0.00	20.00
	Total	**200.00**	**185.00**	**0.00**	**20.00**	**0.00**	**0.00**	**200.00**	**205.00**
	Total Oilseed Crops	**200.00**	**185.00**	**0.00**	**20.00**	**0.00**	**0.00**	**200.00**	**205.00**
	Grand Total (Raichur)	**554.33**	**554.50**	**0.00**	**141.75**	**0.00**	**0.00**	**554.33**	**696.25**
36. RVSKVV, Gwalior									
Cereal Crops	**Rice**								
	Kranti	0.00	0.00	0.00	0.00	10.00	1050.00	10.00	**1050.00**
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**10.00**	**1050.00**	**10.00**	**1050.00**
	Wheat								
	MP 4010	55.00	15.00	0.00	0.00	0.00	0.00	55.00	**15.00**
	RVW 4106	140.00	180.00	0.00	0.00	0.00	0.00	140.00	**180.00**
	MP 1203	210.00	275.00	0.00	0.00	0.00	0.00	210.00	**275.00**
	GW 322	0.00	50.00	0.00	0.00	0.00	0.00	0.00	**50.00**
	GW 366	766.00	90.00	0.00	0.00	0.00	0.00	766.00	**90.00**
	LOK 1	0.00	400.00	0.00	0.00	0.00	0.00	0.00	**400.00**
	Sujata	0.00	15.00	0.00	0.00	0.00	0.00	0.00	**15.00**
	Total	**1171.00**	**1025.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1171.00**	**1025.00**
	Total Cereal Crops	**1171.00**	**1025.00**	**0.00**	**0.00**	**10.00**	**1050.00**	**1181.00**	**2075.00**
Pulse Crops	**Mung**								
	TJM 3	0.00	0.00	0.00	0.00	5.00	164.80	5.00	164.80
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**5.00**	**164.80**	**5.00**	**164.80**
	Pigeonpea								
	JA 4	0.00	0.00	0.00	0.00	1.00	4.00	1.00	4.00
	JKM 189	0.00	0.00	0.00	0.00	5.00	30.00	5.00	30.00
	TJT 501	0.00	0.00	0.00	0.00	8.00	30.00	8.00	30.00
	ICPA 2043 A	0.00	0.00	0.00	0.00	1.00	4.00	1.00	4.00
	ICPA 2043 B	0.00	0.00	0.00	0.00	1.00	4.00	1.00	4.00
	ICPA 2671 R	0.00	0.00	0.00	0.00	1.00	4.00	1.00	4.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**17.00**	**76.00**	**17.00**	**76.00**

	Chickpea								
	JAKI 9218	586.00	1414.00	0.00	0.00	0.00	0.00	586.00	1414.00
	RVG 201	128.00	370.00	0.00	0.00	0.00	0.00	128.00	370.00
	RVG 202	0.00	476.00	0.00	0.00	0.00	0.00	0.00	476.00
	RVG 203	93.00	112.00	0.00	0.00	0.00	0.00	93.00	112.00
	JG 16	286.00	518.00	0.00	0.00	0.00	0.00	286.00	518.00
	RVKG 101	0.00	5.60	0.00	0.00	0.00	0.00	0.00	5.60
	JG130	489.00	1070.00	0.00	0.00	0.00	0.00	489.00	1070.00
	JG 11	500.00	364.00	0.00	0.00	0.00	0.00	500.00	364.00
	JG 6	223.00	98.00	0.00	0.00	0.00	0.00	223.00	98.00
	RVKG 101	0.00	1.20	0.00	0.00	0.00	0.00	0.00	1.20
	RVSJKG 102	0.00	5.60	0.00	0.00	0.00	0.00	0.00	5.60
	Total	**2305.00**	**4434.40**	**0.00**	**0.00**	**0.00**	**0.00**	**2305.00**	**4434.40**
	Lentil								
	RVL 31	0.00	8.00	0.00	0.00	0.00	0.00	0.00	8.00
	JL 3	0.00	21.00	0.00	0.00	0.00	0.00	0.00	21.00
	Total	**0.00**	**29.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**29.00**
	Total Pulse Crops	**2305.00**	**4463.40**	**0.00**	**0.00**	**22.00**	**240.80**	**2327.00**	**4704.20**
Oilseed Crops	**Soybean**								
	JS 335	300.00	282.00	0.00	0.00	0.00	0.00	300.00	282.00
	JS 93-05	300.00	525.00	0.00	0.00	0.00	0.00	300.00	525.00
	JS 95-60	1300.00	1146.00	0.00	0.00	0.00	0.00	1300.00	1146.00
	RVS 2001-4	600.00	780.00	0.00	0.00	0.00	0.00	600.00	780.00
	Total	**2500.00**	**2733.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2500.00**	**2733.00**
	Mustard								
	RVM 2	0.00	14.00	0.00	0.00	0.00	0.00	0.00	14.00
	JM 2	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	JM 3	0.00	10.00	0.00	0.00	0.00	0.00	0.00	10.00
	Total	**0.00**	**26.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**26.00**
	Toria								
	JT 1	0.00	7.00	0.00	0.00	0.00	0.00	0.00	7.00
	Total	**0.00**	**7.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.00**
	Safflower								
	JSF 97	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50
	JSF 1	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50
	Total	**0.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**
	Total Oilseed Crops	**2500.00**	**2767.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2500.00**	**2767.00**
	Grand Total (Gwalior)	**5976.00**	**8255.40**	**0.00**	**0.00**	**32.00**	**1290.80**	**6008.00**	**9546.20**
37. SVPUAT, Meerut									
Cereal Crops	**Paddy**								
	Vallabh Basmati- 22	3.00	4.25	0.00	0.00	0.00	0.00	3.00	4.25
	Total	**3.00**	**4.25**	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**4.25**
	Wheat								
	DPW 621-50	50.00	100.00	0.00	0.00	0.00	0.00	50.00	100.00
	DBW 90	50.00	80.00	0.00	0.00	0.00	0.00	50.00	80.00
	DBW 71	50.00	75.00	0.00	0.00	0.00	0.00	50.00	75.00
	DBW 88	120.00	185.00	0.00	0.00	0.00	0.00	120.00	185.00

	DBW 17	100.00	150.00	0.00	0.00	0.00	0.00	100.00	150.00
	DBW 16	50.00	70.00	0.00	0.00	0.00	0.00	50.00	70.00
	Total	**420.00**	**660.00**	**0.00**	**0.00**	**0.00**	**0.00**	**420.00**	**660.00**
	Total Cereal Crops	**423.00**	**664.25**	**0.00**	**0.00**	**0.00**	**0.00**	**423.00**	**664.25**
	Grand Total (Meerut)	**423.00**	**664.25**	**0.00**	**0.00**	**0.00**	**0.00**	**423.00**	**664.25**
38. UAHS, Shivamogga									
Cereal Crops	**Paddy**								
	KPR 1	0.00	0.00	15.00	12.00	0.00	0.00	15.00	12.00
	JGL 1798	0.00	0.00	20.00	15.00	0.00	0.00	20.00	15.00
	Tunga	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
	IET-7191	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
	Intan	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
	KHP-9	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
	KHP-5	0.00	0.00	2.00	1.00	0.00	0.00	2.00	1.00
	Total	**0.00**	**0.00**	**45.00**	**32.00**	**0.00**	**0.00**	**45.00**	**32.00**
	Maize								
	SA Tall	0.00	0.00	40.00	38.00	0.00	0.00	40.00	38.00
	Total	**0.00**	**0.00**	**40.00**	**38.00**	**0.00**	**0.00**	**40.00**	**38.00**
	Total Cereal Crops	**0.00**	**0.00**	**85.00**	**70.00**	**0.00**	**0.00**	**85.00**	**70.00**
Pulse Crops	**Pigeonpea**								
	BRG-1	0.00	0.00	33.00	30.00	0.00	0.00	33.00	30.00
	BRG-2	0.00	0.00	40.00	30.00	0.00	0.00	40.00	30.00
	Total	**0.00**	**0.00**	**73.00**	**60.00**	**0.00**	**0.00**	**73.00**	**60.00**
	Urd								
	Rashmi	0.00	0.00	9.00	7.00	0.00	0.00	9.00	7.00
	Total	**0.00**	**0.00**	**9.00**	**7.00**	**0.00**	**0.00**	**9.00**	**7.00**
	Mung								
	KKM-3	0.00	0.00	9.00	7.00	0.00	0.00	9.00	7.00
	Total	**0.00**	**0.00**	**9.00**	**7.00**	**0.00**	**0.00**	**9.00**	**7.00**
	Beans								
	Hebbal avare-4	0.00	0.00	9.00	5.00	0.00	0.00	9.00	5.00
	Total	**0.00**	**0.00**	**9.00**	**5.00**	**0.00**	**0.00**	**9.00**	**5.00**
	Total Pulse Crops	**0.00**	**0.00**	**100.00**	**79.00**	**0.00**	**0.00**	**100.00**	**79.00**
Oilseed Crops	**Groundnut**								
	JL-24	0.00	0.00	40.00	30.00	0.00	0.00	40.00	30.00
	Total	**0.00**	**0.00**	**40.00**	**30.00**	**0.00**	**0.00**	**40.00**	**30.00**
	Niger								
	KBN-1	0.00	0.00	10.00	7.00	0.00	0.00	10.00	7.00
	Total	**0.00**	**0.00**	**10.00**	**7.00**	**0.00**	**0.00**	10.00	7.00
	Total Oilseed Crops	**0.00**	**0.00**	**50.00**	**37.00**	**0.00**	**0.00**	**50.00**	**37.00**
	Grand Total (Shimoga)	**0.00**	**0.00**	**235.00**	**186.00**	**0.00**	**0.00**	**235.00**	**186.00**
39. NAU, Navsari									
Cereal Crops	**Paddy**								
	NAUR-1	0.00	6.10	0.00	0.00	0.00	0.00	0.00	6.10
	GNR-2	0.00	4.90	0.00	0.00	0.00	0.00	0.00	4.90
	GNR-3	0.00	12.50	0.00	0.00	0.00	0.00	0.00	12.50
	GNR-4	0.00	2.10	0.00	0.00	0.00	0.00	0.00	2.10

	GNR-5	0.00	4.90	0.00	0.00	0.00	0.00	0.00	4.90
	Total	**0.00**	**30.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.50**
	Total Cereal Crops	**0.00**	**30.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.50**
Oilseed Crops	**Castor**								
	SKP-84	2.50	3.00	0.00	0.00	0.00	0.00	2.50	3.00
	VP-1	4.00	9.80	0.00	0.00	0.00	0.00	4.00	9.80
	Total	**6.50**	**12.80**	**0.00**	**0.00**	**0.00**	**0.00**	**6.50**	**12.80**
	Total Oilseed Crops	**6.50**	**12.80**	**0.00**	**0.00**	**0.00**	**0.00**	**6.50**	**12.80**
	Grand Total (Navsari)	**6.50**	**43.30**	**0.00**	**0.00**	**0.00**	**0.00**	**6.50**	**43.30**
ICAR Institute									
40. VPKAS, Almora									
Cereal Crops	**Rice**								
	Vivek Dhan 154	1.30	2.25	0.00	0.00	0.00	0.00	1.30	2.25
	Vivek Dhan 65	0.45	1.00	0.00	0.00	0.00	0.00	0.45	1.00
	VL Dhan 85	2.00	2.40	0.00	0.00	0.00	0.00	2.00	2.40
	VL Dhan 86	1.00	2.25	0.00	0.00	0.00	0.00	1.00	2.25
	VL Dhan 208	1.20	1.50	0.00	0.00	0.00	0.00	1.20	1.50
	VL Dhan 209	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Vivek Dhan 62	0.00	0.00	0.00	0.00	0.00	1.30	0.00	1.30
	Total	**6.95**	**10.40**	**0.00**	**0.00**	**0.00**	**1.30**	**6.95**	**11.70**
	Wheat								
	VL Gehun 829	5.00	16.00	0.00	0.00	0.00	0.00	5.00	16.00
	VL Gehun 892	35.00	42.00	0.00	0.00	0.00	0.00	35.00	42.00
	VL Gehun 907	35.00	42.00	0.00	0.00	0.00	0.00	35.00	42.00
	VL Gehun 967	10.00	13.00	0.00	0.00	0.00	0.00	10.00	13.00
	VL Gehun 953	10.00	14.00	0.00	0.00	0.00	0.00	10.00	14.00
	VL Genhu 832	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
	Total	**95.00**	**127.00**	**0.00**	**0.00**	**0.00**	**5.00**	**95.00**	**132.00**
	Barley								
	VL Jan 118	4.00	6.00	0.00	0.00	0.00	0.00	4.00	6.00
	Total	**4.00**	**6.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.00**	**6.00**
	Maize								
	Vivek Sankul Makka 31	0.60	2.20	0.00	0.00	0.00	0.00	0.60	2.20
	VL Amber Popcorn	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50
	VQL 1	0.30	2.25	0.00	0.00	0.00	0.00	0.30	2.25
	VQL 2	0.10	0.10	0.00	0.00	0.00	0.00	0.10	0.10
	CM 212	0.10	1.70	0.00	0.00	0.00	0.00	0.10	1.70
	VLS 16	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.90
	CM 153	0.00	0.00	0.00	0.00	0.00	1.82	0.00	1.82
	V 373	0.65	6.00	0.00	0.00	0.00	0.00	0.65	6.00
	VSL 4	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.95
	V 390	0.20	0.55	0.00	0.00	0.00	0.00	0.20	0.55
	V 335	0.00	0.00	0.00	0.00	0.00	2.45	0.00	2.45
	V 405	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.24
	V 407	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.18
	V 409	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12
	Vivek Sankul Makka 35	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Total	**1.95**	**12.80**	**0.00**	**0.00**	**0.00**	**7.36**	**1.95**	**20.16**

	Finger Millet								
	VL Mandua 315	0.25	1.00	0.00	0.00	0.00	0.00	0.25	1.00
	VL Mandua 324	0.30	1.10	0.00	0.00	0.00	0.00	0.30	1.10
	VL Mandua 347	0.75	1.10	0.00	0.00	0.00	0.00	0.75	1.10
	VL Mandua 352	0.30	2.00	0.00	0.00	0.00	0.00	0.30	2.00
	Total	**1.60**	**5.20**	**0.00**	**0.00**	**0.00**	**0.00**	**1.60**	**5.20**
	Barnyard millet								
	VL Madira 207	0.88	0.50	0.00	0.00	0.00	0.00	0.88	0.50
	VL Madira 181	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
	Total	**0.88**	**0.50**	**0.00**	**0.00**	**0.00**	**0.10**	**0.88**	**0.60**
	Buckwheat								
	VL Ugal 7	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.10**
	Amaranth								
	VL Chau 44	0.20	0.30	0.00	0.00	0.00	0.00	0.20	0.30
	Total	**0.20**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**0.30**
	Total Cereal Crops	**110.58**	**162.20**	**0.00**	**0.00**	**0.00**	**13.86**	**110.58**	**176.06**
Pulse Crops	**Pigeonpea**								
	VL Arhar 1	3.80	4.00	0.00	0.00	0.00	0.00	3.80	4.00
	Total	**3.80**	**4.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.80**	**4.00**
	Lentil								
	VL Massor 126	1.00	2.50	0.00	0.00	0.00	2.50	1.00	5.00
	VL Massor 133	1.00	2.50	0.00	0.00	0.00	0.00	1.00	2.50
	VL Massor 514	1.00	1.75	0.00	0.00	0.00	0.00	1.00	1.75
	VL Massor 507	1.00	1.50	0.00	0.00	0.00	0.00	1.00	1.50
	VL Massor 129	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	Total	**5.00**	**9.25**	**0.00**	**0.00**	**0.00**	**2.50**	**5.00**	**11.75**
	Field pea								
	VL Matar 42	1.00	1.50	0.00	0.00	0.00	0.00	1.00	1.50
	Vivek Matar 10	0.00	0.50	0.00	0.00	0.00	1.00	0.00	1.50
	Vivek Matar 11	0.00	0.05	0.00	0.00	0.00	1.70	0.00	1.75
	VL Ageti Matar 7	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Vivek Matar 12	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Total	**1.00**	**2.05**	**0.00**	**0.00**	**0.00**	**3.10**	**1.00**	**5.15**
	Rajmash								
	VL Rajmash 63	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.13
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.13**	**0.00**	**0.13**
	Horsegram								
	VL Gahat 19	0.20	1.30	0.00	0.00	0.00	0.00	0.20	1.30
	VL Gahat 8	0.20	0.25	0.00	0.00	0.00	0.00	0.20	0.25
	Total	**0.40**	**1.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.40**	**1.55**
	Beans								
	VL Bean 2	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.12**	**0.00**	**0.12**
	Total Pulse Crops	**10.20**	**16.85**	**0.00**	**0.00**	**0.00**	**5.85**	**10.20**	**22.70**

Oilseed Crops	**Soybean**								
	VL Soya 65	4.00	5.00	0.00	0.00	0.00	0.00	4.00	5.00
	VL Soya 63	3.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00
	VL Soya 47	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
	Total	**7.00**	**8.00**	**0.00**	**0.00**	**0.00**	**0.30**	**7.00**	**8.30**
	Toria								
	VL Toria 3	0.05	0.12	0.00	0.00	0.00	0.00	0.05	0.12
	Total	**0.05**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.12**
	Total Oilseed Crops	**7.05**	**8.12**	**0.00**	**0.00**	**0.00**	**0.30**	**7.05**	**8.42**
	Grand Total (Almora)	**127.83**	**187.17**	**0.00**	**0.00**	**0.00**	**20.01**	**127.83**	**207.18**
41. IIPR, Kanpur									
Pulse Crops	**Pigeonpea**								
	UPAS 120	7.00	30.00	0.00	0.00	2.00	5.00	9.00	35.00
	IPA 203	0.00	0.00	0.00	0.00	1.00	1.20	1.00	1.20
	Total	**7.00**	**30.00**	**0.00**	**0.00**	**3.00**	**6.20**	**10.00**	**36.20**
	Mung								
	Samrat	20.00	20.00	0.00	0.00	2.00	2.23	22.00	22.23
	IPM 02-3	21.35	21.82	0.00	0.00	2.50	2.50	23.85	24.32
	IPM 02-14	13.30	13.74	0.00	0.00	0.00	0.00	13.30	13.74
	Meha	18.00	18.37	0.00	0.00	0.00	0.00	18.00	18.37
	Total	**72.65**	**73.93**	**0.00**	**0.00**	**4.50**	**4.73**	**77.15**	**78.66**
	Urd								
	Uttara	10.00	10.60	0.00	0.00	1.00	1.25	11.00	11.85
	IPU 02-43	13.50	17.65	0.00	0.00	5.00	5.00	18.50	22.65
	Total	**23.50**	**28.25**	**0.00**	**0.00**	**6.00**	**6.25**	**29.50**	**34.50**
	Chickpea								
	Ujjawal	20.00	35.00	0.00	0.00	2.00	2.00	22.00	37.00
	Shubhra	20.00	30.00	0.00	0.00	2.00	2.00	22.00	32.00
	Total	**40.00**	**65.00**	**0.00**	**0.00**	**4.00**	**4.00**	**44.00**	**69.00**
	Lentil								
	DPL 62	2.00	3.00	0.00	0.00	0.00	0.00	2.00	3.00
	IPL 406	13.00	15.00	0.00	0.00	0.00	0.00	13.00	15.00
	IPL 316	24.00	30.00	0.00	0.00	2.50	2.50	26.50	32.50
	IPL 81	5.00	10.00	0.00	0.00	0.00	0.00	5.00	10.00
	Total	**44.00**	**58.00**	**0.00**	**0.00**	**2.50**	**2.50**	**46.50**	**60.50**
	Fieldpea								
	Prakash	30.00	30.00	0.00	0.00	5.00	5.00	35.00	35.00
	Vikash	40.50	45.00	0.00	0.00	0.00	0.00	40.50	45.00
	Aman	30.00	35.00	0.00	0.00	5.00	5.00	35.00	40.00
	Adarsh	10.00	12.00	0.00	0.00	0.00	0.00	10.00	12.00
	IPF 4-9	45.00	55.00	0.00	0.00	5.00	5.00	50.00	60.00
	IPFD 10-12	27.60	35.00	0.00	0.00	0.00	0.00	27.60	35.00
	Total	**183.10**	**212.00**	**0.00**	**0.00**	**15.00**	**15.00**	**198.10**	**227.00**
	Rajmash								
	Arun	3.00	3.00	0.00	0.00	0.00	0.00	3.00	3.00
	Utkarsh	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	Total	**3.00**	**4.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.00**	**4.00**
	Total Pulse Crops	**373.25**	**471.18**	**0.00**	**0.00**	**35.00**	**38.68**	**408.25**	**509.86**

42. IGFRI , Jhansi									
Forage crops	**Sorghum**								
	MP Chari	0.00	0.00	0.00	0.00	0.00	1.75	0.00	1.75
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.75**	**0.00**	**1.75**
	Cowpea								
	EC 4216	1.75	1.75	0.00	0.00	0.00	0.00	1.75	1.75
	BL 1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	BL 2	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30
	BL 4	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.20
	Kohinoor	0.00	0.75	0.00	0.00	0.00	1.00	0.00	1.75
	Total	**1.75**	**2.50**	**0.00**	**0.00**	**0.00**	**2.50**	**1.75**	**5.00**
	Gur								
	BG 1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	**1.00**
	Maize								
	Africal Tall	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**2.00**
	Oat								
	JHO 2000-4	32.50	27.00	0.00	0.00	0.00	0.00	32.50	27.00
	JHO 99-2	2.40	3.00	0.00	0.00	0.00	2.00	2.40	5.00
	JHO 99-1	2.50	3.00	0.00	0.00	0.00	2.00	2.50	5.00
	JHO 882	15.00	20.00	0.00	0.00	0.00	5.00	15.00	25.00
	JHO 851	10.00	12.00	0.00	0.00	0.00	6.00	10.00	18.00
	Kent	59.50	70.00	0.00	0.00	0.00	0.00	59.50	70.00
	Total	**121.90**	**135.00**	**0.00**	**0.00**	**0.00**	**15.00**	**121.90**	**150.00**
	Berseem								
	BB 3	0.00	0.00	0.00	0.00	0.00	1.75	0.00	1.75
	BB 2 (JHB 146)	0.20	1.00	0.00	0.00	0.00	1.00	0.20	2.00
	Wardan	8.05	8.10	0.00	0.00	0.00	0.00	8.05	8.10
	Total	**8.25**	**9.10**	**0.00**	**0.00**	**0.00**	**2.75**	**8.25**	**11.85**
	Total Forage Crops	**131.90**	**146.60**	**0.00**	**0.00**	**0.00**	**25.00**	**131.90**	**171.60**
	Grand Total (Jhansi)	**131.90**	**146.60**	**0.00**	**0.00**	**0.00**	**25.00**	**131.90**	**171.60**
	Expected quantities as Threshing and Processing not yet completed.								
43. CRIJAF, Barrackpore									
Fibre Crops	**Jute**								
	CO 58 (Sourav)	0.12	0.24	0.00	0.00	0.00	0.00	0.12	0.24
	JRC 517	0.30	0.32	0.00	0.00	0.00	0.00	0.30	0.32
	JRC 532	0.20	0.30	0.00	0.00	0.00	0.00	0.20	0.30
	JBO 2003H (IRA)	0.40	0.50	0.00	0.00	0.00	0.00	0.40	0.50
	JRO 204 (Suren)	1.90	2.20	0.00	0.00	0.00	0.00	1.90	2.20
	S 19 (Subala)	0.17	0.30	0.00	0.00	0.00	0.00	0.17	0.30
	JRO 128 (Surya)	1.02	1.06	0.00	0.00	0.10	0.10	1.12	1.16
	JRO 8432 (Shakti Tossa)	0.02	0.06	0.00	0.00	0.00	0.00	0.02	0.06
	JRO 524 (Navin)	2.10	2.50	0.00	0.00	0.00	0.00	2.10	2.50
	JRO 878 (Chaitali Tossa)	0.20	0.22	0.00	0.00	0.00	0.00	0.20	0.22
	JRO 2407(Samapti)	0.10	0.14	0.00	0.00	0.00	0.00	0.10	0.14
	JRC 321	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05

	JRC 80	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
	JRC 698	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
	Total	**6.53**	**7.84**	**0.00**	**0.00**	**0.25**	**0.25**	**6.78**	**8.09**
	Mesta								
	Satyen (JRKM 9-11)	0.20	0.80	0.00	0.00	0.00	0.00	0.20	0.80
	Central Kenaf (JBMP 2)	0.30	0.90	0.00	0.00	0.00	0.00	0.30	0.90
	AMC 108	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	HC 583	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	HC 4288	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	HC 7910	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
	Total	**0.50**	**1.70**	**0.00**	**0.00**	**0.40**	**0.40**	**0.90**	**2.10**
	Sunnhemp								
	SUIN 037	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	SUIN 053	3.00	3.50	0.00	0.00	0.00	0.00	3.00	3.50
	K 12 (yellow)	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25
	Total	**3.00**	**3.50**	**0.00**	**0.00**	**0.45**	**0.45**	**3.45**	**3.95**
	Total Fibre Crops	**10.03**	**13.04**	**0.00**	**0.00**	**1.10**	**1.10**	**11.13**	**14.14**
Grand Total (Barrackpore)		**10.03**	**13.04**	**0.00**	**0.00**	**1.10**	**1.10**	**11.13**	**14.14**
	Production figures are not available because seed crops are in harvesting stage								
44.CAZRI, Jodhpur									
Pulse Crops	**Mothbean**								
	CAZRI Moth 2	5.76	8.00	0.00	0.00	0.00	0.00	5.76	8.00
	Total	**5.76**	**8.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.76**	**8.00**
	Total Cereal Crops	**5.76**	**8.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.76**	**8.00**
Grand Total (Jodhpur)		**5.76**	**8.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.76**	**8.00**
45.CRRI, Cuttack									
Cereal Crops	**Rice**								
	CR Dhan 500	38.00	0.00	0.00	0.00	2.00	0.00	40.00	0.00
	CR Dhan-70	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.00
	CR Sugandh Dhan-3	1.00	0.00	0.00	0.00	1.50	0.00	2.50	0.00
	CR-1014	2.50	0.00	0.00	0.00	4.50	0.00	7.00	0.00
	Geetanjali	7.00	0.00	0.00	0.00	3.00	0.00	10.00	0.00
	Luna Sampad	1.50	0.00	0.00	0.00	0.00	0.00	1.50	0.00
	Luna Suwarna	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
	Lunishree	1.50	0.00	0.00	0.00	0.00	0.00	1.50	0.00
	Dharitri	6.00	0.00	0.00	0.00	1.00	0.00	7.00	0.00
	Gayatri	4.50	0.00	0.00	0.00	3.50	0.00	8.00	0.00
	Utkalprava	0.50	0.00	0.00	0.00	0.00	0.00	0.50	0.00
	CR sugandhadhan 907	16.00	0.00	0.00	0.00	1.00	0.00	17.00	0.00
	Nua Chinikamini	1.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00
	Nua Kalajeera	1.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00
	Pooja	12.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00
	Sarala	3.00	0.00	0.00	0.00	4.00	0.00	7.00	0.00
	Swarana-Sub 1	450.00	0.00	0.00	0.00	0.00	0.00	450.00	0.00
	Varshadhan	26.50	0.00	0.00	0.00	3.50	0.00	30.00	0.00
	Durga	0.00	0.00	0.00	0.00	0.50	0.00	0.50	0.00
	Padmini	0.00	0.00	0.00	0.00	3.00	0.00	3.00	0.00
	Ranjit	0.00	0.00	0.00	0.00	3.50	0.00	3.50	0.00

	Ketakijoha	0.00	0.00	0.00	0.00	2.50	0.00	2.50	0.00
	Moti	0.00	0.00	0.00	0.00	1.50	0.00	1.50	0.00
	CR Dhan 502	0.00	0.00	0.00	0.00	3.50	0.00	3.50	0.00
	CR Dhan 505	0.00	0.00	0.00	0.00	3.50	0.00	3.50	0.00
	Savitri	0.00	0.00	0.00	0.00	3.50	0.00	3.50	0.00
	Total	**573.50**	**0.00**	**0.00**	**0.00**	**47.50**	**0.00**	**621.00**	**0.00**
	Total Cereal Crops	**573.50**	**0.00**	**0.00**	**0.00**	**47.50**	**0.00**	**621.00**	**0.00**
	Grand Total (Cuttack)	**573.50**	**0.00**	**0.00**	**0.00**	**47.50**	**0.00**	**621.00**	**0.00**
Harvesting is still in progress. Post-harvest processing. Quality checking and packing are yet to be completed. So, production figure is not provided.									
46. IIMR, Hyderabad									
Cereal Crops	**Sorghum**								
	296A	0.70	1.00	0.00	0.00	0.00	0.00	0.70	1.00
	296B	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	CS 3541	0.35	0.50	0.00	0.00	0.00	0.00	0.35	0.50
	C 43	0.30	10.00	0.00	0.00	0.00	0.00	0.30	10.00
	CSV 15	2.50	5.00	0.00	0.00	30.00	30.00	32.50	35.00
	CSV 20	6.50	10.00	0.00	0.00	20.00	90.00	26.50	100.00
	CSV 24SS	0.10	0.50	0.00	0.00	0.00	0.00	0.10	0.50
	CSV 27	6.50	10.00	0.00	0.00	10.00	30.00	16.50	40.00
	38 A	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02
	38 B	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
	415A	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	415B	0.10	0.20	0.00	0.00	0.00	0.00	0.10	0.20
	CB 33	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	CSV 17	0.00	0.00	0.00	0.00	30.00	32.00	30.00	32.00
	CSV 23	0.00	0.00	0.00	0.00	15.00	30.00	15.00	30.00
	CSV 29R	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	P Revati	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	P Suchitra	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	Co (FS) 29	0.00	0.00	0.00	0.00	0.00	5.00	0.00	5.00
	CSH 13	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	CSH 14	0.00	0.00	0.00	0.00	15.00	16.00	15.00	16.00
	CSH 16	0.00	0.00	0.00	0.00	25.00	27.00	25.00	27.00
	CSH 22SS	0.00	0.00	0.00	0.00	5.00	5.00	5.00	5.00
	CSH 24MF	0.00	0.00	0.00	0.00	50.00	500.00	50.00	500.00
	CSH 25	0.00	0.00	0.00	0.00	15.00	15.00	15.00	15.00
	CSH 30	0.00	0.00	0.00	0.00	10.00	5.00	10.00	5.00
	Total	**17.87**	**38.53**	**0.00**	**0.00**	**260.00**	**820.00**	**277.87**	**858.53**
	Total Cereal Crops	**17.87**	**38.53**	**0.00**	**0.00**	**260.00**	**820.00**	**277.87**	**858.53**
	Grand Total (Hyderabad)	**17.87**	**38.53**	**0.00**	**0.00**	**260.00**	**820.00**	**277.87**	**858.53**
47. ICAR-IIOR, Hyderabad									
Oilseed Crops	**Castor**								
	DCS 107	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
	Total	**0.20**	**0.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**0.50**

	Sunflower								
	DRSF 113	0.83	1.10	0.00	0.00	0.00	0.00	0.83	1.10
	DRSF 108	0.05	0.10	0.00	0.00	0.00	0.00	0.05	0.10
	Total	**0.88**	**1.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.88**	**1.20**
	Total Oilseed Crops	**1.08**	**1.70**	**0.00**	**0.00**	**0.00**	**0.00**	**1.08**	**1.70**
	Grand Total (IIOR, Hyd.)	**1.08**	**1.70**	**0.00**	**0.00**	**0.00**	**0.00**	**1.08**	**1.70**
48. CICR, Nagpur (Coimbatore)									
Fiber Crops	**Cotton**								
	CAN 1003 (Roja)	0.00	0.00	0.00	0.00	0.00	1.06	0.00	1.06
	Suraj (CCH 510-4)	0.10	0.50	0.00	0.00	0.00	0.00	0.10	0.50
	CICR -2 Hy. Female	0.14	0.30	0.00	0.00	0.00	0.00	0.14	0.30
	Male	0.08	0.30	0.00	0.00	0.00	0.00	0.08	0.30
	CICR-3	0.00	0.00	0.00	0.00	0.00	3.90	0.00	3.90
	CICR-1	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
	Total	**0.32**	**1.10**	**0.00**	**0.00**	**0.00**	**5.96**	**0.32**	**7.06**
	Totoal Fiber Crops	**0.32**	**1.10**	**0.00**	**0.00**	**0.00**	**5.96**	**0.32**	**7.06**
	Grand Total (Nagpur)	**0.32**	**1.10**	**0.00**	**0.00**	**0.00**	**5.96**	**0.32**	**7.06**
49.IARI, Karnal									
Cereal Crops	**Rice**								
	Pusa 44	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	PB 1121	71.00	74.00	0.00	0.00	0.00	0.00	71.00	74.00
	PB 1509	45.00	45.00	0.00	0.00	0.00	0.00	45.00	45.00
	PB 1	20.00	20.00	0.00	0.00	0.00	0.00	20.00	20.00
	PB 6	13.00	15.00	0.00	0.00	0.00	0.00	13.00	15.00
	PB 1609	1.50	1.50	0.00	0.00	0.00	0.00	1.50	1.50
	Improved PB 1	4.50	14.50	0.00	0.00	0.00	0.00	4.50	14.50
	P Sugandh 2	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Pusa 1592	4.00	12.00	0.00	0.00	0.00	0.00	4.00	12.00
	P Sugandh 5	56.00	0.00	0.00	0.00	0.00	0.00	56.00	0.00
	Total	**267.00**	**234.00**	**0.00**	**0.00**	**0.00**	**0.00**	**267.00**	**234.00**
	Wheat								
	HD 2851	103.90	105.00	0.00	0.00	0.00	0.00	103.90	105.00
	HD 2967	550.00	560.00	0.00	0.00	0.00	0.00	550.00	560.00
	HD 3059	78.20	80.00	0.00	0.00	0.00	0.00	78.20	80.00
	HD 3086	738.20	740.00	0.00	0.00	0.00	0.00	738.20	740.00
	HS 542	36.00	40.00	0.00	0.00	0.00	0.00	36.00	40.00
	HS 490	5.00	5.00	0.00	0.00	0.00	0.00	5.00	5.00
	HS 507	75.00	80.00	0.00	0.00	0.00	0.00	75.00	80.00
	WR 544	20.20	22.00	0.00	0.00	0.00	0.00	20.20	22.00
	Total	**1606.50**	**1632.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1606.50**	**1632.00**
	Barley								
	BHS 400	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	BHS 380	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
	Total	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**
	Pearlmillet								
	PC 612	0.20	0.34	0.00	0.00	0.00	0.00	0.20	0.34
	PC 443	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.40

	PC 701	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.40
	PC 383	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.94
	Total	**0.20**	**2.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**2.08**
	Total Cereal Crops	**1874.70**	**1869.08**	**0.00**	**0.00**	**0.00**	**0.00**	**1874.70**	**1869.08**
Pulse Crops	**Pigeon pea**								
	Pusa 2001	0.50	2.05	0.00	0.00	0.00	0.00	0.50	2.05
	Pusa 2002	3.20	0.90	0.00	0.00	0.00	0.00	3.20	0.90
	Total	**3.70**	**2.95**	**0.00**	**0.00**	**0.00**	**0.00**	**3.70**	**2.95**
	Mung								
	Pusa 9531	0.00	3.90	0.00	0.00	0.00	0.00	0.00	3.90
	Pusa Vishal	0.00	15.50	0.00	0.00	0.00	0.00	0.00	15.50
	Pusa 0672	0.00	14.30	0.00	0.00	0.00	0.00	0.00	14.30
	Pusa 9972	0.00	2.10	0.00	0.00	0.00	0.00	0.00	2.10
	Pusa 9072	0.00	4.00	0.00	0.00	0.00	0.00	0.00	4.00
	Total	**0.00**	**39.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**39.80**
	Fieldpea								
	DDR 55	4.00	4.00	0.00	0.00	0.00	0.00	4.00	4.00
	DDR 23	7.50	7.50	0.00	0.00	0.00	0.00	7.50	7.50
	Total	**11.50**	**11.50**	**0.00**	**0.00**	**0.00**	**0.00**	**11.50**	**11.50**
	Lathyrus								
	Ratan (Bio L 212)	6.60	7.00	0.00	0.00	0.00	0.00	6.60	7.00
	Total	**6.60**	**7.00**	**0.00**	**0.00**	**0.00**	**0.00**	**6.60**	**7.00**
	Total Pulse Crops	**21.80**	**61.25**	**0.00**	**0.00**	**0.00**	**0.00**	**21.80**	**61.25**
Oilseed Crops	**Mustard**								
	Pusa Mahak	3.75	3.75	0.00	0.00	0.00	0.00	3.75	3.75
	Pusa Jaikisan	0.98	2.00	0.00	0.00	0.00	0.00	0.98	2.00
	Pusa Vijay	0.60	2.50	0.00	0.00	0.00	0.00	0.60	2.50
	Pusa Agrani	1.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
	Pusa Jagannath	0.10	1.00	0.00	0.00	0.00	0.00	0.10	1.00
	Pusa Bold	4.77	5.00	0.00	0.00	0.00	0.00	4.77	5.00
	PM 24	1.20	1.20	0.00	0.00	0.00	0.00	1.20	1.20
	PM 22	0.02	0.90	0.00	0.00	0.00	0.00	0.02	0.90
	Total	**12.42**	**18.35**	**0.00**	**0.00**	**0.00**	**0.00**	**12.42**	**18.35**
	Total Oilseed Crops	**12.42**	**18.35**	**0.00**	**0.00**	**0.00**	**0.00**	**12.42**	**18.35**
Forage Corps	**Sorghum**								
	PC 9	0.50	1.00	0.00	0.00	0.00	0.00	0.50	1.00
	PC 23	7.00	3.85	0.00	0.00	0.00	0.00	7.00	3.85
	PC 6	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.41
	Total	**7.50**	**5.26**	**0.00**	**0.00**	**0.00**	**0.00**	**7.50**	**5.26**
	Total Forage Crops	**7.50**	**5.26**	**0.00**	**0.00**	**0.00**	**0.00**	**7.50**	**5.26**
	Grand Total (Karnal)	**1916.42**	**1953.94**	**0.00**	**0.00**	**0.00**	**0.00**	**1916.42**	**1953.94**
50 .IARI, New Delhi									
Cereal Crops	**Rice**								
	PS-5	96.00	130.00	0.00	0.00	0.00	0.00	**96.00**	**130.00**
	Pusa-1612	3.50	15.00	0.00	0.00	0.00	0.00	**3.50**	**15.00**
	Total	**99.50**	**145.00**	**0.00**	**0.00**	**0.00**	**0.00**	**99.50**	**145.00**

	Wheat								
	HD-2864	15.00	10.00	0.00	0.00	0.00	0.00	15.00	10.00
	HD-3043	40.00	40.00	0.00	0.00	0.00	0.00	40.00	40.00
	HD-2967	350.00	350.00	0.00	0.00	0.00	0.00	350.00	350.00
	HD-3086	589.00	1200.00	0.00	0.00	0.00	0.00	589.00	1200.00
	HD-3059	65.00	65.00	0.00	0.00	0.00	0.00	65.00	65.00
	HD3171	0.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00
	Total	**1059.00**	**1670.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1059.00**	**1670.00**
	Total Cereal Crops	**1158.50**	**1815.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1158.50**	**1815.00**
Pulse Crops	**Pigeonpea**								
	Pusa 991	4.00	10.00	0.00	0.00	0.00	0.00	4.00	10.00
	Pusa 992	2.20	12.67	0.00	0.00	0.00	0.00	2.20	12.67
	Total	**6.20**	**22.67**	**0.00**	**0.00**	**0.00**	**0.00**	**6.20**	**22.67**
	Moong								
	Pusa Vishal	0.00	15.50	0.00	0.00	0.00	0.00	0.00	15.50
	P-9531	0.00	2.25	0.00	0.00	0.00	0.00	0.00	2.25
	P-672	0.00	3.50	0.00	0.00	0.00	0.00	0.00	3.50
	Total	**0.00**	**21.25**	**0.00**	**0.00**	**0.00**	**0.00**	0.00	21.25
	Total Pulse Crops	**6.20**	**43.92**	**0.00**	**0.00**	**0.00**	**0.00**	**6.20**	**43.92**
Oilseed Crops	**Mustard**								
	PM-25	2.20	2.20	0.00	0.00	0.00	0.00	2.20	2.20
	PM-26	1.40	2.00	0.00	0.00	0.00	0.00	1.40	2.00
	PM-27	1.60	2.00	0.00	0.00	0.00	0.00	1.60	2.00
	PM-28	2.75	3.00	0.00	0.00	0.00	0.00	2.75	3.00
	PM-29	1.13	1.13	0.00	0.00	0.00	0.00	1.13	1.13
	PM-30	1.69	3.00	0.00	0.00	0.00	0.00	1.69	3.00
	Pusa Vijay	0.60	1.00	0.00	0.00	0.00	0.00	0.60	1.00
	Pusa Tarak	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	Total	**11.37**	**16.33**	**0.00**	**0.00**	**0.00**	**0.00**	**11.37**	**16.33**
	Soybean								
	Pusa 9712	20.00	0.00	0.00	0.00	0.00	0.00	**20.00**	**0.00**
	Total	**20.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**0.00**
	Total Oilseed Crops	**31.37**	**16.33**	**0.00**	**0.00**	**0.00**	**0.00**	**31.37**	**16.33**
	Grand Total (New Delhi)	**1196.07**	**1875.25**	**0.00**	**0.00**	**0.00**	**0.00**	**1196.07**	**1875.25**
51. IARI, Indore									
Cereal Crops	**Wheat**								
	HI1531	90.00	120.00	0.00	0.00	0.00	0.00	90.00	120.00
	HI1544	300.00	360.00	0.00	0.00	0.00	0.00	300.00	360.00
	HI8498	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	HI8663	158.80	240.00	0.00	0.00	0.00	0.00	158.80	240.00
	HI8713	100.00	160.00	0.00	0.00	0.00	0.00	100.00	160.00
	HS8737	37.20	130.00	0.00	0.00	0.00	0.00	37.20	130.00
	HI8759	150.00	160.00	0.00	0.00	0.00	0.00	150.00	160.00
	HI1605	50.00	50.00	0.00	0.00	0.00	0.00	50.00	50.00
	HD4728	0.00	25.00	0.00	0.00	0.00	0.00	0.00	25.00
	Total	**936.00**	**1295.00**	**0.00**	**0.00**	**0.00**	**0.00**	**936.00**	**1295.00**
	Total Cereal Crops	**936.00**	**1295.00**	**0.00**	**0.00**	**0.00**	**0.00**	**936.00**	**1295.00**
	Grand Total (IISR, Indore)	**936.00**	**1295.00**	**0.00**	**0.00**	**0.00**	**0.00**	**936.00**	**1295.00**

52. ICAR-IARI, RS, Pusa Bihar									
Cereal Crops	**Wheat**								
	HD 2733	25.00	60.00	0.00	0.00	0.00	0.00	25.00	60.00
	HD 2967	100.00	170.00	0.00	0.00	0.00	0.00	100.00	170.00
	HD 2985	128.00	150.00	0.00	0.00	0.00	0.00	128.00	150.00
	HI 1563	100.00	150.00	0.00	0.00	0.00	0.00	100.00	150.00
	HD 3118	34.80	50.00	0.00	0.00	0.00	0.00	34.80	50.00
	HD 2824	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	HD 2888	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00
	HD 3171	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
	Total	**387.80**	**585.00**	**0.00**	**0.00**	**0.00**	**0.00**	**387.80**	**585.00**
	Total Cereal Crops	**387.80**	**585.00**	**0.00**	**0.00**	**0.00**	**0.00**	**387.80**	**585.00**
	Grand Total (IARI, RS, Pusa)	**387.80**	**585.00**	**0.00**	**0.00**	**0.00**	**0.00**	**387.80**	**585.00**
53. ICAR RC NEH, Manipur									
Cereal Crops	**Paddy**								
	RC Maniphou 4	0.00	0.00	0.00	0.00	0.50	0.60	0.50	0.60
	RC Maniphou 5	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20
	RC Maniphou 6	0.00	0.00	0.00	0.00	0.40	0.45	0.40	0.45
	RC Maniphou 7	0.00	0.00	0.00	0.00	10.00	12.00	10.00	12.00
	RC Maniphou 10	0.00	0.00	0.00	0.00	10.00	10.00	10.00	10.00
	RC Maniphou 11	0.00	0.00	0.00	0.00	0.40	0.50	0.40	0.50
	RC Maniphou 12	0.00	0.00	0.00	0.00	12.00	13.00	12.00	13.00
	RC Maniphou 13	0.00	0.00	0.00	0.00	0.40	5.00	0.40	5.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**33.90**	**41.75**	**33.90**	**41.75**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**33.90**	**41.75**	**33.90**	**41.75**
Grand Total (ICAR RC, Manipur)		**0.00**	**0.00**	**0.00**	**0.00**	**33.90**	**41.75**	**33.90**	**41.75**
54. ICAR RC NEH, Meghalaya									
Cereal Crops	**Rice**								
	Bhalum-1	0.00	0.00	0.00	0.00	0.10	0.05	0.10	0.05
	Bhalum-2	0.00	0.00	0.00	0.00	0.20	0.05	0.20	0.05
	Bhalum-3	0.00	0.00	0.00	0.00	0.50	2.00	0.50	2.00
	Bhalum-4	0.00	0.00	0.00	0.00	0.10	0.05	0.10	0.05
	Bhalum-5	0.00	0.00	0.00	0.00	1.00	2.00	1.00	2.00
	Shasarang	0.00	0.00	0.00	0.00	5.00	8.00	5.00	8.00
	Lampnah	0.00	0.00	0.00	0.00	0.50	0.40	0.50	0.40
	Megha SA-1	0.00	0.00	0.00	0.00	0.10	0.05	0.10	0.05
	Megha SA-2	0.00	0.00	0.00	0.00	0.50	0.60	0.50	0.60
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**13.20**	**8.00**	**13.20**
	Maize								
	RCM 1-76	0.00	0.00	0.00	0.00	3.00	5.00	3.00	5.00
	RCM 1-75	0.00	0.00	0.00	0.00	2.00	3.00	2.00	3.00
	RCM 1-2	0.00	0.00	0.00	0.00	0.50	0.75	0.50	0.75
	RCM 1-1	0.00	0.00	0.00	0.00	0.50	0.30	0.50	0.30
	RCM 1-3	0.00	0.00	0.00	0.00	0.50	0.35	0.50	0.35
	Vijay	0.00	0.00	0.00	0.00	0.50	0.10	0.50	0.10
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**7.00**	**9.50**	**7.00**	**9.50**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**7.00**	**9.50**	**7.00**	**9.50**
	Grand Total (Meghalaya)	**0.00**	**0.00**	**0.00**	**0.00**	**15.00**	**22.70**	**15.00**	**22.70**

55. ICAR RC NEH, Tripura									
Cereal Crops	**Rice**								
	Gomatidhan (TRC 2005-1 / IET 21512)	0.00	0.00	0.00	0.00	0.00	80.00	0.00	80.00
	Tripura Khara 1 (IET 22837)	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Tripura Khara 2 (IET 22835)	0.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00
	Tripura Jala 1 (IET 22167)	0.00	0.00	0.00	0.00	0.00	3.00	0.00	3.00
	Tripura Chikan Dhan (IET 22112)	0.00	0.00	0.00	0.00	0.00	30.00	0.00	30.00
	Tripura Sarat (IET 22113)	0.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00
	Tripura Nirog (IET 22580)	0.00	0.00	0.00	0.00	0.00	25.00	0.00	25.00
	Tripura Hakuchuk 1 (TRC 2013-4)	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Tripura Hakuchuk 2 (TRC 2013-5)	0.00	0.00	0.00	0.00	0.00	4.00	0.00	4.00
	Tripura Aush (TRC 2013-12)	0.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**176.00**	**0.00**	**176.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**176.00**	**0.00**	**176.00**
Pulse Crops	**Fieldpea**								
	TRCP 8	0.00	0.00	0.00	0.00	0.00	20.00	0.00	20.00
	Tripura Maskolai 1	0.00	0.00	0.00	0.00	0.00	20.00	0.00	20.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.00**	**0.00**	**40.00**
	Total Cereal Crops	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.00**	**0.00**	**40.00**
	Grand Total (Tripura)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**216.00**	**0.00**	**216.00**
56. ICAR-IISR, Indore									
Oilseed Crops	**Soybean**								
	NRC 86	215.00	105.00	0.00	0.00	0.00	0.00	**215.00**	**105.00**
	NRC 37	69.00	115.00	0.00	0.00	0.00	0.00	**69.00**	**115.00**
	NRC 7	78.60	45.00	0.00	0.00	0.00	0.00	**78.60**	**45.00**
	JS 20-29	30.00	35.00	0.00	0.00	0.00	0.00	**30.00**	**35.00**
	JS 20-34	4.00	3.50	0.00	0.00	0.00	0.00	**4.00**	**3.50**
	Total	**396.60**	**303.50**	**0.00**	**0.00**	**0.00**	**0.00**	**396.60**	**303.50**
	Total Oilseed Crops	**396.60**	**303.50**	**0.00**	**0.00**	**0.00**	**0.00**	**396.60**	**303.50**
	Grand Total (IISR, Indore)	**396.60**	**303.50**	**0.00**	**0.00**	**0.00**	**0.00**	**396.60**	**303.50**
57. IISS, Mau									
Cereal Crops	**Rice**								
	Samba Manshuri Sub 1	20.00	30.00	0.00	0.00	0.00	0.00	20.00	30.00
	Swarna Sub 1	10.00	10.00	0.00	0.00	0.00	0.00	10.00	10.00
	Total	**30.00**	**40.00**	**0.00**	**0.00**	**0.00**	**0.00**	**30.00**	**40.00**
	Wheat								
	HD 2967	20.00	25.00	0.00	0.00	0.00	0.00	20.00	25.00
	Total	**20.00**	**25.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.00**	**25.00**
	Total Cereal Crops	**50.00**	**65.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.00**	**65.00**
	Grand Total (IISS, Mau)	**50.00**	**65.00**	**0.00**	**0.00**	**0.00**	**0.00**	**50.00**	**65.00**

58. CAU, Impphal									
Cereal Crops	**Rice**								
	CAU-R1	7.50	7.50	0.00	0.00	0.00	0.00	7.50	7.50
	CAU-R2	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	CAU-R3	1.80	1.80	0.00	0.00	0.00	0.00	1.80	1.80
	CAU-R4	2.00	2.00	0.00	0.00	0.00	0.00	2.00	2.00
	Total	**13.30**	**13.30**	**0.00**	**0.00**	**0.00**	**0.00**	**13.30**	**13.30**
	Total Cereal Crops	**13.30**	**13.30**	**0.00**	**0.00**	**0.00**	**0.00**	**13.30**	**13.30**
Oilseed Crops	**Groundnut**								
	CAU-GS-1	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
	Total	**0.30**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.30**
	Total Oilseed Crops	**0.30**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.30**
	Grand Total (Imphal)	**13.60**	**13.60**	**0.00**	**0.00**	**0.00**	**0.00**	**13.60**	**13.60**
59. DGR, Junagadh									
Oilseed Crops	**Groundnut**								
	Girnar-2	59.00	130.00	0.00	0.00	0.00	0.00	59.00	130.00
	Girnar-3	277.76	53.15	0.00	0.00	0.00	0.00	277.76	53.15
	Total	**336.76**	**183.15**	**0.00**	**0.00**	**0.00**	**0.00**	**336.76**	**183.15**
	Total Oilseed Crops	**336.76**	**183.15**	**0.00**	**0.00**	**0.00**	**0.00**	**336.76**	**183.15**
Grand Total (DGR, Junagadh)		**336.76**	**183.15**	**0.00**	**0.00**	**0.00**	**0.00**	**336.76**	**183.15**
60. IIMR, New Delhi									
Cereal Crops	**Maize**								
	HKI 163	0.00	0.00	13.50	14.00	0.00	0.00	13.50	14.00
	HKI 193-1	0.00	0.00	20.00	20.00	0.00	0.00	20.00	20.00
	BML 6	0.00	0.00	2.75	2.75	0.00	0.00	2.75	2.75
	BML 7	0.00	0.00	2.00	2.00	0.00	0.00	2.00	2.00
	Total	**0.00**	**0.00**	**38.25**	**38.75**	**0.00**	**0.00**	**38.25**	**38.75**
	Total Cereal Crops	**0.00**	**0.00**	**38.25**	**38.75**	**0.00**	**0.00**	**38.25**	**38.75**
	Grand Total (IIMR, N. Delhi)	**0.00**	**0.00**	**38.25**	**38.75**	**0.00**	**0.00**	**38.25**	**38.75**
61. CIARI, Andaman									
Cereal Crops	**Paddy**								
	CARI Dhan 1	0.15	6.00	0.00	0.00	0.00	0.00	0.15	6.00
	CARI Dhan 2	0.20	0.25	0.00	0.00	0.00	0.00	0.20	0.25
	CARI Dhan 3	0.35	0.05	0.00	0.00	0.00	0.00	0.35	0.05
	CARI Dhan 4	0.30	0.49	0.00	0.00	0.00	0.00	0.30	0.49
	CARI Dhan 5	0.50	0.55	0.00	0.00	0.00	0.00	0.50	0.55
	CARI Dhan 6	0.50	0.36	0.00	0.00	0.00	0.00	0.50	0.36
	CARI Dhan 7	0.35	0.36	0.00	0.00	0.00	0.00	0.35	0.36
	CARI Dhan 8	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	CARI Dhan 9	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
	CSR 36	0.10	0.30	0.00	0.00	0.00	0.00	0.10	0.30
	Gayatri	0.30	0.43	0.00	0.00	0.00	0.00	0.30	0.43
	Total	**4.75**	**10.79**	**0.00**	**0.00**	**0.00**	**0.00**	**4.75**	**10.79**
	Total Cereal Crops	**4.75**	**10.79**	**0.00**	**0.00**	**0.00**	**0.00**	**4.75**	**10.79**
	Grand Total (Andaman)	**4.75**	**10.79**	**0.00**	**0.00**	**0.00**	**0.00**	**4.75**	**10.79**
	Total Grand Total	**61210.54**	**64819.86**	**34836.99**	**36406.89**	**17819.51**	**22813.44**	**113867.04**	**124040.20**

Table 6: Crop-wise and centre-wise anticipated breeder seed production during 2016-17

(Figures in quintals)

Centre	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Target	Production	Indent	Production
CEREAL CROPS								
Rice								
Srinagar	0.00	0.00	13.95	16.00	0.00	0.00	13.95	16.00
Jammu	5.00	12.75	0.00	0.00	0.00	0.00	5.00	12.75
Palampur	23.00	25.00	2.00	2.50	19.00	24.80	44.00	52.30
Ludhiana	123.00	229.40	10.00	25.00	0.00	0.00	133.00	254.40
Hisar	84.50	89.00	4.00	6.00	0.00	0.00	88.50	95.00
Pantnagar	8.00	51.60	0.00	0.00	278.00	481.00	286.00	532.60
Faizabad	189.50	377.50	0.00	0.00	344.00	465.50	533.50	843.00
Varanasi	16.50	21.25	25.50	42.00	27.20	57.00	69.20	120.25
Jorhat	60.50	66.80	0.00	428.75	0.00	0.00	60.50	495.55
Ranchi	27.00	19.10	13.00	141.00	0.00	0.00	40.00	160.10
Dholi	272.10	265.60	98.10	278.20	3120.00	1591.15	3490.20	2134.95
Bhubaneswar	203.50	207.40	270.00	265.20	0.00	0.00	473.50	472.60
Kota	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
Anand	16.00	17.00	103.48	159.00	0.00	0.00	119.48	176.00
Raipur	460.00	524.40	3.10	6.20	92.00	174.00	555.10	704.60
Jabalpur	118.50	118.50	6521.90	6526.80	0.00	0.00	6640.40	6645.30
Rahuri	37.60	49.00	0.30	0.00	30.00	37.00	67.90	86.00
Akola	120.00	210.00	0.60	0.60	80.00	80.00	200.60	290.60
Bangalore	6.25	10.00	42.25	46.00	0.00	0.00	48.50	56.00
Dharwad	1.45	1.45	0.00	0.00	1.00	1.00	2.45	2.45
PJTSAU, Hyderabad	167.10	184.70	860.90	837.70	505.00	560.63	1533.00	1583.03
ANGRAU, Guntur	1047.00	1164.78	782.25	948.50	0.00	0.00	1829.25	2113.28
Coimbatore	95.75	95.75	1337.25	1368.50	1397.04	1036.74	2830.04	2500.99
KAU, Pattambi	10.00	19.50	3.06	51.85	0.00	0.00	13.06	71.35
PAJANCOA&RI, Karaikal	0.00	0.00	3.70	21.50	0.00	0.00	3.70	21.50
KKV, Dapoli	21.12	39.15	0.65	1.40	154.10	180.62	175.87	221.17
West Bengal	38.00	42.50	10.00	10.00	0.00	0.00	48.00	52.50
Raichur	0.00	0.00	0.00	66.25	0.00	0.00	0.00	66.25
Gwalior	0.00	0.00	0.00	0.00	10.00	1050.00	10.00	1050.00
SVPUAT, Meerut	3.00	4.25	0.00	0.00	0.00	0.00	3.00	4.25
Shivamogga	0.00	0.00	45.00	32.00	0.00	0.00	45.00	32.00
Navsari	0.00	30.50	0.00	0.00	0.00	0.00	0.00	30.50
Almora	6.95	10.40	0.00	0.00	0.00	1.30	6.95	11.70
Cuttack	573.50	0.00	0.00	0.00	47.50	0.00	621.00	0.00
IARI, Karnal	267.00	234.00	0.00	0.00	0.00	0.00	267.00	234.00
IARI, New Delhi	99.50	145.00	0.00	0.00	0.00	0.00	99.50	145.00
Manipur	0.00	0.00	0.00	0.00	33.90	41.75	33.90	41.75
Meghalaya	0.00	0.00	0.00	0.00	8.00	13.20	8.00	13.20
Tripura	0.00	0.00	0.00	0.00	0.00	176.00	0.00	176.00
IISS, Mau	30.00	40.00	0.00	0.00	0.00	0.00	30.00	40.00
CAU, Imphal	13.30	13.30	0.00	0.00	0.00	0.00	13.30	13.30
Andman	4.75	10.79	0.00	0.00	0.00	0.00	4.75	10.79
Total	**4149.87**	**4330.87**	**10150.99**	**11280.95**	**6146.74**	**5971.69**	**20447.60**	**21583.51**

Wheat								
Srinagar	0.00	0.00	10.78	13.00	0.00	0.00	10.78	13.00
Jammu	0.00	0.00	82.00	71.00	0.00	0.00	82.00	71.00
Palampur	245.00	248.00	20.00	90.00	192.00	192.00	457.00	530.00
Ludhiana	2273.50	4727.00	405.00	515.00	0.00	0.00	2678.50	5242.00
Hisar	1835.20	1841.60	134.00	158.68	0.00	0.00	1969.20	2000.28
Pantnagar	630.50	875.00	0.00	0.00	1613.00	3070.00	2243.50	3945.00
Faizabad	0.00	0.00	0.00	0.00	665.00	665.00	665.00	665.00
Kanpur	715.68	715.68	0.00	0.00	0.00	408.82	715.68	1124.50
Varanasi	25.32	30.50	28.50	31.50	57.40	64.00	111.22	126.00
Ranchi	0.00	0.00	15.00	50.00	0.00	0.00	15.00	50.00
Dholi	430.00	259.50	310.00	192.50	1950.00	1162.25	2690.00	1614.25
Kota	1775.45	4176.00	0.00	0.00	0.00	0.00	1775.45	4176.00
Bikaner	808.00	1040.00	0.00	0.00	300.00	350.00	1108.00	1390.00
Udaipur	125.00	132.00	0.00	0.00	0.00	0.00	125.00	132.00
S.K. Nagar	669.60	715.00	1360.10	1450.00	0.00	0.00	2029.70	2165.00
Jamnagar	314.40	316.00	21.60	22.00	0.00	0.00	336.00	338.00
Raipur	195.00	265.00	30.00	50.00	182.55	255.00	407.55	570.00
Jabalpur	2600.00	2600.00	9564.00	9564.00	0.00	0.00	12164.00	12164.00
Rahuri	174.80	192.00	4.00	144.00	86.00	127.00	264.80	463.00
Akola	27.00	40.00	10.00	28.00	12.00	30.00	49.00	98.00
Dharwad	21.55	18.80	1.85	1.10	53.50	50.50	76.90	70.40
Gwalior	1171.00	1025.00	0.00	0.00	0.00	0.00	1171.00	1025.00
SVPUAT, Meerut	420.00	660.00	0.00	0.00	0.00	0.00	420.00	660.00
Almora	95.00	127.00	0.00	0.00	0.00	5.00	95.00	132.00
IARI, Karnal	1606.50	1632.00	0.00	0.00	0.00	0.00	1606.50	1632.00
IARI, New Delhi	1059.00	1670.00	0.00	0.00	0.00	0.00	1059.00	1670.00
IARI, Indore	936.00	1295.00	0.00	0.00	0.00	0.00	936.00	1295.00
IARI, Pusa, Bihar	387.80	585.00	0.00	0.00	0.00	0.00	387.80	585.00
IISS, Mau	20.00	25.00	0.00	0.00	0.00	0.00	20.00	25.00
Total	**18561.30**	**25211.08**	**11996.83**	**12380.78**	**5111.45**	**6379.57**	**35669.58**	**43971.43**
Maize								
Srinagar	0.00	0.00	5.72	6.00	0.00	0.00	5.72	6.00
Palampur	0.00	0.00	0.00	2.00	2.20	2.55	2.20	4.55
Ludhiana	0.00	0.00	10.40	14.80	0.00	0.00	10.40	14.80
Hisar	8.46	7.18	0.00	0.00	0.00	0.00	8.46	7.18
Pantnagar	2.42	4.73	0.00	0.00	0.00	0.00	2.42	4.73
Kanpur	0.20	0.20	0.00	0.00	0.00	0.60	0.20	0.80
Ranchi	0.00	0.00	0.20	0.50	0.00	0.00	0.20	0.50
Udaipur	35.40	32.64	0.00	0.00	0.00	0.00	35.40	32.64
Anand	0.00	0.00	12.00	15.91	0.00	0.00	12.00	15.91
Jabalpur	0.00	0.00	80.00	80.00	0.00	0.00	80.00	80.00
Rahuri	0.00	0.00	0.00	0.00	3.00	3.00	3.00	3.00
Bangalore	0.00	0.00	30.00	27.00	0.00	0.00	30.00	27.00
Dharwad	0.00	0.00	0.00	0.00	5.40	14.50	5.40	14.50
PJTSAU, Hyderabad	8.93	14.98	0.13	0.13	0.00	0.00	9.06	15.11
Coimbatore	9.03	8.43	6.20	7.00	7.88	8.53	23.11	23.96
Shivamogga	0.00	0.00	40.00	38.00	0.00	0.00	40.00	38.00

Almora	1.95	12.80	0.00	0.00	0.00	7.36	1.95	20.16
Meghalaya	0.00	0.00	0.00	0.00	7.00	9.50	7.00	9.50
IIMR, New Delhi	0.00	0.00	38.25	38.75	0.00	0.00	38.25	38.75
Total	**66.39**	**80.96**	**222.90**	**230.09**	**25.48**	**46.04**	**314.77**	**357.09**
Sorghum								
Kanpur	0.00	0.00	0.00	0.00	0.00	3.20	0.00	3.20
Udaipur	15.66	7.50	0.00	0.00	0.00	0.00	15.66	7.50
Rahuri	10.96	17.40	0.00	2.00	5.04	7.53	16.00	26.93
Akola	7.21	2.41	0.17	0.17	0.00	0.00	7.38	2.58
Parbhani	12.32	14.32	0.00	0.00	0.00	0.00	12.32	14.32
Dharwad	3.00	2.00	0.25	0.25	8.30	7.60	11.55	9.85
PJTSAU, Hyderabad	0.00	0.00	0.52	1.70	0.00	0.00	0.52	1.70
Coimbatore	0.00	0.00	0.35	0.35	0.64	0.76	0.99	1.11
Raichur	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
IIMR, Hyderabad	17.87	38.53	0.00	0.00	260.00	820.00	277.87	858.53
Total	**67.02**	**82.16**	**1.29**	**6.47**	**273.98**	**839.09**	**342.29**	**927.72**
Barley								
Palampur	0.00	0.00	0.00	0.00	17.00	17.00	17.00	17.00
Ludhiana	99.15	121.00	0.50	3.50	0.00	0.00	99.65	124.50
Hisar	131.10	131.10	18.50	22.90	0.00	0.00	149.60	154.00
Pantnagar	3.20	5.00	0.00	0.00	0.00	0.00	3.20	5.00
Faizabad	0.00	0.00	0.00	0.00	190.00	190.00	190.00	190.00
Kanpur	3.40	3.40	0.00	0.00	0.00	48.40	3.40	51.80
Varanasi	63.00	65.00	0.00	0.00	0.00	0.00	63.00	65.00
Bikaner	0.00	0.00	0.00	0.00	150.00	160.00	150.00	160.00
Jabalpur	56.00	56.00	94.00	94.00	0.00	0.00	150.00	150.00
Almora	4.00	6.00	0.00	0.00	0.00	0.00	4.00	6.00
IARI, Karnal	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
Total	**360.85**	**388.50**	**113.00**	**120.40**	**357.00**	**415.40**	**830.85**	**924.30**
Finger Millet								
Ranchi	0.20	0.25	0.10	0.10	0.00	0.00	0.30	0.35
Dholi	3.00	3.00	1.10	1.10	0.00	0.00	4.10	4.10
Raipur	3.90	4.20	0.00	0.00	0.00	0.00	3.90	4.20
Rahuri	0.06	1.00	0.00	0.00	0.10	0.50	0.16	1.50
Bangalore	11.76	25.00	3.90	35.07	0.00	0.00	15.66	60.07
Coimbatore	0.00	0.00	0.50	0.50	0.94	0.94	1.44	1.44
KKV, Dapoli	0.02	1.00	0.00	0.00	4.98	3.50	5.00	4.50
Almora	1.60	5.20	0.00	0.00	0.00	0.00	1.60	5.20
Total	**20.54**	**39.65**	**5.60**	**36.77**	**6.02**	**4.94**	**32.16**	**81.36**
Pearl Millet								
Hisar	1.18	1.51	2.24	2.56	0.00	0.00	3.42	4.07
Jobner	0.42	16.28	0.00	0.00	0.00	0.00	0.42	16.28
Jamnagar	0.02	0.12	0.79	5.02	0.00	0.00	0.81	5.14
Rahuri	0.00	0.00	0.11	0.44	0.15	0.39	0.26	0.83
Akola	0.04	0.04	0.00	0.00	0.00	0.00	0.04	0.04
Parbhani	0.05	0.10	0.00	0.00	0.00	0.90	0.05	1.00
Coimbatore	0.10	0.10	0.50	0.90	0.20	0.10	0.80	1.10
IARI, Karnal	0.20	2.08	0.00	0.00	0.00	0.00	0.20	2.08
Total	**2.01**	**20.23**	**3.64**	**8.92**	**0.35**	**1.39**	**6.00**	**30.54**

Littile Millet								
Jabalpur	0.00	0.00	6.37	6.37	0.00	0.00	6.37	6.37
Rahuri	0.00	0.00	0.00	0.00	0.60	0.15	0.60	0.15
Coimbatore	0.00	0.00	0.30	0.30	0.72	0.81	1.02	1.11
Total	**0.00**	**0.00**	**6.67**	**6.67**	**1.32**	**0.96**	**7.99**	**7.63**
Kodo								
Raipur	2.50	2.60	0.00	0.00	0.00	0.00	2.50	2.60
Jabalpur	5.40	2.77	12.32	12.32	0.00	0.00	17.72	15.09
Coimbatore	0.00	0.00	0.00	0.00	0.18	0.20	0.18	0.20
Total	**7.90**	**5.37**	**12.32**	**12.32**	**0.18**	**0.20**	**20.40**	**17.89**
Foxtail Millet								
ANGRAU, Guntur	0.36	0.36	0.36	0.36	0.00	0.00	0.72	0.72
Coimbatore	0.00	0.00	0.30	0.30	0.92	0.95	1.22	1.25
Raichur	0.00	0.00	0.00	3.50	0.00	0.00	0.00	3.50
Total	**0.36**	**0.36**	**0.66**	**4.16**	**0.92**	**0.95**	**1.94**	**5.47**
Barnyard millet								
Coimbatore	0.00	0.00	1.00	1.00	1.91	1.91	2.91	2.91
Almora	0.88	0.50	0.00	0.00	0.00	0.10	0.88	0.60
Total	**0.88**	**0.50**	**1.00**	**1.00**	**1.91**	**2.01**	**3.79**	**3.51**
Buckwheat								
Almora	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**0.10**
Amaranth								
Rahuri	0.00	0.00	0.00	0.20	0.20	0.80	0.20	1.00
Almora	0.20	0.30	0.00	0.00	0.00	0.00	0.20	0.30
Total	**0.20**	**0.30**	**0.00**	**0.20**	**0.20**	**0.80**	**0.40**	**1.30**
Proso millet								
Coimbatore	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
Total	**0.00**	**0.00**	**0.10**	**0.10**	**0.00**	**0.00**	**0.10**	**0.10**
Total Cereal Crops	**23237.32**	**30159.98**	**22515.00**	**24088.83**	**11925.55**	**13663.14**	**57677.87**	**67911.95**
PULSE CROPS								
Chick Pea								
Palampur	20.00	24.00	0.00	0.00	1.20	1.20	21.20	25.20
Ludhiana	19.00	22.00	10.00	13.00	0.00	0.00	29.00	35.00
Hisar	28.05	33.00	0.00	0.00	0.00	0.00	28.05	33.00
Pantnagar	13.00	20.00	0.00	0.00	105.00	125.00	118.00	145.00
Faizabad	0.00	0.00	0.00	0.00	80.00	80.00	80.00	80.00
Kanpur	16.50	16.50	0.00	0.00	0.00	68.50	16.50	85.00
Ranchi	0.00	0.00	2.25	5.00	0.00	0.00	2.25	5.00
Dholi	0.00	0.00	4.00	4.08	0.00	0.00	4.00	4.08
Kota	510.00	955.00	0.00	0.00	0.00	0.00	510.00	955.00
Bikaner	409.00	484.00	0.00	0.00	135.00	150.00	544.00	634.00
Udaipur	152.00	152.00	0.00	0.00	0.00	0.00	152.00	152.00
Jamnagar	54.00	77.00	79.00	84.00	0.00	0.00	133.00	161.00
Raipur	0.00	0.00	15.00	20.00	40.00	60.00	55.00	80.00
Jabalpur	1896.80	1896.00	3786.70	3786.70	0.00	0.00	5683.50	5682.70
Rahuri	1588.00	1587.00	0.00	4.00	17.00	19.00	1605.00	1610.00
Akola	855.00	633.00	54.00	52.00	40.00	75.00	949.00	760.00

Parbhani	254.00	300.00	0.00	0.00	90.00	200.00	344.00	500.00
Bangalore	0.00	0.00	100.00	110.00	0.00	0.00	100.00	110.00
Dharwad	1086.00	205.75	18.00	6.00	50.00	30.00	1154.00	241.75
ANGRAU, Guntur	12.50	12.50	4.80	287.50	165.00	95.00	182.30	395.00
West Bengal	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Raichur	295.00	290.00	0.00	27.00	0.00	0.00	295.00	317.00
Gwalior	2305.00	4434.40	0.00	0.00	0.00	0.00	2305.00	4434.40
IIPR, Kanpur	40.00	65.00	0.00	0.00	4.00	4.00	44.00	69.00
Total	**9553.85**	**11207.15**	**4074.75**	**4400.28**	**727.20**	**907.70**	**14355.80**	**16515.13**
Pigeon Pea								
Ludhiana	10.00	10.00	1.00	1.50	0.00	0.00	11.00	11.50
Hisar	4.68	4.68	1.10	1.42	0.00	0.00	5.78	6.10
Pantnagar	43.58	44.00	0.00	0.00	25.00	25.00	68.58	69.00
Faizabad	26.86	32.50	0.00	0.00	55.00	70.00	81.86	102.50
Ranchi	0.00	1.00	0.30	0.20	0.00	0.00	0.30	1.20
Dholi	0.00	0.00	19.50	11.77	18.00	16.97	37.50	28.74
Anand	0.00	0.00	0.00	0.00	8.00	8.50	8.00	8.50
Raipur	0.00	0.00	0.00	0.00	14.20	38.00	14.20	38.00
Jabalpur	40.05	40.05	299.25	299.25	0.00	0.00	339.30	339.30
Rahuri	8.00	0.00	1.00	0.00	0.50	10.00	9.50	10.00
Akola	50.00	34.00	0.00	0.00	14.00	2.00	64.00	36.00
Parbhani	22.98	27.00	0.00	0.00	85.00	271.00	107.98	298.00
Bangalore	7.00	13.00	3.00	64.00	0.00	0.00	10.00	77.00
Dharwad	32.15	14.00	0.00	0.00	3.00	2.00	35.15	16.00
PJTSAU, Hyderabad	8.65	68.50	6.13	9.40	132.27	130.50	147.05	208.40
ANGRAU, Guntur	46.00	46.00	42.07	43.27	50.00	228.76	138.07	318.03
Coimbatore	0.01	0.01	3.70	3.70	3.70	3.32	7.41	7.03
KKV, Dapoli	0.00	0.00	0.00	0.00	0.50	0.10	0.50	0.10
Raichur	59.33	79.50	0.00	0.00	0.00	0.00	59.33	79.50
Gwalior	0.00	0.00	0.00	0.00	17.00	76.00	17.00	76.00
Shimoga	0.00	0.00	73.00	60.00	0.00	0.00	73.00	60.00
Almora	3.80	4.00	0.00	0.00	0.00	0.00	3.80	4.00
IIPR, Kanpur	7.00	30.00	0.00	0.00	3.00	6.20	10.00	36.20
IARI, Karnal	3.70	2.95	0.00	0.00	0.00	0.00	3.70	2.95
IARI, New Delhi	6.20	22.67	0.00	0.00	0.00	0.00	6.20	22.67
Total	**379.99**	**473.86**	**450.05**	**494.51**	**429.17**	**888.35**	**1259.21**	**1856.72**
Field Pea								
Srinagar	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
Pantnagar	42.50	52.00	0.00	0.00	15.00	15.00	57.50	67.00
Faizabad	0.00	0.00	0.00	0.00	25.00	25.00	25.00	25.00
Kanpur	43.80	31.30	0.00	0.00	0.00	205.00	43.80	236.30
Varanasi	12.00	15.00	0.80	1.00	3.10	3.25	15.90	19.25
Dholi	0.00	0.00	2.00	0.77	2.00	7.45	4.00	8.22
Kota	0.00	55.00	0.00	0.00	0.00	0.00	0.00	55.00
Raipur	15.00	25.00	0.00	0.00	5.00	1.00	20.00	26.00
Jabalpur	1.00	1.00	977.00	977.00	0.00	0.00	978.00	978.00
Almora	1.00	2.05	0.00	0.00	0.00	3.10	1.00	5.15
IIPR, Kanpur	183.10	212.00	0.00	0.00	15.00	15.00	198.10	227.00

IARI, Karnal	11.50	11.50	0.00	0.00	0.00	0.00	11.50	11.50
Tripura	0.00	0.00	0.00	0.00	0.00	40.00	0.00	40.00
Total	**309.90**	**404.85**	**980.30**	**979.27**	**65.10**	**314.80**	**1355.30**	**1698.92**
Mung								
Srinagar	0.00	0.00	0.63	0.35	0.00	0.00	0.63	0.35
Jammu	0.50	0.50	0.00	0.00	0.00	0.00	0.50	0.50
Ludhiana	130.50	130.00	0.00	0.00	0.00	0.00	130.50	130.00
Hisar	55.50	49.75	2.50	2.50	0.00	0.00	58.00	52.25
Pantnagar	20.44	34.00	0.00	0.00	50.00	55.00	70.44	89.00
Kanpur	6.90	5.40	0.00	0.00	0.00	54.10	6.90	59.50
Varanasi	26.00	31.50	1.10	1.25	3.00	3.25	30.10	36.00
Jorhat	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
Ranchi	0.00	0.00	1.00	3.00	0.00	0.00	1.00	3.00
Dholi	0.00	0.00	25.09	23.85	35.00	32.00	60.09	55.85
Kota	45.00	40.40	0.00	0.00	0.00	0.00	45.00	40.40
Bikaner	0.00	24.63	0.00	0.00	24.00	22.50	24.00	47.13
Anand	0.00	0.00	0.00	0.00	1.00	2.31	1.00	2.31
Jabalpur	7.50	0.90	0.00	0.00	0.00	0.00	7.50	0.90
Rahuri	2.00	2.00	0.00	0.00	5.20	2.02	7.20	4.02
Akola	10.20	28.00	0.00	0.00	18.00	9.00	28.20	37.00
Parbhani	13.50	16.00	0.00	0.00	80.00	164.00	93.50	180.00
Bangalore	0.00	0.00	0.00	4.00	0.00	0.00	0.00	4.00
Dharwad	154.00	81.70	12.00	4.00	50.00	35.90	216.00	121.60
PJTSAU, Hyderabad	27.00	60.00	6.79	14.70	102.95	90.00	136.74	164.70
ANGRAU, Guntur	18.50	18.50	24.82	24.95	15.00	10.00	58.32	53.45
Coimbatore	3.00	3.00	18.63	17.43	34.65	23.00	56.28	43.43
Raichur	0.00	0.00	0.00	23.00	0.00	0.00	0.00	23.00
Gwalior	0.00	0.00	0.00	0.00	5.00	164.80	5.00	164.80
Shimoga	0.00	0.00	9.00	7.00	0.00	0.00	9.00	7.00
IIPR, Kanpur	72.65	73.93	0.00	0.00	4.50	4.73	77.15	78.66
IARI, Karnal	0.00	39.80	0.00	0.00	0.00	0.00	0.00	39.80
IARI, New Delhi	0.00	21.25	0.00	0.00	0.00	0.00	0.00	21.25
Total	**593.19**	**661.26**	**101.56**	**130.03**	**428.30**	**672.61**	**1123.05**	**1463.90**
Urd								
Jammu	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
Palampur	2.00	3.00	3.00	8.80	11.10	18.95	16.10	30.75
Hisar	21.00	20.00	4.00	5.00	0.00	0.00	25.00	25.00
Pantnagar	43.85	62.00	0.00	0.00	100.00	110.00	143.85	172.00
Kanpur	33.08	33.08	0.00	0.00	0.00	34.50	33.08	67.58
Ranchi	0.00	0.00	0.75	2.80	0.00	0.00	0.75	2.80
Dholi	0.00	0.00	2.03	2.03	0.00	0.00	2.03	2.03
Kota	29.00	115.00	0.00	0.00	0.00	0.00	29.00	115.00
Bikaner	0.00	0.00	0.00	0.00	2.00	3.00	2.00	3.00
Udaipur	5.00	5.20	0.00	0.00	0.00	0.00	5.00	5.20
Raipur	0.00	0.00	2.00	2.20	0.00	0.00	2.00	2.20
Jabalpur	45.00	3.15	0.00	0.00	0.00	0.00	45.00	3.15
Rahuri	0.00	0.00	0.00	0.00	3.00	0.00	3.00	0.00
Akola	47.00	48.00	1.50	2.50	30.00	26.50	78.50	77.00

Parbhani	0.00	0.00	0.00	0.00	50.00	55.00	50.00	55.00
Bangalore	0.00	0.00	0.00	5.92	0.00	0.00	0.00	5.92
Dharwad	17.50	17.50	3.00	2.25	35.00	19.70	55.50	39.45
PJTSAU, Hyderabad	22.50	18.50	2.70	2.70	9.80	6.00	35.00	27.20
ANGRAU, Guntur	69.00	69.00	83.76	81.72	58.00	35.24	210.76	185.96
Coimbatore	28.20	22.20	28.08	27.80	101.11	65.69	157.39	115.69
Shimoga	0.00	0.00	9.00	7.00	0.00	0.00	9.00	7.00
IIPR, Kanpur	23.50	28.25	0.00	0.00	6.00	6.25	29.50	34.50
Total	**387.63**	**445.88**	**139.82**	**150.72**	**406.01**	**380.83**	**933.46**	**977.43**
Lentil								
Srinagar	0.00	0.00	1.50	2.00	0.00	0.00	1.50	2.00
Palampur	2.00	2.00	0.00	0.00	2.50	2.50	4.50	4.50
Ludhiana	1.30	5.00	0.00	0.00	0.00	0.00	1.30	5.00
Hisar	1.50	2.25	0.00	0.00	0.00	0.00	1.50	2.25
Pantnagar	52.75	70.00	0.00	0.00	10.00	10.00	62.75	80.00
Faizabad	0.00	0.00	0.00	0.00	75.00	75.00	75.00	75.00
Kanpur	78.05	66.05	0.00	0.00	0.00	77.95	78.05	144.00
Varanasi	15.00	17.50	1.20	1.40	2.60	3.00	18.80	21.90
Ranchi	0.00	0.00	0.50	0.75	0.00	0.00	0.50	0.75
Dholi	0.00	0.00	22.40	6.13	160.00	25.88	182.40	32.01
Kota	0.00	20.00	0.00	0.00	0.00	0.00	0.00	20.00
Jabalpur	25.00	25.00	230.00	230.00	0.00	0.00	255.00	255.00
Gwalior	0.00	29.00	0.00	0.00	0.00	0.00	0.00	29.00
Almora	5.00	9.25	0.00	0.00	0.00	2.50	5.00	11.75
IIPR, Kanpur	44.00	58.00	0.00	0.00	2.50	2.50	46.50	60.50
Total	**224.60**	**304.05**	**255.60**	**240.28**	**252.60**	**199.33**	**732.80**	**743.66**
Rajmash								
Srinagar	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.50
Palampur	0.00	0.00	14.00	13.20	2.50	4.20	16.50	17.40
Ludhiana	29.30	33.50	0.00	0.00	0.00	0.00	29.30	33.50
Rahuri	0.00	0.00	0.00	4.00	0.00	3.00	0.00	7.00
Almora	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.13
IIPR, Kanpur	3.00	4.00	0.00	0.00	0.00	0.00	3.00	4.00
Total	**32.30**	**37.50**	**14.50**	**17.70**	**2.50**	**7.33**	**49.30**	**62.53**
Horse Gram								
Ranchi	0.00	0.00	0.60	1.00	0.00	0.00	0.60	1.00
Udaipur	4.00	3.70	0.00	0.00	0.00	0.00	4.00	3.70
Raipur	2.50	8.00	1.00	1.20	0.00	0.00	3.50	9.20
Rahuri	0.00	0.00	0.00	0.00	0.20	0.50	0.20	0.50
Bangalore	0.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00
Coimbatore	0.00	0.00	0.00	0.00	6.00	4.00	6.00	4.00
KKV, Dapoli	0.00	0.00	0.00	0.00	4.50	5.00	4.50	5.00
Almora	0.40	1.55	0.00	0.00	0.00	0.00	0.40	1.55
Total	**6.90**	**13.25**	**4.60**	**5.20**	**10.70**	**9.50**	**22.20**	**27.95**
Beans								
Bangalore	0.00	0.00	0.50	5.00	0.00	0.00	0.50	5.00
KKV, Dapoli	0.00	0.00	0.00	0.00	5.00	6.00	5.00	6.00
Shimoga	0.00	0.00	9.00	5.00	0.00	0.00	9.00	5.00
Almora	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12
Total	**0.00**	**0.00**	**9.50**	**10.00**	**5.00**	**6.12**	**14.50**	**16.12**

Cowpea								
Srinagar	0.00	0.00	0.50	1.15	0.00	0.00	0.50	1.15
Bikaner	0.00	7.00	0.00	0.00	20.00	24.46	20.00	31.46
Bangalore	6.00	7.15	4.00	20.90	0.00	0.00	10.00	28.05
Dharwad	39.50	15.70	2.50	1.75	12.00	2.95	54.00	20.40
Coimbatore	0.00	0.00	1.90	1.90	3.85	6.60	5.75	8.50
KKV, Dapoli	0.00	0.00	0.00	0.00	13.00	16.00	13.00	16.00
Total	**45.50**	**29.85**	**8.90**	**25.70**	**48.85**	**50.01**	**103.25**	**105.56**
Moth								
Bikaner	51.51	60.75	0.00	0.00	20.50	16.75	72.01	77.50
Jodhpur	5.76	8.00	0.00	0.00	0.00	0.00	5.76	8.00
Total	**57.27**	**68.75**	**0.00**	**0.00**	**20.50**	**16.75**	**77.77**	**85.50**
Guar								
Hisar	84.00	88.00	7.00	9.00	0.00	0.00	91.00	97.00
Total	**84.00**	**88.00**	**7.00**	**9.00**	**0.00**	**0.00**	**91.00**	**97.00**
Lathyrus								
Raipur	77.00	90.00	0.00	0.00	29.00	50.00	106.00	140.00
West Bengal	0.00	0.00	0.50	1.00	0.00	0.00	0.50	1.00
IARI, Karnal	6.60	7.00	0.00	0.00	0.00	0.00	6.60	7.00
Total	**83.60**	**97.00**	**0.50**	**1.00**	**29.00**	**50.00**	**113.10**	**148.00**
Total Pulse Crops	**11758.73**	**13831.40**	**6047.08**	**6463.69**	**2424.93**	**3503.33**	**20230.74**	**23798.42**
OILSEED CROPS								
Soybean								
Palampur	9.00	12.00	0.00	3.00	11.00	16.00	20.00	31.00
Ludhiana	0.00	0.00	6.35	12.00	0.00	0.00	6.35	12.00
Pantnagar	50.00	53.50	5.00	5.00	15.00	20.00	70.00	78.50
Ranchi	4.00	1.00	0.00	0.00	0.00	0.00	4.00	1.00
Kota	1000.00	208.00	0.00	0.00	0.00	0.00	1000.00	208.00
Udaipur	27.00	28.00	0.00	0.00	0.00	0.00	27.00	28.00
Anand	0.00	0.00	0.00	0.00	6.00	6.50	6.00	6.50
Raipur	200.00	149.20	0.00	0.00	150.00	230.00	350.00	379.20
Jabalpur	4625.00	1490.28	152.00	152.00	0.00	0.00	4777.00	1642.28
Rahuri	650.00	660.00	120.00	130.00	166.00	145.00	936.00	935.00
Akola	350.00	430.00	100.00	220.00	63.00	180.00	513.00	830.00
Parbhani	1411.35	1155.00	0.00	0.00	0.00	2372.00	1411.35	3527.00
Bangalore	200.00	221.20	300.00	40.00	0.00	0.00	500.00	261.20
Dharwad	4500.00	3115.00	30.00	20.00	840.00	585.00	5370.00	3720.00
PJTSAU, Hyderabad	0.00	0.00	687.90	440.30	312.10	179.70	1000.00	620.00
Raichur	200.00	185.00	0.00	20.00	0.00	0.00	200.00	205.00
Gwalior	2500.00	2733.00	0.00	0.00	0.00	0.00	2500.00	2733.00
Almora	7.00	8.00	0.00	0.00	0.00	0.30	7.00	8.30
IARI, New Delhi	20.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
IISR, Indore	396.60	303.50	0.00	0.00	0.00	0.00	396.60	303.50
Total	**16149.95**	**10752.68**	**1401.25**	**1042.30**	**1563.10**	**3734.50**	**19114.30**	**15529.48**
Sunflower								
Rahuri	0.00	0.00	0.00	0.00	0.40	1.00	0.40	1.00
Bangalore	1.02	4.72	9.61	18.86	0.00	0.00	10.63	23.58
Coimbatore	0.00	0.00	0.00	0.00	0.30	0.25	0.30	0.25
IIOR, Hyderabad	0.88	1.20	0.00	0.00	0.00	0.00	0.88	1.20
Total	**1.90**	**5.92**	**9.61**	**18.86**	**0.70**	**1.25**	**12.21**	**26.03**

Groundnut								
Ludhiana	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Kanpur	20.00	2.10	0.00	0.00	0.00	0.00	20.00	2.10
Ranchi	5.95	3.00	0.00	0.00	0.00	0.00	5.95	3.00
Bhubneswar	523.00	523.00	0.00	0.00	0.00	0.00	523.00	523.00
Bikaner	204.00	219.50	0.00	0.00	140.00	152.00	344.00	371.50
Udaipur	10.00	12.60	0.00	0.00	0.00	0.00	10.00	12.60
Jobner	88.00	91.00	0.00	0.00	0.00	0.00	88.00	91.00
Anand	0.00	0.00	0.00	0.00	21.00	21.60	21.00	21.60
Jamnagar	232.00	201.00	1400.18	1712.90	0.00	0.00	1632.18	1913.90
Jabalpur	0.00	0.00	3.50	3.50	0.00	0.00	3.50	3.50
Rahuri	5.00	2.00	50.00	17.00	20.00	17.00	75.00	36.00
Akola	10.00	4.50	0.00	0.00	18.00	2.25	28.00	6.75
Bangalore	0.00	0.00	50.00	20.00	0.00	0.00	50.00	20.00
Dharwad	2291.76	1638.58	31.00	18.00	495.00	420.80	2817.76	2077.38
ANGRAU, Guntur	5355.00	6082.31	2385.00	2000.00	0.00	0.00	7740.00	8082.31
Coimbatore	150.00	43.30	245.00	245.00	756.00	476.80	1151.00	765.10
KKV, Dapoli	0.00	0.00	0.00	0.00	11.00	11.12	11.00	11.12
Shimoga	0.00	0.00	40.00	30.00	0.00	0.00	40.00	30.00
CAU, Imphal	0.30	0.30	0.00	0.00	0.00	0.00	0.30	0.30
DGR, Junagadh	336.76	183.15	0.00	0.00	0.00	0.00	336.76	183.15
Total	**9231.77**	**9006.34**	**4205.68**	**4047.40**	**1461.00**	**1101.57**	**14898.45**	**14155.31**
Linseed								
Palampur	0.20	0.20	0.00	0.00	1.80	1.80	2.00	2.00
Ludhiana	0.00	0.00	0.20	0.60	0.00	0.00	0.20	0.60
Kanpur	10.13	10.13	0.00	0.00	0.00	26.37	10.13	36.50
Ranchi	0.00	0.00	0.95	2.00	0.00	0.00	0.95	2.00
Kota	3.12	12.00	0.00	0.00	0.00	0.00	3.12	12.00
Raipur	8.10	43.00	0.00	0.00	11.15	35.00	19.25	78.00
Jabalpur	0.00	0.00	329.00	329.00	0.00	0.00	329.00	329.00
Akola	0.10	0.80	0.00	0.00	0.00	0.00	0.10	0.80
Total	**21.65**	**66.13**	**330.15**	**331.60**	**12.95**	**63.17**	**364.75**	**460.90**
Mustard								
Faizabad	0.00	0.00	0.00	0.00	17.00	17.00	17.00	17.00
Jorhat	21.00	20.20	0.00	7.00	0.00	0.00	21.00	27.20
Ranchi	0.00	0.00	0.40	2.00	0.00	0.00	0.40	2.00
Bhubneswar	0.00	0.00	0.00	0.00	5.50	2.30	5.50	2.30
Bikaner	1.91	4.10	0.00	0.00	0.00	0.00	1.91	4.10
S.K. Nagar	0.06	0.08	2.14	3.52	0.00	0.00	2.20	3.60
Raipur	1.70	2.00	0.00	0.00	0.00	0.00	1.70	2.00
Jabalpur	0.00	0.00	40.00	40.00	0.00	0.00	40.00	40.00
Gwalior	0.00	26.00	0.00	0.00	0.00	0.00	0.00	26.00
IARI, Karnal	12.42	18.35	0.00	0.00	0.00	0.00	12.42	18.35
IARI, New Delhi	11.37	16.33	0.00	0.00	0.00	0.00	11.37	16.33
Total	**48.46**	**87.06**	**42.54**	**52.52**	**22.50**	**19.30**	**113.50**	**158.88**

Toria								
Palampur	0.50	0.50	0.00	0.00	1.70	2.70	2.20	3.20
Ludhiana	1.17	1.30	0.00	0.00	0.00	0.00	1.17	1.30
Pantnagar	4.92	8.00	0.00	0.00	25.00	35.00	29.92	43.00
Kanpur	2.16	2.16	0.00	0.00	0.00	3.05	2.16	5.21
Gwalior	0.00	7.00	0.00	0.00	0.00	0.00	0.00	7.00
Almora	0.05	0.12	0.00	0.00	0.00	0.00	0.05	0.12
Total	**8.80**	**19.08**	**0.00**	**0.00**	**26.70**	**40.75**	**35.50**	**59.83**
Safflower								
Rahuri	0.30	6.35	0.10	3.50	3.10	5.10	3.50	14.95
Akola	0.00	0.00	0.60	20.50	3.50	1.30	4.10	21.80
Parbhani	4.99	11.00	0.00	0.00	0.00	210.00	4.99	221.00
Dharwad	0.38	0.38	0.00	0.00	0.20	0.20	0.58	0.58
Gwalior	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00
Total	**5.67**	**18.73**	**0.70**	**24.00**	**6.80**	**216.60**	**13.17**	**259.33**
Sesame								
Palampur	0.00	0.00	0.05	0.10	2.00	2.20	2.05	2.30
Ludhiana	0.00	0.00	0.40	3.20	0.00	0.00	0.40	3.20
Bhubneswar	0.00	0.00	0.00	0.00	3.25	1.86	3.25	1.86
Jamnagar	6.84	7.80	25.19	26.41	0.00	0.00	32.03	34.21
Jabalpur	5.60	1.88	5.01	5.01	0.00	0.00	10.61	6.89
Rahuri	0.00	0.00	0.00	0.00	0.12	0.21	0.12	0.21
Akola	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02
Dharwad	0.10	0.10	0.00	0.00	1.00	1.00	1.10	1.10
PJTSAU, Hyderabad	0.00	0.00	1.45	1.50	0.65	0.65	2.10	2.15
Total	**12.56**	**9.80**	**32.10**	**36.22**	**7.02**	**5.92**	**51.68**	**51.94**
Niger								
Ranchi	3.55	1.10	0.20	0.20	0.00	0.00	3.75	1.30
Bhubneswar	0.00	0.00	0.00	0.00	4.00	7.00	4.00	7.00
Jabalpur	0.00	0.00	12.00	12.00	0.00	0.00	12.00	12.00
Rahuri	0.00	0.00	0.00	0.00	0.15	0.12	0.15	0.12
Dharwad	0.50	0.50	0.00	0.00	0.10	0.10	0.60	0.60
Shimoga	0.00	0.00	10.00	7.00	0.00	0.00	10.00	7.00
Total	**4.05**	**1.60**	**22.20**	**19.20**	**4.25**	**7.22**	**30.50**	**28.02**
G. Sarson								
Palampur	0.20	0.20	0.00	0.00	0.15	0.10	0.35	0.30
Ludhiana	1.50	8.00	0.10	0.80	0.00	0.00	1.60	8.80
Total	**1.70**	**8.20**	**0.10**	**0.80**	**0.15**	**0.10**	**1.95**	**9.10**
Castor								
S.K. Nagar	2.93	3.62	22.18	38.91	0.00	0.00	25.11	42.53
Dharwad	0.00	0.00	0.00	0.00	10.00	1.50	10.00	1.50
PJTSAU, Hyderabad	0.00	0.00	0.54	0.65	50.56	50.55	51.10	51.20
Coimbatore	0.00	0.00	0.00	0.00	0.73	0.60	0.73	0.60
Navsari	6.50	12.80	0.00	0.00	0.00	0.00	6.50	12.80
IIOR, Hyderabad	0.20	0.50	0.00	0.00	0.00	0.00	0.20	0.50
Total	**9.63**	**16.92**	**22.72**	**39.56**	**61.29**	**52.65**	**93.64**	**109.13**
Brown Sarson								
Srinagar	0.00	0.00	1.20	1.50	0.00	0.00	1.20	1.50
Palampur	0.15	0.15	0.00	0.00	0.15	0.15	0.30	0.30
Total	**0.15**	**0.15**	**1.20**	**1.50**	**0.15**	**0.15**	**1.50**	**1.80**

Raya								
Palampur	0.10	0.10	0.00	0.00	0.10	0.10	0.20	0.20
Ludhiana	0.38	2.50	0.20	6.50	0.00	0.00	0.58	9.00
Hisar	8.45	9.45	8.65	11.25	0.00	0.00	17.10	20.70
Total	**8.93**	**12.05**	**8.85**	**17.75**	**0.10**	**0.10**	**17.88**	**29.90**
Rai								
Pantnagar	3.65	7.00	0.00	0.00	35.00	42.00	38.65	49.00
Kanpur	9.63	9.63	0.00	0.00	0.00	38.17	9.63	47.80
Total	**13.28**	**16.63**	**0.00**	**0.00**	**35.00**	**80.17**	**48.28**	**96.80**
Karan Rai								
Palampur	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.05**	**0.05**	**0.05**
Til								
Hisar	0.09	0.09	0.05	0.06	0.00	0.00	0.14	0.15
Kanpur	0.40	0.35	0.00	0.00	0.00	0.75	0.40	1.10
Ranchi	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
Total	**0.49**	**0.44**	**0.10**	**0.11**	**0.00**	**0.75**	**0.59**	**1.30**
Total Oilseed Crops	**25518.99**	**20021.73**	**6077.20**	**5631.82**	**3201.76**	**5324.25**	**34797.95**	**30977.80**
FIBRE CROPS								
Cotton								
Ludhiana	6.25	30.73	5.20	10.10	0.00	0.00	11.45	40.83
Hisar	4.33	5.79	40.75	45.40	0.00	0.00	45.08	51.19
Bikaner	9.00	10.95	0.00	0.00	4.00	5.00	13.00	15.95
Anand	0.00	0.00	0.00	0.00	59.01	64.70	59.01	64.70
Rahuri	0.00	0.00	0.00	0.00	2.01	2.58	2.01	2.58
Akola	3.00	7.75	1.50	3.00	0.00	0.00	4.50	10.75
Parbhani	0.46	0.46	0.00	0.00	0.00	0.00	0.46	0.46
Coimbatore	0.10	0.10	2.21	2.25	0.00	0.00	2.31	2.35
CICR, Nagpur	0.32	1.10	0.00	0.00	0.00	5.96	0.32	7.06
Total	**23.46**	**56.88**	**49.66**	**60.75**	**65.02**	**78.24**	**138.14**	**195.87**
Jute								
Jorhat	0.06	0.06	0.00	0.10	0.00	0.00	0.06	0.16
Barrackpore	6.53	7.84	0.00	0.00	0.25	0.25	6.78	8.09
Total	**6.59**	**7.90**	**0.00**	**0.10**	**0.25**	**0.25**	**6.84**	**8.25**
Mesta								
Barrackpore	0.50	1.70	0.00	0.00	0.40	0.40	0.90	2.10
Total	**0.50**	**1.70**	**0.00**	**0.00**	**0.40**	**0.40**	**0.90**	**2.10**
Sunnhemp								
Barrackpore	3.00	3.50	0.00	0.00	0.45	0.45	3.45	3.95
Total	**3.00**	**3.50**	**0.00**	**0.00**	**0.45**	**0.45**	**3.45**	**3.95**
Total Fibre Crops	**33.55**	**69.98**	**49.66**	**60.85**	**66.12**	**79.34**	**149.33**	**210.17**
FORAGE CROPS								
Oats								
Srinagar	0.00	0.00	44.00	46.00	0.00	0.00	44.00	46.00
Palampur	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00
Ludhiana	185.35	204.00	0.00	0.00	0.00	0.00	185.35	204.00
Jabalpur	0.00	0.00	92.00	92.00	0.00	0.00	92.00	92.00
Rahuri	5.00	11.50	0.00	8.00	3.50	8.50	8.50	28.00
Jhansi	121.90	135.00	0.00	0.00	0.00	15.00	121.90	150.00
Total	**312.25**	**350.50**	**136.00**	**146.00**	**33.50**	**53.50**	**481.75**	**550.00**

Maize								
Palampur	0.00	0.00	0.00	0.00	10.00	16.00	10.00	16.00
Ludhiana	38.15	45.00	0.00	0.00	0.00	0.00	38.15	45.00
Rahuri	30.00	26.00	0.00	0.00	0.00	0.00	30.00	26.00
Jhansi	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00
Total	**68.15**	**71.00**	**0.00**	**0.00**	**10.00**	**18.00**	**78.15**	**89.00**
Sorghum								
Ludhiana	0.60	0.60	0.00	0.00	0.00	0.00	0.60	0.60
Hisar	1.40	1.40	0.20	0.25	0.00	0.00	1.60	1.65
Pantnagar	4.32	6.70	0.00	0.00	0.00	0.00	4.32	6.70
Coimbatore	9.80	5.00	0.80	0.80	2.00	2.00	12.60	7.80
Jhansi	0.00	0.00	0.00	0.00	0.00	1.75	0.00	1.75
IARI, Karnal	7.50	5.26	0.00	0.00	0.00	0.00	7.50	5.26
Total	**23.62**	**18.96**	**1.00**	**1.05**	**2.00**	**3.75**	**26.62**	**23.76**
Lucerne								
Rahuri	0.30	1.00	0.00	0.00	0.00	1.50	0.30	2.50
Total	**0.30**	**1.00**	**0.00**	**0.00**	**0.00**	**1.50**	**0.30**	**2.50**
Cowpea								
Hisar	11.00	0.00	0.00	0.00	0.00	0.00	11.00	0.00
Pantnagar	1.35	1.50	0.00	0.00	0.00	0.00	1.35	1.50
Jobner	19.00	24.76	0.00	0.00	0.00	0.00	19.00	24.76
Rahuri	5.00	1.00	0.00	0.00	0.00	0.50	5.00	1.50
Coimbatore	0.00	0.00	1.50	1.50	0.00	0.00	1.50	1.50
Jhansi	1.75	2.50	0.00	0.00	0.00	2.50	1.75	5.00
Total	**38.10**	**29.76**	**1.50**	**1.50**	**0.00**	**3.00**	**39.60**	**34.26**
Grain Cowpea								
Pantnagar	4.25	5.00	0.00	0.00	0.00	0.00	4.25	5.00
Total	**4.25**	**5.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.25**	**5.00**
Berseem								
Ludhiana	27.33	39.00	0.00	0.00	0.00	0.00	27.33	39.00
Jabalpur	0.00	0.00	7.00	7.00	0.00	0.00	7.00	7.00
Rahuri	0.00	0.00	0.00	0.00	0.10	0.00	0.10	0.00
Jhansi	8.25	9.10	0.00	0.00	0.00	2.75	8.25	11.85
Total	**35.58**	**48.10**	**7.00**	**7.00**	**0.10**	**2.75**	**42.68**	**57.85**
Guar								
Ludhiana	0.00	0.00	0.60	1.00	0.00	0.00	0.60	1.00
Bikaner	56.00	48.00	0.00	0.00	155.00	159.27	211.00	207.27
Jobner	123.15	162.46	0.00	0.00	0.00	0.00	123.15	162.46
Jhansi	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Total	**179.15**	**210.46**	**0.60**	**1.00**	**155.00**	**160.27**	**334.75**	**371.73**
Guinea Grass								
Ludhiana	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
Total	**0.00**	**0.00**	**0.30**	**0.30**	**0.00**	**0.00**	**0.30**	**0.30**
Pearlmillet								
Ludhiana	0.55	2.00	1.00	4.00	0.00	0.00	1.55	6.00
Rahuri	0.00	0.00	0.00	0.00	0.25	0.06	0.25	0.06
PJTSAU, Hyderabad	0.00	0.00	0.05	0.05	0.00	0.00	0.05	0.05
Total	**0.55**	**2.00**	**1.05**	**4.05**	**0.25**	**0.06**	**1.85**	**6.11**

Rye Grass								
Ludhiana	0.00	0.00	0.60	0.80	0.00	0.00	0.60	0.80
Total	**0.00**	**0.00**	**0.60**	**0.80**	**0.00**	**0.00**	**0.60**	**0.80**
Stylo								
Rahuri	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.10**	**0.10**	**0.10**
Setaria								
Palampur	0.00	0.00	0.00	0.00	0.10	0.25	0.10	0.25
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.25**	**0.10**	**0.25**
Red Clover								
Palampur	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.20**	**0.10**	**0.20**
Total Forage Crops	**661.95**	**736.78**	**148.05**	**161.70**	**201.15**	**243.38**	**1011.15**	**1141.86**
Grand Total	**61210.54**	**64819.87**	**34836.99**	**36406.89**	**17819.51**	**22813.44**	**113867.04**	**124040.20**

Table 7: Centre-wise anticipated breeder seed production during 2016-17

(Figures in quintals)

Sl. No	Centre	GOI		State		ICAR Seed Project		Total	
		Indent	Production	Indent	Production	Target	Production	Indent	Production
	State Agricultural Universities								
1	SKUA &T, Srinagar	0.00	0.00	79.28	87.00	0.00	0.00	79.28	87.00
2	SKUA &T, Jammu	6.50	14.25	82.00	71.00	0.00	0.00	88.50	85.25
3	CSHPKV, Palampur	302.15	315.15	39.05	119.60	304.65	332.75	645.85	767.50
4	PAU, Ludhiana	2947.03	5611.03	452.85	613.10	0.00	0.00	3399.88	6224.13
5	CCSHAU, Hisar	2280.44	2284.80	222.99	265.02	0.00	0.00	2503.43	2549.82
6	GBPUAT, Pantnagar	928.73	1300.03	5.00	5.00	2271.00	3988.00	3204.73	5293.03
7	NDUA&T, Faizabad	216.36	410.00	0.00	0.00	1451.00	1587.50	1667.36	1997.50
8	CSAUA&T, Kanpur	939.93	895.98	0.00	0.00	0.00	969.41	939.93	1865.39
9	BHU, Varanasi	157.82	180.75	57.10	77.15	93.30	130.50	308.22	388.40
10	AAU, Jorhat	81.56	87.06	0.00	439.85	0.00	0.00	81.56	526.91
11	BAU, Ranchi	40.70	25.45	35.30	208.60	0.00	0.00	76.00	234.05
12	RAU, Dholi	705.10	528.10	484.22	520.43	5285.00	2835.70	6474.32	3884.23
13	OUA&T, Bhubaneswar	726.50	730.40	270.00	265.20	12.75	11.16	1009.25	1006.76
14	MAF, Kota	3363.07	5581.90	0.00	0.00	0.00	0.00	3363.07	5581.90
15	RAU, Bikaner	1539.42	1898.93	0.00	0.00	950.50	1042.98	2489.92	2941.91
16	MPUAT, Udaipur	374.06	373.64	0.00	0.00	0.00	0.00	374.06	373.64
17	SKNAU, Jobner	230.57	294.50	0.00	0.00	0.00	0.00	230.57	294.50
18	SDAU, S.K.Nagar	672.59	718.70	1384.42	1492.43	0.00	0.00	2057.01	2211.13
19	AAU, Anand	16.00	17.00	115.48	174.91	95.01	103.61	226.49	295.52
20	JAU, Jamnagar	607.26	601.92	1526.76	1850.33	0.00	0.00	2134.02	2452.25
21	IGKV, Raipur	965.70	1113.40	51.10	79.60	523.90	843.00	1540.70	2036.00
22	JNKVV, Jabalpur	9425.85	6235.53	22212.05	22216.95	0.00	0.00	31637.90	28452.48
23	MPKV, Rahuri	2517.02	2556.25	175.51	313.14	346.72	392.56	3039.25	3261.95
24	PDKV, Akola	1479.57	1438.52	168.37	326.77	278.50	406.05	1926.44	2171.34
25	MAU, Parbhani	1719.65	1523.88	0.00	0.00	305.00	3272.90	2024.65	4796.78
26	UAS, Bangalore	232.03	281.07	546.26	399.75	0.00	0.00	778.29	680.82
27	UAS, Dharwad	8147.89	5111.46	98.60	53.35	1564.50	1172.75	9810.99	6337.56

28	PJTSAU, Hyderabad	234.18	346.68	1567.11	1308.83	1113.33	1018.03	2914.62	2673.54
29	ANGRAU, Guntur	6548.36	7393.45	3323.06	3386.30	288.00	369.00	10159.42	11148.75
30	TNAU, Coimbatore	295.99	177.89	1648.32	1679.33	2318.77	1633.20	4263.08	3490.42
31	KAU, Pattambi	10.00	19.50	3.06	51.85	0.00	0.00	13.06	71.35
32	PAJANCOA&RI, Karaikal	0.00	0.00	3.70	21.50	0.00	0.00	3.70	21.50
33	KKV, Dapoli	21.14	40.15	0.65	1.40	193.08	222.34	214.87	263.89
34	BCKV, West Bengal	38.00	42.50	11.50	12.00	0.00	0.00	49.50	54.50
35	UAS, Raichur	554.33	554.50	0.00	141.75	0.00	0.00	554.33	696.25
36	RVSKVV, Gwalior	5976.00	8255.40	0.00	0.00	32.00	1290.80	6008.00	9546.20
37	SVPUAT, Meerut	423.00	664.25	0.00	0.00	0.00	0.00	423.00	664.25
38	UAHS, Shivamogga	0.00	0.00	235.00	186.00	0.00	0.00	235.00	186.00
39	NAU, Navsari	6.50	43.30	0.00	0.00	0.00	0.00	6.50	43.30
	Total SAUs	**54731.00**	**57667.32**	**34798.74**	**36368.14**	**17427.01**	**21622.24**	**106956.75**	**115657.70**
	ICAR, Institute								
40	VPKAS, Almora	127.83	187.17	0.00	0.00	0.00	20.01	127.83	207.18
41	IIPR, Kanpur	373.25	471.18	0.00	0.00	35.00	38.68	408.25	509.86
42	IGFRI, Jhansi	131.90	146.60	0.00	0.00	0.00	25.00	131.90	171.60
43	CRIJAF, Barrackpore	10.03	13.04	0.00	0.00	1.10	1.10	11.13	14.14
44	CAZRI, Jodhpur	5.76	8.00	0.00	0.00	0.00	0.00	5.76	8.00
45	CRRI, Cuttack	573.50	0.00	0.00	0.00	47.50	0.00	621.00	0.00
46	IIMR, Hyderabad	17.87	38.53	0.00	0.00	260.00	820.00	277.87	858.53
47	IIOR, Hyderabad	1.08	1.70	0.00	0.00	0.00	0.00	1.08	1.70
48	CICR, Nagpur	0.32	1.10	0.00	0.00	0.00	5.96	0.32	7.06
49	IARI,RS, Karnal	1916.42	1953.94	0.00	0.00	0.00	0.00	1916.42	1953.94
50	IARI, New Delhi	1196.07	1875.25	0.00	0.00	0.00	0.00	1196.07	1875.25
51	IARI, Indore	936.00	1295.00	0.00	0.00	0.00	0.00	936.00	1295.00
52	ICAR-IARI, RS, Pusa	387.80	585.00	0.00	0.00	0.00	0.00	387.80	585.00
53	ICAR RC NEH, Manipur	0.00	0.00	0.00	0.00	33.90	41.75	33.90	41.75
54	ICAR RC NEH, Meghalaya	0.00	0.00	0.00	0.00	15.00	22.70	15.00	22.70
55	ICAR RC NEH,Tripura	0.00	0.00	0.00	0.00	0.00	216.00	0.00	216.00
56	IISR, Indore	396.60	303.50	0.00	0.00	0.00	0.00	396.60	303.50
57	IISS, Mau	50.00	65.00	0.00	0.00	0.00	0.00	50.00	65.00
58	CAU, Imphal	13.60	13.60	0.00	0.00	0.00	0.00	13.60	13.60
59	DGR, Junagadh	336.76	183.15	0.00	0.00	0.00	0.00	336.76	183.15
60	IIMR, New Delhi	0.00	0.00	38.25	38.75	0.00	0.00	38.25	38.75
61	CIARI, Andaman	4.75	10.79	0.00	0.00	0.00	0.00	4.75	10.79
	Total ICAR Institute	**6479.54**	**7152.55**	**38.25**	**38.75**	**392.50**	**1191.20**	**6910.29**	**8382.50**
	Grand Total (SAU + ICAR)	**61210.54**	**64819.87**	**34836.99**	**36406.89**	**17819.51**	**22813.44**	**113867.04**	**124040.20**

Table 8: Crop-wise (total) anticipated breeder seed production during 2016-17

(Figures in quintals)

Crop	GOI		State		ICAR Seed Project		Total	
	Indent	Production	Indent	Production	Indent	Production	Indent	Production
CEREAL CROPS								
Rice	4149.87	4330.87	10150.99	11280.95	6146.74	5971.69	20447.60	21583.51
Wheat	18561.30	25211.08	11996.83	12380.78	5111.45	6379.57	35669.58	43971.43
Maize	66.39	80.96	222.90	230.09	25.48	46.04	314.77	357.09
Pearlmillet	2.01	20.23	3.64	8.92	0.35	1.39	6.00	30.54
Sorghum	67.02	82.16	1.29	6.47	273.98	839.09	342.29	927.72
Barley	360.85	388.50	113.00	120.40	357.00	415.40	830.85	924.30
Finger Millet	20.54	39.65	5.60	36.77	6.02	4.94	32.16	81.36
Foxtail Millet /Navane	0.36	0.36	0.66	4.16	0.92	0.95	1.94	5.47
Barnyard millet	0.88	0.50	1.00	1.00	1.91	2.01	3.79	3.51
Kodo millet	7.90	5.37	12.32	12.32	0.18	0.20	20.40	17.89
Littile Millet	0.00	0.00	6.67	6.67	1.32	0.96	7.99	7.63
Buckwheat	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
Amaranth	0.20	0.30	0.00	0.20	0.20	0.80	0.40	1.30
Proso millet	0.00	0.00	0.10	0.10	0.00	0.00	0.10	0.10
Total Cereal Crops	**23237.32**	**30159.98**	**22515.00**	**24088.83**	**11925.55**	**13663.14**	**57677.87**	**67911.95**
PULSE CROPS								
Chickpea	9553.85	11207.15	4074.75	4400.28	727.20	907.70	14355.80	16515.13
Pigeonpea	379.99	473.86	450.05	494.51	429.17	888.35	1259.21	1856.72
Field Pea	309.90	404.85	980.30	979.27	65.10	314.80	1355.30	1698.92
Mung	593.19	661.26	101.56	130.03	428.30	672.61	1123.05	1463.90
Urd	387.63	445.88	139.82	150.72	406.01	380.83	933.46	977.43
Lentil	224.60	304.05	255.60	240.28	252.60	199.33	732.80	743.66
Rajmash	32.30	37.50	14.50	17.70	2.50	7.33	49.30	62.53
Horse Gram	6.90	13.25	4.60	5.20	10.70	9.50	22.20	27.95
Beans	0.00	0.00	9.50	10.00	5.00	6.12	14.50	16.12
Cowpea	45.50	29.85	8.90	25.70	48.85	50.01	103.25	105.56
Lathyrus	83.60	97.00	0.50	1.00	29.00	50.00	113.10	148.00
Moth Bean	57.27	68.75	0.00	0.00	20.50	16.75	77.77	85.50
Guar/ Cluster bean	84.00	88.00	7.00	9.00	0.00	0.00	91.00	97.00
Total Pulse Crops	**11758.73**	**13831.40**	**6047.08**	**6463.69**	**2424.93**	**3503.33**	**20230.74**	**23798.42**
OILSEED CROPS								
Soybean	16149.95	10752.68	1401.25	1042.30	1563.10	3734.50	19114.30	15529.48
Sunflower	1.90	5.92	9.61	18.86	0.70	1.25	12.21	26.03
Groundnut	9231.77	9006.34	4205.68	4047.40	1461.00	1101.57	14898.45	14155.31
Linseed	21.65	66.13	330.15	331.60	12.95	63.17	364.75	460.90
Safflower	5.67	18.73	0.70	24.00	6.80	216.60	13.17	259.33
Sesame	13.05	10.24	32.20	36.33	7.02	6.67	52.27	53.24
Niger	4.05	1.60	22.20	19.20	4.25	7.22	30.50	28.02
Castor	9.63	16.92	22.72	39.56	61.29	52.65	93.64	109.13
Rapseed Mustard								
Mustard	48.46	87.06	42.54	52.52	22.50	19.30	113.50	158.88
Toria	8.80	19.08	0.00	0.00	26.70	40.75	35.50	59.83
Ghobi Sarson	1.70	8.20	0.10	0.80	0.15	0.10	1.95	9.10
Brown Sarson	0.15	0.15	1.20	1.50	0.15	0.15	1.50	1.80

Raya	8.93	12.05	8.85	17.75	0.10	0.10	17.88	29.90
Rai	13.28	16.63	0.00	0.00	35.00	80.17	48.28	96.80
Karan Rai	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05
Total Oilseed Crops	**25518.99**	**20021.73**	**6077.20**	**5631.82**	**3201.76**	**5324.25**	**34797.95**	**30977.80**
FIBRE CROPS								
Cotton	23.46	56.88	49.66	60.75	65.02	78.24	138.14	195.87
Jute	6.59	7.90	0.00	0.10	0.25	0.25	6.84	8.25
Mesta	0.50	1.70	0.00	0.00	0.40	0.40	0.90	2.10
Sunhemp	3.00	3.50	0.00	0.00	0.45	0.45	3.45	3.95
Total Fibre Crops	**33.55**	**69.98**	**49.66**	**60.85**	**66.12**	**79.34**	**149.33**	**210.17**
FORAGE CROPS								
Oats	312.25	350.50	136.00	146.00	33.50	53.50	481.75	550.00
Maize	68.15	71.00	0.00	0.00	10.00	18.00	78.15	89.00
Sorghum	23.62	18.96	1.00	1.05	2.00	3.75	26.62	23.76
Pearl Millet	0.55	2.00	1.05	4.05	0.25	0.06	1.85	6.11
Lucerne	0.30	1.00	0.00	0.00	0.00	1.50	0.30	2.50
Cowpea	38.10	29.76	1.50	1.50	0.00	3.00	39.60	34.26
Grain Cowpea	4.25	5.00	0.00	0.00	0.00	0.00	4.25	5.00
Berseem	35.58	48.10	7.00	7.00	0.10	2.75	42.68	57.85
Guar	179.15	210.46	0.60	1.00	155.00	160.27	334.75	371.73
Guinea Grass	0.00	0.00	0.30	0.30	0.00	0.00	0.30	0.30
Rey Grass	0.00	0.00	0.60	0.80	0.00	0.00	0.60	0.80
Stylo	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10
Setaria	0.00	0.00	0.00	0.00	0.10	0.25	0.10	0.25
Red Clover	0.00	0.00	0.00	0.00	0.10	0.20	0.10	0.20
Total Forage Crops	**661.95**	**736.78**	**148.05**	**161.70**	**201.15**	**243.38**	**1011.15**	**1141.86**
Grand Total	**61210.54**	**64819.86**	**34836.99**	**36406.89**	**17819.51**	**22813.44**	**113867.04**	**124040.20**

Revolving Fund and Single Window System

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ICAR

AICRP-NSP (Crops) Revolving Fund

Indian Council of Agricultural Research (ICAR) took firm steps as early as 1979-80 by launching AICRP-National Seed Project (Crops) and created as many as 41 Breeder Seed Production (BSP) units in almost all State Agricultural Universities and crop based ICAR institutes to cater to the requirement of breeder seeds in different crops. To support and strengthen breeder seed production programme, ICAR during VIII Plan has made provision of revolving fund with a policy of single window system for stringent compliance to avoid operational problem of recurring fund in the BSP centres. To make the system more efficient, vibrant, accountable and sustainable, fund provided under various heads of revolving funds were clubbed together and the centres were directed to make single account. Centres were instructed to operate single account of the fund and the Nodal Officers were entrusted with the responsibility of fund operation. The centres are instructed to undertake breeder seed production of the field crops. It is mentionable that profits earned by the centres may be ploughed back in the system for creation of infrastructure facilities to enhance the capability of BSP units.

Highlights

1. Revolving fund has made significant impact in enhancing breeder seed production in the country as a whole and subsequently strengthened the infrastructure facilities for breeder seed production.
2. GBPUAT, Pantnagar; JNKVV, Jabalpur; UAS, Dharwad; IGKV, Raipur; VNMKV, Parbhani; UAS. Bengaluru and ICAR-NRRI, Cuttack were rated as very good performing centres. Special mention need to be made of GBPUAT, Pantnagar which has recorded highest Cumulative profit (Table 1).
3. All the centres have refunded the revolving fund amount. Few centres have invested the profit obtained through the operation of revolving funds for infrastructure development in their respective centres.

Table 1: Utilization of revolving fund under AICRP-NSP (Crops) upto December 2016

(Rs. in lakhs)

	Centre	Amount sanctioned	Profit Made in 2015-16 & 2016-17 (upto Nov. 2016)	Profit utilized during 2015-16 & 2016-17	Remarks
1	SKUAT, Srinagar	4.00	0.20 (12.98)	5.93	Strengthening of infrastructure
2	CSKHPKV, Palampur	6.00	15.25 (109.13)	1.51	Purchase of farm equipments
3	PAU, Ludhiana	19.00	22.10 (124.15)	1.50	Purchase of seed, fertilizer etc.
4	CCSHAU, Hisar	17.00	4.37 (205.40)	15.40	Purchase of inputs
5	GBPUAT, Pantnagar	18.00	135.70 (1575.08)	4.75	Fencing, purchase of pump
6	NDUAT, Faizabad	10.00	50.33 (78.33)	55.10	Maintenance of seed godown
7	BHU, Varanasi	3.00	1.12 (39.50)	18.20	Profit utilized for strengthening of BSP
8	CSAUAT, Kanpur	17.00	0.41 (5.99)	0.29	Profits transferred to University RF
9	AAU, Jorhat	5.00	1.47 (27.12)	2.58	Strengthening BSP activity
10	BAU, Ranchi	9.00	-	-	Seed purchased, labourer payment

11	RPCAU, Dholi	10.00	26.67 (103.95)	35.97	Profit utilized for BSP programme.
12	OUAT, Bhubaneswar	13.00	0.78 (16.19)	0.25	Strengthening BSP programme
13	JAU, Jamnagar	2.70	0.16 (10.83)	0.27	-
14	AAU, Anand	1.55	- (39.64)	14.85	-
15	SKRAU, Bikaner	40.00	18.47 (244.08)	12.85	-
16	SDAU, S K Nagar	8.75	2.58 (115.54)	0.00	-
17	IGKV, Raipur	8.50	30.00 (301.06)	0.85	Profit procurement of screen sieves; repairing of implements etc.
18	PDKV, Akola	13.75	0.00 (189.34)	190.17	Credited in university RF account
19	JNKVV, Jabalpur	16.00	204.50 (1082.62)	39.04	Remittance to V.V.
20	MPKV, Rahuri	14.00	20.49 (46.50)	19.57	Strengthening of BSP
21	VNMKV, Parbhani	16.50	92.37 (336.46)	188.59	Purchase of inputs
22	UAS, Bengaluru	13.00	4.65 (350.79)	10.25	Purchase of farm equipments & installation of drip system
23	UAS, Dharwad	18.00	419.27 (1559.98)	219.77	-
24	PJTSAU, Hyderabad	18.00	0.00 (113.90)	0.00	-
25	TNAU, Coimbatore	15.00	73.58 (173.27)	59.08	Profit utilized for strengthening of seed production
26	KAU, Trichur	4.00	16.65 (48.46)	29.50	Seed infrastructure development
27	DBSKKV, Dapoli	4.00	33.25 (114.96)	5.74	profit utilized for purchase of machinery
28	VPKAS, Almora	4.50	1.28 (5.13)	3.85	-
29	IIPR, Kanpur	5.00	18.08 (37.54)	13.68	-
30	IGFRI, Jhansi	3.00	4.04 (3.93)	6.08	-
31	CRIJAF, Barrackpore	2.00	1.34 (9.15)	1.98	-
32	CAZRI, Jodhpur	3.00	0.71 (20.25)	0.51	-
33	NRRI, Cuttack	15.00	115.00 (359.58)	98.02	-
34	IIRR. Hyderabad	4.82	15.15 (77.18)	59.89	-
35	IIMR, Hyderabad	10.50	47.19 (89.76)	8.92	-
	Total	**372.57**	**1396.62 (7627.77)**	**1019.68**	

Note:

1. The values given in parenthesis represent cumulative profit made over the years.
2. All centres have returned the sanctioned amount to council & using single window system

Use of Single Window System

Operation of single window system (SWS) is a phenomenal success in all the centres. The system has helped in streamlining the breeder seed production programme distinctly.

Conclusions

Spectacular advancement made in breeder seed production in the cooperating centres countrywide and revolving fund played important role in improvising breeder seed production programme, however, there are some constraints like genetic purity, varietal mismatch and handling of almost 2000 varieties in the seed production chain is stupendous job. Somehow new varieties need to be incorporated and old varieties need to be phased out regularly through appropriate mechanism by DAC&FW.

Seed Production and Certification




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ICAR

A. Seed production and certification

Experiment 1 : Standardization of isolation distance for hybrid seed production of castor, cumin and wheat

Year of start : 2013-14

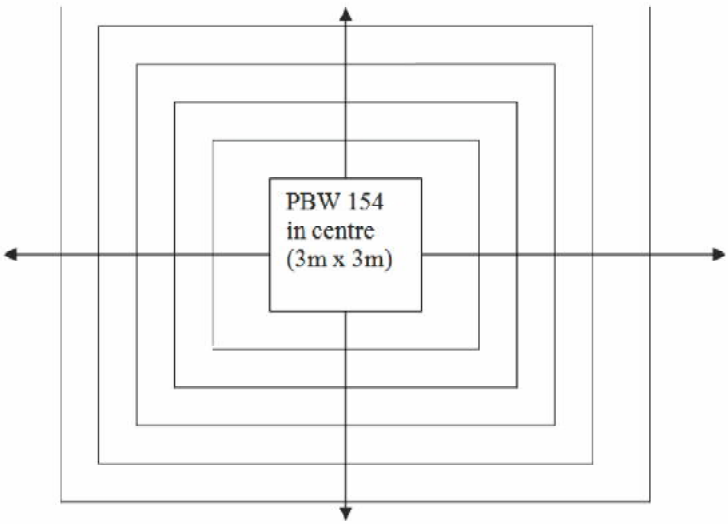
Crops	Centres
Wheat	IARI, New Delhi and JNKVV, Jabalpur
Castor	SDAU, SK Nagar and ICAR-IIOR, Hyderabad
Cumin	JAU, Jamnagar; CIMAP, Anand; AAU, Anand; SDAU, SK Nagar and MPKV, Rahuri

Objectives:

1. To determine isolation distance for hybrid seed production in wheat
2. To verify isolation distance of male parent for foundation seed production

Methodology: Cultivar with dominant morphological marker to be used as pollen parent/contaminator and to be surrounded on all four sides by the female parent with recessive trait, at different distances. PBW 154 to be grown in the centre; plot size of 3m x 3m; To be surrounded by any white glumed CMS line (as depicted in the diagram below); Different distances: 1m, 2m, 4m, 6m, 8m, 10m

Treatments: PBW 154; red glumed variety and any female/CMS line (of the respective centres) with white glume colour



Observations:

1. Evaluation of sterility in the female line by selfing
2. Recording pollen flow at different distances by hanging slides smeared with glycerine and estimating pollen at 10x magnification
3. Seed setting percentage to be recorded from all four directions, at all distances
4. Seed harvested from the female parent to be sown next year for final observation on glume colour.

JNKVV, Jabalpur

Evaluation of pollen flow (*Rabi* 2015-16):

The seed of tester (HD 2932, white glume) harvested from 1, 2, 4, 6, 8 and 10 m distances from contaminator at all the four directions (North, East, West and South) grown during *Rabi* 2015-16 were observed for out-crossing by counting the plants of red glume (Table 1). The investigation exhibited contamination on West side upto 6 m distance.

Table 1 : Evaluation of pollen flow at six distances at JNKVV, Jabalpur (2015-16)

Direction	Distance of tester from contaminator					
	1m	2m	4m	6m	8m	10m
West	√	√	√	√	-	-
East	-	-	-	-	-	-
North	-	-	-	-	-	-
South	-	-	-	-	-	-

Evaluation of pollen flow during (*Rabi* 2016-17):

The seed of contaminator PBW 154 (red glume) was sown at the centre, while variety HD 2932 (white glume) was sown as tester at 1, 2, 4, 6, 8 and 10 m distances from contaminator at all the four directions. The experiment is in the progress.

Field view of evaluation of pollen flow and isolation distances in wheat

(PBW 154) (red glume)

(HD 2932) (White glume)

Experiment 2 : **Seed quality, health, yield, storability as affected by pre-sowing seed priming treatments in Kabuli chickpea, Vegetable pea and lentil**

Objective :

1. Standardization of seed priming of Kabuli chickpea for assured field emergence.
2. Standardization of seed priming of field/vegetable pea for assured field emergence.
3. Seed priming of lentil to reduce seed rate with assured field emergence in utera system.

Crops	Centres
Kabuli Chickpea	PAU, Ludhiana, JNKVV, Jabalpur, UAS, Raichur, MPKV, Rahuri, SKRAU, Durgapura

Field pea CSAUA&T, Kanpur, JNKVV, Jabalpur, IISS, Mau, ICAR RC NEHR-Manipur Centre

Lentil JNKVV, Jabalpur, NDUA&T, Faizabad, ICAR RC NEHR-Manipur Centre

Year of start: 2014-15

Treatments:

1. Seed Priming with *Trichoderma harzianum* @ 1.5%
2. Seed Priming with Vitavax Power @ 0.25%
3. Seed Priming with Gibberelic acid @ 50ppm
4. Seed Priming with Gibberelic acid @ 50ppm + Seed coating with *T. harzianum* @ 15g/ kg seed
5. Seed Priming with Sodium Molybdate @ 500ppm
6. Seed Priming with Sodium Molybdate @ 500ppm+ Seed coating with *T. harzianum* @ 15g/ kg seed
7. Seed Priming with leaf extract of *Lantana camara* @ 10%
8. Seed hydration for 8h.
9. Chemical Check – Seed treatment with Bavistin @ 3g/ kg seed
10. Control

Kabuli Chickpea

PAU, Ludhiana

Results: *Kabuli* chickpea variety L552 was treated and sown in the first week of November in three replications. The mean seed yield was highest for seed primed with Bavistin (200 kg/acre) followed by seed priming with Vitavax power (154.1 kg/acre) and *T. harzianum* (133.33 kg/acre). No significant difference was found for number of seeds per pod but, number of pods per plant was again highest for seed primed with Vitavax power (22.3) followed by seed primed with Bavistin (21.7) and seed primed with *T. harzianum* (21.5). The seeds primed with Vitavax power had the highest test weight (28.1 g) followed by Bavistin (27.7 g) and *T. harzianum* (27.4 g). The highest germination percentage was found for Bavistin treated seeds (78.0%) followed by Vitavax power (74.5 %) and *T. harzianum* (62.0%). The incidence of Ascochyta blight and wilt was minimum (4.3% and 23% respectively) in plots where seed was treated with Bavistin followed by those where seed priming was done with Vitavax power (7.2% and 25.6% respectively) Table 2-4.

Table 2: Effect of pre-sowing seed priming treatments on seed quality parameters

Treatment	Germination (%)	Seedling Length (cm)	Seedling dry weight (g)	Moisture content (%)	Vigor index I
T_1	62.0	18.66	0.403	8.6	1156.92
T_2	74.5	20.88	0.414	8.3	1555.56
T_3	44.5	14.56	0.413	8.6	647.92
T_4	43.0	16.68	0.413	8.7	717.24
T_5	47.5	18.22	0.422	8.8	865.45
T_6	44.5	18.13	0.427	8.6	806.79

T_7	57.5	19.46	0.428	8.5	1118.95
T_8	45.0	21.8	0.383	8.7	981.00
T_9	78.0	23.01	0.482	8.9	1794.78
T_{10}	53.0	19.66	0.463	8.6	1041.98
CD (5%)	**7.1**	**5.5**	**0.03**	**0.27**	**52.0**
CV	**5.7**	**5.1**	**4.1**	**1.48**	**22.5**

Table 3: Effect of pre-sowing seed priming treatments on yield and yield attributes

Treatment	Pods per plant (No's)	Seeds per pod (No's)	100 seed weight (g)	Biological yield (kg/plot)	Seed yield (Kg/plot)	Seed yield (Kg/ha)	Harvest index
T_1	21.5	1.4	27.4	4.1	0.3	133.3	7.3
T_2	22.3	1.3	28.1	7.0	0.3	154.1	4.9
T_3	16.0	1.4	23.9	4.9	0.2	66.7	3.4
T_4	19.7	1.3	26.1	6.2	0.2	77.8	2.7
T_5	19.4	1.4	26.5	4.1	0.2	100.0	5.0
T_6	18.9	1.4	26.6	5.7	0.2	107.4	4.1
T_7	19.3	1.3	25.8	5.4	0.2	77.8	3.2
T_8	17.5	1.3	24.6	2.7	0.1	26.7	2.2
T_9	21.7	1.5	27.7	6.9	0.5	200.0	6.4
T_{10}	14.1	1.3	23.5	3.8	0.1	58.5	3.4
CD (5%)	**4.2**	**NS**	**2.0**	**1.2**	**0.1**	**51.7**	**2.0**
CV	**13.0**	**6.8**	**4.6**	**13.5**	**29.6**	**30.1**	**27.8**

Table 4: Effect of pre-sowing seed priming treatments on seed health

Treatment	Incidence of wilt (%)	Incidence of *Ascochyta* blight (%)
T_1	27.4	10.7
T_2	25.6	7.2
T_3	31.1	20.3
T_4	31.5	15.4
T_5	23.8	20.1
T_6	23.5	14.2
T_7	25.6	10.0
T_8	31.9	20.4
T_9	23.0	4.3
T_{10}	35.7	18.4
CD (5%)	**NS**	**NS**
CV	**18.1**	**72.9**

JNKVV, Jabalpur

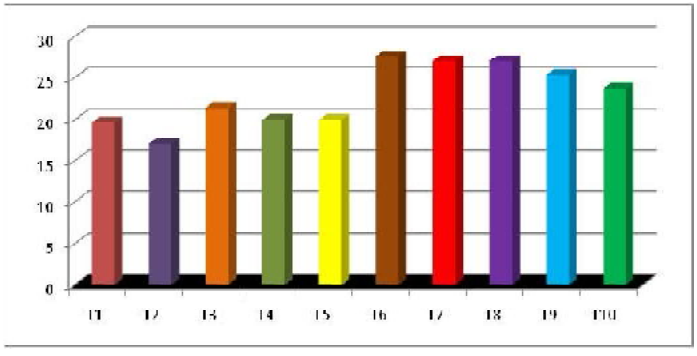
Results: Highest germination was observed in the seed treated with T_8 (leaf extract of *L. camara* @ 10%) among all the treatments, whereas higher root length was recorded in seed treated with T_5 (gibberellic acid @ 50 ppm + seed coating with *Trichoderma harzianum*@ 15 g/ kg of seed). The seed treated with T_3 (Vitavax power @ 0.25%) showed maximum shoot length and plant population whereas seed treated with T_9 (seed hydration for 8 hours) exhibited higher vigour index and nodules/ plant. Among all the treatment combinations, seed treated with T_8 (Leaf extract of *Lantana camara* @10%) found superior for germination percentage and major yield attributing traits followed by seed treated with T_6 (Sodium Molybdate @ 500ppm) Table 5-6.

Table 5: Effect of pre sowing seed priming treatments on seed quality and health of kabuli chickpea

Treatment	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index (length)	Plant pop. (%)	Nodules /plant	Incidence of root rot
T_1 (Control)	91.75	6.67	16.00	2080	24.00	15.00	0.33
T_2 (*Trichoderma harzianum*@ 1.5%)	85.50	6.40	17.43	2037	24.33	26.00	-
T_3 (Vitavax Power @0.25%)	91.50	8.00	19.33	2500	35.00	8.00	0.66
T_4 (GA@ 50 ppm)	93.50	7.23	17.27	2290	31.00	10.00	-
T_5 (GA+ *Trichoderma harzianum* @1.5%)	92.25	9.67	16.90	2451	18.33	11.00	0.66
T_6 (Sodium Molybdate @500ppm)	90.75	8.07	17.77	2314	22.66	4.00	0.33
T_7 (Sodium Molybdate + *T. harzianum)*	75.50	8.93	16.40	1912	15.66	6.00	0.66
T_8 (Leaf extract of *Lantana camara* @10%)	95.00	6.83	18.67	2422	20.00	13.00	0.33
T_9 (Seed hydration for 8 hours)	92.75	8.70	18.97	2566	23.66	30.00	-
T_{10} (Bavistin @3 g /kg seed)	94.50	8.80	16.03	2346	32.66	13.00	-
Sem ±	3.25	0.22	1.38	149.72	2.55	2.13	0.03
CD at 5%	6.83	0.48	2.89	314.56	5.35	4.48	0.07

Table 6: Effect of pre sowing seed priming treatments on seed quality and health of kabuli chickpea

Treatments	Biomass/ plant (g)	Pods/ plant	100 seed wt(g)	Seeds /pod	Seed yield/ plant (g)	Harvest index
T_1 (Control)	43.33	60.27	22.54	1.00	20.22	46.69
T_2 (*Trichoderma harzianum*@ 1.5%)	30.33	46.20	23.11	1.00	19.14	62.52
T_3 (Vitavax Power @0.25%)	40.00	56.53	22.67	1.00	20.40	50.73
T_4 (GA@ 50 ppm)	50.67	50.60	21.38	1.00	18.66	36.78
T_5 (GA+ *Trichoderma harzianum* @1.5%)	42.33	62.33	22.22	1.00	25.11	59.36
T_6 (Sodium Molybdate @500ppm)	53.33	80.53	24.40	1.00	26.73	50.20
T_7 (Sodium Molybdate + *T. harzianum)*	40.00	79.60	23.71	1.07	24.33	60.83
T_8 (Leaf extract of *Lantana camara* @10%)	55.00	80.40	23.69	1.00	27.80	50.49
T_9 (Seed hydration for 8 hours)	46.67	72.87	23.09	1.00	21.93	47.03
T_{10} (Bavistin @3 g /kg seed)	36.00	45.37	23.63	1.00	18.78	52.25
Sem ±	1.84	5.8	1.12	0.02	1.36	1.91
CD at 5%	3.87	12.1	2.36	0.04	2.87	4.01



Effect of Seed priming on yield of Kabuli Chickpea Var. JGK 2

Untreated Control | Leaf extract of *Lantana camara* @10% | Seed hydration for 8 hours

UAS, Raichur

Results: Among different seed priming treatments, kabuli chickpea/MNK-1 primed with GA_3 @ 50ppm + Seed coating with *Trichoderma harzianum* @15g/kg recorded highest seed quality parameters *viz*. germination (96.56%), root length (15.32cm), shoot length (9.47cm) and vigour index (2777). Highest seed yield (23.05q/ha) was recorded in the seeds treated with sprint (Carbendizium 12% + Mancozeb 63%) 3g/kg which is on par with gibberellic acid @ 50 ppm, gibberellic acid @ 50 ppm + Seed coating with *T. harzianum* @ 15 g / kg seed, Sodium Molybdate @ 500 ppm and Sodium Molybdate @ 500 ppm + Seed coating with *T. harzianum* @ 15 g / kg seed (Table 7-8).

Table 7: Effect of priming treatments on seed germination (%), shoot length (cm), root length (cm), vigour index and seed mycoflora (%)

Treat.	Germination (%)			Mean	Root length (cm)			Mean	Shoot length (cm)			Mean
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17		2014-15	2015-16	2016-17	
T_1	96.00	94.00	92.67	94.22	11.67	15.50	13.51	13.56	3.67	8.40	11.83	7.97
T_2	97.33	96.00	88.00	93.78	11.83	15.78	13.12	13.58	3.60	8.30	12.04	7.98
T_3	95.33	95.33	89.67	93.44	11.90	16.05	14.63	14.19	3.60	8.05	13.31	8.32
T_4	**98.00**	**97.00**	**94.67**	**96.56**	**14.03**	**16.34**	**15.60**	**15.32**	**4.30**	**9.80**	**14.31**	**9.47**
T_5	94.33	95.00	88.00	92.44	11.13	15.80	12.11	13.01	3.40	8.05	11.21	7.55
T_6	97.33	96.50	93.33	95.72	13.73	16.14	14.91	14.93	4.17	8.90	13.13	8.73
T_7	96.67	94.33	89.33	93.44	12.13	16.00	13.91	14.01	4.10	8.07	12.91	8.36
T_8	96.00	94.33	88.00	92.78	11.40	15.38	13.64	13.47	3.60	8.02	12.54	8.05
T_9	94.67	94.00	87.33	92.00	12.83	16.07	14.28	14.39	3.67	8.52	12.60	8.26
T_{10}	97.33	96.67	90.00	94.67	13.17	16.32	13.67	14.39	4.10	8.63	12.99	8.57
T_{11}	94.00	93.00	86.67	91.22	10.87	15.28	9.79	11.98	3.40	8.00	9.10	6.83
Mean	96.09	95.11	89.79	93.66	12.25	16	13.56	13.94	3.78	8.00	12.36	8.05
SEm±	0.93	0.18	1.16	2.07	0.36	0.07	0.9	1.14	0.16	0.41	0.75	2.51
CD (0.01)	3.69	0.53	3.38	8.26	1.42	0.22	2.62	4.54	0.64	1.24	2.19	9.99

Treat.	Vigour Index-I			Mean	*Aspergillus niger* (%)			Mean	*Aspergillus flavus* (%)			Mean
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17		2014-15	2015-16	2016-17	
T_1	1471	2247	3607	2442	2.00	2.00	1.47	1.82	1.67	1.67	1.37	1.57
T_2	1502	2312	3370	2395	1.00	1.20	1.33	1.18	0.00	0.62	0.67	0.43
T_3	1477	2297	3840	2538	0.33	2.03	2.37	1.58	0.00	1.45	1.63	1.03
T_4	**1796**	**2536**	**3999**	**2777**	0.00	1.78	1.50	1.09	0.00	1.28	1.27	0.85
T_5	1371	2266	3114	2250	3.00	4.20	4.20	3.80	1.33	1.33	1.21	1.29
T_6	1742	2416	3841	2666	1.00	3.50	3.33	2.61	0.00	1.50	1.27	0.92
T_7	1569	2271	3638	2493	2.33	2.33	2.21	2.29	0.00	1.82	1.43	1.08
T_8	1440	2207	3592	2413	2.33	2.33	2.00	2.22	0.67	0.67	0.60	0.65
T_9	1562	2311	3749	2541	2.67	0.97	0.93	1.52	0.00	0.50	0.37	0.29
T_{10}	1681	2412	3814	2636	3.67	0.65	0.67	1.66	0.00	0.30	0.30	0.20
T_{11}	1341	2165	2487	1998	**7.67**	**7.67**	**6.67**	**7.34**	**2.33**	**2.33**	**1.80**	**2.15**
Mean	1541	2313	3550	2442	2.36	2.61	2.43	1.82	0.55	1.22	1.08	0.95
SEm±	37.07	42	190	595.62	0.97	0.17	0.40	0.52	0.56	0.11	0.15	0.32
CD (0.01)	108.21	126	555	2374.34	3.86	0.57	1.59	2.09	NS	0.34	0.59	0.92

Table 8: Effect of priming treatments on wilt incidence, number of root nodules/plant, number of pods/plant, plant biomass, seed yield/plot, seed yield/ha and test weight

Treatments	No. of root nodules/plant			Mean	Wilt incidence (%)			Mean	No. of pods/plant			Mean
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17		2014-15	2015-16	2016-17	
T_1	11.67	10.67	11.00	11.11	3.00	3.20	0.67	2.29	30.67	30.33	27.30	29.43
T_2	10.67	11.67	9.00	10.45	4.33	4.33	0.33	3.00	30.00	30.00	27.53	29.18
T_3	13.00	13.00	8.00	11.33	5.33	5.33	0.67	3.78	32.00	30.51	28.70	30.40
T_4	14.17	13.67	11.00	12.95	5.00	5.00	2.00	4.00	**33.33**	**33.00**	**30.13**	**32.15**[a]
T_5	12.33	12.67	14.00	13.00	6.00	6.00	4.33	5.44	29.33	29.33	28.13	28.93
T_6	**16.33**	**15.33**	**16.33**	**16.00**[a]	4.33	4.33	1.00	3.22	32.33	31.82	29.00	31.05
T_7	10.00	10.33	7.00	9.11	8.33	8.33	1.33	6.00	29.00	30.33	27.67	29.00
T_8	10.67	10.00	9.67	10.11	6.33	6.33	2.67	5.11	30.00	30.00	27.10	29.03
T_9	11.00	10.33	9.00	10.11	3.00	3.00	1.00	2.33	30.67	31.33	27.33	29.78
T_{10}	12.67	11.67	13.00	12.45	1.67	1.67	0.33	1.22	31.67	31.93	28.27	30.62
T_{11}	9.00	9.33	7.00	8.44	**9.33**	**9.33**	**5.67**	8.11[a]	27.33	28.67	26.27	27.42
Mean	**11.95**	**11.70**	**10.45**	**11.37**	**5.15**	**5.17**	**1.82**	**4.05**	**30.58**	**30.65**	**27.95**	**29.73**
SEm±	0.55	0.59	0.82	0.69	0.92	0.45	0.92	0.53	0.67	0.44	1.26	0.35
CD (0.05)	1.61	1.74	2.39	2.02	2.68	1.35	2.69	1.57	1.96	1.31	3.72	1.03

Treatments	Test weight (g)			Mean	Seed yield (q/ha)			Mean
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17	
T_1	52.83	52.50	49.30	51.54	23.74	17.35	17.44	19.51
T_2	52.27	52.83	50.32	51.81	20.97	16.75	17.47	18.40
T_3	53.00	53.50	51.45	52.65[a]	25.76	17.77	18.27	20.60[a]
T_4	**55.57**	**54.67**	**51.97**	**54.07**[a]	30.44	18.59	18.43	22.49[a]
T_5	54.10	53.00	50.45	52.52[a]	21.74	16.54	17.99	18.76
T_6	55.07	54.00	51.66	53.58[a]	29.56	18.39	18.40	22.12[a]
T_7	51.03	52.33	48.95	50.77	20.10	17.56	17.56	18.41
T_8	52.08	50.17	47.75	50.00	21.21	17.10	17.38	18.56
T_9	53.73	50.67	48.90	51.10	22.68	17.97	17.44	19.36[a]
T_{10}	54.40	53.17	50.91	52.83[a]	**31.90**	**18.69**	**18.55**	**23.05**[a]
T_{11}	46.97	50.33	48.37	48.56	16.53	16.11	17.28	16.64
Mean	**52.82**	**52.47**	**50.00**	**51.76**	**24.06**	**17.53**	**17.84**	**19.81**
SEm±	0.59	0.40	0.46	0.59	2.67	25	0.38	1.42
CD (0.05)	2.35	0.60	1.36	1.73	7.79	75	1.11	4.09

MPKV, Rahuri

Results: The pre-sowing seed priming treatment had significant effect on field emergence, root nodulation, seed quality parameters. Seed priming with Vitavax power @ 0.25% (T_2) recorded significantly higher field emergence (91.87 %), higher number of root nodules per plant (25.11) Table 9-10. Seed priming with Vitavax power @ 0.25% (T_2) recorded significantly higher germination (93%), root shoot length (29.10 cm) and vigour index I (2595.54). Seed priming with Vitavax power @ 0.25% (T_2) recorded significantly lower incidence of wilt (4.00%). Seed priming with Vitavax power @ 0.25% (T_2) recorded significantly higher number of pods/ plant (115.80), seed yield (2.268 kg/plot) and seed yield (1889.99 kg/ha).

Table 9: Effect of pre-sowing seed priming treatments on seed yield of kabuli Chickpea

Treatments/ Traits	Field emergence (%)	Incidence of wilt (%)	No. of root nodules	No. of pods/ plant	Seed yield/plot (kg)	Seed yield/ha (kg)	Biomass yield/plot (kg)
Seed priming with *Trichoderma harzianum* @1.5% (T_1)	89.17 (71.02)	6.00	22.44	99.53	1.624.	1353.60	2133.32
Seed priming with Vitavax powder @0.25% (T_2)	91.87 (73.76)	4.00	25.11	115.80	2.268	1889.99	2361.10
Seed priming with Gibberellic acid @ 500 ppm (T_3)	83.53 (66.39)	7.67	20.22	86.60	1. 494	1245.27	1944.43
Seed priming with Gibberellic acid @ 50 ppm + seed coating with *Trichoderma harzianum* @15g/kg (T_4)	80.10 (63.56)	4.67	24.77	99.60	1.780	1483.05	2222.21
Seed priming with Sodium Molybdate @ 500 ppm (T_5)	77.20 (61.52)	9.67	21.66	95.67	1.525	1270.55	2216.66
Seed priming with Sodium Molybdate @ 500 ppm+ seed coating with *Trichoderma harzianum* @15g/kg (T_6)	83.03 (66.28)	7. 33	25.00	113.33	2.074	1728.05	2374.99
Seed priming with leaf extract of *Lantana camara* @ 10% (T_7)	79. 83 (63.31)	9.00	18.11	86.80	1.445	1204. 44	2336.10
Seed hydration for 8 hrs and dried upto original M.C. (12%) (T_8)	73.03 (58.70)	9.67	20.78	94.53	1.505	1253.88	2294.43
Seed treatment with Bavistin @ 3g/kg seed (T_9)	77.50 (61.71)	8.00	21.22	93.13	1.520	1266.94	2419. 43
Control (T_{10})	72.67 (58.48)	11. 33	16.56	79.33	1.422	1184.72	2172.21
SE ±	**1.849**	**0.869**	**1.77**	**6.47**	**0.076**	**63.22**	**137.06**
CD at 5%	**5.537**	**2.600**	**5.29**	**19.36**	**0.227**	**189.29**	**NS**

Figures in parenthesis are Arc sine transformed values

Table 10: Effect of pre-sowing seed priming treatment on seed quality in kabuli chickpea

Treatments/ Traits	100 seed weight (g)	Germination (%)	Root shoot length	Dry matter content (g)	Vigour index I	Vigour index II
Seed priming with *Trichoderma harzianum* @1.5% (T_1)	29. 39	86.00 (68.03)	22. 33	2.32	1922. 33	200.03
Seed priming with Vitavax power @0.25% (T_2)	29.92	93.00 (74.71)	29.10	2.50	2706.90	232.50
Seed priming with Gibberellic acid @ 50 ppm (T_3)	29.73	88.00 (69.75)	29.00	2.32	2553. 33	204.43
Seed priming with Gibberellic acid @ 50 ppm + seed coating with *Trichoderma harzianum* @15g/kg (T_4)	29.47	87.00 (68.91)	27.87	2.30	2423. 37	200.87
Seed priming with Sodium Molybdate @ 500 ppm (T_5)	29.75	86.00 (68.03)	28.23	2.47	2427.73	212.43

Seed priming with Sodium Molybdate @ 500 ppm+ seed coating with *Trichoderma harzianum* @15g/kg (T_6)	30.17	89.00 (70.61)	27.87	2.14	2481.20	190.93
Seed priming with leaf extract of *Lantana camara* @ 10% (T_7)	27.85	88.67 (70.41)	27.97	2.07	2480.67	183.77
Seed hydration for 8 hrs and dried upto original M.C. (12%) (T_8)	29.85	88. 33 (70.07)	27.75	2.08	2451.65	184.03
Seed treatment with Bavistin @ 3g/kg seed (T_9)	28.07	87.00 (68.91)	23.60	2.36	2053.60	205.67
Control (T_{10})	28.53	85. 33 (67.46)	21. 33	2.06	1820.73	176.03
SE ±	**0.907**	**1.102**	**0.944**	**0.111**	**95.67**	**10.64**
CD at 5%	**NS**	**3.275**	**2.804**	**NS**	**284.21**	**NS**

Figures in parenthesis are Arc sine transformed values

Dr. PDKV, Akola

Results: The seeds of chickpea (PKV Kabuli-2) were subjected to different seed priming treatments before sowing. The observations were recorded in laboratory on seed quality parameters and the same treated seed was grown in field during *Rabi* 2016-17. The data on field and seed quality of 2015-16 trial were recorded and present in table 10 and 11. All the seed priming treatments were significantly superior than control for major yield attributing traits and seed quality parameters. Among all the treatments, T_6 (Seed Primed with Sodium Molybdate and coated with *Trichoderma harzianum*) was significantly superior in root nodulation/ plant (25), no. of pods/plant (38.33), seed yield (15.58 qha^{1}), seed germination (92 %) and vigour index (33.42) Table 11-12.

Table 11: Effect of seed priming on seed quality parameters before sowing

Treatments	Germination (%)	Seedling length (cm)	Seedling dry weight (g)	Vigour Index (GP X SDW)
T_1	82.66	16.4	0.35	28.93
T_2	83.00	16.00	0.33	27.38
T_3	81.00	18.10	0.32	26.19
T_4	82.66	19.70	0.32	27.00
T_5	82.00	17.00	0.32	26.51
T_6	84.33	19.40	0.35	29.51
T_7	79.00	17.00	0.31	24.75
T_8	82.66	18.70	0.32	27.00
T_9	82.33	16.20	0.32	26.62
T_{10}	78.00	14.20	0.27	21.05
SE(m)±	**0.53**	**0.37**	**0.01**	**0.52**
CD@5%	**1.57**	**1.12**	**0.02**	**1.54**

STRU field- Chickpea

Table 12: Effect of seed priming on seed yield and seed quality parameters of chickpea

Treatments	No. of root nodules/ Plant	Days to maturity	No. of pods/ plant	100 seed weight (g)	Seed yield/ha (q/ha)	Germination (%)	Seedling length (cm)	Seedling dry weight (g)	Moisture content (%)	Vigour Index-II
T_1	19.33	97.66	28.33	38.40	11.50	89.00	19.34	0.35	9.4	31.74
T_2	18.66	98.00	33.33	38.20	14.27	91.00	19.42	0.31	9.8	28.81
T_3	17.00	99.66	33.00	38.30	12.58	90.33	18.60	0.36	9.5	33.12
T_4	22.33	99.00	35.66	38.49	14.91	91.00	19.40	0.36	9.9	33.06
T_5	20.00	97.00	34.33	38.18	13.82	89.66	19.30	0.36	9.6	32.28
T_6	25.00	97.33	38.33	38.65	15.58	92.00	19.96	0.36	9.8	33.42
T_7	15.00	98.00	30.33	38.20	12.17	91.00	18.40	0.32	9.7	29.72
T_8	16.66	96.66	32.00	38.11	13.71	90.33	19.32	0.37	10.0	33.41
T_9	20.66	102.00	30.66	38.40	14.33	90.66	19.84	0.35	9.7	32.33
T_{10}	14.33	102.66	25.00	38.01	8.47	87.00	19.80	0.35	9.7	30.45
SE(m)±	**0.71**	**0.38**	**0.47**	**0.40**	**0.48**	**0.66**	**0.31**	**0.01**	**0.11**	**0.43**
CD@5%	**2.12**	**1.15**	**1.41**	**1.20**	**1.43**	**1.98**	**0.93**	**0.02**	**0.33**	**1.28**

Field Pea

CSAUA&T, Kanpur

Results: Significantly higher seed quality in terms of germination (94.00%), SVI-I (1378.98) and SVI-II (158.82) were recorded in T_6 treatment *i.e.* Sodium molybdate @ 500 ppm+ *T. harzianum* coated seeds. Significantly highest root nodules/plant was observed in seeds primed with sodium molybdate @ 500 ppm (T_5) followed by chemical check (T_9) and non primed (T_0) seeds *i.e.* 45.50, 43.67 and 43.17 respectively (Table 13). It may be concluded from the perusal of the results of 2015-16 that T_6 i.e. Seed priming with Sodium molybdate @ 500 ppm+ Seed coating with *T. harzianum* @ 15 g/kg exhibited best result in terms of germination, shoot length, seedling dry weight, SVI-I, SVI-II and root nodules/plant as well as yield q/h followed by T_5.

Table 13: Effect of pre-sowing seed priming treatments on seed quality of field pea at Kanpur (2015-16)

Seed Priming Treatments	Seed Germination (%)	Root length (cm)	Shoot length (cm)	Seedling dry weight (g)	SVI-I	SVI-II	Root nodules/ plant
Control (T_0)	87.00	6.90	6.79	1.50	1191.03	130.50	43.17
Trichderma harzianum @ 1.5% (T_1)	88.00	6.36	6.47	1.38	1129.04	121.44	39.92
Vitavax @ 0.25% (T_2)	90.00	6.36	6.47	1.38	1175.40	127.80	41.00
GA_3 @ 50 ppm (T_3)	91.00	6.70	6.88	1.54	1235.78	140.14	23.50
GA_3 @ 50 ppm+ *T. harzianum* @ 15 g/kg (T_4)	94.00	6.60	7.71	1.57	134.14	147.58	20.33
Sodium molybdate @ 500 ppm (T_5)	93.00	6.73	7.70	1.63	1341.99	151.59	45.50
Sodium molybdate @ 500 ppm + *T. harzianum* (T_6)	94.00	6.88	7.79	1.69	1378.98	158.86	39.42
Lantana camara @ 10% (T_7)	90.00	6.70	7.01	1.45	1233.90	130.50	38.08
Hydration 8 hrs (T_8)	90.00	6.60	7.54	1.53	1272.60	137.70	35.08
Chemical check Bavistin @ 3 g/kg (T_9)	91.00	6.62	7.38	1.52	1274.00	138.32	43.67
SEm(±)	**0.24**	**0.01**	**0.01**	**0.003**	**2.49**	**0.26**	**0.89**
CD 5%	**0.77**	**0.04**	**0.03**	**0.008**	**7.40**	**0.82**	**2.60**

Note: No incidence of Wilt/Root/*Ascochyta* Blight

JNKVV, Jabalpur

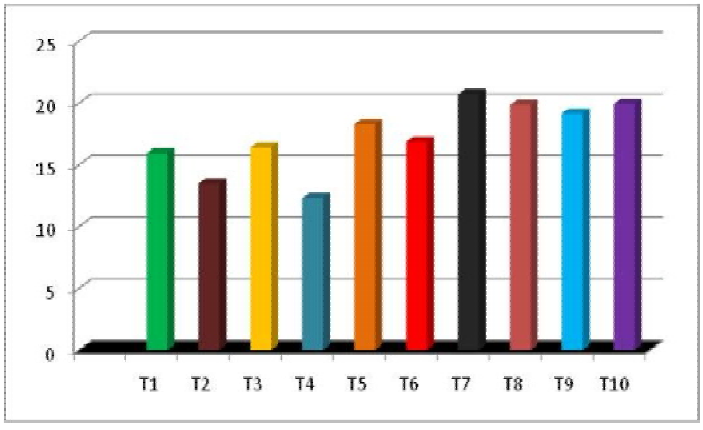
Results: The present investigation revealed that among all the treatment combinations, seed treated with T_6 (Sodium Molybdate @500ppm) followed by T_7 (sodium molybdate + *Trichoderma harzianum*) found superior for germination percentage and major yield attributing traits (Table 14-15).

Table 14: Effect of pre-sowing seed priming treatments on seed quality and health of field pea at JNKVV, Jabalpur

Treatment	Ger. (%)	Root length (cm)	Shoot length (cm)	Vigour index (length)	Plant pop (%)	Nodules /plant	Incidence of root rot
T_1 (Control)	88.50	10.17	21.17	2772	20.00	61.00	Nil
T_2 (*Trichoderma harzianum*@ 1.5%)	95.25	7.87	16.40	2302	20.66	50.67	Nil
T_3 (Vitavax Power @0.25%)	93.50	7.47	16.87	2274	32.33	28.33	Nil
T_4 (GA @ 50 ppm)	90.00	9.73	40.67	4529	21.33	35.00	Nil
T_5 (GA+ *Trichoderma harzianum* @1.5%)	94.75	9.27	26.40	3379	18.66	17.00	Nil
T_6 (Sodium Molybdate @500ppm)	93.00	10.33	16.67	2511	16.33	26.67	Nil
T_7 (Sodium Molybdate + *T. harzianum)*	90.50	9.67	17.83	2488	19.33	18.67	Nil
T_8 (Leaf Extract of *Lantana camara* @10%)	94.50	8.60	14.93	2223	23.33	19.33	Nil
T_9 (Seed hydration for 8 hours)	90.75	8.33	19.83	2556	25.00	52.33	Nil
T_{10} (Bavistin @3g /kg seed)	94.00	11.20	18.97	2836	28.66	45.33	Nil
Sem ±	1.90	0.40	2.03	191.13	2.55	1.71	Nil
CD at 5%	4.00	0.85	4.27	401.56	5.37	3.55	Nil

Table 15: Effect of pre-sowing seed priming treatments on seed quality and health of field pea at JNKVV, Jabalpur

Treatments	Biomass/ plant (g)	Pods/plant	100 seed wt (g)	Seeds/ pod	Seed yield/ plant (g)	Harvest index
T_1 (Control)	33.00	19.61	16.62	5.77	13.58	41.30
T_2 (*Trichoderma harzianum* @ 1.5%)	28.33	30.01	17.98	6.00	14.85	52.45
T_3 (Vitavax Power @0.25%)	30.33	26.02	17.73	5.66	13.06	43.05
T_4 (GA @ 50 ppm)	33.67	16.55	17.58	5.33	16.17	48.14
T_5 (GA+ *Trichoderma harzianum* @1.5%)	32.67	18.03	18.84	5.55	15.62	47.74
T_6 (Sodium Molybdate @500ppm)	30.67	32.50	17.49	5.33	20.46	66.68
T_7 (Sodium Molybdate + *T. harzianum)*	30.00	16.21	17.64	5.44	18.06	60.25
T_8 (Leaf Extract of *Lantana camara* @10%)	36.33	18.23	16.95	6.33	17.73	48.83
T_9 (Seed hydration for 8 hours)	27.33	15.67	17.49	6.00	15.67	57.36
T_{10} (Bavistin @3 g /kg seed)	32.00	14.27	17.98	5.33	12.94	40.48
Sem ±	**1.09**	**0.65**	**0.82**	**0.18**	**0.49**	**1.04**
CD at 5%	**2.29**	**1.36**	**1.72**	**0.38**	**1.03**	**2.19**



Effect of Seed priming on yield & yield attributes of field pea variety Arkle

Untreated Control

Vitavax Power @0.25%

Leaf extract of *Lantana camara* @10%

Lentil

JNKVV, Jabalpur

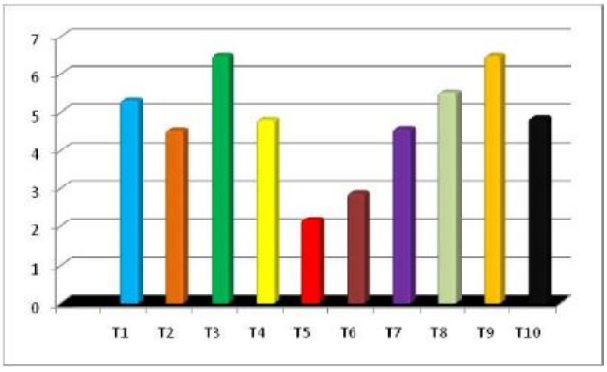
Results: Higher shoot length, root length and vigour index were observed in seed treated with T_5 (Gibberellic acid @ 50 ppm + seed coating with *Trichoderma harzianum* @ 15 g/ kg of seed). Maximum plant population and nodules/ plant observed in the seed treated with T_4 (GA_3@ 50ppm). Seed treated with T_8 (leaf extract of *L. camara* @ 10%) showed highest germination. Among all the treatment combinations, seed priming with T_8 (Leaf extract of *Lantana camara* @ 10%) followed by T_6 (Sodium Molybdate @ 500ppm) found superior for germination percentage and major yield attributing traits viz., no. of pods/plant, no. of seeds/ pod, seed yield/ plant, 100 seed weight and harvest index (Table 16-17).

Table 16: Effect of pre-sowing seed priming treatments on seed quality and health of lentil at JNKVV, Jabalpur

Treatment	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index (length)	Plant pop. (%)	Nodules/ plant	Incidence of root rot
T_1 (Control)	84.00	7.60	10.23	1515	97.33	7.00	8.33
T_2 (*Trichoderma harzianum*@ 1.5%)	80.67	5.80	8.53	1132	82.33	6.67	9.66
T_3 (Vitavax Power @0.25%)	83.50	7.90	8.10	1336	73.33	5.00	1.33
T_4 (GA @ 50 ppm)	78.00	6.83	15.20	1773	122.66	7.67	5.00
T_5 (GA+ *Trichoderma harzianum* @1.5%)	81.00	9.00	21.50	2470	90.00	5.00	5.66
T_6 (Sodium Molybdate @500ppm)	82.50	5.23	9.43	1210	84.66	6.67	11.66
T_7 (Sodium Molybdate + *T. harzianum)*	84.60	6.47	7.70	1218	88.66	4.00	10.33
T_8 (Leaf Extract of *Lantana camara* @10%)	87.50	4.77	7.73	1093	91.66	2.00	10.33
T_9 (Seed hydration for 8 hours)	84.50	5.83	8.73	1231	86.33	2.33	8.33
T_{10} (Bavistin @3g /kg seed)	84.67	7.00	8.67	1269	112.33	4.67	8.66
Sem ±	2.32	0.29	0.71	70.89	14.06	0.77	0.51
CD at 5%	4.88	0.61	1.49	148.94	29.53	1.62	1.08

Table 17: Effect of pre sowing seed priming treatments on seed quality and health of lentil at JNKVV, Jabalpur

Treatments	Biomass/plant (g)	Pods/plant	100 seed wt (g)	Seeds/pod	Seed yield/ plant (g)	Harvest index
T_1 (Control)	16.00	82.00	2.24	1.13	4.37	27.68
T_2 (*Trichoderma harzianum*@ 1.5%)	14.00	85.67	2.40	1.00	6.32	45.12
T_3 (Vitavax Power @0.25%)	13.33	87.67	2.52	1.00	5.66	44.08
T_4 (GA @ 50 ppm)	10.67	86.08	2.36	1.00	4.56	42.97
T_5 (GA+ *Trichoderma harzianum* @1.5%)	12.00	95.20	3.18	1.00	5.28	44.64
T_6 (Sodium Molybdate @500ppm)	12.27	100.73	2.46	1.00	5.98	49.37
T_7 (Sodium Molybdate + *T. harzianum)*	14.67	62.53	2.74	1.00	5.46	37.56
T_8 (Leaf Extract of *Lantana camara* @10%)	14.00	105.27	2.40	1.00	7.52	54.15
T_9 (Seed hydration for 8 hours)	12.00	108.20	2.02	1.00	5.11	43.11
T_{10} (Bavistin @3 g /kg seed)	14.00	112.67	2.46	1.00	4.21	30.37
Sem ±	1.05	21.44	0.26	0.04	0.19	3.07
CD at 5%	2.22	45.05	0.55	0.08	0.40	6.45



Effect of Seed priming on yield & yield components of Lentil variety JL 3

Untreated Control | **Leaf Extract of *Lantana camara* @10%** | **Seed hydration for 8 hours**

NDUAT, Faizabad

Results: The experiment was conducted on lentil cv. NDL 1 as per technical programme during *Rabi* 2015-16. The primed seeds exhibited faster rate of germination, more uniform emergence, higher nodulation, reduced dormancy, greater tolerance to environmental stresses and thus finally enhanced the seed yield. Among all the treatments, lentil seeds primed with sodium molybdate @ 500 ppm combined with seed coating with *T. harzianum* @ 15 g/kg has showed higher seed quality and yield. These seed priming treatments could therefore be exploited commercially leading to yield improvement in lentil even under *Utera* condition (Table 18).

Table 18: Effect of seed priming treatments on seed enhancement in lentil cv. NDL 1 under *Utera* condition

Treatment	Ger. (%)	Vigour index	Seed yield (q/ha)	Nodules/ plant	Incidence of Root rot
Trichoderma harzianum @ 1.5 g/kg seed	80.00	1774	14.74	8.24	-
Vitavax Power @ 0.25%	85.00	1870	16.63	9.47	-
GA_3 @ 50ppm	80.00	2040	14.84	8.96	-
GA_3 + *T. harzianum*	81.00	2089	14.92	8.34	-
Sodium molybdate @ 500ppm	80.00	2008	15.52	14.20	-
Sodium molybdate +*Trichoderma harzianum*	82.00	2075	16.34	14.32	-
leaf extract of *Lantana camara* @10%	80.00	1765	14.65	8.69	-
Hydration (8 hrs)	82.00	1976	16.24	9.53	-
Bavistin @ 3g/kg seed	81.00	1936	15.81	9.50	-
Control (without seed priming)	70.00	1466	11.37	5.76	Trace
CD (5%)	**5.95**	**175**	**3.16**	**5.23**	**-**

Experiment 3 : **Validation of UTLIEF based genetic purity as an acceptable tool to ascertain genetic purity in certified seeds**

Objective : The goal is to validate proof of concept of Protein based genetic purity diagnostic system as an accurate tool to ascertain genetic purity in a short time.

Hybrid Rice

TNAU, Coimbatore

Experimental details: Hybrid rice - KRH4; Number of Lots: 6; Replication: 4; No. of plants per replication: 800

Grow Out Test Field of KRH4 rice hybrid lots conducted at TNAU, Coimbatore

Results: The lot 1, 5 and 6 recorded the genetic purity of 99.62% with the impurity percentage of 0.37. Lot 3 recorded the genetic purity of 99.50% with the impurity percentage of 0.500. The lot 2 recorded the genetic purity percentage of 99.75 with the impurity percentage of 0.25. The lot 4 recorded the genetic purity percentage of 99.87 with the impurity percentage of 0.12 as given below.

Lots	Number of variants	Genetic purity (%)	Impurity (%)
Lot 1	3/800	99.63	0.38
Lot 2	2/800	99.75	0.25
Lot 3	4/800	99.50	0.50
Lot 4	1/800	99.88	0.13
Lot 5	3/800	99.63	0.38
Lot 6	3/800	99.63	0.38

JNKVV, Jabalpur

Experimental details: Hybrid rice - KRH4; Number of Lots: 6; Replication: 4; No. of plants per replication: 800

Results: The variation found in lots in respect of the leaf colour, plant height, panicle exertion, sterility, awning, pigmentation and grain type. The number of off-types found in each seed lot and observations of off-type presented in following table. Careful examination of the test sample indicated that out of six lots, only one lot is meeting the minimum seed certification standerds for genetic purity (>98.00%) (Table 19-20).

Table 19: Morphological characters of KRH 4 and expression of off-types

S. No.	Characteristics	Authentic expression	Expression of off-types
Plant level			
1.	Pigmentation	No pigmentation on any part	Pigmentation in spikelet
2.	Plant height	Mean 102 cm	Short 70-80 cm
3.	Ligule shape	Two cleft	-
4.	Ligule length	Medium	-
5.	Panicle type	Compact	-
6.	Node base colour	Pale green	-
7.	Flag leaf angle	Erect	-
8.	No. of tillers per plant	14	-
9.	No. of panicle per m^2	568	-
10.	Flowering duration	95	Late (115)
11.	Panicle exsertion	Fully exserted	Mostly exserted
12.	Awning	Awnless	Present
13.	Apiculus colour	Green	Purple
Seed level			
1.	Kernel colour	White	-
2.	Grain type	Long slender	Medium bold, short bold
3.	Kernel length (mm)	6.58	-
4.	Kernel breadth	2.27	-
5.	L/B ratio	2.91	-
6.	Kernel appearance	Translucent	-

Table 20: Number of off-types found in each seed lot and purity percentage

Seed lot	No. of offtype detected using GOT	Genetic purity %	Impurity %
Lot 1	32	98.40	1.60
Lot 2	48	97.60	2.40
Lot 3	97	95.15	4.85
Lot 4	98	95.10	4.90
Lot 5	91	95.45	4.55
Lot 6	63	96.85	3.15

Authentic sample of KRH 4

KRH 4 & off-type plant in terms of plant height

KRH 4 & off-type plant in terms of panicle exertion

KRH 4 & off-type plant in terms of leaf colour

KRH 4 & off-type plant in terms of sterility

Expression of off-type plant in terms of grain type

KRH 4 & off-type plant in terms of awning

KRH 4 & off-type plant in terms of pigmentation in grain (on tip and whole grain)

Hybrid Sorghum

MPKV, Rahuri

Experimental details: Sorghum **Hybrid:** CSH-14; 03 lots- minimum 300 grams each.

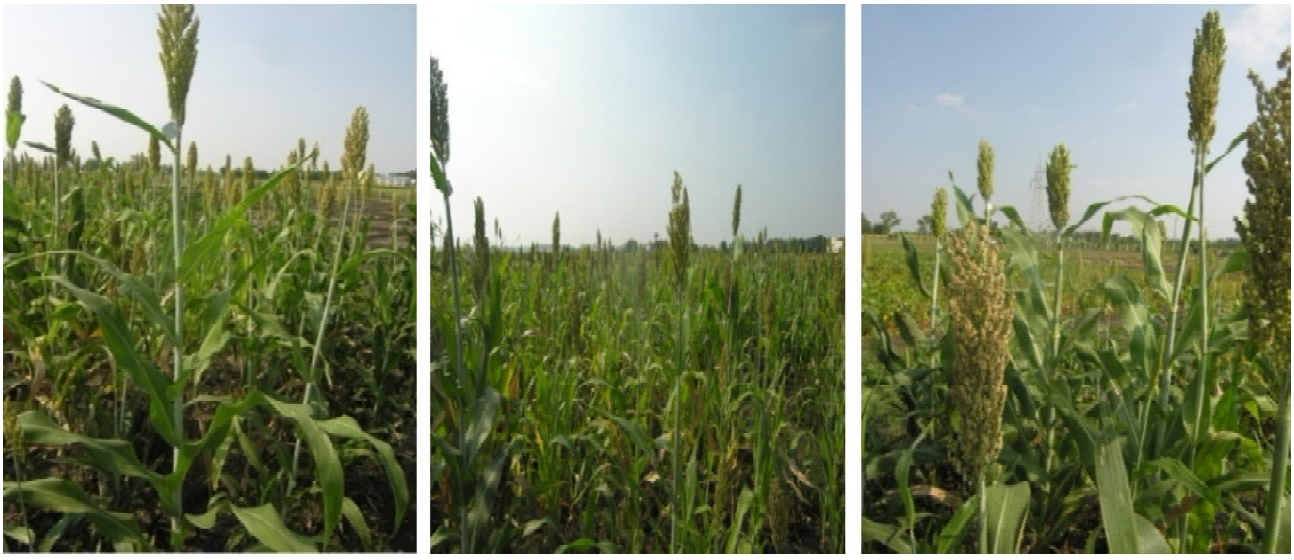
Treatment details

1. Plot size : 4 x 4 m^2
2. Spacing : 45 x 15 cm
3. Date of sowing : 27.07.2016
4. Fertilizer dose : 100:50:50 N:P:K kg/ha
5. No. of plants per plot : 100
6. Replication : Three

Results: Genetic purity was determined on the basis of observations made on plant morphological characters as per DUS guidelines with reference to authentic samples. The variations were observed in lots in respect of panicle emergence, neck of panicle and panicle shape (Table 21).

Table 21: Morphological character as per DUS guidelines: Sorghum- CSH 14

S. No.	Characteristics	Remarks	Observations of off-types
1	Seedling: anthocyanin colouration of Coleoptile	Grey purple	-
2	Leaf Sheath: anthocyanin Colouration	Grey purple	-
3	Leaf: midrib colour (5th fully developed leaf)	Yellow green	-
4	Plant: Time of panicle emergence (50% of the plants with 50% anthesis)	Early (56-65 days)	L. No. 2367 (2) L. No. 2368 (2) Late
5	Plant: natural height of plant up to base of flag leaf	Short (76-150 cm)	L. No. 2366 (3) L. No. 2367 (1) L. No. 2368 (1) Medium
6	Flag leaf: Yellow colouration of midrib	Absent	-
7	Lemma: arista formation	Absent	-
8	Stigma: anthocyanin colouration	Present	-
9	Stigma: Yellow colouration	Present	-
10	Stigma: length	Medium	-
11	Flower with pedicel : length of flower	Long	-
12	Anther: Length	Short	-
13	Anther: colour of dry anther	Grey orange	-
14	Glume : colour	Grey orange	-
15	Plant: total height	Medium (151-225 cm)	-
16	Stem : diameter (at lower one third height of plant)	Small (<2 cm)	-
17	Leaf: length of blade (the third leaf from top including flag leaf)	Long (61-80 cm)	-
18	Leaf: width of blade (the third leaf from top including flag leaf)	Very broad (>8.0 cm)	-
19	Panicle : length without peduncle	Medium (21-30 cm)	LNo.2366 (1) Long 37 cm
20	Panicle : length of branches (middle third of panicle)	Medium (5.1-10 cm)	-
21	Panicle : density at maturity (ear head compactness)	Semi loose	-
22	Panicle : shape	Symmetric	LNo.2366 (4) PBU L.No.2367 (1) PBU
23	Neck of panicle : visible length above sheath	Medium (10.1-15 cm)	L. No. 2367 (1) Absent/Very short
24	Glume : length	Short	-
25	Threshability	Partly threshable	-
26	Caryopsis : color after threshing	Yellow white	-
27	Grain : weight of 1000 grains	Medium (26-35 g)	-
28	Grain: shape (in dorsal view)	Circular	-
29	Grain: shape in profile view	Circular	-
30	Grain: size of mark of germ	Medium	-
31	Grain: texture of endosperm (in longitudinal section)	Half vitreous	-
32	Grain: colour of vitreous albumen	Grey yellow	-
33	Grain : luster	Lustrous	-



Off-types observed

PDKV, Akola

Results: The seed sample of 4 seed lots of sorghum hybrid CSH-14 along with authentic sample and their parental lines were grown to estimate the genetic purity (Table 22-23).

Table 22: DUS characters of Sorghum hybrid CSH-14

Characteristics	L1	L2	L3	L4	AKMS-14 (A)	AKR-150 (R)
Seedling: anthocyanin colouration of Coleoptile	Grey purple	Grey purple	Grey purple	Grey purple	Grey purple	Grey purple
Leaf Sheath: anthocyanin Colouration	Grey purple	Grey purple	Grey purple	Grey purple	Grey purple	Grey purple
Leaf: midrib colour (5th fully developed leaf)	Yellow green	Yellow green	Yellow green	Yellow green	Yellow green	Yellow green
Plant: Time of panicle emergence (50% of the plants with 50% anthesis)	Early	Early	Early	Early	Early	Early
Plant: natural height of plant up to base of flag leaf	Short	Short	Short	Short	Short	Short
Flag leaf: Yellow colouration of midrib	Absent	Absent	Absent	Absent	Absent	Absent
Lemma: arista formation	Absent	Absent	Absent	Absent	Absent	Absent
Stigma: anthocyanin colouration	Present	Present	Present	Present	Present	Present
Stigma: Yellow colouration	Present	Present	Present	Present	Present	Present
Stigma: length	Medium	Medium	Medium	Medium	Medium	Medium
Flower with pedicel : length of flower	Long	Long	Long	Long	Long	Long
Anther: Length	Short	Short	Short	Short	Short	Short
Anther: colour of dry anther	Grey orange	Grey orange	Grey orange	Grey orange	Grey orange	Grey orange
Glume : colour	Grey orange	Grey orange	Grey orange	Grey orange	Grey orange	Grey orange
Plant: total height	Medium	Medium	Medium	Medium	Medium	Medium
Stem : diameter (at lower one third height of plant)	Small	Small	Small	Small	Small	Small
Leaf: length of blade (the third leaf from top including flag leaf)	Long	Long	Long	Long	Long	Long

Leaf: width of blade(the third leaf from top including flag leaf)	Very broad	Very broad	Very broad	Very broad	Very broad	Very broad
Panicle : length without peduncle	Medium	Medium	Medium	Medium	Medium	Medium
Panicle : length of branches (middle third of panicle)	Medium	Medium	Medium	Medium	Medium	Medium
Panicle : density at maturity (ear head compactness)	Semi loose	Semi loose	Semi loose	Semi loose	Semi loose	Semi loose
Panicle : shape	Symmetric	Symmetric	Symmetric	Symmetric	Symmetric	Symmetric
Neck of panicle : visible length above sheath	Medium	Medium	Medium	Medium	Medium	Medium
Glume : length	Short	Short	Short	Short	Short	Short
Threshability	Partly threshable	Partly threshable	Partly threshable	Partly threshable	Partly threshable	Partly threshable
Caryopsis : color after threshing	Yellow white	Yellow white	Yellow white	Yellow white	Yellow white	Yellow white
Grain : weight of 1000 grains	Medium	Medium	Medium	Medium	Medium	Medium
Grain: shape (in dorsal view)	Circular	Circular	Circular	Circular	Circular	Circular
Grain: shape in profile view	Circular	Circular	Circular	Circular	Circular	Circular
Grain: size of mark of germ	Medium	Medium	Medium	Medium	Medium	Medium
Grain: texture of endosperm (in longitudinal section)	Half vitreous	Half vitreous	Half vitreous	Half vitreous	Half vitreous	Half vitreous
Grain: colour of vitreous albumen	Grey yellow	Grey yellow	Grey yellow	Grey yellow	Grey yellow	Grey yellow
Grain : lustre	Lustrous	Lustrous	Lustrous	Lustrous	Lustrous	Lustrous

Table 23: Total plant population, Number of off-type and Genetic Purity percentage in Sorghum hybrid CSH-14

Lot No.	Plant Population	No. of off type	Genetic Purity (%)
L1	396	4	98.00
L2	392	8	96.00
L3	393	7	96.25
L4	382	0	100
AKMS-14 (A)	392	0	100
AKR-150 (R)	390	0	100

Hybrid Sunflower

UAS, Raichur

Experimental details: Design: RCBD; Replication: 4; Treatments /Lots: 10; Hybrid: KBSH -53;

Results: Among the ten lots of sunflower hybrid KBSH-53 tested, all ten seed lots recorded prescribed genetic purity (>95%).

Lot. No.	Off-types			Genetic Purity (%)
	Sterile plants (%)	Multi head (%)	Total	
1	0.0019	0.0269	0.0288	99.97
2	0.0000	0.0267	0.0267	99.97
3	0.0017	0.0213	0.0230	99.98
4	0.0041	0.0242	0.0283	99.97
5	0.0020	0.0179	0.0199	99.98
6	0.0042	0.0839	0.0881	99.91
7	0.0008	0.0540	0.0548	99.95
8	0.0010	0.0455	0.0465	99.95
9	0.0000	0.0333	0.0333	99.97
10	0.0020	0.0328	0.0348	99.97
CD@5%	1.07	9.99	0.04	0.04
SEm	0.37	3.44	0.01	0.01

General view of the experimental plot

Experiment 4 : Recognition of seed film coating polymers for efficient and health friendly seed treatment operations for certified seeds of cereals and legumes

Objective: The Seed Certification agencies in India do not allow any polymer treatments in Certified Seeds. However, the benefits of polymer coating are known in terms of zero dust off, saving the chemicals, eco-friendly seed treatment, and efficient release of chemicals to the root zones. So, this project wishes to demonstrate the *already known* benefits of film coating polymers with a goal to validate use of polymers for approval by the Seed Certification Agencies to accept the polymer treatments.

Methodology -basic plan: treatment matrix.

Crop	Variety/ Hybrid	Treatments	Centre
Rice	MTU 1010	No treatment or water + Thiram only	TNAU, Coimbatore; PJTSAU, Hyderabad; PAJANCOA&RI, Karaikal; NDUAT, Faizabad
		Polymer (DISCO AG SP RED L-200) + Thiram+Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	
Wheat	GW322- central India HD 2967 Northern India	No treatment or water + Thiram only	JNKVV, Jabalpur; PAU, Ludhiana; CCSHAU, Hisar; GBPUAT, Pantnagar
		Polymer (DISCO AG SP RED L-200) + Thiram+Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	
Maize	Hema	No treatment or water + Thiram only	PJTSAU, Hyderabad; UAS, Bangalore; RAU, Dholi
		Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	

Sorghum	CSH 14	No treatment or water + Thiram only	MAU, Parbhani; PDKV, Akola
		Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	
Pigeonpea	Asha	No treatment or water + Thiram only	PJTSAU, Hyderabad; CSAUAT, Kanpur
		Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	
Soybean	JS 335 (or available variety)	No treatment or water + Thiram only	UAS, Dharwad; JNKVV, Jabalpur; MPKV, Rahuri; IISR, Indore; UAS, Raichur; PJTSAU, Hyderabad; HPKV, Palampur
		Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin	
		Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	
		Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots / mycorrhiza	

Treatments: 5; Replications: Four; Plot size: 5 m x 5 m

Observations:

1. Lab germination (Viability) tests at 2 month interval (7 readings)
2. Vigour rating in laboratory (vigour index) and in field
3. Field emergence % (early (30 days) and late (50 days)
4. Plant height at vegetative (30 days) and at flowering.
5. Disease pest incidence scores
6. Final plant stand at maturity
7. Yield attributing characters Crop wise
   - **a.** **Sorghum:** Plant height, Days to flowering, Days to 50% flowering, Days to maturity, Panicle length, number of primary branches per panicle, number of grains per panicle, 100 grain weight, Seed setting percentage, grain yield per plant, harvest index
   - **b.** **Rice:** Plant height, Days to flowering, Days to 50% flowering, Days to maturity, internode length, Panicle length, number of branches per panicle, number of grains per panicle, Seed setting percentage, 100 seed weight and seed yield per plant, harvest index
   - **c.** **Maize:** Plant height, Days to flowering, Days to 50% flowering, Days to silking, days to maturity, internode length, Cob length, girth of the cob, Cob weight, Seeds per cob, 100 seed weight and seed yield per plant, harvest index

d. **Pigeonpea:** Plant height, Number of primary branches per plant, secondary branches per plant, Days to maturity, No. of pods per plant, days to maturity, seeds per pod, seeds per plant, 100 seed weight and seed yield per plant, harvest index

e. **Soybean:** Plant height, Number of primary branches per plant, days to 50 per cent flowering number of pods per plant, 100 seed weight, Grain yield per plant and harvest index.

8. **Seed storability studies:** Seed germination, Seed vigour and viability parameters

Rice

TNAU, Coimbatore

Results: (Storage studies)-The treated seeds along with untreated seeds stored in polythene pouches were analyzed bimonthly for its quality parameters and the results revealed that the seeds recorded the normal deterioration pattern in rice.

1. Seeds treated with Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat recorded the highest germination of 95 % after four months of storage.
2. The seeds treated with Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxine recorded the maximum shoot length (13.3 cm) after four months of storage. The seeds treated with Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ mycorrhiza recorded the maximum root length of 18.7 cm after 4 months of storage.
3. The treatment with Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ mycorrhiza recorded the higher vigour index (3015) compared to the control (2874) after 120 days of storage.

Field experiment: In the field experiment, the seed treatment with Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ mycorrhiza recorded significantly higher values in all parameters studied. This treatment recorded the maximum values in the seed yield attributing characters like plant height (102.52 cm), internode length (20.1 cm), number of tillers (19.0) , panicle length (25.9 cm), number of seeds per panicle (178.8) , root fresh weight (75.06 g), single plant yield (41.4 g), plot yield (7745 g) and resultant seed germination, shoot length, root length and vigour index. It is followed by the seeds treated with Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat, which are on par (Table 24-25).

Field view

Treatment effect on root growth

Table 24: Effect of film coating polymers on seed quality of treated seeds in rice var. MTU 1010 in storage

Treatments	Germination (%)			Shoot length (cm)			Root length (cm)			Vigour index		
	Initial	60 days	120 days	Initial	60 days	120 days	Initial	60 days	120 days	Initial	60 days	120 days
No treatment or water+thiram only	96	94	93	13.2	12.8	12.6	18.6	18.3	18.1	3069	2930	2874
Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxine	97	95	94	13.8	13.5	13.3	18.9	18.5	18.3	3178	3056	2996
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	97	95	94	13.4	13.2	13.1	18.6	18.3	18.2	3117	3011	2970
Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ mycorrhiza	97	95	95	13.5	13.3	13.1	19.2	18.9	18.7	3152	3078	3015
Mean	97	95	94	13.48	13.20	13.03	18.83	18.50	18.33	3129	3019	2963
	P	T	PXT	P	T	PXT	P	T	PXT	P	T	PXT
SEd	0.63	0.52	0.44	0.33	0.43	0.25	0.72	0.54	0.42	21	18	16
CD(P=0.05)	1.28	1.06	0.89	0.67	0.87	0.51	1.46	1.10	0.85	42	36	32

Table 25: Effect of film coating polymers on plant, productive characters and resultant seed quality in rice var.MTU 1010

Treatments	Plant height (cm)	Internode length (cm)	Number of tillers	Panicle length (cm)	Number of branches per panicle	Number of seeds per panicle	100 seed weight (gm)	Root fresh weight (gm)	Single plant yield (g)	Plot yield (g)	Ger. (%)	Shoot length (cm)	Root length (cm)	Vigour index
No treatment or water + thiram only	98.12	19.2	14.4	24.5	8	172.80	2.813	53.85	34.5	6890	98.6	13.52	18.34	3141
Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxine	98.18	19.3	15.0	24.5	8	175.40	2.831	57.28	35.7	7325	98.4	13.58	18.58	3165
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	101.06	19.8	15.0	25.9	8	176.00	2.863	63.94	39.8	7510	98.4	13.78	18.54	3180
Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ mycorrhiza	102.52	20.1	19.0	25.9	8	178.80	2.876	75.06	41.4	7745	98.6	13.54	18.74	3183
Mean	99.97	19.6	15.9	25.2	8	175.75	2.846	62.53	37.9	7368	98.5	13.61	18.55	3167
SEd	3.10	1.14	4.59	1.20	1.26	1.04	0.11	4.06	5.78	72	0.42	0.28	0.21	45.06
CD(P=0.05)	6.40	2.30	8.28	2.44	2.58	2.26	0.22	8.31	12.22	148	0.92	0.61	0.47	98.17

PAJANCOA&RI, Karaikal

Results: Results revealed that significant differences were observed in seed yield and yield contributing components *viz*. root length (cm), field emergence at 30 DAS, seedling length at vegetative (cm) , no. of tillers/ hill, number of productive tillers / hill, 100 seed weight (g), seed yield/ plant & seed yield/ plot in all the polymer seed treatments over control. Significantly longer roots (15.76 cm) were observed in seeds treated with Polymer (DISCO AG SPRED L-200)+ Thiram + Quick roots / Mycorrhiza. Among the three polymer coating seed treatments, T_3 (4.56 kg/plot) was on par with T_1 (4.31 kg/plot) & T_2 (4.29 kg/plot) recorded higher seed yield than untreated control. The higher seed yield in polymer based seed treatments might be due to more number of productive tillers / hill (Table 26-29).

Experimental materials

Field trial on seed film coating polymers in paddy cv. MTU 1010

Table 26: Effect of seed filmcoating polymers on seed yield and yield components in paddy cv. MTU 1010 at PAJANCOA & RI, Karaikal

Parameters	Treatments					SEd.	CD (5%)
	T_0	T_1	T_2	T_3	Mean		
Seed moisture content (%)	8.6	9.0	8.9	8.9	8.85	NS	
Seed germination (%)	94	95	95	92	93.75	NS	
Root length (cm)	23.07	25.56	23.73	24.07	24.11	0.743	1.618
Shoot length (cm)	9.65	10.78	10.23	10.50	10.29	NS	
Dry weight of seedlings (g/10 seedlings)	0.150	0.158	0.152	0.154	0.153	NS	
Vigour index I	30375	3433	3225	3165	3224	NS	
Vigour index II	14.07	14.88	14.39	14.11	14.36	NS	
Field emergence at 30 DAS	90	95	80	83	86.88	3.129	7.079
Field emergence at 50 DAS	81	80	75	79	78.38	NS	
Plant height at vegetative(cm)	41.29	34.80	42.08	38.09	39.07	1.930	3.960
Root dry weight at vegetative (g)	0.066	0.066	0.087	0.080	0.075	NS	
Shoot dry weight at vegetative (g)	0.284	0.212	0.284	0.264	0.262	NS	
Root length at vegetative (cm)	12.57	10.61	12.43	**15.76**	12.84	1.505	3.088
BLB disease incidence (Scale)	1.4	1.0	1.4	1.4	1.3	NS	
Insect infestation-Stem borer (Scale)	4.0	5.4	6.6	5.8	5.6	NS	
Insect infestation-Leaf folder (Scale)	3.8	3.8	3.4	3.4	3.6	NS	

Table 27: Effect of seed filmcoating polymers on seed yield and yield components in paddy cv. MTU 1010 at PAJANCOA & RI, Karaikal

Parameters	Treatments					SEd.	CD (P=0.05)
	T_0	T_1	T_2	T_3	Mean		
Plant height (cm) at flowering	90.47	86.18	90.36	88.68	88.92	NS	
Days to 50 % flowering (%)	75.6	76.0	76.2	75.8	76.05	NS	
Plant population at maturity	24.4	27.4	26.8	27.0	26.40	NS	
Internode length at maturity (cm)	14.3	13.6	14.2	13.8	13.99	NS	
No. of tillers/hill	14.6	15.8	13.2	**17.6**	15.30	0.872	1.890
No. of productive tillers/hill	13.2	14.8	13.0	**16.6**	14.50	0.862	1.879
Panicle length (cm)	19.1	18.6	19.7	19.3	19.14	NS	
No. of branches/panicle	7.1	6.9	7.2	6.9	7.02	NS	
No. of seeds/panicle	68.9	66.2	71.5	65.2	67.96	NS	
Seed setting (%)	84.0	84.4	86.7	85.0	85.01	NS	
100 seed weight (g)	2.457	2.539	2.492	2.505	2.498	0.025	0.055
Seed yield/hill (g)	16.515	20.406	19.472	**21.145**	19.384	0.991	2.159
Seed yield/plot (kg)	4.13	4.31	4.29	**4.56**	4.323	0.129	0.281

Table 28: Effect of seed film coating polymers on seed storability in paddy cv. MTU 1010 at PAJANCOA& RI, Karaikal

Treatments	Seed moisture content (%)				Seed germination (%)				Shoot length (cm)				Root length (cm)			
	Initial	2	4	Mean	Initial	2	4	Mean	Initial	2	4	Mean	Initial	2	4	Mean
T_0	8.6	9.7	11.0	**9.8**	94	92	90	**92**	9.65	10.35	10.57	**10.20**	23.07	22.89	24.22	**23.39**
T_1	9.0	10.1	11.2	**10.1**	95	94	96	**95**	10.78	10.69	11.76	**11.07**	25.56	23.83	21.75	**23.51**
T_2	8.9	9.9	11.1	**10.0**	95	95	96	**95**	10.23	10.38	11.96	**10.86**	23.73	23.45	22.54	**23.24**
T_3	8.9	9.9	11.1	**10.0**	92	96	95	**94**	10.50	10.70	11.99	**11.06**	24.07	22.62	23.03	**23.58**
Mean	**8.6**	**9.9**	**11.1**		**94**	**94**	**94**		**10.29**	**10.54**	**11.57**		**24.11**	**23.30**	**22.88**	
	Analyzed by seed moisture meter				**T**	**P**	**T x P**					**T**	**P**	**T x P**		**T**
SEd.					NS	NS	NS		0.245	0.215	NS		NS	NS	NS	
CD (P=0.05)									0.503	0.435						

Table 29: Effect of seed film coating polymers on seed storability in paddy cv. MTU 1010 at PAJANCOA& RI, Karaikal

Treatments	Dry weight of seedlings (g/10 seedlings)				Vigour index I				Vigour index II			
	Initial	2	4	Mean	Initial	2	4	Mean	Initial	2	4	Mean
T_0	0.150	0.160	0.159	**0.156**	3073	3061	2894	**3009**	14.07	14.66	14.26	14.33
T_1	0.158	0.166	0.159	**0.161**	3433	3172	3218	**3274**	14.88	15.54	15.29	15.24
T_2	0.152	0.164	0.164	**0.160**	3225	3215	3313	**3251**	14.39	15.34	15.70	15.21
T_3	0.154	0.161	0.160	**0.159**	3165	3294	3307	**3255**	14.11	15.48	15.14	**14.91**
Mean	0.153	0.163	0.161		**3224**	**3185**	**3183**		**14.36**	**15.30**	**15.10**	
	T	**P**	**T x P**		**T**	**P**	**T x P**		**T**	**P**	**T x P**	
SEd.	NS	0.002	NS		70.72	NS	NS		0.256	0.222	NS	
CD (P=0.05)		0.004			143.45				0.519	0.449		

NDUAT, Faizabad

Results: The observations recorded showed that the polymer coated treatments were superior in comparison to control in rice cv. MTU 1010. It is therefore concluded that the benefit of film coating polymers could be recommended for the approval of Seed Certification Agencies (Table 30).

Table 30: Performance of seed film coating polymers in rice cv. MTU 1010 during *Kharif* , 2017

Treat ment	Days to 50% flowering	Final plant stand at maturity	Panicle length (cm)	Number of grains / panicle	Seed Setting (%)	100 seed weight (g)	Seed yield (q/ha)
T_1	86	395	21.72	205	98.56	2.17	42.47
T_2	90	445	23.32	245	99.75	2.26	48.34
T_3	91	452	23.51	252	99.89	2.27	50.15
T_4	90	450	23.39	249	99.73	2.27	49.25
CD(5%)	**2.25**	**23.54**	**1.12**	**22.78**	**NS**	**NS**	**4.32**

T_1: No treatment or Water+ Thiram only, T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine, T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat and T_4: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/mycorrhiza

ICAR RC NEHR, Manipur

Results: In rice variety MTU 1010, significant differences among the treatments were found for all the characters studied. Among the treatments, T_2 (polymer DISCO AG SP RED L-200) + thiram+ genius coat has the better performance compared to other treatments (Table 31).

Rice variety MTU 1010

Table 31: Growth and yield studies of Rice (MTU 1010) as influenced by different treatments

Treatments	Plant height 30 Days (cm)	Panicle Length (cm)	Tiller Number Per Plant	Number of Branches Per Panicle	Number of Grains Per Panicle	Number of Panicles Per Plant	Grain Yield (t/ha)	100 Seed Weight (gm)
T_0	81.40	24.58	10.55	9.20	127.22	10.55	7.55	2.38
T_1	80.55	24.13	10.15	9.20	134.86	9.95	7.61	2.21
T_2	79.13	24.28	10.90	9.45	135.77	10.55	7.97	2.39
T_3	83.50	24.75	10.35	9.25	130.43	10.15	7.65	2.29
S.E.(d) ±	**2.469**	**0.317**	**0.672**	**0.344**	**9.67**	**0.697**	**0.951**	**0.072**
C.D. at (5%)	**5.585**	**0.718**	**1.520**	**0.778**	**21.87**	**1.576**	**2.152**	**0.163**

Treatments	Germination (%)	Vigour Index	Germination % (After Two Months)	Vigour Index (After Two Months)	Seed Setting %
T_0	93.00	3.17	87.00	2.90	66.28
T_1	98.00	3.14	90.00	3.11	75.22
T_2	99.00	3.22	91.00	3.06	76.20
T_3	96.00	3.16	94.00	3.26	72.68
S.E.(d) ±	**1.70**	**0.195**	**3.916**	**0.158**	**2.492**
C.D. at (5%)	**3.84**	**0.440**	**8.858**	**0.358**	**5.637**

Wheat

PAU, Ludhiana

Results: The germination percentage was found to be significantly different among the treatments for seed stored at ambient conditions 2 MAS, 4 MAS, 6 MAS, 8 MAS, 10 MAS and 12 MAS. Although the % moisture content was non-significant among the treatments, but over the period of storage on an average the seed had imbibed 1% moisture. The analysis of data revealed that none of the treatments differed significantly from control for any of the yield and yield contributing traits (Table 32-39).

Table 32: Effect of seed film coating polymer treatments on treated wheat seeds at time of receipt

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	96.0	25.6	72	11.8	2460.5
T_2	93.0	26.8	70	11.3	2495.2
T_3	95.0	25.7	76	11.8	2443.4
T_4	92.5	26.1	77	11.4	2418.0
CD (5%)	**2.0**	**NS**	**1.8**	**NS**	**NS**
CV	**2.5**	**2.9**	**2.8**	**0.3**	**10.1**

Table 33: Effect of seed film coating polymer treatments on treated wheat seeds after 2 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	95.5	22.5	72	11.8	2148.8
T_2	93.0	26.0	72	11.3	2418.0
T_3	93.5	25.9	76	11.9	2417.0
T_4	91.0	25.3	76	11.3	2302.3
CD (5%)	**1.5**	**2.3**	**2.0**	**NS**	**102.2**
CV	**0.7**	**0.2**	**2.4**	**0.3**	**10.6**

Table 34: Effect of seed film coating polymer treatments on treated wheat seeds after 4 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	94.0	27.5	70	11.8	2585.0
T_2	93.5	29.5	72	11.4	2758.3
T_3	92.0	25.4	76	11.9	2336.8
T_4	91.0	28.3	74	11.3	2575.3
CD (5%)	**2.0**	**2.8**	**3.0**	**NS**	**110.2**
CV	**2.8**	**0.5**	**2.8**	**0.2**	**15.2**

Table 35: Effect of seed film coating polymer treatments on treated wheat seeds after 6 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	91.0	29.4	70	11.8	2673.1
T_2	92.5	27.3	70	11.3	2523.4
T_3	93.5	27.3	72	11.8	2549.3
T_4	88.0	27.4	70	11.3	2411.6
CD (5%)	**2.5**	**NS**	**NS**	**NS**	**201.0**
CV	**1.5**	**1.2**	**0.8**	**0.14**	**11.0**

Table 36: Effect of seed film coating polymer treatments on treated wheat seeds after 8 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	92.0	27.4	68	12	2520.8
T_2	92.5	25.2	70	11.9	2331.0
T_3	92.5	27.1	70	11.8	2506.8
T_4	87.5	27.4	68	12	2397.5
CD (5%)	**2.0**	**1.2**	**1.8**	**NS**	**150.8**
CV	**2.1**	**2.0**	**1.9**	**0.4**	**8.8**

Table 37: Effect of seed film coating polymer treatments on treated wheat seeds after 10 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	91	25.8	68	12.1	2347.8
T_2	93	24.8	70	12.4	2306.4
T_3	90.5	25.5	68	12.2	2307.8
T_4	87.5	25.3	66	12.4	2213.8
CD (5%)	**1.8**	**NS**	**NS**	**NS**	**NS**
CV	**2.7**	**0.6**	**3.0**	**0.5**	**7.0**

Table 38: Effect of seed film coating polymer treatments on treated wheat seeds after 12 months of storage

Treatment	Germination (%)	Seedling length (cm)	Field emergence (%)	Moisture content (%)	Vigor index I
T_1	90.5	25.5	66	12.0	2307.8
T_2	92.5	26.1	68	12.1	2414.3
T_3	90.5	25.8	66	12.4	2334.9
T_4	87.5	25.3	66	12.4	2213.8
CD (5%)	**2.2**	**NS**	**NS**	**NS**	**155.8**
CV	**1.7**	**5.0**	**0.1**	**2.0**	**13.0**

Table 39: Influence of seed film coating polymers on seed yield and its component traits on wheat

Treat.	Tillers per plant (No's)	Spikelet (No's)	Seeds per tiller (No's)	100 seed weight (g)	Plant height (cm)	Seed yield (Kg/ plot)	Seed yield (Kg/ acre)	Biological yield (kg/plot)	Harvest index	Disease incidence score
T_1	5.8	15.5	46.4	14.9	92.6	16.0	2279.1	37.3	43.1	20 S (YR)
T_2	6.3	15.6	46.1	14.4	92.5	17.0	2414.2	39.2	43.4	20 S (YR)
T_3	6.5	15.9	47.1	15.4	92.5	17.2	2446.2	38.9	44.3	20 S (YR)
T_4	6.2	15.9	45.4	13.9	92.5	16.0	2272.0	35.7	44.8	40 S (YR)
CD (5%)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	-
CV	**21.3**	**7.0**	**5.4**	**14.6**	**0.4**	**6.3**	**6.3**	**8.6**	**3.6**	-

CCSHAU, Hisar

Results: The seed treatment T_3 - Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots /Mycorrhiza showed superiority for seed yield and yield attributing traits of wheat variety HD-2967. Highest seed yield (46.97 q/ha), field emergence (78.75%) and 100 seed weight (4.25 g) was observed in T_3. Seed storability study revealed that maximum germination (67.70%) and vigour index (2,176.70) was observed after 12 months of storage in treatment T_3. Among the treatments studied, Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots /mycorrhiza showed superiority for efficient and health friendly seed treatment operation for certified seeds of wheat (Table 40-41).

Table 40: Effect of seed film coating polymers on seed yield and yield attributes of wheat variety HD 2967

Treat.	Field emergence (%)	Plant Height (cm)		Days to maturity	No. of grains/ spike	100 seed wt.(g)	Seed Yield/plot (kg)	Seed yield (q/ha)	Harvest Index
		At 30 D	At flr.						
T_0	75.50	33.15	81.00	144.75	59.50	4.01	7.61	38.06	40.65
T_1	78.25	34.05	81.50	144.50	65.50	4.02	8.19	40.93	43.08
T_2	78.00	33.95	81.75	144.50	62.75	4.18	8.50	42.48	41.95
T_3	78.75	34.05	81.50	144.25	65.00	4.25	9.40	46.97	43.04
CD at 5%	2.04	0.23	N.S.	N.S.	2.13	0.14	0.54	2.68	1.350

Table 41: Effect of seed film coating polymers on storage of wheat variety HD 2967

Treat.	Germination (%) at storage on 2 months interval							Vigour Index-I at storage on 2 months interval						
	Initial	2	4	6	8	10	12	Initial	2	4	6	8	10	12
T_0	89.58	89.30	89.25	85.10	80.93	71.35	64.78	3195.41	3165.58	3139.42	3033.68	2,670.41	2,281.35	1,931.84
T_1	93.48	91.58	91.25	90.25	84.05	73.70	67.40	3619.99	3431.67	3412.65	3285.28	2,876.64	2,467.28	2,155.02
T_2	91.70	91.28	89.55	89.80	83.65	71.90	67.23	3507.56	3422.88	3331.27	3174.23	2,818.46	2,442.98	2,117.18
T_3	91.55	90.13	89.58	87.88	84.68	73.40	67.70	3483.60	3337.08	3381.46	3095.38	2,963.63	2,580.18	2,176.70
CD at 5%	0.556	0.289	0.284	0.612	1.184	1.02	1.51	137.90	191.61	92.94	117.29	71.43	96.17	60.04

T_0 - Control, T_1 -Polymer (DISCO AG SP RED L-200) + Thiram+Carboxine, T_2 -Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat, T_3 - Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots /mycorrhiza

CSAUA&T, Kanpur

Results: Polymer coated seeds were stored under ambient condition in the month of Sep. 2015 in cloth bag. Initially significantly highest germination (94%) and vigour I (1786) was exhibited in T_2 coated seeds and followed by T_3, T_1 and control but, germination performance of T_3 and T_1 were at par. Better performance in terms of germination and vigour was exhibited by T_3 in 2, 4, 6, 8 and 10 months storage but after12 month T_3 and T_2 was at par for germination and vigour I with values of 79.33, 78.00% and 802.81 & 764.40 respectively. In field, the significantly highest emergence at 10 & 30 days, plant height at 50 days, days to 50% heading, no. of effective tillers/plant, spike length, seed yield/plant were found in T_2 (Table 42-43).

Table 42: Germination & vigour rating of polymer coated wheat seed during ambient storage

Treat.	0 Month (Sep. 15)					2 Month (Nov. 15)				
	G%	SL (cm)	SDW (g)	SVI-I	SVI-II	G%	SL (cm)	SDW (g)	SVI-I	SVI-II
No Treatment (T_0)	84	18.0	0.340	1512	25.56	85.33	18.16	0.27	1593.9	23.12
Polymer+Thi. +Car.(T_1)	90	18.3	0.360	1647	32.40	90.00	20.44	.220	1375.20	25.08
Polymer+Thi.+Genius (T_2)	94	19.0	0.380	1786	35.72	94.00	20.44	.280	1922.01	26.88
Polymer+Th.+Quick Root/myco.(T_3)	91	18.7	0.360	1702	32.76	92.00	23.12	.260	2136.28	24.89
SEm±	1.15	0.29	0.010	15.01	0.74	1.54	0.33	0.010	32.90	0.32
CD at 0.05	3.76	N.S	N.S.	48.90	2.41	5.01	1.09	0.03	107.15	1.05
Treat.	**4 Month (Jan. 16)**					**6 Month (Mar. 16)**				
	G%	SL (cm)	SDW (g)	SVI-I	SVI-II	G%	SL (cm)	SDW (g)	SVI-I	SVI-II
No Treatment (T_0)	83.66	17.90	0.240	1501.23	20.83	81.66	16.10	0.210	131.40	16.93
Polymer+Thi. +Car.(T_1)	88.66	14.63	0.210	1296.88	19.26	85.33	12.83	0.190	1095.31	16.74
Polymer+Thi.+Genius (T_2)	86.67	14.58	0.260	1265.01	22.89	86.00	13.17	0.220	1121.75	19.22
Polymer+Th.+Quick Root/myco.(T_3)	90.00	13.87	0.260	1257.44	23.76	88.33	12.49	0.220	1103.02	19.42
SEm±	1.05	0.54	0.030	29.22	0.52	0.76	0.31	0.006	62.33	1.00
CD at 0.05	3.44	1.78	0.03	95.18	1.72	2.50	1.03	0.01	100.04	1.70

Conti..

Treatments	8 Month (May 8)					10 Month (July 9)					Month 12 (Sept.9)				
	G%	SL (cm)	SDW (g)	SVI-I	SVI-II	G%	SL (cm)	SDW (g)	SVI-I	SVI-II	G%	SL (cm)	S.DW (g)	SVI-1	SVI-2
No Treatment (T_0)	80.33	15.82	0.204	1270.96	16.38	78.33	13.93	0.189	1088.17	14.85	66.00	8.36	0.160	551.76	10.56
Polymer+ Thi. +Car.(T_1)	84	12.50	0.195	1050.37	16.40	82.66	11.20	0.187	925.40	15.45	75.33	8.33	0.163	627.49	12.27
Polymer+ Thi.+Genius (T_2)	82.66	13.10	0.209	1084.43	17.31	80.00	11.53	0.200	923.06	16.02	78.00	9.80	0.171	764.40	13.33
Polymer+ Th.+Quick Root/myco.(T_3)	86.33	13.43	0.212	1072.73	18.32	83.33	11.80	0.207	982.56	17.26	79.33	10.12	0.183	802.81	14.51
SE (d)	**0.81**	**0.45**	**0.002**	**46.75**	**0.44**	**0.57**	**0.46**	**0.003**	**35.99**	**0.77**	**1.23**	**0.37**	**0.002**	**6.82**	**0.28**
CD	**1.88**	**1.38**	**0.006**	**107.69**	**1.03**	**1.33**	**1.10**	**0.120**	**83.90**	**N.S.**	**2.83**	**0.86**	**0.01**	**48.67**	**0.66**

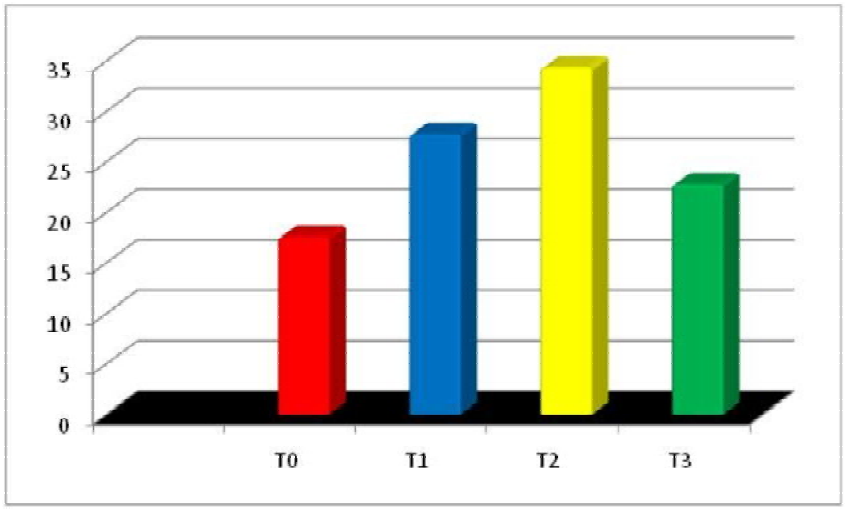
Table 43: Field emergence, plant height & yield attributing characters of polymer coated wheat seeds

	Field emergence (%) on 10th day	Field emergence (%) on 30th day	Plant height on 30 days	Plant height on 50 days	Days of 50% heading	No. of effective tillers/ plant
No Treatment (T_0)	82.00	80.33	19.5	33.70	67.3	7.2
Polymer+Thi. +Car.(T_1)	**88.00**	**86.70**	20.57	36.50	**69.3**	7.0
Polymer+Thi.+Genius (T_2)	**86.00**	**85.33**	18.83	**35.80**	**69.0**	**8.3**
Polymer+Th.+Quick Root/myco.(T_3)	84.00	**83.70**	19.65	40.33	**70.0**	**9.4**
SE(m±)	**1.08**	**1.15**	**1.21**	**0.80**	**0.41**	**0.35**
CD at 0.05	**3.74**	**3.97**	**N.S.**	**2.76**	**1.44**	**1.20**

	Spike length (cm)	No. of Seed/ Spike	1000 Seed Weight (g)	Seed yield/plant (g)	Harvest index
No Treatment (T_0)	8.38	45.4	35.77	12.01	43.47
Polymer+Thi. +Car.(T_1)	9.44	47.7	36.87	12.14	43.15
Polymer+Thi.+Genius (T_2)	9.58	47.7	35.81	13.84	43.24
Polymer+Th.+Quick Root/myco.(T_3)	9.77	46.3	35.58	14.63	42.24
SE(m±)	**0.33**	**1.27**	**1.28**	**0.99**	**0.89**
CD at 0.05	**0.93**	**N.S.**	**N.S.**	**2.30**	**N.S.**

JNKVV, Jabalpur

Results: The seed treatment T_2 (polymer + thiram + genius coat) was found to be the best over all the treatments followed by T_1 (polymer + thiram + carboxine) and T_3 (polymer + thiram + mycorrhiza). Treatment T_0 (no treatment or water + thiram only) was found poor among all the treatments. Yield per plant of treatment T_2 (polymer + thiram + genius coat) was significantly higher than the other treatments because seed setting percentage was higher than other treatments (Table 44).



Effect of seed film coating polymers for efficient and health friendly seed treatment operations on seed yield of Wheat

Table 44: Effect of seed film coating polymers for efficient and health friendly seed treatment on Wheat

Treatments	Field Emergence (%)		Plant Height (cm)		Days to 50% flr.	Days to matu.	Internode length (cm)	Ear length (cm)	Tillers/ plant	No. of grains/ ear	100 seed weight (g)	Yield/ plant (g)	HI	Seed Set. %
	Early 30 D	Late 50 D	At 30 D	At flr.										
T_0 (No treatment + Thiram only (2.5 g/ kg of seed)	75	74.25	33.00	67.83	71.5	134	17.42	11.09	12.50	64.58	4.59	17.58	49.21	95.46
T_1 (Polymer + Thiram + carboxine)	74.83	74.25	31.50	63.33	71.25	134	17.83	10.54	13.83	64.25	4.68	27.75	51.38	98.02
T_2 (Polymer + Thiram + genius coat)	74	72.75	32.08	70.58	71.25	134	16.96	11.60	17.83	65.50	4.69	34.33	50.86	99.27
T_3 (Polymer + Thiram + mycorrhiza)	75.95	75.68	31.97	64.41	71.31	134	18.06	10.95	13.62	63.42	4.45	22.79	43.30	98.60
Sed±	0.91	0.69	1.1	1.97	0.32	0	0.53	0.24	0.76	2.48	0.13	0.83	6.4	0.46
CD at 5%	2.05	1.56	2.5	4.45	0.73	0	1.2	0.55	1.72	5.61	0.3	1.88	14.48	1.04

Maize

PJTSAU, Hyderabad

Results: Initial evaluation of seeds treated with polymer coating showed non-significant differences among the treatments for germination at initial and 2 MAS and for seedling characters like root length, seedling length and seedling vigour index I at 0, 2 MAS and 4 MAS and shoot length at 0 and 4 MAS. However, the treatment T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure exhibited numerical superiority for germination and seedling vigour index – I. Under field conditions, expression of polymer did not differ significantly for root length recorded at 13 DAS. However, significant differences were noticed among the treatments for shoot length and seedling length. The treatments T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure and T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat were found to be at par with each other and significantly different from T_0: Control and T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin. The treatments did not differ significantly for yield and yield attributing characters. Though numerically higher seed yield was recorded with T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat (50.22 q/ha), it was on par with the other treatments. Further, the incidence of foliar diseases was not observed in any of the treatments. Under laboratory conditions, germination percentage did not differ significantly among the treatments. However, seedling characters like seedling length and seedling vigour index I were found superior with T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin and control and differed significantly with the other two treatments (Table 45-48).

Experimental plots with Shubham 90 maize during *kharif*, 2016

Table 45: Influence of polymer coating on seedling characters of maize var. Shubham 90 during *kharif*, 2016

Treatments	Germination (%)			Root length (cm)			Shoot length (cm)			Seedling length (cm)			SVI - I		
	Initial	2 MAS	4 MAS	Initial	2 MAS	4 MAS	Initial	2 MAS	4 MAS	Initial	2 MAS	4 MAS	Initial	2 MAS	4 MAS
Control	100	92	93	19.4	16.4	16.8	17.6	15.4	15.4	37.0	31.8	32.2	3695	2929	2978
Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin	99	96	91	19.8	16.4	15.4	17.2	15.9	16.4	37.0	32.3	31.8	3661	3102	2899
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	100	97	93	19.1	16.7	17.2	17.4	14.7	16.0	36.5	31.4	33.1	3652	3053	3065
Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure	100	100	97	18.9	16.8	15.8	17.3	16.2	15.1	36.2	32.9	30.9	3620	3294	2984
Mean	99.8	96.3	93.3	19.3	16.6	16.3	17.4	15.5	15.7	36.7	32.1	32.0	3656.8	3094.5	2981.7
S.Em±	0.00	2.75	1.20	0.16	0.90	0.75	0.42	0.39	0.74	0.42	0.85	1.03	42.20	120.44	90.23
S.Ed.	0.00	3.89	1.70	0.23	1.27	1.06	0.60	0.56	1.05	0.60	1.21	1.46	59.67	170.31	127.59
C.D. (0.05)	0.00	9.64	3.84	0.56	3.15	2.39	1.49	1.38	2.37	1.48	2.99	3.31	147.99	422.36	288.34
C.V (%)	0.00	4.94	2.58	1.44	9.40	9.20	4.23	4.38	9.44	2.00	4.61	6.47	2.00	6.74	6.05

Table 46: Influence of polymer coating on seedling characters of maize var. Shubham 90 at 13 DAS

Treatments	Root length (cm)	Shoot length (cm)	Seedling length (cm)
Control	6.9	7.9	14.8
Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin	6.7	7.6	14.2
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	7.3	8.6	15.4
Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure	7.2	8.5	15.8
Mean	7.0	8.0	15.0
S.Em±	0.4	0.	0.4
S.Ed.	0.6	0.2	0.6
C.D. (0.05)	1.2	0.5	1.2
C.V (%)	13.8	4.9	6.7

Table 47: Influence of polymer coating on yield attributing characters of maize var. Shubham 90

Treatments	Initial plant stand (no.)	Days to 1st flr.	Days to 50% Flr.	Days to first Silk.	Plant Ht. (cm)	Tassel Lt. (cm)	Cob Lt. (cm)	Cob Wdt. (cm)
Control	219.7	50.2	54.2	50.7	159.8	38.5	17.6	14.1
Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin	218.0	48.8	54.3	50.3	158.2	38.5	17.3	14.5
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	218.2	49.7	54.3	52.2	160.9	38.7	18.3	14.6
Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure	219.8	51.0	54.5	52.2	156.8	38.1	17.8	14.3
Mean	218.90	49.9	54.3	51.3	158.9	38.5	17.8	14.4
SEM	9.50	0.68	0.35	0.66	3.70	0.97	0.39	0.21
SED	13.40	0.97	0.50	0.94	5.23	1.38	0.55	0.30
CD (0.05)	28.60	2.06	1.06	2.00	11.14	2.93	1.18	0.65
C . V %	10.6	3.36	1.59	3.16	5.70	6.20	5.40	3.65

Treatments	Rows/ cob (no.)	Seeds/ row (no.)	Cob yield/ plant (g)	Seed yield/ plant (g)	Shelling (%)	100 seed weight (g)	Seed yield/ plot (kg)	Seed yield/ ha (q)
Control	15.1	33.9	145.00	131.67	90.9	27.20	16.88	50.01
Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin	15.4	31.5	145.07	132.27	92.8	27.77	16.95	46.32
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	15.3	33.8	155.71	140.73	90.6	27.99	15.63	50.23
Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure	15.3	34.1	149.38	135.20	90.5	27.40	13.55	40.15
Mean	15.3	33.3	148.8	135.0	91.2	27.6	15.8	46.68
SEM	0.42	0.88	7.83	7.62	4.04	0.47	1.14	3.39
SED	0.59	1.24	11.07	10.77	5.71	0.67	1.62	4.80
CD (0.05)	1.26	2.64	23.58	22.94	12.17	1.43	3.44	10.20
C . V %	6.70	6.44	12.89	13.82	10.85	4.21	17.78	17.78

Table 48: Influence of polymer coating on seedling characters of maize var. Shubham 90

Treatments	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling length (cm)	Seedling vigour index I
Polymer (DISCO AG SP RED L-200) + Thiram + Carboxin	99.9	16.3	15.3	31.6	3161
Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat	99.3	16.9	12.7	29.6	2933
Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure	99.9	15.5	11.7	27.2	2722
Mean	99.8	16.5	13.4	29.9	2985.7
SEM	0.34	0.25	0.41	0.55	52.0
SED	0.49	0.35	0.58	0.77	73.6
CD	1.04	0.75	1.23	1.64	156.7
Gr. Mean	99.79	16.54	13.38	29.92	2985.7
C . V %	0.85	3.71	7.45	4.46	4.3

RPCAU, Dholi

Results: Seed film coating polymer treatment had significant effect on most of the characters. Seed coating with Polymer+ Thiram + Genius coat (T_3) recorded significant effect on days to 50 % flowering, inter node length, 100 seed weight, seed yield / plant (g), seed yield (q/ha), field emergence at 30 days and 60 days whereas seed coating with Polymer + Thiram +Quick Root+ Mycorrhiza (T_4) influenced significantly days to first flowering, days to 50% flowering, plant height at 30 days, seed yield per plant and field emergence at 30 & 60 days while seed coating with Polymer DISCO AG SP RED L -200+ Thiram + Carboxine (T_2)influenced significantly to very few traits. Therefore, the study indicates that seed treated with Polymer + Thiram + Genius coat (T_3) was found superior in increasing seed yield of maize (Table 49-50).

Table 49: Recognition of seed film coating polymers for efficient and health friendly seed treatment operations for certified seeds of maize var. Hema

Trt.	Characters														
	Days to first flr.	Days to 50% flr.	Days to skl.	Plant Ht. at 30 days	Plant ht. at flr.	Plant ht. at mat. (cm)	Days to mat. (cm)	Cob lt. (cm)	Cob grt. (cm)	Cob Wt. (g)	Seeds /cob	Internode lt. (cm)	100-seed wt(g)	Seed yield /plant (g)	Seed yield/ plot (kg.)
T_1	34.74	42.35	56.80	22.38	88.68	97.06	88.68	0.11	5.88	67.26	312.4	2.13	17.1	56.57	5.47
T_2	33.65	43.30	57.45	21.36	87.58	94.96	87.58	0.12	5.94	63.70	318.6	2.22	18.6	62.92	5.56
T_3	33.60	42.40	56.95	23.27	88.56	98.15	88.56	0.12	5.99	77.72	325.0	2.24	20.0	73.38	5.66
T_4	34.25	43.15	57.30	21.31	88.76	98.22	88.76	0.12	5.98	68.64	343.4	2.15	19.32	72.73	5.52
C.D. at 5%	0.75	0.70	NS	0.48	0.62	1.27	0.62	NS	NS	NS	47.20	0.08	2.44	8.63	NS
SE(m) ±	0.24	0.22	0.18	0.15	0.20	0.40	0.20	0.00	0.03	3.55	15.31	0.02	0.79	2.77	0.48
C.V.	1.60	1.18	0.73	1.56	0.50	0.94	0.50	6.43	1.40	11.45	10.54	2.65	9.46	9.33	19.43

NS: Non Significant

Table 50: Recognition of seed film coating polymers for efficient and health friendly seed treatment operations for certified seeds of Maize var. Hema

Sl. No	Treatment	Characters								
		Harvest index (g)	Viability test (%)	Seed yield (q/ha)	Ger. %	Vigour index . (Lab.)	Field emergence 30 days	Field emergence 60 days	Final plant stand at maturity	Disease-pest incidence (%)
1	T_1	146.44	94.84	26.18	92.80	2,146	189.8	184.24	156.9	5.0
2	T_2	166.92	93.94	28.10	93.16	1,767	191.2	185.52	176.8	6.8
3	T_3	168.9	94.90	32.90	93.80	2,564	195.4	190.26	167.0	3.4
4	T_4	168.34	94.98	28.30	93.96	2,699	197.4	193.2	167.7	4.1
C.D. at 5%		NS	NS	6.33	NS	NS	2.5	2.8	12.0	0.9
SE(m)±		8.28	0.31	2.05	1.09	227.61	0.83	0.90	3.88	0.2
C.V		11.38	0.75	15.92	2.61	22.18	0.95	1.07	5.19	13.79

NS: Non Significant

ICAR RC NEHR, Manipur

Maize variety Hema better performed with the treatment T_2 (polymer DISCO AG SP RED L-200) + thiram+ genius coat (Table 51).

Maize variety Hema

Table 51: Growth and yield studies of Maize (Hema) as influenced by different treatments

Trt.	Plant ht. 30 D (cm)	Plant ht. Flr. Stage (cm)	Internode Lt. (cm)	Cob Lt. (cm)	Girth of the Cob (mm)	Cob Wt. (gm)	Seed Yield (t/ha)	100 Seed Wt. (gm)	Seed Per Cob
T_0	105.90	183.05	12.35	13.64	38.864	138.68	4.52	25.42	343.15
T_1	112.35	192.50	13.35	13.64	39.933	154.88	4.42	24.97	334.70
T_2	108.90	187.25	12.55	13.06	39.985	158.30	4.56	25.99	358.20
T_3	111.75	186.40	12.70	13.49	39.782	151.03	4.35	25.31	324.25
S.E.(d) ±	6.83	8.35	0.590	1.198	1.652	3.881	0.088	0.791	18.96
C.D. at (5%)	15.46	18.88	1.334	2.710	3.736	8.780	0.199	1.790	42.88

Treatments	Germination (%)	Vigour Index-II	Germination % (After Two Months)	Vigour Index (After Two Months)
T_0	96.00	5.71	88.00	4.96
T_1	99.00	5.85	88.00	5.16
T_2	98.00	5.66	93.00	5.27
T_3	96.00	5.99	91.00	5.21
S.E.(d) ±	2.22	0.23	5.81	0.42
C.D. at (5%)	5.03	0.52	13.15	0.95

Sorghum

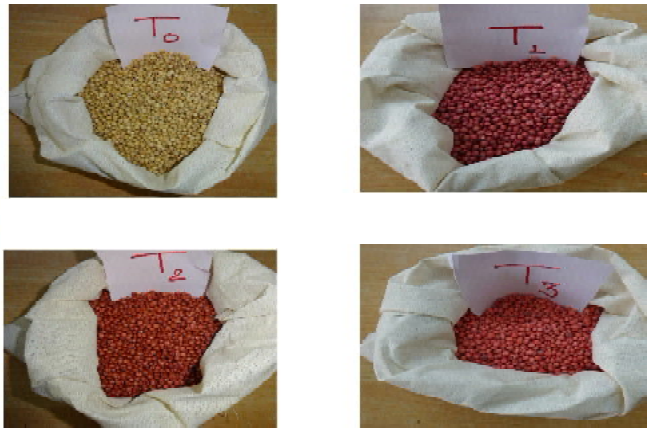
PDKV, Akola

Results: Among all the treatments, significantly highest germination (90.33%), seedling length(24.55 cm), seedling dry weight (0.25 g), vigour index-I (2218.94) and vigour index-II (22.59) were recorded in the treatment T_4 (Polymer + Thiram + Quick Roots) after four months of storage (Table 52-53).

Table 52: Seed quality parameters before storage.

Trt.	Before sowing				
	Seed Ger. (%)	Seedling lt. (cm)	Seedling dry wt. (g)	VI-I	VI-II
T_1	90.67	22.84	0.26	2071.19	23.88
T_2	91.33	21.68	0.27	1980.67	24.37
T_3	90.00	24.71	0.28	2223.71	25.20
T_4	91.67	25.32	0.29	2321.06	26.89
SE(±m)	**0.21**	**0.26**	**0.01**	**25.24**	**0.54**
CD@ 5%	**0.74**	**0.92**	**0.02**	**87.39**	**1.87**

Treated samples of Hy. Sorghum received form INCOTEC.



Treated samples of Hy. Sorghum stored in cloth bags at STRU, Dr. PDKV, Akola

Table 53: Effect of seed film coating polymers on seed quality parameters during storage

Treatment	Seed germination (%)		Seedling length (cm)		Seedling dry weight (g)		VI- I		VI-II	
Months -	**2**	**4**	**2**	**4**	**2**	**4**	**2**	**4**	**2**	**4**
T_1	89.00	85.67	21.00	20.22	0.25	0.23	1868.33	1732.78	21.95	19.42
T_2	90.00	88.33	20.00	19.55	0.25	0.23	1799.67	1726.16	22.51	20.17
T_3	88.67	87.33	24.33	23.59	0.28	0.24	2157.67	2059.70	24.54	21.25
T_4	91.33	90.33	24.67	24.55	0.29	0.25	2254.00	2218.94	26.19	22.59
SE(±m)	**0.46**	**0.28**	**0.51**	**0.69**	**0.01**	**0.01**	**52.01**	**64.44**	**0.70**	**0.52**
CD@ 5%	**1.59**	**0.99**	**1.79**	**2.4**	**0.02**	**0.02**	**180.08**	**223.12**	**2.43**	**1.81**

Pigeonpea

CSAUA&T, Kanpur

Results: No treatmental effect was observed under laboratory conditions for any seed/seedling characters in pigeonpea var. Asha. However, T3 (polymer + thiran + quick roots/mycorrhiza) recorded higher seedling growth parameters under field conditions (Table 54-55).

Table 54: Lab observation on seed/seedling characters in pigeonpea

Treatment	Germination (%)	Seedling length (cm)	Dry wt. (g)	SVI-I	SVI-II
T_0	96	16.33	0.26	1502	25.29
T_1	95.33	15.88	0.19	1385	18.71
T_2	93	16.56	0.21	1673.66	19.61
T_3	91	13.96	0.21	1251	20.19
Mean	93.83	15.68	0.22	1452.91	20.95
SE	0.40	0.21	0.00	3.06	0.16
CD5%	0.93	0.49	0.00	6.98	0.37
CV	0.53	1.69	1.46	0.25	0.96

Table 55: Field observation on seed/seedling characters in pigeonpea

Treatment	Field emergence (30 days)	Field emergence (50 days)	Plant height (30 days) cm	No. of primary branches	No. of secondary branches	Total No. of branches
T_0	70.90	69.41	43.63	9.50	5.02	44.60
T_1	71.70	66.11	42.76	10.26	5.50	51.36
T_2	67.23	62.83	41.56	8.53	5.25	52.81
T_3	76.46	69.45	40.21	8.80	4.76	52.86
Mean	71.57	66.95	42.04	9.27	5.13	50.41
SE	0.47	0.58	0.54	0.36	0.06	0.46
CD5%	1.09	1.32	1.24	0.83	0.14	1.05
CV	0.82	1.06	1.59	4.84	1.53	1.12

Soybean

PJTSAU, Hyderabad

Result: Under field conditions, non-significant differences were noticed among the treatments for root length. However, significant differences were observed for shoot length and seedling length. Among the treatments, T_2 (Polymer (DISCO AG SP RED L-200) + Thiram+ Genius Coat) and T_3 (Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza) were at par with each other for seedling characters like shoot length and seedling length. However, they differed significantly from T_0 (Control) and T_1 (Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin). With respect to yield attributing characters, expression of polymer coating did not differ significantly among the treatments including control. Though higher seed yield was recorded with T_2 (Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat), it was on par with the other treatments. Germination percentage did not differ significantly amongst the treatments. T_1 (Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxin) was found significantly superior for root length, shoot length, seedling length and seedling vigour index – I (Table 56-60).

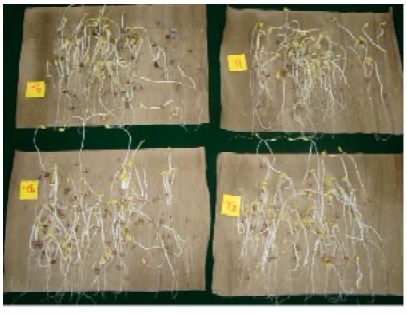


Table 56: Influence of polymer coating on seedling characters of soybean during *kharif*, 2016-17

Trt.	Germination (%)			Root length (cm)			Shoot length (cm)			Seedling length (cm)			SVI - I			% Seed infection
	0M	2M	4M	0M	2M	4M	0M	2M	4M	0M	2M	4M	0M	2M	4M	0M
Control	96.0	80.0	76	13.8	13.5	12.0	12.8	11.9	12.4	26.6	25.4	24.4	2553	2028	1841	9
T_1	95.0	84.0	82	13.3	13.3	12.9	12.7	11.0	11.7	26.0	24.3	24.6	2470	2045	1992	7
T_2	95.7	80.0	82	14.0	13.8	14.0	12.8	12.8	13.1	26.8	26.7	27.4	2566	2125	2227	3
T_3	95.3	80.0	77	12.8	14.1	14.1	12.7	11.5	13.6	25.5	25.6	27.8	2433	2053	2142	8
Mean	95.5	81.0	78.9	13.5	13.7	13.3	12.8	11.8	12.7	26.2	25.5	26.0	2505.1	2063	2050.5	6.8
SEM	0.88	3.77	3.40	0.19	0.40	1.05	0.39	0.52	1.05	0.55	0.73	1.37	46.8	105.19	52.00	
SED	1.24	5.33	4.81	0.27	0.57	1.48	0.55	0.74	1.48	0.77	1.04	1.94	66.2	148.74	73.53	
CD	3.07	13.22	15.29	0.68	1.42	4.71	1.35	1.83	4.71	1.91	2.57	6.16	164.2	368.89	233.81	
Gr. Mean	95.50	81.00	78.88	13.46	13.69	13.33	12.77	11.80	13.33	26.23	25.49	26.02	2505.1	2062.68	2050.51	
C.V %	1.59	8.06	6.10	2.50	5.11	11.12	5.24	7.66	11.12	3.60	4.97	7.45	3.2	8.83	3.59	

0M = 06.07.2016; 2M = 06.09.2016; 4M = 06.11.2016

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

Table 57: Influence of polymer coating on seedling characters of soybean during *kharif*, 2016-17

Treatments	Root length (cm)	Shoot length (cm)	Seedling length (cm)
Control	4.55	11.82	16.37
T_1	4.64	11.65	16.30
T_2	5.78	12.82	18.60
T_3	4.83	12.90	17.73
Mean	4.95	12.30	17.25
S.Em±	0.39	0.26	0.43
S.Ed.	0.55	0.37	0.61
C.D. (0.05%)	1.18	0.79	1.29
C.V (%)	19.32	5.23	6.08

Table 58: Influence of polymer coating on yield attributing characters of soybean during *kharif*, 2016-17

Treatments	Days to first flowering	Days to 50% flowering	Plant height (cm)	Branches/ plant (no.)	Pods/ plant (no.)	Pod length (no.)	Seeds/ pod (no.)
Control	36.8	40.7	40.9	5.0	127.9	4.5	2.7
T_1	37.0	41.0	43.1	5.5	140.0	4.5	2.8
T_2	36.8	40.8	43.2	5.9	144.3	4.6	2.7
T_3	36.7	40.7	46.0	5.0	134.0	4.4	2.7
Mean	36.8	40.8	43.3	5.4	136.6	4.5	2.7
S.Em±	0.16	0.16	1.48	0.21	7.04	0.07	0.07
S.Ed.	0.22	0.23	2.09	0.30	9.95	0.10	0.10
C.D. (0.05%)	0.47	0.48	4.46	0.63	21.19	0.21	0.22
C.V (%)	1.03	0.96	8.38	9.61	12.62	3.82	6.56

Table 59: Influence of polymer coating on yield attributing characters of soybean during *kharif*, 2016-17

Treatments	Test weight (g)	Seed yield /plant (g)	Seed yield/plot (kg)	Seed yield/ha (q)	Hull weight /plant (g)	Dry weight /plant (g)
Control	12.36	20.3	1.75	6.49	14.67	13.98
T_1	13.18	22.8	2.36	8.73	15.97	14.86
T_2	13.02	29.0	2.44	9.02	18.25	14.97
T_3	12.64	22.1	1.86	6.88	15.45	14.46
Mean	12.80	23.6	2.1	7.78	16.1	14.6
SEM	0.24	2.63	0.34	1.25	1.45	1.57
SED	0.34	3.71	0.48	1.76	2.05	2.22
CD	0.72	7.91	1.01	3.75	4.38	4.73
C . V %	4.59	27.29	39.24	39.24	22.13	26.43

Table 60: Influence of polymer coating on seedling characters of soybean, JS 97-52 during *kharif*, 2016-17

Treatments	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling length (cm)	Seedling vigour index I
Control	91.2	14.45	10.68	25.14	2292
T_1	93.0	15.00	11.56	26.55	2477
T_2	92.7	9.66	11.07	20.73	1923
T_3	88.0	9.17	11.76	20.92	1846
Mean	91.2	12.1	11.3	23.3	2134.6
SEM	3.69	0.27	0.32	0.44	101.41
SED	5.21	0.38	0.45	0.62	143.40
CD	11.10	0.80	0.96	1.32	305.44
C . V %	9.90	5.41	6.92	4.59	11.64

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

UAS, Dharwad

Results: Soybean seed coated with Polymer (T_3: DISCO AG SP RED L-200) + Thiram +Quick Roots / mycorrhiza recorded significantly highest field emergence, final plant stand, yield and seed quality parameters which was on par with treatment T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat) whereas the control recorded significantly lowest growth, yield and quality parameters (Table 61-68).

Table 61: Effect of seed film coating on plant growth parameters

Treatments	Field emergence (%)		Final plant stand	Plant height (cm) at	
	30 DAS	50 DAS		Vegetative stage	flowering stage
Control	64.56	64.75	64.50	31.65	36.24
T_1	84.75	84.94	84.38	36.49	41.95
T_2	88.56	89.06	88.63	35.52	40.83
T_3	88.75	89.88	89.25	40.70	46.79
SE m ±	**1.91**	**1.98**	**2.01**	**0.39**	**0.47**
CD (0.05)	**5.72**	**5.94**	**6.02**	**1.17**	**1.40**

Table 62: Effect of seed film coating on seed yield parameters

Treatments	No. of pods per plant	Seed yield			100 seed weight (g)
		Per plant (g)	per plot (kg)	per hectare (q)	
Control	58.45	14.57	2.14	8.54	16.30
T_1	60.15	14.62	2.70	10.81	15.80
T_2	56.10	14.40	2.99	11.96	15.93
T_3	64.80	14.60	3.35	13.41	15.83
SE m ±	**1.84**	**1.03**	**0.10**	**0.40**	**0.09**
CD (0.05)	**5.51**	**NS**	**0.30**	**1.20**	**0.28**

Table 63: Effect of seed film coating on seed quality parameters

Treatments	Seed germination (%)	Seedling root length (cm)	Seedling Shoot length (cm)	Seedling vigour index	Seedling dry weight (mg)
Control	72.75	15.74	14.67	2212	1.41
T_1	75.75	16.75	14.36	2359	1.31
T_2	77.00	15.97	14.09	2316	1.29
T_3	80.50	16.53	13.16	2386	1.33
SE m ±	**1.49**	**0.30**	**0.36**	**53**	**0.04**
CD (0.05)	**4.47**	**NS**	**NS**	**NS**	**NS**

Table 64: Effect of seed film coating on germination during seed storage

Treatments	2nd month	4th month	6th month	8th month	10thmonth	12thmonth
Control	69.11	64.27	53.35	36.81	12.15	0.0
T_1	71.96	66.93	55.55	38.33	12.65	0.0
T_2	73.15	68.03	56.46	38.96	12.86	0.0
T_3	76.48	71.12	59.03	40.73	13.44	0.0
SE m ±	**1.42**	**1.32**	**1.09**	**0.75**	**0.25**	-
CD (0.05)	**4.24**	**3.95**	**3.27**	**2.26**	**0.75**	-

Table 65: Effect of seed film coating on seedling root length (cm) during seed storage

Treatments	2nd month	4th month	6th month	8th month	10thmonth	12thmonth
Control	13.18	11.99	9.95	7.26	6.47	0.0
T_1	14.42	13.12	10.89	7.95	7.07	0.0
T_2	14.69	13.37	11.10	8.10	7.21	0.0
T_3	15.21	13.84	11.49	8.38	7.46	0.0
SE m ±	**0.30**	**0.28**	**0.23**	**0.17**	**0.30**	-
CD (0.05)	**0.91**	**0.83**	**0.69**	**0.50**	**0.91**	-

Table 66: Effect of seed film coating on seedling shoot length (cm) during seed storage

Treatments	2nd month	4th month	6th month	8th month	10thmonth	12thmonth
Control	11.62	10.11	8.39	6.12	5.57	0.0
T_1	13.21	11.49	9.54	6.96	6.34	0.0
T_2	13.23	11.51	9.56	6.98	6.35	0.0
T_3	14.05	12.23	10.15	7.41	6.74	0.0
SE m ±	**0.24**	**0.21**	**0.17**	**0.13**	**0.12**	-
CD (0.05)	**0.72**	**0.63**	**0.52**	**0.38**	**0.35**	-

Table 67: Effect of seed film coating on seedling vigour index during seed storage

Treatments	2nd month	4th month	6th month	8th month	10thmonth	12thmonth
Control	1713	1420	1179	860	284	0.0
T_1	1986	1645	1366	997	329	0.0
T_2	2045	1695	1407	1027	339	0.0
T_3	2236	1852	1537	1122	370	0.0
SE m ±	**43**	**36**	**30**	**22**	**7**	-
CD (0.05)	**129**	**107**	**89**	**65**	**21**	-

Table 68: Effect of seed film coating on seedling dry weight (mg) during seed storage

Treatments	2nd month	4th month	6th month	8th month	10thmonth	12thmonth
Control	1.190	1.107	1.037	0.944	0.878	0.0
T_1	1.216	1.131	1.060	0.964	0.897	0.0
T_2	1.253	1.165	1.091	0.993	0.924	0.0
T_3	1.370	1.274	1.194	1.087	1.011	0.0
SE m ±	**0.029**	**0.027**	**0.025**	**0.023**	**0.021**	-
CD (0.05)	**0.087**	**0.081**	**0.076**	**0.069**	**0.064**	-

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

T_1: No treatment

T_4: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots **/ mycorrhiza.

JNKVV, Jabalpur

Results: Different seed film coating polymers significantly influenced the yield attributing traits of soybean variety JS 20-29. Maximum percentage of field emergence was observed in seeds treated with T_1 (polymer + thiram + carboxine) followed by seed treated with T_2 (polymer + thiram + genius coat). The data indicated that, T_3 (polymer + thiram + mycorrhiza) showed significant effect on seed yield of soybean followed by T_2 (polymer + thiram + genius coat). It may be because of more number of pods per plant and higher 100 seed weight (Table 69-70).

Table 69: Effect of seed film coating polymers for efficient and health friendly seed treatment operations on germination (viability) of Soybean under lab condition

Month	Treatments	Viable	Non- viable
June	T_0 (No treatment)	66.40	33.60
	T_1 (Polymer +thiram +carboxine)	89.20	10.80
	T_2 (Polymer+ thiram+ genius coat)	92.00	8.00
	T_3 (Polymer+ thiram+ mycorrhiza)	96.55	3.45
August	T_0 (No treatment)	57.60	42.40
	T_1 (Polymer +thiram +carboxine)	74.28	25.72
	T_2 (Polymer+ thiram+ genius coat)	77.64	22.36
	T_3 (Polymer+ thiram+ mycorrhiza)	84.92	15.08
October	T_0 (No treatment)	54.14	45.86
	T_1 (Polymer +thiram +carboxine)	70.38	29.62
	T_2 (Polymer+ thiram+ genius coat)	72.20	27.80
	T_3 (Polymer+ thiram+ mycorrhiza)	78.00	22.00
December	T_0 (No treatment)	51.28	48.72
	T_1 (Polymer +thiram +carboxine)	64.72	35.28
	T_2 (Polymer+ thiram+ genius coat)	68.44	31.56
	T_3 (Polymer+ thiram+ mycorrhiza)	72.00	28.00
SE m±		1.48	1.48
CD at 5%		3.34	3.34

Table 70: Effect of seed filmcoating polymers for efficient and health friendly seed treatment operations of Soybean

Treatments	Field Emergence (%)		Plant Height (cm)		Days to 50% flr.	Branches /plant	Pods/ plant	100 seed wt. (g)	Yield/ plant (g)	HI	Plant stand at maturity	Vigour Index in lab	Vigour Index in field
	Early 30 D	Late 50 D	At 30 D	At flr.									
T_0	70.00	64.00	39.56	51.33	43.75	4.55	38.00	12.61	8.72	20.50	42.65	1441.00	2159.07
T_1	80.00	74.00	41.16	52.42	45.00	5.25	39.85	13.21	9.94	24.50	40.79	1119.85	2228.32
T_2	77.00	72.00	43.17	56.08	43.00	4.30	35.35	13.79	10.60	25.50	41.90	1229.62	2505.50
T_3	74.00	70.00	42.58	57.25	44.00	4.75	41.30	13.09	12.18	25.50	48.24	1360.50	2660.05
SE m±	1.17	1.67	0.99	1.29	1.04	0.25	2.01	0.55	0.47	1.37	2.96	22.58	26.95
CD at 5%	5.66	5.34	NS	4.13	NS	NS	NS	NS	1.51	NS	NS	51.08	60.97

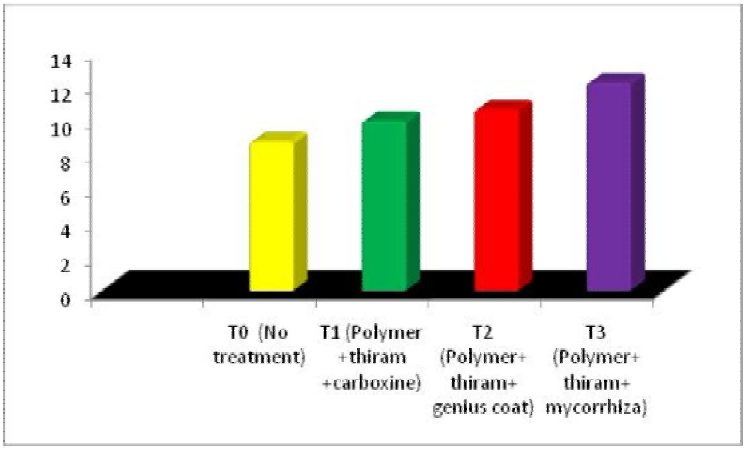


Fig 4: Effect of seed film coating polymers for efficient and health friendly seed treatment operations on seed yield of Soybean
T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

MPKV, Rahuri

Results: Seed coating with polymer (DISCO AG SP RED L -200) + Thiram + Genius coat (T_3) recorded the highest field emergence, yield contributing parameters, yield and seed quality parameters followed by seed coating with polymer (DISCO AG SP RED L -200) + Thiram + carboxine. Seed coating with polymer (DISCO AG SP RED L -200) + Thiram + Genius coat (T_3) maintained significantly higher seed quality parameters throughout the storage periods (Table 71-72).

Experimental view

Control plot

Polymer (DISCO AG SP RED L -200) + Thiram + Genius coat

Table 71: Effect of seed film coating polymers on yield contributing parameters, yield and seed quality of soybean

Treatments	Field emergence at 30 DAS (%)	Field emergence at 50 DAS (%)	Plant height at 30 DAS (cm)	Plant height at flr. (50 DAS) (cm)	Plant stand at maturity (%)	Plant ht. at maturity (cm)	No. of primary branches/ plant	Days to 50% flr.	No. of pods/ plant
Control	72.00 (58.06)	71.25 (57.58)	23.73	60.86	67.75 (55.38)	53.93	5.60	44.33	70.00
T_1	89.83 (71.59)	88.33 (70.12)	27.33	66.20	86.91 (68.86)	60.83	7.23	44.00	86.00
T_2	94.16 (76.36)	92.33 (74.07)	28.53	67.20	90.25 (71.86)	62.26	8.06	42.66	92.83
T_3	87.41 (69.62)	85.58 (68.16)	26.20	62.66	83.66 (66.59)	56.53	6.16	44.00	82.46
SE ±	**2.594**	**2.443**	**0.60**	**1.50**	**2.352**	**2.19**	**0.24**	**0.63**	**3.40**
CD at 5%	**9.150**	**8.619**	**2.13**	**NS**	**8.299**	**NS**	**0.87**	**NS**	**11.99**

Trt.	100 seed wt. (g)	Seed yield/plot (kg)	Seed yield/ha (kg)	Seed yield/ plant (g)	G (%)	Root shoot lt. (cm)	Dry matter content (g)	Vigour Index I	Vigour Index II
Control	10.13	1.63	1362.77	3.27	80.33 (63.71)	30.44	0.95	2446.46	76.23
T_1	10.94	2.50	2088.88	6.04	88.33 (70.05)	36.40	1.19	3213.73	105.10
T_2	11.32	2.91	2428.60	6.50	91.33 (72.89)	37.53	1.28	3430.33	117.13
T_3	10.37	2.27	1893.05	5.92	87.00 (68.91)	36.40	1.15	3166.13	100.60
SE ±	**0.29**	**0.12**	**104.60**	**0.16**	**1.215**	**1.06**	**0.02**	**111.15**	**1.46**
CD at 5%	**NS**	**0.44**	**369.00**	**0.58**	**4.024**	**3.53**	**0.08**	**368.10**	**4.86**

Figures in parenthesis are Arc sin transformed values

Table 72: Effect of seed film coating polymers on seed quality of soybean during storage

Treatments	Germination %				Root length (cm)				Dry matter content (g)			
	Storage periods (days)				Storage periods (days)				Storage periods (days)			
	Initial	60 DAS	120 DAS	180 DAS	Initial	60 DAS	120 DAS	180 DAS	Initial	60 DAS	120 DAS	180 DAS
Control	81.33 (64.42)	79.66 (63.18)	73.33 (58.93)	73.66 (59.12)	32.30	30.60	28.23	27.83	1.04	0.93	0.85	0.87
T_1	85.00 (67.28)	81.66 (64.67)	77.66 (61.78)	77.33 (61.56)	34.73	33.30	30.06	29.43	1.14	1.06	0.96	0.97
T_2	86.66 (68.84)	82.00 (64.89)	82.33 (65.16)	81.00 (64.14)	35.83	34.90	32.76	31.56	1.22	1.12	1.01	0.97
T_3	85.00 (67.25)	82.00 (64.91)	77.00 (61.33)	77.66 (61.78)	33.63	32.16	29.40	28.40	1.14	1.00	0.90	0.89
SE ±	**1.871**	**1.028**	**1.082**	**0.724**	**1.04**	**1.09**	**0.85**	**0.48**	**0.02**	**0.03**	**0.03**	**0.02**
CD at 5%	**NS**	**NS**	**3.583**	**2.399**	**NS**	**NS**	**2.83**	**1.60**	**0.08**	**0.10**	**0.11**	**NS**

Figures in parenthesis are Arc sin transformed values

Treatments	Vigour Index I				Vigour Index II			
	Storage periods (days)				Storage periods (days)			
	Initial	60 DAS	120 DAS	180 DAS	Initial	60 DAS	120 DAS	180 DAS
Control	2623.00	2437.23	2070.06	2049.16	85.24	74.05	62.37	64.28
T_1	2950.26	2719.70	2334.30	2275.56	97.48	87.42	75.06	75.04
T_2	3104.86	2862.53	2694.86	2556.53	106.05	92.14	83.82	78.81
T_3	2858.33	2638.23	2263.20	2205.80	97.51	82.51	69.25	69.39
SE ±	**98.70**	**103.76**	**60.54**	**33.90**	**4.16**	**2.96**	**3.36**	**2.18**
CD at 5%	**326.88**	**NS**	**200.51**	**112.28**	**13.79**	**9.80**	**11.13**	**7.22**

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

IISR, Indore

Results: The experiment was undertaken at the institute farm during *kharif* 2016 under rainfed condition. The field emergence percentage was higher in all the treatments as compared to control but, the difference was not statistically significant. The flowering and maturity time was not influenced by these treatments. There was little increase in plant height and pods per plant due to Polymer + Thiram+ Genius Coat over control but there was no significant variation among all the treatments for all the yield attributing characters. Though there was no significant influence of these treatments on yield attributing characters but quality of harvested seeds from these treatment plots were influenced by these treatments. Seedling vigour (Vigour Index I-Germination x seedling dry weight and Vigour Index II- Germination x seedling length) was significantly improved due to these treatments - Polymer + Thiram+ Genius Coat and Polymer + Thiram + Quick root/Mycorrhiza (Table 73-74).

Table 73: Effect of polymer film coating of seeds on yield attributing character of soybean during *Kharif* 2016

Trt.	Plant stand	Days to 50% flr.	Days to maturity	No. of branches	Plant height at flr. (cm)	Pods per plant	Yield per plant (g)	100 Seed Wt. (g)	Yield (q/ ha)
Control	380	42	98	3.23	58.20	47.8	10.42	12.28	29.48
T_1	407	42	98	3.13	57.77	51.0	11.04	11.82	31.17
T_2	411	42	98	3.17	60.10	50.9	10.99	11.84	30.94
T_3	405	42	98	3.07	57.03	51.9	11.77	12.55	31.20
CV %	**5.79**			**9.8**	**5.02**	**4.86**	**9.55**	**3.46**	**10.65**
$CD_{0.05}$	**46.36**			**0.612**	**1.494**	**4.897**	**2.109**	**0.838**	**6.281**

Table 74: Effect of polymer film coating on seed quality parameters

Trt.	G (%)	Seedling dry wt. (mg/seedling)	Seedling lt. (cm)	SVI-I	SVI-II
Control	75	95.160	22.22	7754.4	1672.8
T_1	82	100.750	22.67	8266.4	1858.7
T_2	78	96.189	24.50	7357.6	1908.3
T_3	79	96.502	24.00	7475.9	1903.5
CV %	**3.56**	**2.97**	**4.03**	**4.73**	**2.96**
$CD_{0.05}$	**5.602**	**5.774**	**2.005**	**728.5**	**108.7**

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

UAS, Raichur

Variety: JS-20-29

Results: Second Treatment [Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat] recorded higher seed germination of 70.40% and seedling vigour index II than other treatments, which are on par with control [germination percentage (62.40%) and SVI II (4298.11)] after four months of storage. Treatment [Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/ Mycorrhiza] recorded highest shoot length (11.18 cm), root length (12.78 cm), seedling dry weight (79.79mg), seedling vigour index I (1638.86) than other treatments and which are on par with control. The same study was conducted under field and observed that the highest plant height, field emergence, primary branches, seed yield/plant, 100 seed weight and harvest index was observed in T_2 treatment than other treatments which are on par with control (Table 75-78).

Table 75: Effect of seed film coating polymers on seed quality during storage in soybean var. JS-20-29.

Trt.	Germination (%)				Seedling shoot length (cm)			
	Initial	1 month	2 month	3 month	Initial	1 month	2 month	3 month
Control	74.00 (59.34)	73.20 (58.82)	72.80 (58.56)	62.40 (52.18)	12.04	12.30	11.23	9.82
T_1	77.20 (62.48)	76.80 (61.21)	76.00 (60.67)	68.40 (55.80)	13.772	13.68	10.65	10.51
T_2	78.80 (62.58)	77.20 (61.48)	73.60 (59.08)	70.40 (57.04)	13.728	12.60	11.08	10.46
T_3	77.60 (61.75)	76.80 (61.21)	74.40 (59.60)	68.40 (55.80)	15.628	14.84	11.97	11.18
Mean	76.90	76.00	74.20	67.40	13.79	13.35	11.23	10.49
Sem	1.75	1.97	0.75	1.85	0.45	0.70	0.75	0.68
CD @ 1%	5.40	6.07	2.32	5.71	1.39	1.26	0.23	2.10

Table 76: Effect of seed film coating polymers on during storage

Treatments	Seedling root length (cm)				Seedling dry weight (mg/seedling)			
	Initial	1 month	2 month	3 month	Initial	1 month	2 month	3 month
Control	15.02	13.47	12.95	12.66	71.84	70.76	69.12	68.88
T_1	15.86	14.87	13.70	11.89	77.08	75.76	73.88	66.88
T_2	16.19	16.08	13.48	12.76	91.88	88.08	87.12	86.76
T_3	16.55	16.25	13.73	12.78	92.56	91.92	89.68	79.76
Mean	15.91	15.17	13.46	12.55	83.34	81.63	79.95	75.57
Sem	0.94	0.60	0.83	0.49	2.5	2.03	1.70	1.73
CD @ 1%	2.89	1.84	2.57	1.52	7.7	6.24	5.24	5.33

Table 77: Effect of seed film coating polymers during storage

Treatments	Seedling vigour index I				Seedling vigour index II			
	Initial	1 month	2 month	3 month	Initial	1 month	2 month	3 month
Control	2002	1886	1760	1402	5316	5179	5031	4298
T_1	2287	2193	1850	1532	5950	5818	5614	4574
T_2	2358	2214	1807	1634	7240	6799	6412	6107
T_3	2497	2387	1911	1638	7182	7059	6672	5455
Mean	2283	2170	1831	1551	6422	6218	5931	5111
Sem	75.20	96.12	104.63	65.79	242.65	280.09	144.94	188.85
CD @ 1%	231.71	296.16	322.39	202.72	747.67	863.05	626.09	815.80

T_0 [No treatment or water +thiram]

T_1 [Polymer (DISCO AG SP RED L-200) + Thiram– Carboxine]

T_2 [Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat]

T_3 [Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots /mycorrhiza]

General view of the experiment of soybean/JS-20-29

Table 78: Effect of seed film coating polymers on field emergence, plant height and other seed yield parameters

Treatments	Field Emergence (%)			Plant ht (cm)			Pods/ plant	Primary branches	Seed yield/ plant (g)	100 seed weight (g)	Harvest index
	30 DAS	60 DAS	At maturity	30 DAS	60 DAS	At maturity					
Control	86.93 (58.83)	86.31 (58.55)	84.86 (57.69)	22.30	34.72	49.31	16.68	12.52	3.59	8.72	1.07
T_1	87.84 (59.36)	87.04 (58.93)	85.93 (58.27)	23.38	36.54	49.67	17.78	13.68	3.70	8.84	1.10
T_2	90.98 (61.28)	89.86 (60.70)	88.95 (60.03)	23.48	46.36	53.44	19.10	14.72	4.03	9.05	1.27
T_3	89.46 (60.30)	88.11 (59.60)	87.48 (59.13)	25.33	40.56	51.54	19.53	14.12	3.77	8.88	1.20
Mean	88.80 (59.94)	87.83 (59.44)	86.81 (58.78)	23.62	39.545	50.99	18.27	13.76	3.77	8.873	1.16
C.D@5%	1.27	1.36	1.15	4.02	5.97	3.48	2.26	1.33	0.28	0.24	0.09
SE(m)±1	0.41	0.44	0.37	1.30	1.94	1.13	0.73	0.43	0.09	0.08	0.03

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza

HPKVV, Palampur

Results: Seed coating with polymer (DISCO AG SP RED L-200) + Thiram + Bioensure (T_3) recorded significantly higher field emergence at 30 and 50 days after sowing, plant height at 30 days after sowing. The same treatment also proved significantly superior over other treatments producing more number of pods and seeds per plant. Significantly higher seed yield was obtained with polymer (DISCO AG SP RED L-200) + Thiram + Bioensure (T_3) over other treatments and it proved better treatment among all treatments with respect to quality parameters like 100-seed weight, germination and vigour index which were significantly superior as compare to other treatments. During storage, seed quality parameters were not affected significantly by the polymer coating during 2015-16 initially as well as after 12 months of storage. However, during 2016-17, polymer coating of seed affected the quality parameters significantly. T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure treatment recorded highest germination, seedling length, seedling dry weight, vigour index I,

vigour index II, lowest disease incidence and no insect infestation, followed by T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat and T_1: Polymer (DISCO AG SP RED L-200) + Thiram+ Carboxine in comparison to control (T_0: No treatment or water + thiram only) after 6 months of storage. Upto 4 months of storage of coated seeds, no disease incidence was recorded, however, seeds deteriorated rapidly after 6 months of storage and lowest disease incidence (10.67 %) was recorded for T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Bioensure as compared to T_0 (No treatment or water + thiram only) (35.0 %) (Table 79-90).

Table 79: Effect of seed coat polymers on growth of soybean

Treatments	Field emergence at 30 DAS (%)	Field emergence at 50 DAS (%)	Plant height at 30 DAS (cm)	Plant height at flowering (cm)	Plant height at maturity (cm)	Days to 50% flowering
Control	70.1	68.3	36.1	72.2	65.7	51.2
T_1	74.6	74.1	36.9	71.8	66.1	51.7
T_2	75.8	74.9	36.4	71.4	65.4	51.1
T_3	79.3	78.2	38.3	72.5	66.7	51.4
SE (m) ±	1.28	1.14	0.53	0.44	0.62	0.32
CD 5%	3.86	3.41	1.59	NS	NS	NS

Table 80: Effect of seed coat polymers on seed quality, yield and yield contributing parameters of soybean

Treatments	No of primary branches/ plant	No of pods/ plant	Seed yield/ plant (g)	100- seed weight (g)	Seed yield/ha (kg)	G (%)	Vigour index
Control	6.1	60.9	17.5	10.37	1125.0	82.9	1825.7
T_1	6.3	61.3	17.7	10.23	1157.3	84.1	1911.2
T_2	6.4	61.1	17.5	10.29	1187.2	85.7	1985.6
T_3	6.5	68.6	19.4	11.87	1226.7	86.4	2113.9
SE (m) ±	0.24	0.85	0.47	0.16	11.46	0.78	45.0
CD 5%	NS	2.58	1.42	0.49	34.56	2.34	135.7

Table 81: Effect of seed coat polymers on moisture content during storage for one year (2015-16)

Treatments	Moisture content (%)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	8.77	9.63	13.07	12.73	11.56	12.37	18.33
T_1	8.93	9.23	12.83	12.77	11.67	11.87	18.07
T_2	9.33	9.33	12.83	12.83	11.53	11.57	17.97
T_3	9.03	9.13	12.73	12.73	11.57	11.93	18.13
SE (m) ±	0.03	0.03	0.04	0.02	-	0.01	0.03
CD 5%	0.11	0.09	0.13	0.06	NS	0.05	0.11

Table 82: Effect of seed coat polymers on germination during storage for one year (2015-16)

Treatments	Germination (%)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	93.3	89.3	79.3	79.3	78.7	73.3	70.7
T_1	75.3	70.7	70.7	70.0	69.3	68.7	66.7
T_2	83.3	80.7	62.7	62.0	59.3	58.7	55.3
T_3	79.3	74.7	69.3	68.7	66.7	64.7	62.7
SE (m) ±	0.58	0.74	0.69	0.43	0.79	0.58	0.59
CD 5%	2.00	2.58	2.40	1.49	2.66	2.00	1.99

Table 83: Effect of seed coat polymers on seedling length during storage for one year (2015-16)

Treatments	Seedling length (cm)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	24.13	23.13	19.17	18.63	15.53	14.23	13.33
T_1	13.81	14.00	13.27	13.20	13.13	13.10	13.17
T_2	18.30	17.13	13.43	13.20	12.93	12.87	12.80
T_3	15.87	15.37	13.40	13.30	13.20	13.17	13.10
SE (m) ±	0.40	0.26	0.37	0.25	0.12	0.20	0.05
CD 5%	1.39	0.88	1.27	0.88	0.42	0.69	0.18

Table 84: Effect of seed coat polymers on seedling dry weight during storage for one year (2015-16)

Treatments	Seedling dry weight (mg/seedling)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	30.00	29.40	21.80	21.73	21.67	21.27	21.00
T_1	22.13	21.73	21.07	20.93	20.73	20.67	20.60
T_2	22.93	22.13	21.40	21.27	21.13	20.93	20.67
T_3	21.40	20.67	20.40	20.33	20.20	20.13	20.07
SE (m) ±	0.17	0.11	0.12	0.06	0.06	0.07	0.08
CD 5%	0.58	0.39	0.41	0.20	0.21	0.24	0.27

Table 85: Effect of seedcoat polymers on vigour index-I during storage for one year (2015-16)

Treatments	Vigour Index-I(Germination x Seedling length)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	2252.20	2066.07	1071.67	1478.53	1221.87	1043.80	942.20
T_1	1040.00	989.67	937.27	924.00	910.87	899.33	877.80
T_2	1524.93	1382.00	841.73	818.00	767.40	754.87	708.20
T_3	1258.73	1147.20	928.47	913.20	880.07	851.47	821.00
SE (m) ±	28.33	17.55	37.85	21.13	16.17	15.03	8.37
CD 5%	98.06	60.73	130.99	73.14	55.98	52.02	28.98

Table 86: Effect of seed coat polymers on vigour index-II during storage for one year (2015-16)

Treatments	Vigour Index-II (Germination x Seedling dry weight)						
	Initial	2 MAS	4 MAS	6 MAS	8 MAS	10 MAS	12 MAS
Control	2800.00	2626.27	1729.60	1724.27	1704.40	1559.60	1483.86
T_1	1667.20	1535.73	1488.80	1465.33	1437.47	1419.06	1373.33
T_2	1911.06	1785.60	1341.07	1318.53	1254.00	1228.13	1143.60
T_3	1697.60	1543.07	1414.27	1396.27	1346.67	1301.86	1257.60
SE (m) ±	14.55	17.51	18.04	11.02	16.40	9.93	13.54
CD 5%	50.35	60.60	62.44	38.14	56.85	34.38	46.86

Table 87: Effect of seed coat polymers on moisture content and germination during storage (2016-17)

Treatments	Moisture content (%)				Germination (%)			
	Initial	2 MAS	4 MAS	6 MAS	Initial	2 MAS	4 MAS	6 MAS
Control	10..47	17.33	15.27	7.87	74.67	73.33	71.33	32.67
T_1	10.56	17.03	14.47	7.70	77.33	75.33	73.33	55.33
T_2	10.63	17.13	14.67	7.73	79.33	76.67	75.33	57.33
T_3	10.57	17.13	14.53	7.76	82.67	81.33	79.33	61.33
SE (m) ±	0.03	0/003	0.02	0.03	0.69	0.67	0.74	0.74
CD 5%	0.10	0.01	0.06	0.11	2.40	2.30	2.58	2.58

Table 88: Effect of seed coat polymers on seedling length and seedling dry weight during storage (2016-17)

Treatments	Seedling length (cm)				Seedling dry weight (mg/seedling)			
	Initial	2 MAS	4 MAS	6 MAS	Initial	2 MAS	4 MAS	6 MAS
Control	16.31	16.16	16.03	8.15	22.51	22.18	22.16	11.93
T_1	16.50	16.33	16.23	8.78	23.80	23.38	23.36	16.90
T_2	16.90	16.81	16.51	10.07	25.28	25.10	25.10	17.73
T_3	17.42	17.20	17.08	10.25	26.30	25.82	25.33	18.20
SE (m) ±	0.06	0.07	0.06	0.19	0.08	0.51	0.15	0.13
CD 5%	0.20	0.23	0.21	0.66	0.30	0.18	0.51	0.45

Table 89: Effect of seed coat polymers on Vigour Index-I and Vigour Index-II during storage (2016-17)

Treatments	Vigour Index-I				Vigour Index-II			
	Initial	2 MAS	4 MAS	6 MAS	Initial	2 MAS	4 MAS	6 MAS
Control	1218.00	1185.10	1144.67	265.96	1677.17	1650.30	1582.37	389.87
T_1	1276.10	1230.33	1190.33	485.83	1862.27	1792.87	1714.73	935.07
T_2	1340.70	1289.06	1243.43	577.27	2017.90	1938.33	1890.87	1016.73
T_3	1439.76	1399.00	1356.60	628.42	2185.80	2139.07	2048.07	1116.20
SE (m) ±	13.27	13.58	10.48	9.27	22.57	14.22	16.14	12.69
CD 5%	45.92	47.00	36.28	32.07	78.11	49.22	55.88	43.92

Table 90: Effect of seed coat polymers on disease incidence during storage (2016-17)

Treatments	Disease incidence (%)-Fungal infection			
	Initial	2 MAS	4 MAS	6 MAS
Control	0	0	0	35.00
T_1	0	0	0	15.00
T_2	0	0	0	12.67
T_3	0	0	0	10.67
SE (m) ±	-	-	-	0.63
CD 5%	-	-	-	2.18

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza.

ICAR RC NEHR, Manipur

Results: Soybean variety JS-335, presented significant differences among the treatments for all the characters studied. Among the treatments, T_1 (polymer DISCO AG SP RED L-200) + thiram + carboxine had the better performance from other treatments. Among the characters studied, grain yield, number of branch per plant and number of pods per plant were found to differ significantly (Table 91).

Soybean Variety JS-335

Table 91: Growth and yield studies of Soybean (JS 335) as influenced by different treatments

Trt.	Plant ht. at 30 DAS (cm)	Plant ht. at 50 DAS (cm)	G (%)	VI- II	G (%) (At 2 MAS)	VI -II (at 3 MAS)	Branch/ Plant (No's)	Pods /Plant (Nos)	Yield (t/ha)	Yield Per Plant (gm)	100 Seed Weight (gm)
T_0	42.65	62.00	76.00	2.38	73.00	3.118	6.35	36.35	1.52	6.085	7.28
T_1	48.05	65.32	84.00	3.19	84.00	3.583	7.45	43.70	1.87	7.490	7.43
T_2	46.10	64.90	86.00	3.86	84.00	3.565	7.15	32.05	1.81	7.255	5.95
T_3	47.25	64.75	84.00	4.39	76.00	3.280	6.80	34.00	1.66	6.640	6.85
S.E.d±	**2.57**	**2.87**	**4.243**	**0.34**	**3.66**	**0.161**	**0.39**	**2.054**	**0.16**	**0.661**	**0.63**
C.D. (5%)	**5.81**	**6.49**	**9.598**	**0.77**	**8.27**	**0.363**	**0.88**	**4.646**	**0.37**	**1.495**	**1.42**

T_1: Polymer (DISCO AG SP RED L-200) + Thiram + Carboxine; T_2: Polymer (DISCO AG SP RED L-200) + Thiram + Genius Coat; T_3: Polymer (DISCO AG SP RED L-200) + Thiram + Quick Roots/Mycorrhiza.

Experiment 5 : Standardization of seed production technology in Green manure crops

Objectives:

1. To study the influence of nipping or pinching of terminal buds on the number and intervals of pod pickings, seed shattering loss, seed yield and quality.
2. To study the influence of Phosphorous application on seed yield and quality.
3. To study the effect of DAP 2% as foliar spray to enhance seed yield and quality.

Year of start: 2015-16

Crops	Centres
Dhaincha (*Sesbania aculeata*)	HPKV, Palampur; TNAU, Coimbatore; AAU, Jorhat; MPKV, Rahuri; UAS, Dharwad; ANGRAU, Dholi, BCKV, PAJANCOA & RI, Karaikal; JAU, Jamnagar; OUAT, Bhubneshwar
Sunnhemp (*Crotolaria juncea*)	
Pillipesara (*Vigna trilobata)*	

Methodology

1. Nitrogen application: 30 kg/ha
2. Phosphorous application : 50 kg/ha as basal
3. Foliar spray: Two sprayings of the following nutrients as detailed below.
4. Effect of nipping or pinching of tendrils
   - Being an indeterminate crop, pinching or nipping of terminal buds may have influence on seed yield and quality. Nipping should be done on *Sesbania aculeata* at 60 DAS, *Vigna trilobata* between 20 and 40 DAS. In sunhemp, the main stem of sunhemp when attains a height of 90 cm to break apical dominance and more branching.
   - However a control may be maintained without nipping and cutting in all crops.

Treatments

Main plot: Pinching

M_1: With pinching

M_2: Without pinching

Sub plot: Foliar application

T_1 - Foliar spray with DAP @ 2%

T_2 - Foliar spray with MN Mixture ($ZnSO_4$ @ 0.5% + Boric acid @ 0.3%)

T_3 - Foliar spray with NAA @ 40 ppm

T_4 - Foliar spray with DAP 2% + MN Mixture (Zn+B) + NAA @ 40ppm

T_5 - Control

- The total fertilizer application be split into two, one as basal and other as top dressing.
- Foliar spray should be done at flowering. In addition, the recommended agronomic packages and plant protection practices should be followed.

Dhaincha (*Sesbania aculeata*)

TNAU, Coimbatore

Results: Pinching of the daincha crop recorded significantly increased seed yield compared to non-pinching. Pinching recorded the highest number of seeds per pod (26.3), single plant yield (16.2 gm) and seed yield per plot (2.62 kg). Among the foliar sprays, foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm, recorded the highest single plant seed yield (18.7 gm). The same treatment recorded the highest seed yield per plot (2.92 kg). Vigour index of the resultant seed is higher from the seeds of foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm. Pinching the daincha crop with foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm is superior in all the treatments with highest single plant seed yield and seed yield per plot. Pinching combined with foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm recorded the maximum number of pods per plant (66) compared to the control (58.8). Without pinching recorded the lowest number of pods per plant (46). Pinching combined with foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm recorded the maximum number of seeds per pod (30) compared to the control (20.6). The pinching treatment recorded 17.1 gm of single plant seed yield compared to 14.9 gm in control (Table 92).

Seedling performance of I, II and III picking

Seedlings from seeds of I picking

Seedlings from seeds of II picking

Seedlings from seeds of III picking

Table 92: Effect of pinching and different foliar spray during flower initiation on seed yield attributing characters, seed yield and resultant seed quality.

Treatment		Plant height	Number of pods / plant	Number of seeds /pod	Seed yield per plant (gm)	Seed yield per plot (kg)	100 seed weight (gm)	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
With pinching	T_1	194.6	60.2	28.4	16.4	2.78	1.85	84	12.5	9.2	955
	T_2	190.8	60.2	26.0	16.4	2.62	1.90	84	12.3	8.7	924
	T_3	198.2	64	26.4	15.6	2.50	1.81	85	11.8	8.5	914
	T_4	200.4	66	30.0	17.7	2.92	1.96	86	13.6	9.6	1067
	Control	190.4	58.8	20.6	14.9	2.38	1.80	82	11.3	8.7	840
	Mean	194.9	62.0	26.3	16.2	2.62	1.86	84	12.3	8.9	940
Without pinching	T_1	226.6	44.8	28.2	16.3	2.61	1.83	85	12.3	9.3	972
	T_2	257.8	46.2	23.4	15.1	2.42	1.88	84	11.4	8.9	893
	T_3	243.0	48.6	25.4	14.5	2.32	1.80	86	11.3	8.9	929
	T_4	255.4	50.8	30.8	18.7	2.68	1.90	85	13.3	9.8	1040
	Control	210.2	46.0	20.4	13.0	2.08	1.77	84	11.8	8.8	906
	Mean	238.6	47.3	25.6	15.5	2.49	1.84	85	12.0	9.1	948
SEd	N	2.81	1.42	0.35	2.76	4.14	0.92	0.51	0.15	0.40	52
	F	3.90	2.04	0.13	3.16	5.12	1.54	0.74	0.13	0.43	64
	NXF	5.45	2.95	0.39	5.60	5.21	2.45	1.66	0.21	0.47	58
CD(P=0.05)	N	6.43	3.95	0.98	5.13	8.40	3.45	2.13	0.42	0.82	105
	F	7.95	4.16	0.28	6.37	10.24	3.66	2.37	0.26	0.87	132
	NXF	11.8	6.52	1.07	11.12	10.50		3.36	0.52	0.95	122

T_1 - Foliar spray with DAP @ 2%; T_2 - Foliar spray with MN Mixture ($ZnSO_4$ @ 0.5% + Boric acid @ 0.3%); T_3 - Foliar spray with NAA @ 40 ppm; T_4 - Foliar spray with DAP 2% + MN Mixture (Zn+B) + NAA @ 40ppm

AAU, Jorhat

Results: Three treatment combinations (T_1, T_2 and T_3) with pinching of tendrils and only one treatment combination (T_3) without pinching of tendrils had produced significantly higher pod yield (kg/ha), none of the treatment combinations could maintain the significantly higher seed yield (kg/ha) than the control (T_5) in both with pinching and without pinching of tendrils. Highest seed yields of 2482.54 and 2579.37 kg/ha were recorded by the treatment combinations viz. T_1 and T_3 with pinching and without pinching, respectively. Among the seed quality parameters studied, seed germination (%) witnessed excellent performance ranging from 92 (lowest) in T_5 (control) with pinching to 98.75 % (highest) in T_1 both with pinching and without pinching. Three treatment combinations (T_1, T_2 and T_3) with pinching and two treatment combinations (T_1 and T_3) without pinching had registered significantly higher germination (%) than the control (T_1). Similarly, the treatment combination T_1 (851.78) with pinching and T_3 (890.29) without pinching had recorded significantly higher seedling vigour than the control (T_5) (Table 93-94).

Table 93: Seed yield and other ancillary characters of green manure crop Dhaincha during *summer*, 2016 at AAU, Jorhat Centre

Treatments	Pod yield (kg/ha)		Seed yield (kg/ha)		Pod yield/ plant (g)		Seed yield/plant (g)	
	With pinching	Without pinching	With pinching	Without pinching	With pinching	Without pinching	With pinching	Without pinching
T_1	2785.71	2482.54	2482.54	2539.68	164.93	183.68	148.75	165.00
T_2	2827.78	2339.68	2339.68	2169.05	129.33	118.78	111.5	101.75
T_3	2630.16	1796.03	1796.03	2579.36	97.73	156.08	83.75	131.25
T_4	2447.62	1946.83	1946.83	2296.03	80.78	85.98	68.75	70.00
T_5 (control)	2290.48	2196.83	2196.83	2373.02	165.60	176.68	138.75	147.50
C.D.(0.05)	**338.10**	**338.10**	**470.51**	**470.51**	**21.36**	**21.36**	**20.35**	**20.35**
Treatments	**No. of pods/plant**		**No. of pods Shattered/ plant**		**No. of seeds/pod**		**Seed recovery (%)**	
	With pinching	**Without pinching**	**With pinching**	**Without pinching**	**With pinching**	**Without pinching**	**With pinching**	**Without pinching**
T_1	14.58	16.13	1.950	2.550	16.78	16.03	95.35	96.45
T_2	14.33	14.83	2.425	2.575	15.08	13.95	93.18	94.98
T_3	12.65	17.60	1.975	2.550	11.10	16.78	93.48	97.08
T_4	12.45	13.1	2.475	3.000	14.48	14.18	88.55	85.83
T_5 (control)	15.03	14.93	3.125	3.200	14.13	15.33	87.35	89.18
C.D. (5%)	**2.26**	**2.26**	**0.530**	**0.530**	**2.53**	**2.53**	**3.29**	**3.29**
Treatments	**100 seed weight (g)**		**Seed germination (%)**		**Seedling vigour (Germination % x Seedling height in cm)**			
	With pinching	**Without pinching**	**With pinching**	**Without pinching**	**With pinching**	**Without pinching**		
T_1	1.855	1.73	98.75	98.75	851.78	652.37		
T_2	1.415	1.76	97.25	96.00	657.85	607.40		
T_3	1.495	1.54	95.50	97.50	669.67	890.29		
T_4	1.440	1.77	92.50	96.50	774.63	752.68		
T_5 (control)	1.265	1.44	92.00	94.00	705.38	710.17		
C.D. (5%)	**0.18**	**0.18**	**3.39**	**3.39**	**81.48**	**81.48**		

Table 94: Seed production technology in green manure crop dhaincha duing summer, 2016 at AAU, Jorhat Centre

Treatments	Pod Yield (kg/ha)	Seed yield (kg/ha)	Pod yield / plant (g)	Seed yield /plant (g)	Pods / plant	Pods shattered / plant
	1	2	3	4	5	6
Pinching:						
With pinching	2596.03	2151.98	127.67	110.38	13.81	2.39
Without pinching	2674.60	2391.27	144.24	123.10	15.32	2.78
CV (%)	10.27	12.41	5.69	5.20	11.77	10.83
CD (%)	272.23	268.81	7.79	6.11	1.73	0.28
Treatments:						
T_1	2739.58	2510.91	174.30	156.88	15.35	2.25
T_2	2753.97	2253.97	124.05	106.63	14.58	2.50
T_3	2815.97	2187.50	126.90	107.50	15.13	2.26
T_4	2538.19	2121.03	**83.36**	69.38	12.78	2.74
T_5: Control	2328.37	2284.72	171.14	143.13	14.98	3.16
CV (%)	**8.89**	**13.48**	**10.76**	**11.95**	**10.63**	**10.83**
C.D. (0.05)	**238.89**	**332.70**	**15.10**	**14.39**	**1.60**	**0.52**

Treatments	Seeds / pod	Seed recovery (%)	100 seed weight (g)	Seed germination (%)	Seedling vigour (Germination % x Seedling height in cm)
	6	7	8	9	10
Pinching:					
With pinching	14.31	91.58	1.494	95.20	731.86
Without pinching	15.25	92.70	1.648	96.55	722.58
CV (%)	10.95	0.94	1.160	1.77	4.03
CD (%)	1.63	0.87	0.184	1.71	31.60
Treatments:					
T_1	16.40	95.90	1.793	98.75	752.08
T_2	14.51	94.08	1.588	96.63	632.63
T_3	13.94	95.28	1.518	96.50	779.98
T_4	**14.33**	87.19	1.605	94.50	763.66
T_5: Control	14.73	88.26	1.353	93.00	707.78
CV (%)	**12.25**	**2.45**	**0.790**	**2.43**	**7.68**
C.D. (0.05)	**1.87**	**2.33**	**0.362**	**2.40**	**57.61**

MPKV, Rahuri

Results:

Effect of pinching: Pinching had significant effect on seed yield and quality of Dhaincha irrespective of foliar application of fertilizer/micronutrients. Number of pods/plant (68. 32), number of seeds/pod (30.76), seed yield/ plot (1.317 kg), seed yield/ha (658.30 kg), germination (85.86%), root shoot length (32.17 cm), dry matter content (0.110 g), vigour index I (2766.90) and vigour index II (9. 48) were significantly higher in the pinching treatment and pod shattering per cent (3.53%) was also lower in this treatment.

Effect foliar application of fertilizers/ micronutrients: Foliar application of fertilizers/ micronutrients had significant effect on seed yield and quality of Dhaincha irrespective of pinching. Number of pods/plant (66.43), number of seeds/pod (35.33), 100 seed weight (1.91 g), seed yield/plot (1.460 kg), seed yield/ha (730.00 kg), germination (86.16%), root shoot length (32.37 cm) dry matter content (0.114 g), vigour index I (2793.06), vigour index II (9.83) were significantly higher in the foliar application of DAP 2% + MN mixture + NAA 40 ppm (T_4) treatment. The pod shattering per cent (4.00%) was also lower in this treatment.

Interaction effect: The interaction effect of pinching and foliar application of fertilizers/micronutrients showed significant effect on seed yield. Seed yield /plot (1.796 kg) and seed yield/ha (898.00kg) was significantly higher in the pinching and foliar application of DAP 2% + MN mixture + NAA 40 ppm (P_1T_4) (Table 95-96).

Table 95: Effect of pinching and foliar application on seed yield and quality parameters of Dhaincha during *kharif*, 2016

Treatments	No. of pods/ Plant	No. of seeds/ Pod	No. of pods shattered (%)	100 seed weight (g)	Seed yield/ plot (kg)	Seed yield/ ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
Pinching											
With pinching (P_1)	68.32	30.76	3.53	1.86	1.317	658.30	85.86 (68.20)	32.17	0.110	2766.90	9.48
Without pinching (P_2)	42.24	25.28	9.66	1.74	0.945	472.47	78.20 (62.26)	30.33	0.104	2375.77	8.17
SE ±	**1.47**	**0. 37**	**0.613**	**0.018**	**0.016**	**8.04**	**0.603**	**0.896**	**0.002**	**88.90**	**0.067**
CD at 5%	**9.66**	**2.41**	**4.015**	**0.119**	**0.105**	**22.67**	**3.948**	**NS**	**NA**	**NS**	**0.436**
Foliar application											
Spray with DAP 2% (F_1)	55.81	26.56	5.83	1.84	1.286	643.17	84.00 (66.89)	31.80	0.110	2682.56	9.23
Spray with MN mixture (F_2)	53.61	27.30	5.83	1.80	1.106	553.17	82.33 (65.34)	32.02	0.107	2640.50	8.78
Spray with NAA 40 ppm (F_3)	51.40	25.73	7.33	1.79	1.043	521.50	80.00 (63.52)	30.96	0.106	2478.55	8.50
Spay with DAP 2% + MN mixture + NAA (F_4)	66.43	35.33	4.00	1.91	1.460	730.00	86.16 (68.50)	32.37	0.114	2793.06	9.83
Control (F_5)	49.13	25.16	10.00	1.68	0.758	379.08	77.66 (61.90)	29.10	0.100	2262.00	7.80
SE ±	**2.27**	**1.27**	**0.667**	**0. 036**	**0.047**	**23.40**	**1.366**	**0.614**	**0.002**	**78.09**	**0.270**
CD at 5%	**6.86**	**3.83**	**2.16**	**0.109**	**0.142**	**70.77**	**4.130**	**1.858**	**0.007**	**236.15**	**0.816**

Figures in parenthesis are Arc sin transformed values

Table 96: Interaction effects of pinching and foliar applications on seedyield and quality parameters of Dhaincha during *kharif* 2016

Treatments	No. of pods/ Plant	No. of seeds/ pod	No. of pods shattered	100 seed weight (g)	Seed yield/ plot (kg)	Seed yield/ ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter (g)	Vigour index I	Vigour index II
P_1F_1	72.33	29.40	3.00	1.91	1.551	775.33	89.00 (71.04)	33.54	0.111	2986.83	9.84
P_1F_2	65.26	28.40	3.33	1.88	1.218	609.00	84.66 (67.04)	32.53	0.110	2759.66	9.33
P_1F_3	63.93	28.26	4.33	1.85	1.211	605.33	83.00 (65.67)	32.20	0.111	2671.46	9.18
P_1F_4	76.80	39.60	1.00	1.96	1.796	898.00	90.66 (72.34)	32.83	0.117	2977.40	10.61
P_1F_5	63.26	28.13	6.00	1.71	0.808	403.83	82.00 (64.89)	29.76	0.103	2439.13	8.45
P_2F_1	39.30	23.73	8.66	1.80	1.286	511.00	79.00 (62.73)	30.06	0.109	2378.30	8.63
P_2F_2	41.96	26.20	8.33	1.71	1.106	497.33	80.00 (63.63)	31.51	0.103	2521.33	8.23
P_2F_3	38.86	23.20	10.33	1.73	1.043	437.67	77.00 (61.38)	29.72	0.102	2285.63	7.83
P_2F_4	56.06	31.06	7.00	1.86	1.460	562.00	81.66 (64.65)	31.92	0.111	2608.73	9.05
P_2F_5	35.00	22.20	14.00	1.65	0.758	354.33	73.33 (58.91)	28.43	0.097	2084.86	7.15
Factor B at same level of A											
SE ±	**3.296**	**0.824**	**1.370**	**0.040**	**0.036**	**17.98**	**1.348**	**2.004**	**0.003**	**198.79**	**0.149**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.216**	**51.10**	**NS**	**NS**	**NS**	**NS**	**NS**
Factor A at same level of B											
SE ±	**3.225**	**1.642**	**1.042**	**0.049**	**0.061**	**30.68**	**1.830**	**1.186**	**0.003**	**132.90**	**0.348**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.200**	**100.19**	**NS**	**NS**	**NS**	**NS**	**NS**

Figures in parenthesis are Arc sin transformed value

UAS, Dharwad

Foliar spray and pinching effects on growth and yield characters in Daincha illustrated in Table 97-98.

Table 97: Effect of pinching and foliar spray on growth and yield characters of Daincha

Trt.	No. of branches/pl	No. of pods/pl	No. of seeds/pod	Pods yield per plant (g)	Seed yield per plant (g)	Seed yield per plot (kg)	Seed yield per ha (q)
M_1	15.18	123.31	24.57	189.74	70.28	5.27	26.36
M_2	8.62	70.06	25.62	104.44	39.93	4.19	20.97
SEm±	0.30	2.42	1.01	3.70	1.38	0.11	0.57
CD at 5%	0.89	7.19	NS	10.98	4.10	0.34	1.68
P_1	12.30	99.92	24.91	153.75	56.95	4.93	24.64
P_2	12.76	103.66	25.72	157.39	59.09	5.02	25.10
P_3	11.50	93.40	25.11	141.78	53.24	4.53	22.66
P_4	11.39	92.53	26.84	140.21	52.74	4.56	22.78
P_5	11.56	93.90	22.90	142.29	53.52	4.62	23.12
SEm±	0.47	3.83	1.60	5.85	2.18	0.18	0.90
CD at 5%	NS	NS	NS	NS	NS	NS	NS
M_1P_1	15.15	123.05	23.55	189.34	70.14	5.26	26.30
M_1P_2	17.05	138.49	25.03	213.10	78.94	5.92	29.60
M_1P_3	15.23	123.70	23.78	190.34	70.51	5.29	26.44
M_1P_4	14.15	114.92	29.04	176.83	65.50	4.91	24.56
M_1P_5	14.33	116.38	21.46	179.08	66.34	4.98	24.88
M_2P_1	9.45	76.80	26.27	118.17	43.77	4.60	22.98
M_2P_2	8.47	68.84	26.40	101.69	39.24	4.12	20.60
M_2P_3	7.77	63.10	26.45	93.22	35.97	3.78	18.88
M_2P_4	8.63	70.13	24.64	103.60	39.98	4.20	20.99
M_2P_5	8.79	71.42	24.34	105.51	40.71	4.27	21.37
SEm±	0.67	5.41	2.26	8.27	3.09	0.25	1.27
CD at 5%	NS	NS	NS	NS	NS	NS	NS

General view of experiment

Pinching operation

Table 98: Effect of pinching and foliar spray on growth and yield characters of Daincha

Trt.	No. of Pickings	100 seed weight (g)	Seed Germination (%)	Seedling length (cm)	Seedling dry weight (mg)	Seedling vigour index
M_1	3.00	3.16	78.98	27.72	72.19	2191
M_2	2.73	2.76	76.01	26.11	71.98	1984
SEm±	0.13	0.01	0.56	0.26	0.43	27
CD at 5%	NS	0.02	1.68	0.76	NS	82
P_1	3.00	2.76	76.99	27.01	71.05	2079
P_2	2.67	3.40	77.82	26.27	72.23	2045
P_3	2.83	2.76	77.58	26.75	71.59	2079
P_4	3.33	3.18	79.42	27.43	72.93	2182
P_5	2.50	2.71	75.65	27.10	72.64	2053
SEm±	0.21	0.01	0.89	0.40	0.68	43
CD at 5%	NS	0.03	NS	NS	NS	NS
M_1P_1	3.00	3.43	77.13	27.80	70.75	2145
M_1P_2	2.67	3.41	78.22	25.87	72.30	2024
M_1P_3	3.00	2.45	80.40	27.33	71.75	2201
M_1P_4	3.67	4.28	82.00	28.69	73.30	2353
M_1P_5	2.67	2.24	77.13	28.91	72.88	2231
M_2P_1	3.00	2.09	76.84	26.21	71.36	2012
M_2P_2	2.67	3.40	77.43	26.67	72.17	2066
M_2P_3	2.67	3.07	74.76	26.18	71.42	1958
M_2P_4	3.00	2.09	76.84	26.17	72.56	2011
M_2P_5	2.33	3.18	74.17	25.29	72.39	1876
SEm±	0.30	0.01	1.26	0.57	0.96	61
CD at 5%	0.88	NS	NS	NS	NS	NS

PJTSAU, Hyderabad

Results: Pinching had significant influence in improving pods/plant and non significant for majority of the yield attributing traits. However, pinching recorded 21.7% increase in seed yield/plant over unpinched plots of dhaincha. Similar numerical increase in branches/plant, pod length, seeds/pod, 100 seed weight, seed recovery % and seed yield/plot was noticed with pinched plots. Similar trend was noticed with all the seed quality traits like germination percentage, shoot length, seedling length and seedling vigour index I. However, pinching resulted in significant improvement in root length (6.8%). Among the sub treatments, foliar application with DAP 2%+ MN Mixture (Zn+B) + NAA resulted in higher seed yield (13.68 q/ha) followed by foliar spray with MN Mixture ($ZnSO_4$ 0.5% +Boric acid 0.3%) (11.72 q/ha) and foliar spray with DAP 2% (11.31 q/ha) (Table 99-101).

Table 99: Influence of pinching on yield attributing characters of dhaincha during *kharif*, 2016

Treatments	Days to 50% flowering		Plant height (cm)		Branches/plant		Pod length		Seeds/pod (no.)	
	Pinching	Without pinching	Pinching	Without pinching	Pinching	Without pinching	Pinching	Without pinching	Pinching	Without pinching
T_1	31.7	31.7	167.7	247.0	15.2	13.8	23.4	23.9	34.3	33.9
T_2	32.7	31.3	170.6	246.6	16.7	14.1	24.6	24.4	34.4	33.6
T_3	32.3	31.7	157.8	243.3	14.7	12.7	24.7	24.1	33.0	33.6
T_4	33.0	32.3	176.5	261.9	19.4	14.1	24.9	24.9	34.8	34.2
T_5: Control	31.3	31.3	162.1	226.3	13.8	11.7	24.1	23.9	32.8	33.1
Mean	32.2	31.7	166.9	245.0	16.0	13.3	24.4	24.2	33.9	33.7

	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.
Ai.-Aj.	0.19	0.27	1.15	2.25	3.18	13.66	0.98	1.38	5.94	0.21	0.30	1.29	0.26	0.37	1.58
Bi.-Bj.	0.49	0.69	1.47	8.69	12.29	26.06	0.94	1.33	2.82	0.31	0.44	0.94	0.45	0.64	1.35
AiBi-AiBj	0.69	0.98	2.08	12.29	17.38	36.85	1.33	1.88	3.99	0.44	0.62	1.32	0.64	0.90	1.91
AiBi-AjBi	0.65	0.92	2.11	11.22	15.87	35.03	1.54	2.18	6.53	0.45	0.63	1.66	0.63	0.88	2.21
C.V. (%)			3.76			10.34			15.75			3.15			3.26

Table 100: Influence of pinching on yield attributing characters of dhaincha during *kharif*, 2016

Treat-ments	Test weight (g)		Pods/plant (no.)		Seed yield/plant (g)		Seed yield/plot (kg)		Graded seed yield/plot (kg)		Seed yield/ha (q)	
	Pinching	With-out pinching	Pinching	With-out pinch-ing	Pinching	With-out pinch-ing	Pinching	With-out pinch-ing	Pinching	Without pinching	Pinching	With-out pinching
T_1	1.91	1.70	93.5	57.3	21.16	18.39	2.38	1.93	2.25	1.75	11.31	9.18
T_2	1.97	1.78	97.9	58.1	26.11	20.57	2.46	1.92	2.33	1.78	11.72	9.14
T_3	1.86	1.65	86.0	53.0	21.34	18.70	2.31	1.92	2.17	1.75	11.01	9.14
T_4	1.97	1.80	107.9	62.1	28.00	25.01	2.87	2.28	2.47	2.07	13.68	10.88
T_5: Control	1.88	1.64	79.9	38.8	20.80	13.76	2.18	1.91	2.04	1.70	10.38	9.07
Mean	1.9	1.7	93.0	53.8	23.48	19.29	2.44	1.99	2.25	1.81	11.62	9.48

	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.
Ai.-Aj.	0.01	0.01	0.05	4.56	6.45	27.74	1.08	1.52	6.54	0.11	0.15	0.66	0.16	0.22	0.95	0.52	0.71	3.14
Bi.-Bj.	0.05	0.07	0.16	4.70	6.65	14.09	1.48	2.09	4.42	0.16	0.23	0.49	0.13	0.19	0.39	0.76	1.10	2.33
AiBi-AiBj	0.07	0.11	0.22	6.65	9.40	19.92	2.09	2.95	6.25	0.23	0.33	0.69	0.19	0.26	0.56	1.10	1.57	3.29
AiBi-AjBi	0.07	0.10	0.21	7.49	10.59	31.02	2.15	3.05	8.11	0.23	0.33	0.85	0.23	0.32	1.01	1.10	1.57	4.05
C.V. (%)			7.15			15.67			16.90			17.98			15.87			17.98

Table 101: Influence of pinching on seed quality parameters of dhaincha during *kharif*, 2016

Treatments	Germination (%)			Root length (cm)			Shoot length (cm)			Seedling length (cm)			SVI I		
	Pinching		Without pinching	Pinching		Without pinching	Pinching		Without pinching	Pinching		Without pinching	Pinching		Without pinching
T_1	95		90	7.8		7.2	13.5		13.3	21.3		20.4	2029		1833
T_2	96		89	8.2		7.8	14.1		13.0	22.3		20.7	2147		1844
T_3	95		87	7.5		6.9	12.7		13.0	20.2		19.9	1913		1745
T_4	97		93	8.2		7.8	14.5		13.7	22.7		21.5	2204		2005
T_5: Control	91		88	7.3		7.0	12.6		12.5	19.9		19.6	1822		1724
Mean	94.9		89.4	7.8		7.3	13.5		13.1	21.3		20.4	2023.0		1830.4
	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.	S.E.	S.Ed	C.D.
Ai.-Aj.	1.43	2.03	8.75	0.02	0.03	0.15	0.25	0.35	1.52	0.25	0.35	1.49	48.3	68.27	293.7
Bi.-Bj.	2.24	3.16	6.70	0.39	0.56	1.18	0.44	0.62	1.32	0.52	0.74	1.57	84.4	119.4	253.2
AiBi-AiBj	3.16	4.47	9.48	0.56	0.79	1.67	0.62	0.88	1.87	0.74	1.05	2.22	119.4	168.9	358.0
AiBi-AjBi	3.17	4.49	11.52	0.50	0.71	1.50	0.61	0.86	2.14	0.71	1.00	2.38	117.2	165.8	412.8
C.V. (%)			5.94			12.79			8.11			6.15			10.74

T_1 - Foliar spray with DAP @ 2%; T_2 - Foliar spray with MN Mixture ($ZnSO_4$ @ 0.5% + Boric acid @ 0.3%); T_3 - Foliar spray with NAA @ 40 ppm; T_4 - Foliar spray with DAP 2% + MN Mixture (Zn+B) + NAA @ 40ppm

RPCAU, Dholi

Results: The effect of Pinching on all the characters under study was manifested non-significant. However, the higher seed yield (q/ha) (7.528) was obtained with pinching of terminal bud. Result also showed that the effect of foliar application of different nutrients was found significant for pod yield / plot (Kg), seed yield / plant (g), seed yield (q/ha) and vigour index. The remaining traits under studied were found non-significant in relation to foliar application of different nutrients. Treatments F_4 & F_2 were significantly superior over control (F_5) for pod yield / plot, seed yield / plant (g) and seed yield / ha (q) & vigour index whereas F_3 for pod yield / plot & vigour index and F_1 for only vigour index. Analysis also showed that the interaction effect (M+F) was found non-significant for all the traits. Thus, it is concluded that foliar application of F_4 & F_2 with pinching produced higher Seed Yield (Table 102-103).

Table 102: Effect of Pinching and Foliar application on Seed Yield and Quality Parameters of Dhaincha, at Dholi Centre, during *Kharif*, 2016

Trt.	No. of Pods/ Plant	Seeds/ Pod (No)	Pod yield/ Plant (g)	Pod yield/ Plot(Kg)	Seed yield/ Plant (g)	Seed yield/ ha (q)	Pods Shattered/ Plant (No)	100 seed wt(g)	Vigour Index	G %
Pinching										
P_1	42.77	26.52	3.065	12.93	12.07	7.528	15.490	1.562	1166.216	82.55
P_2	40.99	26.48	3.156	12.98	12.98	6.940	15.155	1.637	1190.064	83.15
SE(m)±	1.027	0.483	0.063	0.499	0.496	0.221	0.813	0.039	14.925	0.238
CD at5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Foliar Application										
F_1	44.47	26.30	3.209	12.65	12.65	6.85	15.22	1.578	1195.555	83.12
F_2	44.25	26.56	3.067	13.30	13.30	7.63	15.85	1.683	1178.575	82.12
F_3	39.36	26.63	3.074	13.17	12.95	6.90	15.40	1.545	1193.657	83.62
F_4	41.65	26.43	3.131	14.41	14.28	8.31	15.30	1.626	1259.063	83.62
F_5	39.67	26.58	3.072	11.26	11.26	6.45	14.83	1.564	1063.849	81.75
SE(m)±	1.482	0.514	0.160	0.546	0.648	0.385	0.625	0.060	30.272	0.795
CD at5%	NS	NS	NS	1.602	1.901	1.132	NS	NS	88.883	NS

NS: Non Significant

Table 103: Interaction effects influenced seed yield and quality parameters of Dhaincha at Dholi Centre during *Kharif*, 2016

Treatment	No. of Pods/ Plant	Seeds/ Pod (No)	Pod yield/ Plant (g)	Pod yield/ Plot(Kg)	Seed yield/ Plant (g)	Seed yield/ ha (q)	Pods Shattered/ Plant (No)	100 seed wt(g)	Vigour Index	G %
P_1F_1	44.70	26.83	3.075	12.85	12.85	6.30	16.60	1.60	1219.40	82.75
P_1F_2	44.75	26.75	2.849	13.00	13.00	7.26	15.90	1.73	1168.65	81.50
P_1F_3	42.85	26.67	2.988	13.50	13.00	6.53	14.50	1.46	1174.89	84.00
P_1F_4	42.15	26.36	3.176	14.32	14.07	8.42	15.10	1.51	1226.00	83.00
P_1F_5	39.40	25.99	3.236	11.00	11.00	6.17	15.35	1.49	1042.12	81.50
P_2F_1	44.25	25.77	3.343	12.45	12.45	7.41	13.85	1.55	1171.71	83.50
P_2F_2	43.75	26.38	3.285	13.60	13.60	8.01	15.80	1.63	1188.50	82.75
P_2F_3	35.88	26.60	3.160	12.85	12.85	7.27	16.30	1.62	1212.42	83.25
P_2F_4	41.15	26.51	3.085	14.50	14.50	8.20	15.50	1.73	1292.12	84.25
P_2F_5	39.95	27.17	2.908	11.52	11.52	6.73	14.32	1.63	1085.57	82.00
SE(m)±	2.297	1.079	0.142	1.117	1.109	0.385	1.817	0.088	33.372	0.532
CD at5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS: Non Significant

BCKV, Nadia

Role of pinching on seed quality parameters at BCKV, Nadia centre is illustrated in Table 104-105

Table 104: With pinching

Treatments	Days to 50% Flr.	Plant ht. (cm)	No. of Pods /Plant	No. of Seeds /Pod	Pod Yield/ Plant (gm)	Seed yield/ Plant (gm)	Seed yield/ Plot (20m^2) (gm)	Seed yield/ ha (kg/ha)	100 seed wt. (gm)	G (%)
T_1	53.25	257.60	26.40	22.43	17.38	11.46	2463.99	1232.00	1.04	75.75
T_2	54.00	269.45	30.60	22.98	18.10	11.84	2822.53	1286.27	1.04	77.00
T_3	53.25	264.40	29.70	22.30	21.01	14.45	2642.08	1321.03	1.01	74.75
T_4	54.75	269.40	32.30	24.18	21.46	14.86	3108.02	1554.02	1.09	78.50
T_5	53.50	257.70	27.85	20.33	14.97	10.99	2183.39	1091.70	1.02	73.00
GM	53.75	263.71	29.37	22.44	18.58	12.71	2644.00	1297.00	1.04	75.80
S.Em	0.84	5.27	3.09	2.30	0.76	0.49	186.01	57.60	0.07	2.49
C.D. (5%)	2.39	15.06	8.82	6.58	2.18	1.39	531.63	164.64	0.19	7.12
C. V.	3.1	4.0	21.0	20.5	8.2	7.6	14.1	8.9	12.7	6.6

Table 105: Without pinching

Trt.	Days to 50% Flr.	Plant ht. (cm)	No. of Pods /Plant	No. of Seeds /Pod	Pod Yield/ Plant (gm)	Seed yield/ Plant (gm)	Seed yield/ Plot (20m^2) (gm)	Seed yield/ ha (kg/ha)	100 seed wt. (gm)	G (%)
T_1	53.50	289.20	23.90	22.20	13.08	8.51	1741.92	870.96	1.10	75.25
T_2	53.50	283.90	20.75	24.40	13.78	9.15	2076.49	1038.25	1.13	70.75
T_3	53.25	292.05	25.35	23.23	17.26	12.68	2217.49	1108.74	1.08	75.50
T_4	53.75	284.95	23.75	23.35	19.28	13.68	2501.80	1250.90	1.20	72.50
T_5	52.75	278.45	19.78	20.93	13.85	8.56	1636.42	818.21	1.13	71.00
GM	53.35	285.71	22.70	22.82	15.44	10.51	2034.82	1017.41	1.12	73.00
S.Em	0.96	8.00	2.78	1.40	0.96	0.84	123.71	61.86	0.07	3.27
C.D. (5%)	2.75	22.86	7.95	3.99	2.74	2.39	353.59	176.79	0.19	9.34
C. V.	3.6	5.6	24.5	12.2	12.4	15.9	12.2	12.2	11.7	9.0

PAJANCOA&RI, Karaikal

Results:

Seed yield and yield components

The method of pinching had significant influence on pod and seed yield / plant, 100 seed weight and seed germination in daincha. The foliar treatments had significant influence on number of pods/plant and 100 seed weight. However, the number of pickings had significant effect on all the parameters studied. Between methods, the plants with pinching had produced a higher pod and seed yield / plant to the tune of 10 g and 3.5 g, respectively as compared to plants without pinching. Among the foliar treatments, foliar spray with MN mixture ($ZnSO_4$ 0.5% + Boric acid 0.3%) (T_2) produced significantly more no. of pods / plant followed by foliar spray with 2% DAP (T_1). Among the pickings, the 1st Picking resulted in significantly higher pod yield / plant, maximum number of sound seeds / pod, more pod yield and seed yield /plant as well as seed yield /plot followed by 2nd picking (Table 106-111).

Resultant seed quality

The results on resultant seed quality on seeds collected from different pickings revealed that the pinching method had influence on 100 seed weight and seed germination only. The foliar treatments also had significant effect on 100 seed weight only. However, significant differences were noticed in all the parameters due to number of pickings.

Conclusion

1. Single pinching may not be sufficient to get higher seed yield in Dhaincha
2. Though the seed yield was less in 3rd picking, quality wise comparable with first two pickings. Hence, seed collection may be done upto three pickings at 10 days intervals.
3. Foliar spray with MN mixture ($ZnSO_4$ 0.5 % + Boric acid 0.3 %) and DAP (2%) are essential to get higher seed yield and better quality in daincha.

1st Picking

2nd Picking

3rd Picking

Table 106: Effect of pinching of terminal buds and foliar application on seed yield components in Dhaincha (*Sesbania aculeata*)

Treatments		No. of pods/plant*				No. of sound seeds/pod*			
		1st Picking	2nd Picking	3rd Picking	Total	1st Picking	2nd Picking	3rd Picking	Mean
M_1	T_1	30.93	44.00	23.87	**98.80**	28.27	19.73	15.40	**21.13**
	T_2	42.07	57.00	29.73	**128.80**	24.80	22.60	13.80	**20.40**
	T_3	34.00	30.33	25.33	**89.66**	28.27	19.40	13.80	**20.49**
	T_4	28.73	31.33	17.87	**77.93**	29.67	22.47	13.40	**21.85**
	T_5	24.80	40.53	17.87	**83.20**	25.60	19.00	12.80	**19.13**
	Mean	**32.11**	**40.64**	**22.93**	**95.68**	**27.32**	**20.64**	**13.84**	**20.60**
M_2	T_1	30.87	31.13	33.87	**95.87**	25.87	17.47	11.87	**18.40**
	T_2	30.20	40.93	14.73	**85.86**	26.33	17.73	12.87	**18.98**
	T_3	21.40	31.20	35.40	**88.00**	25.27	20.00	17.60	**20.96**
	T_4	18.20	15.00	33.93	**67.13**	25.53	20.27	11.60	**19.13**
	T_5	23.80	38.93	20.27	**83.00**	22.73	16.87	20.87	**20.16**
	Mean	**24.89**	**31.44**	**27.64**	**83.97**	**25.15**	**18.47**	**14.96**	**19.53**
	Mean-P	**28.50**	**36.04**	**25.29**		**26.24**	**19.56**	**14.40**	

		M	T	P	M x T	T x P	M x P	MxTxP	M	T	P	M x T	T x P	M x P	MxTxP
	SEd	NS	3.47	2.69	NS	6.01	3.80	NS	NS	NS	1.15	NS	NS	NS	NS
	CD (p=0.05)		6.94	5.38		12.02	7.60				2.30				

Table 107: Effect of pinching of terminal buds and foliar application on pod yield in Dhaincha (*Sesbania aculeata*)

Treatments		Pod yield /plant (g)*				Pod yield /plot (kg)*			
		1st Picking	2nd Picking	3rd Picking	Total	1st Picking	2nd Picking	3rd Picking	Total
M_1	T_1	27.306	27.227	13.550	**68.083**	1.822	0.600	0.397	**2.819**
	T_2	31.259	31.493	15.176	**77.928**	1.842	0.928	0.618	**3.388**
	T_3	27.676	19.175	17.836	**64.687**	1.692	0.625	0.723	**3.04**
	T_4	20.617	18.429	12.457	**51.503**	1.505	0.297	0.383	**2.185**
	T_5	18.589	23.415	14.248	**56.252**	2.420	0.533	0.675	**3.628**
	Mean	**25.089**	**23.948**	**14.653**	**63.691**	**1.856**	**0.597**	**0.559**	**3.012**
M_2	T_1	24.166	15.439	18.566	**58.171**	2.577	0.620	0.613	**3.81**
	T_2	22.199	15.719	13.417	**51.335**	2.228	0.575	0.653	**3.456**
	T_3	18.610	18.991	19.575	**57.176**	2.245	0.407	0.517	**3.169**
	T_4	16.570	8.459	21.697	**46.726**	2.130	0.818	0.267	**3.215**
	T_5	16.721	22.102	13.241	**52.064**	1.862	0.430	0.655	**2.947**
	Mean	**19.653**	**16.142**	**17.299**	**53.094**	**2.208**	**0.570**	**0.541**	**3.319**
	Mean-P	**22.371**	**20.045**	**15.976**	**58.393**	**2.032**	**0.584**	**0.550**	**3.166**

		M	T	P	M x T	T x P	M x P	MxTxP	M	T	P	M x T	T x P	M x P	MxTxP
	SEd	1.32	NS	1.61	NS	NS	2.20	NS	NS	NS	0.124	NS	NS	NS	NS
	CD (p=0.05	2.64		3.23			4.57				0.249				

Table 108: Effect of pinching of terminal buds and foliar application on seed yield in Dhaincha (*Sesbania aculeata*)

Treatments		Seed yield/plant (g)*				Seed yield/plot (g)*			
		1st Picking	2nd Picking	3rd Picking	Total	1st Picking	2nd Picking	3rd Picking	Total
M_1	T_1	11.157	6.809	2.799	**20.765**	589.767	95.73	26.287	**711.784**
	T_2	10.894	7.338	2.280	**20.512**	506.717	189.217	43.583	**739.517**
	T_3	9.378	4.364	3.307	**17.049**	515.733	112.503	42.447	**670.683**
	T_4	6.787	5.128	1.917	**13.832**	476.36	44.267	61.32	**581.947**
	T_5	7.089	6.389	1.996	**15.474**	730.803	65.377	34.553	**830.733**
	Mean	**9.061**	**6.006**	**2.460**	**17.526**	**563.876**	**101.419**	**41.638**	**706.933**
M_2	T_1	**8.763**	4.737	2.472	**15.972**	871.677	133.12	45.54	**1050.337**
	T_2	8.145	3.494	2.542	**14.181**	690.363	94.03	43.50	**827.893**
	T_3	5.883	5.223	2.006	**13.112**	648.19	65.353	44.613	**758.156**
	T_4	6.175	1.999	3.804	**11.978**	691.993	93.623	20.017	**805.633**
	T_5	6.497	6.177	1.667	**14.341**	593.443	52.753	49.380	**695.576**
	Mean	**7.093**	**4.326**	**2.498**	**13.917**	**699.133**	**87.776**	**40.610**	**827.519**
	Mean-P	**8.077**	**5.166**	**2.479**		**631.505**	**94.598**	**41.124**	
		M	**T**	**P**	**M x T**	**T x P**	**M x P**	**MxT x P**	**M**	**T**	**P**	**M x T**	**T x P**	**M x P**	**MxT xP**
	SEd	0.43	NS	0.53	NS	NS	NS	NS	NS	NS	39.22	NS	NS	NS	NS
	CD (p=0.05	0.87		1.06							78.52				

Table 109: Effect of pinching of terminal buds and foliar application on seed recovery (%) / Plant and 100 seed weight (g) in Dhaincha

Treatments		Seed Recovery (%) / Plant							100 seed weight (g)						
		1st Picking		2nd Picking		3rd Picking		Mean	1st Picking		2nd Picking		3rd Picking		Mean
M_1	T_1	40.2		25.1		21.4		**28.90**	1.963		2.027		2.017		**2.002**
	T_2	35.1		24.6		15.8		**25.17**	2.007		2.240		2.040		**2.096**
	T_3	33.9		23.6		18.1		**25.20**	1.910		2.080		1.997		**1.996**
	T_4	33.7		26.6		13.6		**24.63**	1.897		2.077		1.973		**1.982**
	T_5	38.3		26.3		12.9		**25.83**	1.923		2.050		1.900		**1.958**
	Mean	**36.24**		**25.24**		**16.36**		**25.95**	**1.940**		**2.095**		**1.985**		**2.007**
M_2	T_1	**35.5**		30.9		15.2		**27.20**	**2.040**		2.087		2.033		**2.053**
	T_2	35.7		23.7		20.2		**26.53**	1.903		2.087		1.867		**1.952**
	T_3	31.9		27.2		10.5		**23.20**	2.013		2.050		1.883		**1.982**
	T_4	37.6		23.2		17.5		**26.10**	2.000		2.030		1.897		**1.976**
	T_5	38.8		27.5		13.6		**26.63**	2.000		2.037		1.863		**1.967**
	Mean	**35.90**		**26.50**		**15.40**		**25.93**	**1.991**		**2.058**		**1.909**		**1.986**
	Mean-P	**36.07**		**25.87**		**15.88**			**1.967**		**2.077**		**1.947**		
		M	**T**	**P**	**M x T**	**T x P**	**M x P**	**MxT xP**	**M**	**T**	**P**	**M x T**	**TxP**	**M x P**	**MxT xP**
	SEd	NS	NS	8.09	NS	NS	NS	NS	0.005	0.007	0.006	0.010	0.013	0.01	0.018
	CD (p=0.05			16.2					0.009	0.015	0.011	0.021	0.025	0.02	0.036

Table 110: Effect of pinching of terminal buds and foliar application on seed germination and root length of seedling in Dhaincha

Treatments		Seed germination (%)				Shoot length (cm)			
		1st Picking	2nd Picking	3rd Picking	Mean	1st Picking	2nd Picking	3rd Picking	Mean
M1	T1	97	97	97	**97.0**	16.18	12.31	10.85	**13.11**
	T2	100	97	96	**97.7**	15.55	12.26	10.78	**12.86**
	T3	99	95	97	**97.0**	15.54	12.04	10.77	**12.78**
	T4	96	98	95	**96.3**	15.45	12.19	11.00	**12.88**
	T5	97	98	96	**97.0**	15.75	11.91	10.71	**12.79**
	Mean	**97.8**	**97.0**	**96.2**	**97.0**	**15.69**	**12.14**	**10.82**	**12.89**
M2	T1	**98**	97	**94**	**96.3**	15.58	12.11	10.37	**12.69**
	T2	97	96	95	**96.0**	15.89	12.05	10.24	**12.73**
	T3	95	95	93	**94.3**	16.12	12.39	10.84	**13.12**
	T4	99	95	92	**95.3**	15.83	12.72	10.72	**13.09**
	T5	98	97	95	**96.7**	16.22	12.60	10.01	**12.94**
	Mean	**97.4**	**96.0**	**93.8**	**95.7**	**15.93**	**12.37**	**10.44**	**12.91**
	Mean-P	**97.6**	**96.5**	**95.0**		**15.81**	**12.26**	**10.63**	

		M	T	P	M x T	T x P	M x P	MxTxP	M	T	P	M x T	T x P	M x P	MxTxP
	SEd	0.59	NS	0.72	NS	NS	NS	NS	NS	NS	0.12	NS	NS	0.17	NS
	CD (p=0.05	1.18		1.45							0.24			0.34	

Table 111: Effect of pinching of terminal buds and foliar application on Root length (cm) and Dry weight of seedlings (g/10 seedlings) in Dhaincha

Treatments		Root length (cm)				Dry weight of seedlings (g/10 seedlings)			
		1st Picking	2nd Picking	3rd Picking	Mean	1st Picking	2nd Picking	3rd Picking	Mean
M1	T1	15.45	14.78	14.16	**14.80**	0.103	0.104	0.103	**0.103**
	T2	15.11	14.83	13.69	**14.54**	0.106	0.107	0.101	**0.105**
	T3	15.37	14.83	12.98	**14.39**	0.107	0.108	0.097	**0.104**
	T4	14.31	15.36	13.28	**14.32**	0.108	0.099	0.101	**0.103**
	T5	15.15	14.89	13.37	**14.47**	0.105	0.099	0.096	**0.100**
	Mean	**15.08**	**14.94**	**13.50**	**14.50**	**0.106**	**0.103**	**0.100**	**0.103**
M2	T1	**15.16**	14.82	14.19	**14.72**	0.105	0.107	0.104	**0.105**
	T2	14.58	15.07	13.76	**14.47**	0.104	0.097	0.101	**0.101**
	T3	13.89	14.64	13.62	**14.05**	0.111	0.097	0.102	**0.103**
	T4	15.20	15.03	12.52	**14.25**	0.106	0.099	0.102	**0.102**
	T5	15.59	15.11	12.87	**14.52**	0.104	0.095	0.104	**0.101**
	Mean	**14.88**	**14.93**	**13.39**	**14.40**	**0.106**	**0.099**	**0.103**	**0.103**
	Mean-P	**14.98**	**14.94**	**13.45**		**0.106**	**0.101**	**0.102**	

		M	T	P	M x T	T x P	M x P	MxTxP	M	T	P	M x T	T x P	M x P	MxT xP
	SEd.	NS	NS	0.16	NS	NS	NS	NS	NS	NS	0.003	NS	NS	NS	NS
	CD (p=0.05)			0.33							0.005				

JAU, Jamnagar

Results:

Pinching/nipping (M): Effect of pinching on all the characters under studied was manifested non-significant. However, the higher production of seed yield (9.57 q/ha) was obtained with pinching of terminal buds at 60 DAS.

Foliar application (T): Effect of foliar application of different nutrients was found significant for seed yield per plant (g), seed yield per plot (kg), seed yield (q/ha), dry pods yield per plant (gm), dry pods yield per plot (kg) and number of pods shattered per plant before 2nd picking. The remaining traits under studied were reflected non-significant results in relation to foliar application of different nutrients. The foliar sprayings of treatment T_4 i.e. DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period was produced significantly higher seed yield (10.99 q/ha) over control (8.49 q/ha). The same treatment T_4 was also significantly superior over control (T_5) for seed yield per plant (gm), dry pods yield per plant (gm), dry pods yield per plot (kg) and less number of pods shattered per plant before 2nd picking.

Interaction: Interaction effect M x T was found non-significant for all the traits under studied.

Conclusion: The foliar application of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period with pinching was produced the highest seed yield (11.08 q/ha), dry pods yield per plant (36.67 gm), 100-seeds weight (1.40 gm) and higher seed vigour index-I (968.9%) and less number of pods shattered per plant before 2nd picking (0.08) (Table 112-113).

Table 112: Replicated data for seed yield in Dhaincha at JAU, Jamnagar during *Kharif*, 2016

Pinching	Foliar spray	Seed Yield (kg/plot)				Total	Mean	Seed Yield (q/ha)
		I	II	III	IV			
M_1	T_1	1.985	1.615	1.760	1.520	6.880	1.720	9.56
	T_2	1.680	1.708	2.085	1.732	7.205	1.801	10.01
	T_3	1.670	1.455	1.245	1.945	6.315	1.579	8.77
	T_4	1.940	2.015	1.665	2.355	7.975	1.994	11.08
	T_5	1.805	1.420	1.710	1.125	6.060	1.515	8.42
M_2	T_1	1.480	1.535	1.550	1.950	6.515	1.629	9.05
	T_2	1.735	1.950	1.530	1.670	6.885	1.721	9.56
	T_3	1.730	1.160	1.960	1.332	6.182	1.546	8.59
	T_4	1.900	1.725	2.155	2.077	7.857	1.964	10.91
	T_5	1.560	1.855	1.100	1.645	6.160	1.540	8.56
Total		**17.485**	**16.438**	**16.760**	**17.351**	**68.034**	**1.701**	**--**

M_1=With pinching, M_2= Without pinching, T_1= Foliar spray with DAP 2%, T_2= Foliar spray with MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%), T_3= Foliar spray with NAA 40 ppm, T_4= Foliar spray with DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm, T_5=Control.

Table 113: Ancillary, physiological observations and seed yield in Dhaincha at JAU, Jamnagar during *Kharif*, 2016

Treat.	Seed yield			No. of plants /plot	No. of pods/ plant	No. of seeds/ pod	Dry pods yield		Pods shattered/ Plant before		100 seeds weight (gm)	Seed germination (%)	Seedling length (cm),	Seedling dry weight (gm)	Seed vigour Index (%)	
	Per plant (g)	Per Plot (kg)	(q/ha)				Per Plant (gm)	PerPlot (kg)	1st* picking	2nd picking					I	II
(A) Pinching /nipping (M)																
M_1	16.72	1.72	9.57	173.85	93.65	29.39	31.54	3.03	0	0.10	1.37	86.55	10.51	0.952	907.1	82.50
M_2	16.61	1.68	9.33	176.50	92.90	29.36	31.55	2.99	0	0.10	1.38	86.05	9.87	0.946	849.6	81.83
SEm ±	0.43	0.02	0.13	3.72	2.21	0.53	0.81	0.05	-	0.003	0.012	0.52	0.20	0.01	16.54	1.08
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	-	NS	NS	NS	NS	NS	NS	NS
C.V. %	11.40	5.97	5.98	9.50	10.62	8.06	11.49	7.94	-	11.17	3.95	2.69	8.92	5.50	8.42	5.90
(B) Foliar application (T)																
T_1	15.26	1.67	9.30	173.50	84.38	28.91	28.52	2.97	0	0.11	1.36	86.25	10.51	0.96	906.0	82.53
T_2	17.51	1.76	9.78	180.25	96.13	29.68	32.91	3.09	0	0.10	1.38	84.38	11.01	0.93	929.9	78.48
T_3	16.29	1.56	8.68	169.00	99.25	29.54	31.14	2.79	0	0.11	1.39	87.50	9.19	0.97	795.6	85.07
T_4	19.11	1.98	10.99	187.13	106.25	29.59	36.40	3.52	0	0.09	1.38	86.88	9.82	0.95	855.5	82.49
T_5	15.14	1.53	8.49	166.00	80.38	29.14	28.77	2.69	0	0.12	1.36	86.50	10.40	0.95	904.7	82.27
SEm ±	0.94	0.10	0.56	9.33	6.72	0.41	1.74	0.18	-	0.006	0.03	2.42	0.59	0.03	55.93	4.40
CD at 5%	2.75	0.30	1.64	NS	NS	NS	5.07	0.53	-	0.018	NS	NS	NS	NS	NS	NS
C.V. %	15.97	16.84	16.84	15.06	20.39	3.97	15.58	16.96	-	17.19	5.58	7.94	16.33	8.27	18.01	15.14
(C) Interaction effects (M x T):																
M_1 T_1	15.83	1.72	9.56	174.50	86.25	28.75	29.40	3.05	0	0.11	1.34	88.00	10.69	0.97	937.3	85.01
M_1 T_2	17.76	1.80	10.01	183.50	98.50	30.13	33.03	3.12	0	0.09	1.36	84.00	11.39	0.94	953.7	78.54
M_1 T_3	16.42	1.58	8.77	163.75	97.50	29.68	31.54	2.79	0	0.12	1.40	86.00	9.68	0.95	826.4	81.94
M_1 T_4	19.20	1.99	11.08	183.00	104.75	29.70	36.67	3.52	0	0.08	1.40	88.50	10.96	0.98	968.9	86.76
M_1 T_5	14.38	1.52	8.42	164.50	81.25	28.68	27.08	2.69	0	0.12	1.37	86.25	9.81	0.93	849.0	80.26
M_2 T_1	14.69	1.63	9.05	172.50	82.50	29.08	27.64	2.89	0	0.10	1.38	84.50	10.33	0.95	874.7	80.05
M_2 T_2	17.26	1.72	9.56	177.00	93.75	29.23	32.79	3.06	0	0.10	1.39	84.75	10.63	0.92	906.2	78.43
M_2 T_3	16.15	1.55	8.59	174.25	101.00	29.40	30.74	2.79	0	0.10	1.38	89.00	8.70	0.99	764.8	88.20
M_2 T_4	19.02	1.96	10.91	191.25	107.75	29.48	36.13	3.53	0	0.09	1.37	85.25	8.69	0.91	742.1	78.22
M_2 T_5	15.91	1.54	8.56	167.50	79.50	29.60	30.45	2.70	0	0.11	1.36	86.75	10.99	0.96	960.3	84.27
SEm ±	1.33	0.14	0.80	13.19	9.51	0.58	2.46	0.26	-	0.01	0.04	3.43	0.83	0.04	79.09	6.22
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	-	NS	NS	NS	NS	NS	NS	NS

Note: *Pod was not shattered before 1st picking in the field.

Dhaincha with Pinching (M_1T_1)

Dhaincha without Pinching (M_2T_1)

OUAT, Bhubaneswar

Results: The yield attributing parameters, pod and seed yield were enhanced due to pinching of the terminal buds at 60 DAS, as compared to crop without pinching. Significantly higher number of pods per plant was recorded in case of pinching (60.38) as compared to non-pinching (55.92). The pod yield per plant was significantly high due to pinching (41.40 g) as compared to non-pinching (39.09 g). Similarly, seed yield per plant, seed yield per plot and seed yield per hectare were significantly higher in case of pinching (17.40 g, 2.02 kg and 13.44 q, respectively) in comparison to non-pinching (16.00 g, 1.92 kg and 12.78 q, respectively). Pinching of terminal buds increased the number of pickings (3.30) in contrast to non-pinching (2.70). The number of pods shattered per plant was also higher in case of pinching. The 1000-seed weight was slightly lower when pinching of terminal buds was done as compared to non-pinching, though the difference was found to be statistically non-significant. Pinching of terminal buds did not produce any significant effect in respect of seed quality parameters.

Among various foliar sprays, T_4 (i.e. foliar spray with DAP, MN mixture and NAA) recorded highest number of pods per plant, pod yield per plant, seed yield per plant, seed yield per plot and seed yield per hectare. Highest seed yield per hectare was recorded in T_4 (14.81 q) while the lowest was in case of T_5 (Control) (11.99 q). The seed recovery (%) was highest in T_1 (43.78%). Significantly lower shattering of pods was observed in case of T_3 (4.26 per plant). Significantly higher number of pickings (3.38) was recorded in case of T_1 and T_4, while T_5 (Control) recorded the lowest number of pickings (2.38). Foliar sprays with various nutrients / growth regulators in *Dhaincha* had no significant effect on the seed quality parameters (Table 114).

Dhaincha crop in the field

Table 114: Effect of pinching and foliar application of nutrients on pod, seed yield and its components & seed quality parameters in *Dhaincha*

Trt.	No. of pods / plant	No. of seeds/ pod	Pod yield / plant (g)	Seed yield / plant (g)	Seed yield / plot (kg)	Seed yield / ha (q)	Seed recovery (%)	No. of pods shat-tered / plant	No. of pick-ings	100-seed weight (g)	G (%)	Seedl-ing length (cm)	Dry weight seedlings (g)	SVI-I	SVI-II
Main plot															
M_1	60.38	22.76	41.40	17.40	2.02	13.44	40.33	5.12	3.30	1.77	82.25 (9.068)	23.35	0.093	1918.99	0.767
M_2	55.92	23.33	39.09	16.00	1.92	12.78	40.88	4.66	2.70	1.80	82.40 (9.076)	22.82	0.090	1881.11	0.745
Mean	**58.15**	**23.05**	**40.24**	**16.70**	**1.97**	**13.11**	**40.61**	**4.89**	**3.00**	**1.79**	**82.33**	**23.08**	**0.092**	**1900.05**	**0.756**
S.E.m(±)	**0.355**	**0.394**	**0.135**	**0.115**	**0.003**	**0.019**	**0.190**	**0.064**	**0.115**	**0.019**	**0.0348**	**0.665**	**0.0009**	**54.209**	**0.0107**
CD (0.05)	**1.599**	**NS**	**0.606**	**0.519**	**0.013**	**0.084**	**NS**	**0.289**	**0.520**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Sub-plot															
T_1	54.50	20.65	37.30	17.01	1.92	12.77	43.78	5.49	3.38	1.79	81.50 (9.027)	23.71	0.092	1931.89	0.751
T_2	56.80	25.04	38.65	16.14	2.00	13.34	41.60	4.70	2.88	1.82	83.25 (9.124)	22.39	0.089	1863.01	0.738
T_3	60.85	23.55	42.88	15.95	1.90	12.64	40.80	4.26	3.00	1.73	81.75 (9.041)	23.23	0.097	1897.65	0.794
T_4	64.75	23.00	47.19	18.89	2.22	14.81	40.33	4.95	3.38	1.83	82.38 (9.075)	22.88	0.094	1885.44	0.773
T_5	53.85	22.99	35.20	15.52	1.80	11.99	36.53	5.05	2.38	1.78	82.75 (9.096)	23.21	0.087	1922.25	0.723
Mean	**58.15**	**23.05**	**40.24**	**16.70**	**1.97**	**13.11**	**40.61**	**4.89**	**3.00**	**1.79**	**82.33**	**23.08**	**0.092**	**1900.05**	**0.756**
S.E.m(±)	0.428	2.008	0.405	0.320	0.010	0.066	0.841	0.069	0.141	0.036	0.0434	0.430	0.0040	42.906	0.0331
CD (0.05)	**1.249**	**NS**	**1.183**	**0.933**	**0.029**	**0.192**	**2.455**	**0.201**	**0.411**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

HPKV, Palampur

Results : The results revealed significant differences among pinching and non-pinching treatments. The pinching of terminal buds at 60 DAS produced significantly higher number of pods per plant, pod yield per plant and plot, thereby exhibiting significant increase in seed yield over no pinching treatment. However no significant differences were observed with respect to seeds per pod, seed yield per plant and other seed quality parameter like 100-seed weight, germination percentage, seedling length and vigour index among pinching and non-pinching treatments. Among foliar spray treatments, treatment T_4 (foliar spray with DAP @ 2% + MN mixture + NAA @ 40 ppm) produced significantly higher number of pods per plant, pod yield and seed yield over other treatments. The same treatment also exhibited higher germination percentage, seedling weight and vigour index and differed significantly with other treatments. No significant effect on 100- seed weight was observed due to application of different foliar spray of nutrients. The trend among other treatments except T_4 was not uniform and varied for different attributes (Table 115-116).

Table 115: Effect of pinching and foliar application of nutrients on seed quality of Dhaincha

Treatment	Pod shattering per plant (%)	No of pickings	100-seed weight	Germination (%)	Vigour Index-I	Seedling length (cm)
Pinching						
M_1	2.05	1	1.95	86.1	1334.55	15.5
M_2	1.98	1	1.93	86.3	1329.02	15.4
SE (m) ±	0.05	0	0.05	0.09	2.93	0.04
CD (5%)	NS	NS	NS	NS	NS	NS
Nutrient spray						
T_1	2.05	1	1.93	86.5	1314.8	15.2
T_2	1.94	1	1.94	86.4	1365.12	15.8
T_3	1.93	1	1.92	85.1	1267.99	14.9
T_4	2.12	1	2.01	88.2	1525.86	17.3
T_5	1.97	1	1.91	84.2	1187.22	14.1
SE (m) ±	0.07	0	0.08	1.24	86.57	1.15
CD (5%)	0.15	NS	0.16	2.56	178.69	2.37

Table 116: Effect of pinching and foliar application of nutrients on pods, yield attributes and seed yield of Dhaincha

Treatment	Pods per plant	Seeds per pod	Pod yield per plant (g)	Pod yield per plot (g)	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield (q/ha)
Pinching							
M_1	55.2	26.4	25.64	1867.3	10.012	987.6	8.23
M_2	48.2	27.3	23.57	1789.7	09.562	952.8	7.94
SE (m) ±	1.69	0.32	0.49	10.53	0.10	3.64	0.07
CD (5%)	5.37	NS	1.56	33.40	NS	11.56	0.23
Nutrient spray							
T_1	51.6	27.2	26.4	1789.5	9.561	976.8	8.14
T_2	51.7	27.6	26.8	1820.3	10.245	1000.8	8.34
T_3	51.2	26.7	26.2	1756.2	9.637	952.8	7.94
T_4	54.2	28.3	30.8	2238.1	11.235	1110.0	9.25
T_5	49.8	24.6	23.4	1546.2	8.239	807.6	6.73
SE (m) ±	1.25	1.04	1.05	147.45	0.81	41.16	0.71
CD (5%)	2.58	2.14	2.18	204.36	1.67	84.97	1.46

Main plots : M_1 – Pinching M_2 - Non pinching
Sub plots : T_1 - Foliar spray with DAP @ 2%, T_2 - Foliar spray with MN mixture (Zn SO4 @ 0.5% + Boric acid @ .3%), T_3 - Foliar spray with NAA @ 40 ppm, T_4 - Foliar spray with DAP @ 2% + MN mixture + NAA @ 40 ppm, T_5 - Control

Sunhemp (*Crotolaria juncea*)

TNAU, Coimbatore

Results: The sunhemp crop without pinching recorded significantly increased seed yield per plant (11.20 gm) compared to pinching treatment (9.84 gm). Among the foliar sprays, foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm, recorded the highest single plant seed yield (13.5 gm). Vigour index of the resultant seed is higher from the seeds of foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm. Non-pinching the sunhemp crop with foliar spray of DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm is superior in all the treatments with highest single plant seed yield and seed yield per plot (Table 117).

Non-pinching combined with foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm recorded the maximum number of pods per plant (28.8) compared to the control (19.2). Non Pinching combined with foliar spray with DAP 2%+ MN mixture (Zn+B) + NAA 40 ppm recorded the maximum number of seeds per pod (9.2) compared to the control (7.2). Non-pinching combined with foliar spray with DAP 2%+ MN mixture (Zn+B) + NAA 40 ppm recorded the maximum seed yield per plot (2.98 kg) compared to control (2.12 kg).

Field view

Table 117: Effect of pinching and different foliar spray during flower initiation on seed yield attributing characters, seed yield and resultant seed quality

Treatment		Plant height (cm)	Number of pods / plant	Number of seeds / pod	Seed yield per plant (gm)	Seed yield per plot (kg)	100 seed weight (gm)	Germi-nation (%)	Root length (cm)	Shoot length (cm)	Vigour index
With pinching	T_1	98.0	23.2	8.2	9.9	1.98	1.58	81	16.26	12.6	2334
	T_2	97.5	22.2	8.4	9.8	1.86	1.63	80	16.04	11.2	2192
	T_3	98.4	25.5	8.2	9.9	1.82	1.55	78	16	10.5	2070
	T_4	95.4	26.3	8.6	10.1	2.12	1.65	88	16.58	13.6	2652
	$T_{5\,(Control)}$	98.0	18.2	7.2	9.5	1.82	1.52	78	15.58	9.5	1958
	Mean	97.5	23.08	8.24	9.84	1.92	1.59	81.00	16.09	11.48	2241
Without pinching	T_1	112.4	22.5	8.6	11.8	2.73	1.6	78	14.8	9.52	1887
	T_2	116.2	26.6	8.4	11.1	2.65	1.65	82	15.15	9.87	2039
	T_3	110.8	25.3	8.2	11.3	2.32	1.56	84	15.1	9.65	2074
	T_4	116.4	28.8	9.2	13.5	2.98	1.71	86	14.65	10.23	2400
	$T_{5\,(Control)}$	113.9	19.2	7.4	10.8	2.12	1.55	78	14.32	9.1	1820
	Mean		24.08	8.28	11.20	2.56	1.61	81.60	14.80	9.67	2044
SEd	N		2.04	1.08	3.09	2.08	0.73	0.48	0.97	0.10	33
	F		3.14	2.14	4.13	5.24	1.79	0.22	0.14	0.13	49
	NXF		3.18	2.19	6.20	7.10	1.84	0.62	0.20	0.20	71
CD (P=0.05)	N		4.28	2.22	6.27	4.22	1.87	1.02	0.27	0.28	94
	F		6.34	4.29	8.28	10.46	3.94	0.56	0.28	0.27	100
	NXF		6.48	4.42	12.44	14.24	4.07	1.18	0.45	0.44	156

Sub plots : T_1 - Foliar spray with DAP @ 2%
T_2 - Foliar spray with MN mixture (Zn SO4 @ 0.5% + Boric acid @ .3%)
T_3 - Foliar spray with NAA @ 40 ppm
T_4 - Foliar spray with DAP @ 2% + MN mixture + NAA @ 40 ppm
T_5 - Control

MPKV, Rahuri

Results

Effect of pinching: Pinching had significant effect on seed yield and quality of sunhemp irrespective of foliar application of fertilizers/micronutrients. Number of pods/plant (96.54), seed yield/plot (1.54 kg), seed yield/ha (770. 93 kg), germination (88.66%), root shoot length (27.86 cm), dry matter content (0.18 g), vigour index I (2477.51) and vigour index II (16.13) were significantly higher in the pinching treatment.

Effect foliar application of fertilizers/ micronutrients: Foliar application of fertilizers/ micronutrients had significant effect on seed yield and quality of sunhemp irrespective of pinching. Number of pods/plant (101.53), number of seeds/pod (12.06), 100 seed weight (2.54g), seed yield/plot (1.74 kg), seed yield/ha (873.75 kg), germination (88.16%) and vigour index I (2769.70) were significantly higher in the foliar application of DAP 2% + MN mixture + NAA 40 ppm (T_4) treatment. The pod shattering per cent (1.33%) was lower in this treatment.

Interaction effect: The interaction effect of pinching and foliar application of fertilizers/ micronutrients showed significant effect on seed yield and seed quality parameters. Seed yield/plot (2.15 kg) and seed yield/ha (1075.66 kg) were significantly higher in the pinching and foliar application of DAP 2% + MN mixture + NAA 40 ppm (P_1T_4) treatment (Table 118-119).


Experimental view of Sunhemp

Table 118: Effect of pinching and foliar application on seed yield and quality parameters of Sunhemp during *kharif*, 2016

Treatments	No. of pods/ Plant	No. of seeds/ Pod	No. of pods shattered	100 seed weight (g)	Seed yield/ Plot (kg)	Seed yield/ ha (kg)	Germi-nation (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
Pinching											
With pinching (P_1)	96.54	11.30	4.80	2.49	1.54	770.93	88.66 (70.58)	27.86	0.18	2477.51	16.13
Without pinching (P_2)	73.13	10.88	3.26	2.23	1.06	530.26	82.40 (65.24)	24.14	0.16	1991.35	13.83
SE ±	**3.76**	**0.38**	**0.78**	**0.10**	**0.04**	**20.58**	**0.76**	**0.18**	**0.001**	**40.50**	**0.22**
CD at 5%	**24.66**	**NS**	**NS**	**NS**	**0.27**	**134.84**	**4.98**	**1.20**	**0.005**	**265.33**	**1.49**
Foliar application											
Spray with DAP 2% (F_1)	82.63	10.93	4.66	2.42	1.45	729.33	86.33 (68.67)	25.75	0.18	2238.36	15.60

Spray with MN mixture (F_2)	88.70	10.93	3.83	2.31	1.30	655.83	87.16 (69.26)	26.96	0.17	2355.76	15.53
Spray with NAA 40 ppm (F_3)	81.13	11.53	4.50	2.39	1.10	550.66	85.00 (67.27)	27.78	0.18	2366.11	15.29
Spay with DAP 2% + MN mixture + NAA (F_4)	101.53	12.06	1.33	2.54	1.74	873.75	88.16 (70.20)	26.76	0.17	2369.70	15.41
Control (F_5)	70.18	10.00	5.83	2.13	0.89	448.41	81.00 (64.15)	22.73	0.16	1842.21	15.07
SE ±	**3.02**	**0.32**	**0.79**	**0.10**	**0.10**	**52.90**	**0.722**	**0.78**	**0.005**	**71.13**	**0.47**
CD at 5%	**9.14**	**0.96**	**2.40**	**NS**	**0.32**	**159.97**	**2.183**	**2.38**	**NS**	**215.08**	**1.42**

Figures in parenthesis are Arc sin transformed values

Table 119: Interaction effects influenced seed yield and quality parameters of Sunhemp green manure crops during *kharif*, 2016

Treatments	No. of pods/ Plant	No. of seeds/ Pod	No. of pods shattered	100 seed weight (g)	Seed yield/ Plot (kg)	Seed yield/ ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
P_1F_1	96.80	11.20	5.00	2.51	1.82	913.16	91.66 (73.20)	28.56	0.187	2618.20	17.14
P_1F_2	99.26	11.40	5.33	2.42	1.65	826.16	90.66 (72.28)	28.80	0.182	2606.26	16.50
P_1F_3	93.33	12.13	6.00	2.57	1.13	567.83	87.00 (68.88)	29.30	0.188	2550.63	16.38
P_1F_4	115.60	11.40	1.66	2.77	2.15	1075.66	92.33 (73.90)	29.33	0.183	2708.46	16.87
P_1F_5	77.70	10.40	6.00	2.17	0.94	471.83	81.66 (64.65)	23.30	0.169	1904.00	13.77
P_2F_1	68.46	10.66	4.33	2.33	1.09	545.50	81.00 (64.14)	22.93	0.174	1858.53	14.07
P_2F_2	78.13	10.46	2.33	2.20	0.95	475.50	83.66 (66.23)	25.13	0.174	2105.26	14.56
P_2F_3	68.93	10.93	3.00	2.22	1.06	533.50	83.00 (65.67)	26.26	0.171	2181.60	14.20
P_2F_4	87.46	12.73	1.00	2.31	1.34	671.83	84.00 (66.50)	24.20	0.166	2030.93	13.96
P_2F_5	62.66	9.60	5.66	2.10	0.85	425.00	80.33 (63.65)	22.16	0.154	1780.43	12.37
Factor B at same level of A											
SE ±	**8.41**	**0.85**	**1.75**	**0.22**	**0.09**	**46.02**	**1.701**	**0.41**	**0.002**	**90.56**	**0.51**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.49**	**249.05**	**4.563**	**NS**	**NS**	**363.96**	**NS**
Factor A at same level of B											
SE ±	**5.36**	**0.55**	**1.27**	**0.17**	**0.14**	**70.01**	**1.189**	**1.01**	**0.007**	**98.67**	**0.63**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.46**	**233.06**	**5.311**	**NS**	**NS**	**357.00**	**NS**

Figures in parenthesis are Arc sin transformed value

UAS, Dharwad

Results: Pinching was found to be better over control (without pinching) since the pinched plants produced significantly more number of branches, pods and seed yield per plant, per hectare. Foliar application of DAP @ 2% + Mixture (ZnSO4 +Boric Acid @ 0.3 %) significantly affected seed quality parameters like seed germination percentage, dry weight and seedling vigour index (Table 120-121).

Table 120: Effect of pinching and foliar spray on growth and yield characters of Sunhemp

Trt.	No. of Branches /Pl	No. of Pods /pl	No. of Seeds /pod	Pods yield per plant (g)	Seed yield per plant (g)	Seed yield per plot (kg)	Seed yield per ha (q)
M_1	14.72	348.82	14.99	96.88	49.92	3.45	17.25
M_2	8.92	240.84	13.23	66.56	35.50	2.76	13.80
SEm±	0.50	12.20	0.38	1.79	1.26	0.09	0.46
CD at 5%	1.48	36.24	1.11	5.31	3.75	0.27	1.36
P_1	9.54	237.98	13.83	71.64	39.42	3.01	15.05
P_2	12.63	315.10	13.60	82.02	41.66	3.13	15.65
P_3	12.81	319.51	14.07	85.83	45.91	3.16	15.81
P_4	12.37	308.49	14.60	82.44	42.84	3.19	15.94
P_5	11.75	293.07	14.43	86.66	43.72	3.04	15.18
SEm±	0.79	19.29	0.59	2.82	1.99	0.15	0.73
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
M_1P_1	11.88	281.56	14.40	88.18	41.33	3.34	16.72
M_1P_2	15.73	372.80	14.27	98.06	49.48	3.48	17.39
M_1P_3	15.95	378.02	15.40	98.44	54.91	3.51	17.57
M_1P_4	15.40	364.98	15.40	95.93	51.71	3.54	17.71
M_1P_5	14.63	346.73	15.47	103.77	52.17	3.37	16.87
M_2P_1	7.20	194.40	13.27	55.10	37.51	2.68	13.38
M_2P_2	9.53	257.40	12.93	65.98	33.84	2.78	13.92
M_2P_3	9.67	261.00	12.73	73.22	36.91	2.81	14.06
M_2P_4	9.33	252.00	13.80	68.95	33.96	2.83	14.17
M_2P_5	8.87	239.40	13.40	69.56	35.27	2.70	13.50
SEm±	1.12	27.28	0.84	3.99	2.82	0.21	1.03
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

Table 121: Effect of pinching and foliar spray on growth and yield characters of Sunhemp

Trt.	No. of Pickings	100 seed weight (g)	Seed Germination (%)	Seedling length (cm)	Seedling dry weight (mg)	Seedling vigour index
M_1	3.37	2.56	83.82	39.66	78.26	3331
M_2	2.69	2.57	81.21	38.43	75.82	3124
SEm±	0.08	0.03	0.56	0.26	0.52	43
CD at 5%	0.24	NS	1.65	0.78	1.54	129
P_1	3.01	2.51	80.86	38.26	75.50	3097
P_2	3.13	2.52	82.52	39.05	77.05	3225
P_3	3.03	2.51	83.29	39.41	77.76	3287
P_4	3.27	2.71	86.72	41.04	80.96	3561
P_5	2.71	2.59	79.17	37.46	73.91	2966
SEm±	0.13	0.05	0.88	0.42	0.82	68
CD at 5%	NS	NS	2.61	1.23	2.44	203
M_1P_1	3.34	2.50	82.72	39.14	77.23	3239
M_1P_2	3.48	2.50	83.60	39.56	78.05	3311
M_1P_3	3.25	2.61	83.77	39.64	78.21	3327
M_1P_4	3.71	2.68	89.00	42.11	83.09	3748
M_1P_5	3.09	2.54	80.00	37.86	74.69	3029
M_2P_1	2.68	2.51	79.00	37.38	73.76	2955
M_2P_2	2.78	2.54	81.45	38.54	76.05	3140
M_2P_3	2.81	2.40	82.81	39.19	77.31	3247
M_2P_4	2.83	2.74	84.44	39.96	78.84	3375
M_2P_5	2.34	2.64	78.33	37.07	73.14	2904
SEm±	0.18	0.07	1.24	0.59	1.16	97
CD at 5%	NS	NS	NS	NS	NS	NS

NS= Non significant

BCKV, Nadia

Results: In sunhemp, pinching of terminal buds in combination of foliar spray with DAP 2% + MN mixture (Zn+B) + NAA @ 40 ppm recorded higher seed yield than any other treatment combinations.

Table 122: With pinching

Treatment	Days to 50% flr.	Plant ht. (cm)	Pods /Plant (No's)	Seeds /Pod (No's)	Pod Yield/ Plant (g)	Seed yield/ Plant (g)	Seed yield/ Plot (g)	Seed yield/ (kg/ha)	100 seed wt.(g)	G (%)
T_1	83.50	211.65	92.30	7.45	12.98	6.83	911.78	455.89	2.47	79.50
T_2	85.00	223.05	107.55	7.65	17.93	11.33	1013.63	506.82	2.53	78.00
T_3	80.75	225.30	112.55	7.80	19.83	11.39	1087.45	543.73	2.44	79.00
T_4	81.50	237.45	114.85	8.40	19.75	12.43	1354.38	677.18	2.44	78.75
T_5	82.50	228.00	88.80	7.30	12.78	6.13	721.45	360.73	2.45	74.50
GM	82.650	225.09	103.21	7.720	16.65	9.62	1017.73	508.86	2.46	77.95
S.Em	1.11	7.70	4.43	0.59	1.43	0.94	90.84	45.42	0.21	2.58
C.D. (5%)	3.16	22.01	12.65	1.69	4.10	2.70	259.63	129.81	0.59	7.37
C. V.	2.7	6.8	8.6	15.3	17.2	19.6	17.9	17.9	16.7	6.6

Table 123: Without pinching

Trt.	Days to 50% flr.	Plant ht. (cm)	Pods /Plant (No's)	Seeds /Pod (No's)	Pod Yield/ Plant(g)	Seed yield/ Plant(g)	Seed yield/ Plot (g)	Seed yield/ (kg/ha)	100 seed wt. (g)	G (%)
T_1	82.00	235.15	64.95	7.93	13.35	6.64	779.07	389.53	2.58	72.75
T_2	82.00	235.40	83.00	7.45	12.80	6.77	775.72	387.86	2.21	80.25
T_3	82.00	243.60	82.80	6.18	15.08	9.17	1020.94	510.47	2.37	77.50
T_4	83.50	257.50	84.50	7.85	15.35	8.72	1051.95	525.98	2.60	78.75
T_5	81.00	215.83	71.13	7.50	14.32	7.39	761.32	380.66	2.30	77.75
GM	82.10	237.49	77.27	7.38	14.178	7.73	877.79	438.90	2.41	77.40
S.Em	0.96	12.44	5.32	0.44	0.89	0.66	41.98	20.99	0.19	1.76
C.D. (5%)	2.75	35.56	15.20	1.26	2.55	1.89	119.99	60.00	0.54	5.03
C. V.	2.3	10.5	13.8	12.0	12.6	17.1	9.6	9.6	15.5	4.5

JAU, Jamnagar

Results:

Pinching/nipping (M): Effect of pinching was found non-significant for all the characters under studied except number of pods per plant and dry pods yield per plant. The number of pods per plant (182.7) and dry pods yield per plant (41.76 gm) were significantly higher with pinching than without pinching. The higher production of seed yield (9.63 q/ha) was obtained with pinching of terminal buds at 60 DAS.

Foliar application (T): Different nutrients spraying exert their significant effect on seed yield per plant (gm), per plot (kg) and q/ha; number of pods per plant; dry pods yield per plant (gm) & per plot (kg); and number of pods shattered per plant before 1st and 2nd picking. The remaining traits studied were reflected non-significant results in relation to foliar application of different nutrients. The maximum seed yield (10.71 q/ha) was produced when foliar spray of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period. The foliar spray of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid

0.3%) + NAA 40 ppm was significantly superior over control for seed yield per plant (gm), seed yield (q/ha), number of pods per plant, dry pods yield per plant (gm) & per plot (kg) and pods shattering losses.

Interaction: Interaction M x T was found non-significant for all the traits under studied.

Conclusion: The overall results showed that the foliar application of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period with pinching was produced the highest seed yield (10.80 q/ha), seeds per pod (11.13), dry pods yield per plot (14.72 kg), 100-seeds weight (1.31 gm) and reflected more number of pods per plant (193.75) and less number of pods shattered per plant before 1st (0.14) and 2nd (0.20) picking in sun hemp (Table 124-125).

Table 124: Replicated data for seed yield in sun hemp at JAU, Jamnagar during *Kharif*, 2016

Pinching	Foliar spray	Seed Yield (kg/plot)				Total	Mean	Seed Yield (q/ha)
		I	II	III	IV			
M_1	T_1	1.647	2.100	1.705	1.583	7.035	1.759	9.77
	T_2	1.818	2.060	1.536	2.135	7.549	1.887	10.48
	T_3	1.865	1.467	1.590	1.315	6.237	1.559	8.66
	T_4	1.759	1.805	2.230	1.985	7.779	1.945	10.80
	T_5	1.628	1.336	1.710	1.378	6.052	1.513	8.41
M_2	T_1	1.345	1.780	1.625	1.210	5.960	1.490	8.28
	T_2	1.949	1.500	1.790	1.375	6.614	1.653	9.19
	T_3	1.504	1.990	1.412	1.910	6.816	1.704	9.47
	T_4	1.871	1.916	1.812	2.045	7.644	1.911	10.62
	T_5	1.510	1.162	1.575	1.849	6.096	1.524	8.47
Total		**16.896**	**17.116**	**16.985**	**16.785**	**67.781**	**1.695**	**9.41**

M_1=With pinching, M_2= Without pinching, T_1= Foliar spray with DAP 2%, T_2= Foliar spray with MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%), T_3= Foliar spray with NAA 40 ppm, T_4= Foliar spray with DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm, T_5=Control

Sunhemp with pinching (M_1T_1)

Sunhemp without pinching (M_2T_1)

Table 125: Ancillary, physiological observations and seed yield in Sun hemp at JAU, Jamnagar during *Kharif*, 2016

Treat.		Seed yield			No. of plants /plot	No. of pods/ plant	No. of seeds/ pod	Dry pods yield		Pods shattered/ Plant before		100 seeds weight (gm)	Seed germination (%)	Seedling length (cm),	Seedling dry weight (gm)	Seed vigour Index (%)	
		Per plant (gm)	Per Plot (kg)	(q/ha)				Per Plant (gm)	Per Plot (kg)	1st picking	2nd picking					I	II
(A) Pinching /nipping (M)																	
M_1		5.47	1.73	9.63	318.1	182.67	10.81	41.76	13.04	0.18	0.25	1.25	89.90	11.65	0.99	1055.2	89.67
M_2		5.24	1.66	9.20	318.5	178.41	10.69	40.63	12.50	0.18	0.27	1.29	87.65	10.96	0.96	963.5	84.40
SEm ±		0.09	0.02	0.10	4.92	0.69	0.16	0.15	0.29	0.01	0.01	0.03	1.39	0.32	0.02	43.23	2.94
CD at 5%		NS	NS	NS	NS	2.10	NS	0.49	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %		7.20	4.76	4.76	6.92	1.71	6.74	1.67	10.21	22.43	21.60	10.06	7.01	12.69	8.34	19.15	15.10
(B) Foliar application (T)																	
T_1		5.25	1.62	9.02	311.7	177.40	10.75	40.09	12.01	0.19	0.27	1.25	86.25	11.19	0.96	973.5	83.06
T_2		5.53	1.77	9.83	322.0	183.65	11.01	42.06	13.32	0.17	0.26	1.27	91.00	11.41	1.00	1043.9	90.93
T_3		5.12	1.63	9.07	318.9	175.55	10.53	40.13	12.20	0.19	0.27	1.27	85.00	10.72	0.93	916.9	79.43
T_4		6.05	1.92	10.71	323.8	195.00	11.08	45.03	14.59	0.14	0.22	1.30	89.50	11.63	0.99	1041.8	88.91
T_5		4.84	1.52	8.44	315.0	171.10	10.38	38.68	11.73	0.20	0.31	1.26	92.13	11.57	1.00	1070.7	92.83
SEm ±		0.17	0.09	0.52	9.75	5.02	0.23	1.24	0.68	0.01	0.01	0.05	3.00	0.41	0.03	64.15	5.39
CD at 5%		0.49	0.27	1.52	NS	14.66	NS	3.61	1.99	0.03	0.03	NS	NS	NS	NS	NS	NS
C.V. %		8.94	15.62	15.62	8.66	7.87	6.07	8.48	15.07	13.15	12.67	10.35	9.55	10.29	8.61	17.98	17.52
(C) Interaction effects (M x T):																	
M_1	T_1	5.56	1.76	9.77	318.5	184.35	10.83	41.38	12.49	0.19	0.26	1.22	87.75	11.83	0.97	1048.1	86.08
	T_2	5.78	1.89	10.48	325.0	189.45	11.03	43.43	14.24	0.16	0.23	1.24	93.25	11.93	1.03	1119.7	96.32
	T_3	5.11	1.56	8.66	310.3	174.50	10.65	40.25	11.98	0.18	0.27	1.27	86.00	10.95	0.95	951.2	82.30
	T_4	6.07	1.94	10.80	323.5	193.75	11.13	44.88	14.72	0.14	0.20	1.31	90.00	11.80	0.99	1068.6	89.52
	T_5	4.85	1.51	8.41	313.3	171.30	10.40	38.88	11.77	0.20	0.30	1.21	92.50	11.73	1.02	1088.5	94.14
M_2	T_1	4.93	1.49	8.28	305.0	170.45	10.68	38.80	11.54	0.19	0.27	1.28	84.75	10.56	0.94	898.9	80.08
	T_2	5.28	1.65	9.19	319.0	177.85	11.00	40.70	12.40	0.18	0.28	1.30	88.75	10.89	0.96	968.0	85.52
	T_3	5.12	1.70	9.47	327.5	176.60	10.40	40.00	12.43	0.19	0.27	1.27	84.00	10.49	0.91	882.5	76.56
	T_4	6.03	1.91	10.62	324.0	196.25	11.03	45.18	14.46	0.14	0.23	1.28	89.00	11.45	0.99	1015.0	88.30
	T_5	4.82	1.52	8.47	316.8	170.90	10.35	38.48	11.68	0.20	0.31	1.30	91.75	11.41	0.99	1053.0	91.49
SEm ±		0.24	0.13	0.74	13.78	7.10	0.33	1.75	0.96	0.01	0.02	0.07	4.24	0.58	0.04	90.73	7.62
CD at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Pillipesara (*Vigna trilobata*)

TNAU, Coimbatore

Results: Pinching of the pillipesara crop recorded significantly increased seed yield compared to non-pinching. Number of pods per plant (58.0), Number of seeds per pod (7.3), Seed yield per plant (18.6 gm), Seed yield per plot (2.18 kg), germination percentage (93), and vigour index (1690) were recorded more in pinching treatment. Whereas the non-pinching treatment recorded less number of pods per plant (54.0), number of seeds per pod (6.5), seed yield per plant (16.4 gm), seed yield per plot (1.79 kg) but the quality of the resultant seeds were on

a par. Among the foliar sprays, foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm was recorded the highest single seed plant yield (21.1 gm). The same treatment recorded the highest seed yield per plot (2.38 kg). Vigour index of the resultant seed was higher from the seeds of foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm (1843). Pinching the pillipesara crop with foliar spray of foliar spray with DAP 2%+ MN Mixture (Zn+B) + NAA 40 ppm was superior with highest Number of seeds per pod (10.8) single plant seed yield (21.1 gm) and seed yield per plot (2.38 kg) (Table 126).

Field view of the experiment

Pod picking

Table 126: Effect of pinching and different foliar spray during flower initiation on seed yield attributing characters, seed yield and resultant seed quality

Treatment		Plant height	Number of pods / plant	Number of seeds / pod	Seed yield per plant (gm)	Seed yield per plot (kg)	100 seed weight (gm)	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
With pinching	T_1	156.8	55.0	8.4	20.15	2.22	1.18	93	9.8	8.5	1702
	T_2	164.8	55.0	6	18.45	2.06	1.23	93	9.6	8.1	1646
	T_3	166.4	62.0	6.4	17.05	2.04	1.14	92	9.6	8.4	1656
	T_4	171.4	59.0	10.8	21.1	2.38	1.29	96	10.3	8.9	1843
	$T_{5\ (Control)}$	163.4	68.0	5.6	16.31	1.52	1.13	91	9.6	8.2	1620
	Mean	164.6	58.0	7.3	18.6	2.18	1.2	93.0	9.7	8.4	1690
Without pinching	T_1	188.2	52.0	8.2	18.05	1.52	1.16	92	9.5	8.5	1656
	T_2	189.2	54.0	3.4	16.18	1.46	1.21	93	9.4	8.4	1655
	T_3	194.0	56.0	5.4	15.26	1.35	1.13	92	9.5	8.3	1638
	T_4	197.6	57.0	9.6	19.35	1.94	1.23	96	10.1	8.9	1824
	$T_{5\ (Control)}$	187.4	59.0	4.5	13.28	1.120	1.1	92	9.7	8.3	1656
	Mean	191.3	54.0	6.5	16.4	1.799	1.2	93.0	9.7	8.5	1690
SEd	N	1.72	1.12	1.19	3.21	4.04	1.01	0.74	0.63	0.40	31.1
	F	2.73	1.91	2.21	4.14	6.14	2.03	0.94	0.11	0.10	41.4
	NXF	3.65	2.67	2.98	4.76	7.18	2.8	1.41	0.15	0.13	53.5
CD(P=0.05)	N	3.25	3.11	2.48	6.58	8.11	2.3	1.2	1.17	0.11	62.3
	F	5.57	3.90	4.75	8.46	12.32	4.57	2.19	0.23	0.20	84.5
	NXF	7.71	5.78	6.64	9.86	14.37	6.46	2.32	0.33	0.27	108.5

T_1 - Foliar spray with DAP @ 2%
T_2 - Foliar spray with MN mixture (Zn SO4 @ 0.5% + Boric acid @ .3%)
T_3 - Foliar spray with NAA @ 40 ppm
T_4 - Foliar spray with DAP @ 2% + MN mixture + NAA @ 40 ppm
T_5 - Control

MPKV, Rahuri

Results:

Effect of pinching: Pinching had significant effect on seed yield and quality of Pillipesara irrespective of foliar application of fertilizers/ micronutrients. Number of pods/plant (141.94), number of seeds/pod (14.10), seed yield/plot (0.864 kg), seed yield / ha (432.07kg), germination (90.00 %), vigour index I (1799.36) and vigour index II (4.91) were significantly higher in the pinching treatment and pod shattering per cent (3.33%) was also lower in this treatment.

Effect foliar application of fertilizers/ micronutrients: Foliar application of fertilizers/ micronutrients had significant effect on seed yield and quality of Pillipesara irrespective of pinching. Number of pods/plant (141.83), number of seeds/pod (13.70), 100 seed weight (1.13 g), seed yield/plot (0.909 kg), seed yield/ha (454.67 kg), germination (89.50%), vigour index I (1872.23) and vigour index II (5.16) were significantly higher in the foliar application of DAP 2% + MN mixture + NAA 40 ppm (T_4) treatment. The pod shattering per cent (4.16%) was also lower in this treatment (T_4) (Table 127-128).

Interaction effect: The interaction effect of pinching and foliar application of fertilizers/ micronutrient showed significant effect on seed yield/plot and seed yield/ha. Seed yield /plot (1.111 kg) and seed yield/ha (555.33kg) was significantly higher in the pinching and foliar application of DAP 2% + MN mixture + NAA 40 ppm (P_1T_4).

Table 127: Interaction effects of pinching and foliar applications on seed yield and quality parameters of Pillipesara during *kharif*, 2016

Treatments	No. of pods/ Plant	No. of seeds/ Pod	No. of pods shattered	100 seed weight (g)	Seed yield/ Plot (kg)	Seed yield/ ha (kg)	Germi-nation (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
Pinching											
With pinching (P_1)	141.94	14.10	3.33	1.122	0.864	432.07	90.00 (72.10)	19.98	0.055	1799.36	4.91
Without pinching (P_2)	106.42	10.67	9.06	0.971	0.599	299.53	82.40 (65.35)	19.85	0.053	1638.15	4.35
SE ±	**3.94**	**0.381**	**0.57**	**0.030**	**0.031**	**15.74**	**0.18**	**0.26**	**0.001**	**24.75**	**0.11**
CD at 5%	**12.80**	**2.497**	**3.76**	**NS**	**0.206**	**41.14**	**1.18**	**NS**	**NS**	**162.15**	**NS**
Foliar application											
Spray with DAP 2% (F_1)	129.03	12.48	4.83	1.026	0.830	414.75	87.16 (69.47)	19.43	0.055	1692.08	4.73
Spray with MN mixture (F_2)	132.06	12.33	6.33	1.042	0.723	361.42	86.50 (68.68)	20.70	0.056	1790.75	4.81
Spray with NAA 40 ppm (F_3)	112.53	11.77	7.50	1.021	0.677	338.25	88.50 (70.77)	19.60	0.052	1737.08	4.57
Spay with DAP 2% + MN mixture + NAA (F_4)	141.83	13.70	4.16	1.139	0.909	454.67	89.50 (71.75)	20.91	0.058	1872.23	5.16
Control (F_5)	105.46	11.67	8.16	1.004	0.520	259.92	79.33 (62.98)	18.93	0.049	1501.63	3.85
SE ±	**4.49**	**0.310**	**0.48**	**0.028**	**0.021**	**10.32**	**1.10**	**0. 48**	**0.002**	**50.85**	**0.187**
CD at 5%	**13.58**	**0.937**	**1.45**	**0.084**	**0.062**	**31.22**	**3. 34**	**NS**	**NS**	**153.78**	**0.564**

Figures in parenthesis are Arc sin transformed values

Table 128: Interaction effects of pinching and foliar applications on seed yield and quality parameters of Pillipesara during *kharif*, 2016

Treat-ments	No. of pods/ Plant	No. of seeds/ Pod	No. of pods shattered	100 seed weight (g)	Seed yield/ Plot (kg)	Seed yield/ ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
P_1F_1	148.40	14.53	2.33	1.07	1.019	509.67	91.66 (73.50)	18.78	0.050	1721.63	4.62
P_1F_2	152.80	13.66	3.66	1.13	0.820	410.17	89.66 (71.36)	21.03	0.057	1886.43	5.07
P_1F_3	124.73	13.26	4.33	1.08	0.784	392.17	93.00 (74.73)	19.66	0.053	1830.46	4.97
P_1F_4	165.53	15.93	1.00	1.23	1.111	555.33	94.33 (76.52)	21.09	0.059	1987.93	5.53
P_1F_5	118.26	13.13	5.33	1.07	0.586	293.00	81.33 (64.41)	19.33	0.054	1570.33	4.38
P_2F_1	109.66	10.43	7.33	0.97	0.640	319.83	82.66 (65.43)	20.08	0.059	1662.53	4.84
P_2F_2	111.33	11.00	9.00	0.95	0.625	312.67	83.33 (65.99)	20.36	0.055	1695.06	4.55
P_2F_3	100.33	10.27	10.66	0.95	0.569	284.33	84.00 (66.80)	19.54	0.050	1643.70	4.17
P_2F_4	118.13	11.47	7.33	1.04	0.708	354.00	84.66 (66.99)	20.73	0.057	1756.53	4.86
P_2F_5	92.66	10.20	11.00	0.93	0.454	226.83	77.33 (61.55)	18.54	0.043	1432.93	3.32
Factor B at same level of A											
SE ±	**8.13**	**0.852**	**1.28**	**0.068**	**0.070**	**35.20**	**0. 402**	**0.577**	**0.003**	**55.34**	**0.251**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.149**	**74.66**	**NS**	**NS**	**NS**	**NS**	**NS**
Factor A at same level of B											
SE ±	**6.75**	**0.547**	**0.83**	**0.046**	**0.041**	**20.45**	**1. 408**	**0.665**	**0.003**	**68.93**	**0.261**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.209**	**57.58**	**NS**	**NS**	**NS**	**NS**	**NS**

Figures in parenthesis are Arc sin transformed values

UAS, Dharwad

Results: Nipping of terminal bud at 60 DAS increased number of primary branches per plant, number of pods and seed yield over without nipping. Foliar sprays of 2 per cent DAP + MN mixture + NAA @ 40 ppm (T_4) significantly improved seed quality parameters. Treatment combination of M_2T_4 significantly increased number of branches, pods per plant, seed yield and quality as compare to rest of treatment combinations (Table 129-130).

Table 129: Effect of pinching and foliar spray on growth and yield characters of Pillipesara

Trt.	No. of Branches	No. of Pods/plant	Pod yield per plant (g)	Pod yield per plot (kg)	No. of seeds per pod	Seed yield per plant (g)	Seed yield per plot (kg)
M_1	7.67	105.05	52.53	2.93	8.49	3.94	0.44
M_2	4.65	63.67	31.83	1.78	7.51	2.12	0.24
SEm±	**0.26**	**3.56**	**1.78**	**0.10**	**0.32**	**0.25**	**0.03**
CD at 5%	**0.77**	**10.58**	**5.29**	**0.30**	**NS**	**0.75**	**0.08**
P_1	4.97	68.09	34.05	1.90	6.46	2.04	0.23
P_2	6.58	90.16	45.08	2.51	8.55	3.31	0.37
P_3	6.67	91.42	45.71	2.55	8.67	3.41	0.38
P_4	6.44	88.27	44.13	2.46	8.37	3.38	0.37
P_5	6.12	83.86	41.93	2.34	7.95	3.02	0.34
SEm±	**0.41**	**5.63**	**2.82**	**0.16**	**0.51**	**0.40**	**0.04**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
M_1P_1	6.19	84.80	42.40	2.36	6.86	2.67	0.30
M_1P_2	8.20	112.28	56.14	3.13	9.08	4.29	0.48
M_1P_3	8.31	113.85	56.92	3.17	9.20	4.30	0.48

M_1P_4	8.02	109.92	54.96	3.06	8.89	4.46	0.49
M_1P_5	7.62	104.42	52.21	2.91	8.44	4.00	0.44
M_2P_1	3.75	51.39	25.70	1.43	6.06	1.40	0.15
M_2P_2	4.97	68.05	34.02	1.90	8.02	2.33	0.26
M_2P_3	5.04	69.00	34.50	1.92	8.14	2.53	0.28
M_2P_4	4.86	66.62	33.31	1.86	7.86	2.30	0.26
M_2P_5	4.62	63.29	31.64	1.76	7.46	2.04	0.23
SEm±	0.58	7.96	3.98	0.22	0.72	0.57	0.06
CD at 5%	NS	NS	NS	NS	NS	NS	NS

Table 130: Effect of pinching and foliar spray on growth and yield characters of Pillipesara

Treat.	**Seed yield per ha (q)**	**100 seed wt (g)**	**Seed Germination (%)**	**Seedling length (cm)**	**Seedling dry weight (mg)**	**SVI**
M_1	21.88	0.85	79.44	19.98	1.98	1610
M_2	11.75	0.86	75.48	18.99	1.99	1442
SEm±	**1.41**	**0.01**	**0.88**	**0.22**	**0.02**	**34**
CD at 5%	**4.18**	**NS**	**2.62**	**0.66**	**0.05**	**101**
				SIG		
P_1	11.30	0.89	75.61	19.02	2.06	1442
P_2	18.35	0.84	71.42	17.96	1.94	1289
P_3	18.94	0.86	81.50	20.50	1.98	1677
P_4	18.74	0.84	88.63	22.30	1.95	1984
P_5	16.75	0.85	70.12	17.64	1.96	1240
SEm±	**2.23**	**0.01**	**1.39**	**0.35**	**0.03**	**53**
CD at 5%	**NS**	**NS**	**4.14**	**1.04**	**NS**	**160**
				SIG		SIG
M_1P_1	14.85	0.90	76.90	19.34	2.08	1488
M_1P_2	23.79	0.83	69.17	17.40	1.93	1208
M_1P_3	23.86	0.82	85.67	21.55	1.89	1847
M_1P_4	24.73	0.85	93.62	23.55	1.98	2207
M_1P_5	22.18	0.87	71.84	18.07	2.01	1302
M_2P_1	7.75	0.88	74.33	18.70	2.05	1396
M_2P_2	12.92	0.84	73.67	18.53	1.95	1369
M_2P_3	14.02	0.90	77.33	19.45	2.08	1506
M_2P_4	12.76	0.83	83.65	21.04	1.93	1761
M_2P_5	11.32	0.83	68.40	17.21	1.92	1177
SEm±	**3.15**	**0.02**	**1.97**	**0.50**	**0.04**	**76**
CD at 5%	**NS**	**NS**	**NS**	**1.47**	**NS**	**226**

JAU, Jamnagar

Result:

Pinching/nipping (M): Effect of pinching on all the characters studied was reflected non-significant. However, the higher production of seed yield (6.71 q/ha) was obtained with pinching of terminal buds at 40 DAS.

Foliar application (T): Effect of foliar application of different nutrients was found significant for all the characters studied except number of plants per plot, number of seeds per pod, 100-seeds weight (gm), seed germination (%), seedling length (cm), seed vigour index-I and II. The foliar spray of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period was significantly superior over control for seed yield (q/ha), number of pods per plant, dry pods yield per plant (gm), dry pods yield per plot (kg) and less number of pods shattered per plant before each picking.

Interaction: Interaction M x T was found non-significant for all the traits studied.

Conclusion: It is concluded that the foliar application of DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm at initiation of flowering and at end of flowering period with pinching was produced the highest seed yield (8.45 q/ha), number of pods per plant (155.75), dry pods yield per plant (30.00 gm), 100-seeds weight (gm) and less number of pods shattered per plant before 1st picking (1.05) (Table 131-132:).

Table 131: Replicated data for seed yield in Pillipesara at JAU, Jamnagar during *Kharif*, 2016

Pinching	Foliar spray	Seed Yield (kg/plot)				Total	Mean	Seed Yield (q/ha)
		I	II	III	IV			
M_1	T_1	1.235	1.343	1.048	1.045	4.671	1.168	6.49
	T_2	1.035	1.319	1.180	1.388	4.922	1.231	6.84
	T_3	1.168	1.185	1.302	0.853	4.508	1.127	6.26
	T_4	1.524	1.125	1.610	1.826	6.085	1.521	8.45
	T_5	1.088	0.808	0.995	1.065	3.956	0.989	5.49
M_2	T_1	0.907	1.440	1.097	0.994	4.438	1.110	6.16
	T_2	1.031	1.092	1.309	1.265	4.697	1.174	6.52
	T_3	1.200	1.055	1.025	0.963	4.243	1.061	5.89
	T_4	1.285	1.507	1.291	1.452	5.535	1.384	7.69
	T_5	1.090	0.972	1.193	0.986	4.241	1.060	5.89
Total		**11.563**	**11.846**	**12.050**	**11.837**	**47.296**	**1.182**	**--**

M_1=With pinching, M_2= Without pinching, T_1= Foliar spray with DAP 2%, T_2= Foliar spray with MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%), T_3= Foliar spray with NAA 40 ppm, T_4= Foliar spray with DAP 2% + MN Mixture ($ZnSo_4$ 0.5% + Boric acid 0.3%) + NAA 40 ppm, T_5=Control.

Pillipesara with pinching (M_1T_4)

Pillipesara without pinching (M_2T_4)

Table 132: Ancillary, physiological observations and seed yield in Pillipesara at JAU, Jamnagar during *Kharif*, 2016

Treat.		Seed yield			No. of plants /plot	No. of pods/ plant	No. of seeds/ pod	Dry pods yield		pods shattered/ Plant before		100 seeds weight (gm)	Seed germination (%)	seedling length (cm)	seedling dry weight (gm)	Seed vigour Index (%)	
		Per plant (gm)	Per Plot (kg)	(q/ha)				Per Plant (gm)	Per Plot (kg)	1st picking	2nd picking					I	II
(A) Pinching /nipping (M)																	
M_1		9.29	1.21	6.71	115.10	144.29	8.83	27.36	2.73	1.52	2.31	0.95	78.60	11.71	0.576	918.79	45.76
M_2		9.12	1.16	6.43	115.80	141.89	8.77	27.18	2.70	1.47	2.31	0.94	74.85	12.10	0.548	903.21	41.49
SEm ±		0.21	0.03	0.15	1.91	2.40	0.14	0.60	0.04	0.05	0.08	0.01	1.17	0.36	0.008	27.28	1.25
CD at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %		10.09	10.26	10.26	7.41	7.50	7.00	9.81	6.09	15.79	15.15	5.96	6.83	13.68	6.73	13.39	12.82
(B) Foliar application (T)																	
T_1		8.90	1.14	6.33	114.75	140.00	8.79	26.30	2.51	1.45	2.31	0.94	74.25	12.15	0.539	904.68	40.30
T_2		9.34	1.20	6.68	117.50	145.13	8.86	27.41	2.88	1.43	2.18	0.94	78.13	12.19	0.564	952.13	44.43
T_3		8.76	1.09	6.08	111.75	136.93	8.86	26.71	2.53	1.57	2.39	0.94	71.38	12.66	0.511	897.03	36.84
T_4		10.20	1.45	8.07	123.25	154.53	8.94	29.59	3.07	1.18	2.04	0.96	81.25	11.55	0.619	935.75	50.86
T_5		8.82	1.03	5.89	110.00	138.88	8.53	26.31	2.58	1.85	2.63	0.93	78.63	10.97	0.576	865.43	45.68
SEm ±		0.34	0.07	0.36	4.25	3.98	0.17	0.74	0.14	0.10	0.08	0.02	3.12	0.51	0.024	53.41	3.62
CD at 5%		0.98	0.19	1.06	NS	11.61	NS	2.16	0.41	0.28	0.23	NS	NS	NS	0.07	NS	NS
C.V. %		10.32	15.60	15.60	10.41	7.86	5.45	7.68	14.78	18.08	9.82	5.63	11.51	12.00	11.86	16.58	23.45
(C) Interaction effects (M x T):																	
M_1	T_1	9.04	1.17	6.49	117.50	142.05	9.00	26.15	2.53	1.53	2.33	0.94	76.50	12.26	0.565	943.63	43.45
	T_2	9.56	1.23	6.84	111.25	148.00	8.88	27.48	2.90	1.46	2.30	0.96	82.25	11.30	0.595	927.78	49.23
	T_3	8.80	1.13	6.26	116.50	138.30	8.83	27.08	2.68	1.68	2.33	0.95	73.00	12.42	0.528	898.75	38.81
	T_4	10.20	1.52	8.45	122.75	155.75	8.95	30.00	3.05	1.05	2.09	0.96	81.75	11.53	0.613	943.32	50.71
	T_5	8.87	0.99	5.49	107.50	137.35	8.48	26.08	2.48	1.89	2.51	0.94	79.50	11.02	0.580	880.48	46.59
M_2	T_1	8.77	1.11	6.16	112.00	137.95	8.58	26.45	2.49	1.37	2.29	0.94	72.00	12.03	0.513	865.73	37.15
	T_2	9.12	1.17	6.52	123.75	142.25	8.85	27.35	2.85	1.40	2.06	0.92	74.00	13.08	0.533	976.48	39.63
	T_3	8.73	1.06	5.89	107.00	135.55	8.90	26.35	2.38	1.46	2.45	0.94	69.75	12.91	0.495	895.30	34.86
	T_4	10.21	1.38	7.69	123.75	153.30	8.93	29.18	3.10	1.31	2.00	0.96	80.75	11.57	0.625	928.18	51.02
	T_5	8.77	1.06	5.89	112.50	140.40	8.58	26.55	2.68	1.81	2.75	0.93	77.75	10.93	0.573	850.38	44.77
SEm ±		0.48	0.09	0.51	6.01	5.63	0.24	1.05	0.20	0.14	0.11	0.03	4.41	0.71	0.03	75.53	5.12
CD at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Experiment 6 : Development of technologies to mitigate the effect of elevated temperatures on seed set, yield and quality

Objectives:

1. To standardize the techniques to mitigate the effect of elevated temperatures on seed set, yield and quality.
2. To study the impact of heat stress on various crop phenological parameters, pollen and stigmatic character/ floral behavior, seed set percentage.
3. To study the effect of heat stress on seed quality (germination, viability, vigour and seed health) of both freshly harvested as well as stored seed under both stressed and non-stressed environments.

Crop	Centre
Wheat	IARI, New Delhi; JNKVV, Jabalpur; PAU, Ludhiana; GBPUAT, Pantnagar; HAU, Hisar; RAU, Dholi; MAU, Parbhani; RARI, Durgapura; CSAUAT, Kanpur; JNKVV, Jabalpur
Sorghum	MPKV, Rahuri, MAU, Parbhani and PDKV, Akola
Rice	DSST, IARI, New Delhi; PJTSAU, Hyderabad; UAS, Bengaluru; TNAU, Coimbatore; OUAT, Bhubaneshwar
Mustard	CAZRI, Jodhpur; IARI, New Delhi and CSAUAT, Kanpur

Sowing dates: Two dates of sowing to be adopted in such a way that one set will not be caught in heat stress and another set will have flowering and seed setting taking place in heat stress. The following chemicals will be used for the foliar spray to mitigate the effect of elevated temperatures on seed set. This experiment will be conducted on heat susceptible variety/ hybrid in randomized block design under field condition preferably March - June with three replications by following all the recommended package of practices.

Treatments

	Treatments	Stages of application	
T_0	Control	-	
T_1	Glycine betaine (600 ppm)	Vegetative	Seed filling
T_2	Salicylic acid (800 ppm)	Vegetative	Seed filling
T_3	Salicylic acid (400 ppm)	Vegetative	Seed filling
T_4	Ascorbic acid (10 ppm) + Citric acid (1.3%)	Vegetative	Seed filling
T_5	á-Tocopherol (150 ppm)	Vegetative	Seed filling
T_6	KCl 1%	Vegetative	Seed filling
T_7	Brassinolides (0.3 ppm)	Vegetative	Seed filling
T_9	Brassinolides (10 ppm)	Vegetative	Seed filling

Wheat

ICAR-IARI, New Delhi

Results: To evaluate the efficacy of various chemicals viz. alpha tocopherol (150ppm), ascorbic acid (10ppm) + citric acid (1.3%), KCl 1% and salicylic acid (400ppm); spraying was done at two stages of crop growth i.e. at vegetative(booting stage; approximately 65 DAS) and seed filling stage (approximately 85 DAS) in all the eleven wheat varieties.

The effect of chemical sprays on various parameters are as under:

Thousand grain weight

There was a significant effect of all the priming treatments in increasing the thousand grain weight as compared to the control (Table 133). For the control, an average of 29.08g was recorded which increased to 31.23g for T_1; 32.26g for T_2 and 29.98g for T_3 and 34.29g for T_4.

Table 133: Effect of foliar spray on thousand seed weight

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	26.08	29.17	28.19	26.03	32.06	28.31
HD2932	26.90	28.54	31.56	29.76	32.79	29.91
HD2967	29.12	31.31	32.47	28.13	33.93	30.99
HD3059	27.94	30.14	31.59	29.29	31.93	30.17
HD3090	32.02	33.93	33.94	31.80	35.95	33.53
HD3118	29.27	31.64	31.89	30.44	34.03	31.45
PBW17	30.94	32.92	33.98	31.97	35.95	33.15
PBW550	28.16	30.34	31.93	30.12	33.68	30.84
GW322	29.09	32.03	32.57	31.09	35.91	32.14
HI1563	31.33	32.43	33.94	31.04	35.99	32.94
HI1564	29.10	31.09	32.82	30.10	34.96	31.61
Mean	**29.08**	**31.23**	**32.26**	**29.98**	**34.29**	

	SE (mean)	C.D. at 5%
Variety	0.202	0.574
Treatment	0.136	0.387
VXT	0.451	1.283

Seed yield per plot

There was a significant effect of all the foliar treatments in increasing the seed yield per plant as compared to control (Table 134). For the control, an average of 464.7g was recorded which increased to 531.4g for T_1; 526.8g for T_2 and 484.3g for T_3 and 599.76g for T_4.

Table 134: Effect of foliar spray on seed yield per plot

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	383.33	400.00	415.33	350.33	488.33	407.47
HD2932	405.00	550.00	533.33	571.67	633.33	538.67
HD2967	560.00	580.33	591.33	571.67	598.33	580.33
HD3059	506.67	623.00	588.33	550.33	706.67	595.00
HD3090	475.00	500.25	588.33	518.33	618.33	540.05
HD3118	398.33	520.33	448.00	433.00	541.33	468.20
PBW17	446.67	556.33	396.67	445.33	580.00	485.00
PBW550	413.33	456.67	558.33	430.00	581.33	487.93
GW322	480.00	551.00	558.33	463.33	591.33	528.80
HI1563	551.67	566.67	580.33	514.00	668.33	576.20
HI1564	491.67	541.67	536.67	479.67	590.00	527.93
Mean	**464.70**	**531.48**	**526.82**	**84.33**	**599.76**	

	SE(mean)	C.D. at 5%
Variety	30.885	86.699
Treatment	20.822	58.452
VXT	69.06	N/A

Seed quality parameters

Germination

The study revealed that there was a significant effect of all foliar treatments in increasing the germination percentage as compared to the control (Table 135). For the control, an average of 80.82% was recorded which increased to 82.00% for T_1; 84.96% for T_2 and 81.77% for T_3 and 88.86% for T_4.

Table 135: Effect of foliar spray on germination percentage

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	78.50	84.50	86.00	80.50	90.00	83.90
HD2932	77.00	79.00	87.00	83.50	92.00	83.70
HD2967	84.50	84.50	86.50	84.00	89.00	85.70
HD3059	83.00	81.00	89.00	78.00	93.00	84.80
HD3090	86.00	87.50	86.50	83.00	88.00	86.20
HD3118	79.00	78.50	82.00	79.00	89.50	81.60
PBW17	80.00	79.50	81.00	83.00	86.50	82.00
PBW550	82.50	79.50	82.50	81.50	88.00	82.80
GW322	82.50	80.50	83.00	82.50	86.50	83.00
HI1563	78.50	81.00	87.00	82.00	85.50	82.80
HI1564	77.50	86.50	84.00	82.50	89.50	84.00
Mean	**80.82**	**82.00**	**84.96**	**81.77**	**88.86**	

	SE(mean)	C.D. at 5%
Variety	1.27	N/A
Treatment	0.856	2.435
VXT	2.841	N/A

Vigour index I

There was a significant effect of all the foliar treatments in increasing the VI 1 as compared to the control for the control, an average of 2163.9 was recorded which increased to 2232.9 for T_1; 2368.3 for T_2 and 21994.09 for T_3 and 2394.4 for T_4 (Table 136).

Table 136: Effect of foliar spray on vigour index I

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	2169.94	2330.00	2434.57	1990.19	2441.52	2273.24
HD2932	2125.08	2105.77	2353.49	1983.10	2056.24	2124.73
HD2967	2034.95	2384.24	2506.95	2034.97	2296.16	2251.45
HD3059	2220.50	2130.92	2595.24	2151.32	2515.43	2322.68
HD3090	2362.35	2383.16	2400.21	2206.78	2343.56	2339.21
HD3118	2173.80	2174.46	2230.96	1885.65	2470.09	2186.99
PBW17	2262.91	2135.55	2308.22	1950.63	2415.02	2214.46
PBW550	2276.56	2259.54	2228.40	1919.98	2321.86	2201.269
GW322	2058.82	2204.07	2195.35	1858.09	2273.45	2117.95
HI1563	2206.45	2163.54	2411.64	2006.44	2657.31	2289.07
HI1564	1912.34	2291.64	2386.47	1947.85	2548.04	2217.26
Mean	**2163.9750**	**2232.9900**	**2368.3180**	**1994.0910**	**2394.4260**	

	SE(mean)	C.D. at 5%
Variety	44.284	125.907
Treatment	29.856	84.887
VXT	99.022	N/A

Vigour index II

There was a significant effect of all the foliar treatments in increasing the VI-II as compared to the control (Table 137). For the control, an average of 10.80 was recorded which increased to 11.40 for T_1; 11.10 for T_2 and 20.52 for T_3 and 23.42 for T_4.

Table 137: Effect of foliar spray on vigour index II

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	9.040	13.105	10.330	18.530	25.210	15.243
HD2932	11.570	10.695	10.845	20.420	24.880	15.682
HD2967	14.415	18.105	10.385	18.915	22.300	16.824
HD3059	8.280	9.290	10.680	19.140	22.300	13.938
HD3090	10.735	10.070	12.125	22.820	23.770	15.904
HD3118	11.090	11.750	12.330	18.900	25.025	15.819
PBW17	14.830	9.525	8.530	19.940	24.235	15.412
PBW550	9.075	12.290	10.320	23.215	19.350	14.850
GW322	9.480	9.705	12.035	19.805	21.640	14.533
HI1563	9.040	10.530	12.180	21.340	23.925	15.403
HI1564	11.260	10.380	11.345	22.695	25.085	16.153
Mean	**10.801**	**11.404**	**11.010**	**20.520**	**23.429**	

	SE(mean)	C.D. at 5%
Variety	0.456	1.295
Treatment	0.307	0.873
VXT	1.019	2.896

Estimation of Malondialdehyde (MDA)

The study revealed that there was a significant effect of all the foliar treatments in decreasing the MDA content as compared to the control (Table 138). For the control, an average of 14.90 was recorded which decreased to 7.06 for T_1; 5.19 for T_2 and 7.56 for T_3 and 4.20 for T_4.

Table 138: Effect of foliar spray on MDA content in wheat varieties TBA number (nano mole/gm)

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	17.76	7.49	5.24	8.20	3.62	8.46
HD2932	14.53	7.90	5.06	8.33	4.22	8.01
HD2967	12.48	6.02	3.89	8.57	3.97	6.99
HD3059	15.15	6.37	5.22	8.50	4.56	7.96
HD3090	18.35	7.32	5.65	7.92	4.08	11.07
HD3118	11.42	7.66	5.82	7.50	4.35	7.35
PBW17	11.83	7.35	6.12	7.74	3.55	7.32
PBW550	11.60	7.10	4.91	6.83	4.76	7.04
GW322	13.96	6.64	5.41	6.66	4.51	7.44
HI1563	12.03	6.71	4.52	5.39	3.37	6.40
HI1564	12.79	7.09	5.27	7.51	5.22	7.58
Mean	**14.90**	**7.06**	**5.19**	**7.56**	**4.20**	

	SE(m)	C.D. at 5%
Variety	0.314	0.88
Treatment	0.211	0.593
VXT	0.701	1.967

Electrical Conductivity (EC) (ISTA, 2015)

The study revealed that there was a significant effect of all the foliar treatments in decreasing the EC value as compared to the control (Table 139). For the control, an average of 31.41 was recorded which decreased to 21.50 for T_1; 22.69 for T_2 and 26.80 for T_3 and 22.41 for T_4.

Table 139: Effect of foliar spray on electrical conductivity in wheat varieties

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	28.370	21.309	20.383	24.523	22.240	23.365
HD2932	32.192	23.492	24.173	26.840	23.316	26.003
HD2967	30.571	19.982	20.597	24.027	20.741	23.184
HD3059	31.426	17.356	18.721	22.391	19.140	21.807
HD3090	30.204	20.776	21.998	25.542	21.010	23.906
HD3118	33.403	19.250	21.402	25.432	18.397	23.577
PBW17	37.084	31.323	32.081	34.448	33.554	33.698
PBW550	29.981	21.682	23.240	29.231	22.639	25.355
GW322	31.439	25.284	25.834	28.104	22.334	26.599
HI1563	30.359	17.138	18.748	26.818	19.289	22.470
HI1564	30.486	18.979	22.443	27.509	24.079	24.699
Mean	**31.411**	**21.506**	**22.693**	**26.806**	**22.431**	

	SE(mean)	C.D.at 5%
Variety	1.409	3.918
Treatment	0.95	2.642
VXT	3.151	

Dehydrogenase activity in seed

The study revealed that there was a significant effect of all the foliar treatments in increasing the dehydrogenase activity as compared to the control (Table 140). For the control, an average of 0.157 was recorded which increased to 0.260 for T_1; 0.360 for T_2 and 0.360 for T_3 and 0.455 for T_4.

Table 140: Effect of foliar spray on dehydrogenase activity in wheat varieties

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	0.140	0.216	0.346	0.163	0.458	0.265
HD2932	0.118	0.239	0.366	0.181	0.505	0.282
HD2967	0.143	0.265	0.378	0.180	0.452	0.284
HD3059	0.167	0.290	0.367	0.179	0.442	0.289
HD3090	0.144	0.269	0.374	0.171	0.454	0.283
HD3118	0.154	0.264	0.373	0.175	0.467	0.287
PBW17	0.182	0.266	0.364	0.159	0.428	0.280
PBW550	0.173	0.270	0.360	0.165	0.462	0.286
GW322	0.160	0.266	0.349	0.170	0.459	0.281
HI1563	0.172	0.257	0.353	0.186	0.438	0.281
HI1564	0.176	0.263	0.373	0.176	0.441	0.286
Mean	**0.157**	**0.260**	**0.364**	**0.173**	**0.455**	

Variety	SE(mean)	C.D. at 5%
Treatment	0.006	N/A
VXT	0.004	0.011

Estimation of Hydrogen peroxide activity (H_2O_2)

The study revealed that there was a significant effect of all the foliar treatments in decreasing *hydrogen peroxide activity* as compared to the control (Table 141). For the control, an average of 0.204 was recorded which decreased to 0.148 for T_1; 0.163 for T_2 and 0.178 for T_3 and 0.144 for T_4.

Table 141: Effect of foliar spray on hydrogen peroxide in wheat

Variety	Control	Alpha tocopherol (150ppm)	Ascorbic acid (10ppm) + Citric acid (1.3%)	KCL 1%	Salicylic acid (400ppm)	Mean
HD2733	0.247	0.148	0.184	0.175	0.152	0.181
HD2932	0.212	0.146	0.166	0.170	0.144	0.167
HD2967	0.201	0.145	0.166	0.174	0.142	0.165
HD3059	0.196	0.168	0.167	0.177	0.138	0.169
HD3090	0.187	0.148	0.162	0.172	0.141	0.162
HD3118	0.186	0.144	0.164	0.186	0.144	0.165
PBW17	0.190	0.140	0.164	0.171	0.147	0.162
PBW550	0.212	0.144	0.163	0.177	0.144	0.168
GW322	0.210	0.142	0.161	0.180	0.144	0.167
HI1563	0.208	0.145	0.154	0.172	0.143	0.164
HI1564	0.200	0.161	0.145	0.174	0.147	0.165
Mean	**0.204**	**0.148**	**0.163**	**0.175**	**0.144**	

	SE(mean)	C.D.at 5%
Variety	0.002	0.005
Treatment	0.001	0.003
VXT	0.004	0.011

JNKVV, Jabalpur

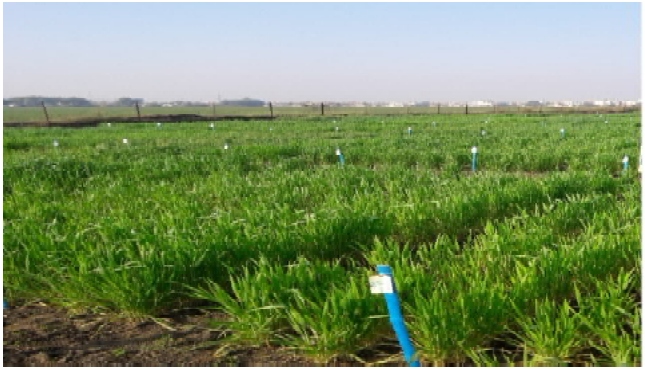
Results: Out of eight treatments, glycine betaine @ 600 ppm (T_1) was found to be significantly superior for seed yield per plant as well as seed yield per plot in both the dates of sowing. However, in terms of seed set percentage treatment including brassinolides @ 0.3 ppm (T_7) and brassinolides @ 10 ppm (T_8) were observed superior in 1st and 2nd date of sowing respectively. Among all the treatment combination, glycine betaine @ 600 ppm (T_1) found superior in terms of yield and quality in both sowing dates (Table 142-143).

Table 142: Effect of elevated temperatures on seed set, yield and quality in different treatments of wheat on first date of sowing

Trt.	Chlorophyll index (before spray) Vegetative phase	After spray (Vegetative stage)	Chlorophyll index(before spray) Grain filling stage	After spray (Grain filling stage)	Radical content of leaf MAD (before spray) Vegetative stage	After spray MAD (Vegetative stage)	Radical content of leaf MAD (before spray) Grain filling stage	After spray MAD (Grain filling stage)	Pollen viability %	Seed Set Percent	100 seed wt.	Seed yield/ plant (g)	Seed yield/ plot kg
T_0	40.70	41.02	39.53	42.99	3.12	3.53	10.33	14.06	92.67	98.50	4.37	9.71	1.96
T_1	41.17	42.95	44.49	45.54	3.73	4.31	8.54	11.55	95.00	99.19	3.96	16.87	3.25
T_2	40.72	43.19	43.40	43.58	7.45	8.12	9.93	13.34	95.00	98.40	4.43	11.93	2.42
T_3	40.43	44.12	46.68	45.25	6.36	7.33	8.45	12.64	96.97	99.07	4.33	13.10	2.33
T_4	40.87	44.64	46.71	45.30	5.19	6.06	9.33	14.35	77.98	99.31	4.23	13.06	2.22
T_5	40.70	42.27	44.56	43.57	3.72	4.77	8.74	14.59	88.40	98.60	3.99	12.01	2.59
T_6	39.28	41.04	41.23	43.59	3.05	3.93	9.36	14.85	91.67	98.81	4.31	11.66	2.63
T_7	36.25	37.93	34.86	44.83	4.13	4.52	10.54	15.35	92.79	99.79	4.16	14.07	3.15
T_8	34.17	35.51	37.08	44.09	2.26	3.33	11.05	14.34	100.0	98.95	4.13	13.07	2.73
SEd±	1.23	1.02	0.58	1.72	0.02	0.02	0.02	0.02	6.47	0.41	0.16	0.93	0.31
CD at 5%	2.62	2.16	1.23	3.65	0.04	0.04	0.05	0.05	13.71	0.86	0.35	1.98	0.65

Table 143: Effect of elevated temperatures on seed set, yield and quality in different treatments of wheat on second date of sowing

Trt.	Chlorophyll index (before spray) Vegetative phase	After spray (Vegetative stage)	Chlorophyll index (before spray) Grain filling stage	After spray (Grain filling stage)	Radical content of leaf MAD (before spray) Vegetative stage	After spray MAD (Vegetative stage)	Radical content of leaf MAD (before spray) Grain filling stage	After spray MAD (Grain filling stage)	Pollen viability %	Seed Set Percent	100 seed wt.	Seed yield/ plant (g)	Seed yield/ plot kg
T_0	37.45	42.86	38.88	40.25	7.52	10.78	12.12	16.52	90.00	98.06	4.02	8.20	1.90
T_1	41.76	35.65	41.60	43.76	6.83	9.56	11.26	15.17	92.67	99.10	4.24	11.1	2.74
T_2	36.57	40.04	36.41	44.49	9.30	12.65	10.55	14.82	93.00	98.03	3.72	9.34	2.08
T_3	37.06	38.35	38.53	40.68	8.76	13.36	13.72	19.55	94.67	99.15	3.82	8.77	2.16
T_4	39.17	37.30	39.98	43.17	6.23	8.46	10.84	14.63	76.33	97.88	4.05	9.28	2.02
T_5	37.54	41.24	40.60	40.96	6.74	7.91	11.25	14.84	87.00	98.63	4.16	9.58	2.01
T_6	41.16	34.03	40.53	44.64	7.72	8.93	13.36	18.71	91.00	98.36	3.97	9.88	2.22
T_7	35.98	40.59	42.49	44.98	6.33	7.73	10.04	16.86	90.58	98.28	3.98	10.1	2.41
T_8	35.26	41.33	39.37	43.29	10.57	12.70	12.76	15.50	97.33	99.26	3.99	9.80	2.24
SEd±	0.62	1.48	0.59	1.66	0.02	0.02	0.02	0.02	6.31	0.57	0.09	0.77	0.21
CD at 5%	1.31	3.14	1.26	3.52	0.04	0.04	0.03	0.04	13.37	1.20	0.20	1.63	0.45



Effect of elevated temperatures on different treatments of wheat in first date of sowing

Effect of elevated temperatures on different treatments of wheat in second date of sowing

PAU, Ludhiana

Results: The trial was sown with a single variety of wheat, HD 2967 on two dates of sowing, *viz.* November 5 and December 15. Perusal of the results on different parameters of wheat crop before and after sprays presented in Table 144 for first date of sowing showed that none of the traits, except number of seeds per plant, showed any difference for treatments. The highest number of seeds was produced on the crop sprayed with Brassinolides @ 10 ppm while the lowest were produced on control. All other treatments were statistically at par with each other. Significant differences were recorded for seed set percentage, number of spikelets per spike and number of seeds produced per plant for second date of sowing (Table 145). The seed set percentage was highest (87 %) for T5 (á-Tocopherol @ 150 ppm), which also had the highest number of spikelets per spike (33.8) and number of seeds per plant (56.5).

Table 144: Effect of heat stress on yield and other parameters of wheat (1st DOS)

Treatment	Chlorophyll index before first spray	Chlorophyll index after first spray	Chlorophyll index before 2nd spray	Chlorophyll index after second spray	Pollen viability	Seed set (%)	No of tillers per plant	No of spikelets per spike	No of seeds per plant	Seed yield plot (kg)	Biological Yield per plot (kg)
T_1	39.3	35.4	34.2	33.2	93.2	72.3	5.5	31.9	45.7	11.1	25.7
T_2	31.0	33.4	34.5	33.8	88.3	69.2	5.8	34.9	48.1	12.7	25.4
T_3	33.0	33.9	34.1	27.4	93.2	71.8	5.6	33.9	48.5	12.7	27.7
T_4	28.2	30.8	31.5	30.6	88.3	79.9	5.8	31.3	50.1	12.0	31.0
T_5	28.9	32.5	28.0	31.1	88.3	74.2	5.9	29.2	43.4	12.0	32.8
T_6	28.2	32.1	27.6	28.0	81.7	74.5	5.7	33.1	48.7	12.3	30.1
T_7	36.0	32.9	30.3	31.3	90.0	84.1	5.7	29.3	49.1	11.6	29.8
T_8	23.8	33.9	29.6	29.5	85.0	78.3	5.5	33.4	52.3	11.5	26.5
T_9	33.4	30.5	28.3	30.5	88.3	66.4	5.5	24.2	32.0	12.2	28.9
CD (5%)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**9.04**	**NS**	**NS**

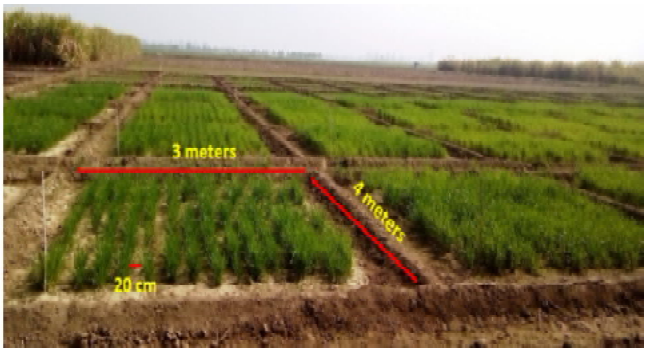
Table 145: Effect of heat stress on yield and other parameters of wheat (2nd DOS)

Treatment	Chlorophyll index before first spray	Chlorophyll index after first spray	Chlorophyll index before 2nd spray	Chlorophyll index after second spray	Pollen viability	Seed set (%)	No of tillers/ plant	No of spikelets per spike	No of seeds per plant	Seed yield plot (kg)	Biological Yield per plot (kg)
T_1	31.9	32.2	34.2	33.2	76.7	70.7	5.3	32.7	46.3	13.5	29.4
T_2	33.1	31.9	34.5	33.8	82.5	81.7	5.7	28.8	46.8	12.8	26.8
T_3	31.9	29.2	34.1	27.4	84.2	77.4	5.4	29.1	50.1	11.9	28.1
T_4	31.6	29.8	31.5	30.6	75.8	76.0	5.3	29.3	44.9	12.1	26.7
T_5	30.1	29.3	28.0	31.1	85.0	87.0	6.2	33.8	56.5	12.2	26.6
T_6	29.8	30.0	27.6	28.0	75.8	86.0	6.1	27.1	46.5	12.1	26.2
T_7	30.3	31.5	30.3	31.3	84.2	85.3	5.9	29.3	45.8	12.1	28.0
T_8	28.9	29.3	29.6	29.5	77.5	85.4	5.5	29.3	50.8	12.3	27.4
T_9	30.0	29.2	28.3	30.5	63.3	70.7	5.9	27.0	45.0	11.9	25.8
CD (5%)	**NS**	**NS**	**NS**	**NS**	**NS**	**11.2**	**NS**	**3.9**	**5.5**	**NS**	**NS**

GBPUA&T, Pantnagar

Results: The results of both early and late sown conditions as well as pooled estimates over the environments are presented in Table 146. Under both environmental conditions as well as pooled estimates revealed that, the maximum seed yield per plot was obtained in both the varieties by T_1 i.e. spray with glycine betaine 600 ppm (5.08 kg (V_1T_1), 5.04 (V_2T_1) followed by T_5 i.e. α-tocopherol 150ppm (4.60 (V_2T_5), 4.39 kg (V_1T_5) and T_3 i.e. salicylic acid 400 ppm (4.10 kg (V_1T_3), 4.10 kg (V_2T_3). These three treatments were also helpful in significant increase in seed set percentage as well as germination percentage capacity during the storage of seeds for the period of 6 and 9 month at ambient temperature. The three treatments namely T_1 i.e. spray with glycine betaine 600 ppm followed by T_5 i.e. α-tocopherol 150 ppm and T_3 i.e. salicylic acid 400 ppm were found superior than rest of the treatment to increase the seed yield as well as storability in wheat.

Overview of wheat trial at Pantnagar



Wheat trial at Pantnagar at vegetative stage

Table 146: Mean Performance of Yield and its contributing traits in wheat (Replicated Data) under late sown condition

Treat.	Plant Height (cm)			Days to heading			Days to maturity			Ear Length (cm)		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
V_1T_0	82.47	84.16	87.55	76.58	73.95	81.05	112.78	103.92	118.33	9.73	10.22	7.75
V_1T_1	85.72	83.66	81.35	89.23	85.47	88.03	130.11	128.53	125.50	11.83	12.50	12.00
V_1T_2	81.40	88.91	80.11	78.43	87.13	76.38	110.36	118.17	108.75	10.48	9.38	13.02
V_1T_3	87.93	82.43	81.97	80.18	75.91	82.35	119.58	115.05	120.50	10.08	10.11	11.92
V_1T_4	80.72	87.50	80.78	71.33	78.07	89.52	115.92	112.53	125.39	8.11	8.80	9.73
V_1T_5	83.98	90.05	78.71	83.43	90.16	88.05	118.69	125.03	122.48	11.63	12.37	11.09
V_1T_6	80.67	84.78	82.35	78.13	76.45	83.18	115.38	122.40	118.00	9.74	8.63	13.00
V_1T_7	86.05	90.33	79.85	87.05	74.63	78.00	130.02	105.75	121.84	11.07	7.81	12.57
V_1T_8	78.75	82.78	84.33	76.37	80.71	75.25	115.25	128.95	104.66	8.78	9.33	10.18
V_2T_0	81.32	87.95	82.56	74.63	78.19	73.52	107.88	116.39	110.27	9.36	8.55	12.50
V_2T_1	93.25	89.07	90.00	82.58	86.95	89.55	116.33	120.27	133.92	12.46	12.53	13.08
V_2T_2	78.46	83.23	82.00	80.93	77.51	84.73	110.00	107.58	122.90	10.91	8.90	13.49
V_2T_3	82.53	89.10	83.85	76.69	81.92	85.45	112.81	118.20	125.65	11.33	10.81	11.75
V_2T_4	84.33	88.92	80.28	75.10	80.55	70.00	117.60	129.07	103.55	8.02	12.18	9.00
V_2T_5	87.53	84.90	82.75	79.33	88.28	90.78	122.91	132.07	128.80	11.84	12.95	13.00
V_2T_6	82.14	78.37	85.50	73.58	82.05	78.14	108.45	125.00	113.88	12.05	7.85	9.33
V_2T_7	80.05	84.25	88.00	85.64	76.33	80.00	133.60	105.28	122.87	9.76	8.17	8.00
V_2T_8	83.98	78.90	85.38	75.48	81.11	78.53	112.80	130.75	118.43	7.63	11.84	9.25

Cont.

Treat.	Spikelets/ ear			Grain/ ear			Seed Set %			1000-seed weight (gm)		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
V_1T_0	13.83	14.01	12.68	38.63	42.11	36.75	61.71	62.75	72.84	55.78	48.85	47.07
V_1T_1	18.07	18.38	17.65	52.60	55.18	50.12	67.56	71.70	63.02	48.67	52.00	54.28
V_1T_2	13.45	12.77	16.78	41.83	40.05	45.75	70.11	68.90	60.55	49.07	46.33	52.95
V_1T_3	14.67	15.90	16.25	43.58	45.96	48.73	62.33	71.95	67.01	55.48	46.08	50.67
V_1T_4	14.50	14.00	14.73	42.00	38.72	46.12	68.33	58.74	75.93	45.78	53.00	47.54
V_1T_5	15.11	17.55	16.03	48.33	54.15	52.00	73.94	79.85	68.45	53.06	49.38	51.83
V_1T_6	14.22	13.03	15.87	43.59	39.66	48.08	68.22	70.51	65.35	47.25	49.13	54.03

V_1T_7	13.90	12.19	14.63	38.18	35.79	45.41	63.00	65.82	71.33	48.45	51.00	53.68
V_1T_8	10.75	15.58	11.63	35.42	48.95	37.03	78.11	68.40	59.82	53.18	46.94	50.00
V_2T_0	12.84	12.03	13.95	40.17	33.75	46.50	67.33	62.00	78.48	47.22	52.50	48.13
V_2T_1	16.98	18.50	19.73	49.85	53.50	58.03	70.05	65.13	68.17	50.95	53.11	47.30
V_2T_2	14.79	12.95	17.82	43.58	40.03	47.38	68.91	72.03	65.33	43.82	50.75	45.67
V_2T_3	15.35	13.87	16.38	48.70	46.93	51.86	65.54	59.33	71.08	45.64	47.53	53.88
V_2T_4	12.28	14.75	12.99	33.81	38.25	32.52	70.95	68.18	63.40	57.18	45.01	48.45
V_2T_5	17.63	16.59	18.13	50.75	47.60	56.47	71.93	62.33	74.91	55.12	48.75	45.52
V_2T_6	15.38	12.60	13.15	42.68	34.84	37.21	68.05	59.50	62.75	46.50	49.18	45.08
V_2T_7	13.02	12.91	11.85	40.33	37.50	32.19	73.99	61.38	63.00	53.84	47.95	42.15
V_2T_8	11.95	14.18	12.75	33.05	36.97	31.58	69.18	67.55	62.73	46.02	48.00	50.72

Cont.

Treat.	Seed Yield/ plant (gm.)			Seed Yield / plot (kg.)			Germination after 6 month storage at room temp.			Germination after 9 month storage at room temp.		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
V_1T_0	28.93	30.75	32.57	2.74	3.50	2.52	98.02	96.38	95.50	93.75	97.91	95.00
V_1T_1	35.83	37.05	44.57	3.85	4.93	5.56	95.80	98.43	97.63	98.00	95.75	94.78
V_1T_2	36.19	28.78	31.03	3.80	3.36	4.75	96.33	94.02	95.78	96.22	95.00	93.10
V_1T_3	36.94	38.41	35.50	4.20	3.60	4.53	92.97	99.11	97.55	97.48	94.08	93.75
V_1T_4	33.00	35.35	37.61	2.61	2.85	3.48	96.53	98.00	95.42	93.81	95.33	94.67
V_1T_5	36.56	37.79	40.15	4.03	3.92	4.80	98.25	96.75	99.00	97.05	99.00	95.53
V_1T_6	34.70	36.54	32.05	2.85	2.76	3.63	96.64	98.05	95.20	95.00	93.47	97.11
V_1T_7	29.84	32.07	39.64	3.10	2.70	3.95	99.00	93.53	97.00	92.85	97.13	95.75
V_1T_8	33.24	30.63	28.38	1.82	2.91	3.07	96.83	94.05	98.68	98.00	92.18	93.68
V_2T_0	30.93	37.28	35.79	3.86	3.06	4.33	93.75	98.33	96.00	93.92	95.00	95.03
V_2T_1	38.19	42.51	39.84	4.60	4.90	5.25	98.41	95.70	97.50	95.38	98.13	95.00
V_2T_2	33.35	34.01	38.60	3.20	2.81	4.58	96.33	98.50	99.00	97.33	93.50	94.65
V_2T_3	38.75	37.99	35.91	3.98	3.31	4.05	93.90	96.18	98.55	92.58	97.13	94.38
V_2T_4	33.12	36.95	31.03	2.17	3.00	2.48	95.72	98.00	97.83	95.90	93.62	95.47
V_2T_5	35.98	42.15	40.76	3.93	4.06	4.91	94.07	99.13	96.25	97.85	95.12	96.07
V_2T_6	27.41	34.70	35.42	4.55	2.83	3.42	95.14	97.65	99.00	94.70	95.63	95.00
V_2T_7	35.93	28.63	37.05	3.62	2.84	2.75	98.03	93.11	96.83	96.18	92.01	95.35
V_2T_8	39.57	31.75	32.33	2.59	3.03	2.90	97.84	96.79	93.95	93.00	98.15	95.75

CCSHAU, Hisar

Result: Among the treatments studied, T_1 [Glycine betaine (600 ppm] was found effective in enhancing seed yield (49.23, 43.23 q/ha), 100 seed weight (4.43, 4.17 g), germination (95.67, 93 %) and vigour index (3348.00, 2821.67) in normal and late sown conditions respectively followed by T_5-α-Tocopherol (150 ppm) and T_4-Ascorbic acid (10 ppm) + Citric acid (1.3%). Chlorophyll index was found non-significant among the treatments. Crop sown on 18th November showed better results as compared to crop sown on 19th December. It could be due to the optimum temperature available for crop growth. The temperature rose up to 35.6°C in the end of

March. Late sowing of crop affect the plant growth and caused the reduction in yield. Treatment T_1 increased germination and enhanced enzyme activities i.e. POX, APX, CAT and DHA whereas the reduction was observed in MDA level (Lipid peroxidation) in both the sowing dates (Table 147-148).

Table 147: Effect of chemicals on seed yield and quality parameters of wheat variety WH 711

Treat.	Chlorophyll index				Germination (%)		Vigour Index-I		Electrical conductivity (dS/cm/seed)		100 seed weight (g)		Seed yield/ plot (kg)		Seed yield (q/ha)	
	Before spray		After spray													
	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2
T_0	27.27	26.10	38.77	38.83	91.00	89.67	2668.33	2604.00	0.39	0.40	4.24	3.64	9.69	6.70	48.47	33.48
T_1	27.67	26.07	38.53	37.73	95.67	93.00	3348.00	2821.67	0.40	0.40	4.43	4.17	9.85	8.65	49.23	43.23
T_2	27.40	26.43	38.67	38.57	94.00	87.00	3194.67	2609.33	0.40	0.40	4.19	4.05	9.74	7.87	48.70	39.37
T_3	27.70	26.13	38.67	39.37	93.00	92.00	2975.67	2575.33	0.39	0.39	4.49	4.16	9.77	8.16	48.85	40.78
T_4	27.53	26.67	38.70	38.07	95.00	93.00	2943.33	2541.00	0.40	0.40	4.32	3.87	9.72	7.87	48.62	39.33
T_5	27.57	26.83	38.70	38.93	93.00	93.33	2883.67	2800.33	0.40	0.40	4.39	3.99	9.73	8.00	48.65	40.00
T_6	27.50	26.73	38.60	38.97	94.33	93.33	2926.00	2566.67	0.42	0.40	4.42	3.94	9.54	7.79	47.72	38.93
T_7	26.77	26.63	38.33	38.93	91.67	92.00	2767.33	2668.67	0.41	0.40	4.19	3.93	9.61	7.48	48.07	37.40
T_8	27.57	26.40	38.20	38.63	92.33	90.00	2954.67	2610.67	0.40	0.40	4.34	3.68	9.71	7.08	48.55	35.42
T_9	27.80	26.47	38.17	38.13	93.67	90.67	3216.00	2660.00	0.400	0.40	3.99	3.92	9.42	7.99	47.10	39.93
T_{10}	28.17	27.33	38.13	38.57	95.33	91.00	2987.33	2669.67	0.43	0.40	4.25	3.90	9.58	7.31	47.92	36.57
T_{11}	27.30	26.27	38.63	38.67	93.67	93.33	3059.67	2646.33	0.39	0.40	4.37	4.07	9.65	7.85	48.27	39.25
CD at 5% T	N.S.		N.S.		0.51		99.47		0.003		0.05		0.16		0.78	
D	N.S.		N.S.		1.26		N.S.		0.008		0.11		0.38		1.91	
T x D	N.S.		N.S.		1.78		N.S.		0.011		0.16		0.54		2.70	

D_1- First date of sowing (Timely sowing- 18th November, 2015), D_2- second date of sowing (Late sowing-19th December, 2015)

Table 148: Effect of chemicals on enzymes activity of seed of wheat variety WH 711

Treat.	POX (Unit/min/g FW)		CAT (Unit/min/g FW)		APX (Unit/min/g FW)		DHA (OD/g/ml)		MDA (nmol/g FW)	
	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2	D_1	D_2
T_0	7.03	7.19	4.020	4.923	0.317	0.517	0.244	0.239	5.110	6.187
T_1	12.31	9.64	6.680	7.390	0.919	1.150	0.362	0.348	3.110	2.160
T_2	9.68	8.83	6.090	6.420	0.642	0.930	0.318	0.303	3.490	2.670
T_3	9.11	8.72	6.030	6.110	0.650	0.860	0.302	0.300	3.860	2.980
T_4	9.41	9.03	6.103	7.060	0.644	0.930	0.348	0.333	3.500	3.040
T_5	10.64	9.12	6.140	7.180	0.702	1.023	0.359	0.339	3.260	2.840
T_6	8.110	7.077	4.640	4.987	0.411	0.412	0.300	0.278	5.190	6.087
T_7	6.840	7.220	3.870	5.010	0.300	0.508	0.260	0.257	5.230	6.110
T_8	7.98	7.27	4.720	5.180	0.211	0.439	0.258	0.257	5.263	6.977
T_9	7.96	7.31	4.830	5.260	0.217	0.426	0.309	0.288	5.230	6.420
T_{10}	8.10	7.63	5.060	5.850	0.438	0.700	0.300	0.297	5.200	6.140
T_{11}	8.49	8.14	5.180	5.720	0.510	0.720	0.303	0.300	5.290	5.190
CD at 5% T	0.015		0.011		0.003		0.001		0.015	
D	0.038		0.026		0.007		0.003		0.036	
T x D	0.053		0.037		0.010		0.004		0.051	

D_1- First date of sowing (Timely sowing- 18th November, 2015), D_2- second date of sowing (Late sowing-19th December, 2015)

CSAUA&T, Kanpur

Results: The performance of D_1T_5 with respect to chlorophyll intensity (48.23), pollen viability (85.00%), no. of effective tillers (7.66), seed yield per plant (9.47g), seed yield per plot (2.87kg), 1000 seed weight (28.46g) and germination (95.41%) was superior than D_2 and other chemicals, respectively; while the maximum no. of seeds per spike (51.33) and highest spike length (15.46cm) were recorded in D_1T_3. Though the maximum seedling length (18.94cm) was recorded in D_1T_4 but maximum seed vigour index (1797) was found in D_2T_6. However, the overall performance of D_1 was better than D_2 and among chemicals T_5 performed best followed by T_6 (Table 149).

Table 149: Effect of date of sowing & various chemical spray on growth, flowering, maturity and yield attributing characters of wheat during Rabi 2015-16

Treat.	Chlorophyll infesting					Pollen viability			No. of effective tillers			No. of seeds per spike `			Spike length (cm)			Seed yield/plant (g)		
	B D^1	A D^1	B D_2	A D_2	Mean	D^1	D^2	Mean	D_1	D_2	Mean	D1	D2	Mean	D_1	D_2	Mean	D_1	D_2	Mean
T_1	47.1	46.6	42.4	42.3	44.6	73.6	76.0	74.8	6.6	6.9	6.7	48.3	47.0	47.6	15.0	15.1	15.0	8.8	8.9	8.9
T_2	42.3	40.4	42.0	42.4	41.7	78.6	74.3	76.4	6.8	6.8	6.8	44.6	49.0	46.8	15.1	14.9	15.0	9.4	8.7	9.1
T_3	47.3	46.2	41.2	42.16	44.22	81.00	78.33	79.66	6.8	6.66	6.73	50.66	46.66	48.66	15.46	15.20	15.33	8.73	9.16	8.945
T_4	49.0	45.86	42.2	43.73	45.21	75.33	73.33	74.33	6.46	6.6	6.53	47.33	50.00	48.66	15.00	15.20	15.1	9.10	9.30	9.2
T_5	48.13	48.23	40.9	43.40	45.17	85.00	81.00	83	7.66	6.8	7.23	49.00	46.00	47.5	15.23	15.33	15.28	9.27	9.09	9.18
T_6	47.43	46.33	42.6	43.36	44.93	80.00	80.66	80.33	6.73	6.73	6.73	49.00	53.00	51	14.9	15.36	15.13	8.90	8.90	8.9
T_7	45.66	45.26	42.6	41.83	43.85	78.33	74.33	76.33	6.86	7.1	6.98	49.00	48.33	48.66	15.0	15.10	15.05	9.35	9.11	9.23
Mean	46.70	45.56	42.0	42.7	44.25	78.85	76.85	77.85	6.85	6.80	6.82	48.28	48.57	48.42	15.11	15.17	15.14	9.1	9.04	9.07
SE (d)	A=0.30 A*B= 0.43	B=0.30 A*C= 0.80	C=0.57 B*C =0.80	A*B*C =1.13		A= 0.60	B= 1.13	A*B= 1.60	A= 0.06	B= 0.12	A*B= 0.37	A= 0.36	B= 0.68	A*B= 0.97	A= 0.20	B= 0.38	A*B= 0.53	A= 0.11	B= 0.19	A*B= NS
CD 5%	A=0.62 A*B= 0.87	B=NS A*C= 1.64	C=1.16 B*C= NS	A*B* C=NS		1.24	2.32	3.29	NS	0.26	0.36	NS	1.40	1.98	NS	NS	NS	NS	0.48	NS

Treatment	Seed yield/plot			1000 Seed Weight			Germination %			Seedling length(cm)			Seed Vigour Index		
	D^1	D^2	Mean	D^1	D^2	Mean	D^1	D^2	Mean	D_1	D_2	Mean	D_1	D_2	Mean
T_1	2.71	2.65	2.68	27.40	27.70	27.55	95.33	94.41	94.87	17.30	17.91	17.60	1647.80	1689.9	1668.88
T_2	2.74	2.70	2.72	28.23	28.40	28.315	96.56	94.58	95.57	18.34	18.50	18.42	1768.07	1750.6	1759.34
T_3	2.78	2.70	2.74	27.43	26.76	27.095	92.91	95.33	94.12	16.64	18.73	17.685	1112.2	1786.8	1449.52
T_4	2.72	2.66	2.69	28.46	26.66	27.56	93.00	93.33	93.165	18.94	19.00	18.97	1761.10	1774.99	1768.04
T_5	2.87	2.76	2.815	28.46	27.83	28.145	95.41	94.5	94.955	16.59	18.91	17.75	1583.76	1787.30	1685.53
T_6	2.74	2.68	2.71	28.13	28.33	28.23	94.91	92.25	93.58	18.36	19.50	18.93	1742.09	1797.03	1769.56
T_7	2.78	2.67	2.725	28.26	28.30	28.28	95.41	95.16	95.285	16.96	20.69	18.825	1617.05	1970.82	1793.93
Mean	2.76	2.69	2.73	28.05	27.71	27.88	94.79	94.22	94.50	17.59	19.03	18.31	1604.58	1793.93	1699.25
SE (d)	A=0.05	B=0.09	A*B= 0.13	A=0.06	B=0.12	A*B= 0.18	A=0.20	B=0.38	A*B= 0.54	A=0.07	B=0.13	A*B=0.19	A=3.04	B=5.68	A*B=8.03
CD(P=0.05)	NS	NS	NS	0.14	0.26	0.37	0.42	0.79	1.12	0.15	0.28	0.39	6.24	11.67	16.49

Sorghum

MPKV, Rahuri

Crop: Sorghum **Variety:** Swati **Replications:** Three **Plot size:** 5 x 4 m^2

Results: The data on effect of temperature during normal sowing and sowing under elevated temperature and foliar application of PGRs on seed yield and quality parameters of sorghum are presented in following (Table 150-151). The data revealed that the seed yield and quality parameters are significantly influenced due to

Table 150: Effect of normal and sowing under elevated temperature and PGR foliar application on seed yield and quality parameters of Sorghum

Treatments	CSI At pre flowering stage	CSI At post flowering stage	Pollen viability (%)	Panicle length (cm)	No. of spikelets/ Plant	No. of filled spikelets/ plant	Seed set (%)	Seed yield/ plant (g)
Sowing dates								
15th October (S_1)	0.071	0.137	85.42	16.99	1313.58	1115.66	84.42	43.05
15th January (S_2)	0.166	0.230	73.81	14.27	1173.47	894.28	75.04	32.98
SE ±	**0.004**	**0.006**	**0.75**	**0.13**	**16.60**	**13.74**	**0.51**	**0.45**
CD at 5%	**0.012**	**0.017**	**2.19**	**0.39**	**48.53**	**40.16**	**1.51**	**1.33**
Foliar application								
Control	0.178	0.273	75.00	14.14	951.16	653.83	68.05	32.12
Spray with Salicylic acid (800 ppm)	0.070	0.113	81.58	16.71	1604.00	1381.33	85.97	43.47
Spray with Salicylic acid (400 ppm)	0.090	0.169	82.41	16.49	1358.25	1119.83	82.29	39.87
Spray with Ascorbic acid (10 ppm) + Citric acid (1. 3%)	0.082	0.151	82.25	15.81	1461.00	1224.00	83.80	41.92
Spray with α tocopherol (150 ppm)	0.117	0.183	78.91	15.86	1268.53	1041.83	81.95	37.42
Spray with KCL 1%	0.164	0.220	79.25	15.41	999.08	781.33	78.23	35.54
Spray with Brassinolides (0. 3ppm)	0.130	0.173	77.91	14.99	1062.68	832.66	77.83	35.80
SE ±	**0.007**	**0.011**	**1.40**	**0.25**	**31.06**	**25.70**	**0.96**	**0.85**
CD at 5%	**0.022**	**0.032**	**4.09**	**0.73**	**90.80**	**75.13**	**2.82**	**2.49**

Contd….

Treatments	Seed yield Kg/plot (kg)	Seed yield Kg/ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
Sowing dates							
15th October (S_1)	368.40	1842.01	83.79 (66.56)	32.86	0.179	2759.92	15.08
15th January (S_2)	183.02	915.10	78.40 (62.34)	22.99	0.157	1803.65	12.36
SE ±	**6.47**	**32.35**	**0.45**	**0.60**	**0.003**	**51.16**	**0.24**
CD at 5%	**18.91**	**94.55**	**1. 32**	**1.74**	**0.008**	**148.97**	**0.70**
Foliar application							
Control	198.46	992. 30	78.00 (62.03)	24.50	0.141	1916.67	10.97
Spray with Salicylic acid (800 ppm)	388.52	1942.60	85.33 (68.26)	31.66	0.183	2744.67	15.80
Spray with Salicylic acid (400 ppm)	263.87	1319.37	80.67 (63.92)	29.99	0.187	2426.10	15.08
Spray with Ascorbic acid (10 ppm) + Citric acid (1.3%)	334.68	1673.40	82.83 (65.76)	28.75	0.176	2391.83	14.60
Spray with α tocopherol (150 ppm)	279.55	1397.75	77.25 (61.50)	29.66	0.161	2299.17	12.43
Spray with KCL 1%	217.43	1087.15	79.17 (62.88)	24.51	0.170	1948. 31	13.48
Spray with Brassinolides (0.3 ppm)	247.47	1237.33	84.42 (66.99)	26.41	0.162	2245.75	13.65
SE ±	**12.10**	**60.52**	**0.85**	**1.11**	**0.005**	**95.71**	**0.45**
CD at 5%	**35.38**	**176.89**	**2.47**	**3.25**	**0.014**	**278.70**	**1. 31**

Figures in parenthesis are Arc sin transformed values

Table 151: Interaction effects normal and sowing under elevated temperature and PGR foliar application on seed yield and quality parameters of Sorghum

Treatments	CSI At pre flowering stage	CSI At post flowering stage	Pollen viability (%)	Panicle length (cm)	No. of spikelets/ Plant	No. of filled spikelets/plant	Seed set (%)	Seed yield/ plant (g)
S_1F_1	0.109	0.166	82.33	15.74	1035.67	796.33	77.09	36.18
S_1F_2	0.050	0.092	86.83	17.66	1646.33	1487.67	90.40	49.15
S_1F_3	0.060	0.144	89.17	17.49	1440.50	1224.33	85.04	44.81
S_1F_4	0.055	0.110	85.83	17.25	1469.33	1313.33	89.53	48.49
S_1F_5	0.065	0.144	84.50	17.00	1341.07	1144.33	85.37	42.04
S_1F_6	0.087	0.153	85.83	16.85	1036.83	846.00	81.99	40.44
S_1F_7	0.072	0.147	83.50	16.98	1225.37	997.67	81.52	40.30
S_2F_1	0.247	0.380	67.67	12.54	866.67	511.33	59.00	28.07
S_2F_2	0.089	0.134	76.33	15.77	1561.67	1275.00	81.55	37.79
S_2F_3	0.119	0.194	75.67	15.51	1276.00	1015.33	79.56	34.93
S_2F_4	0.108	0.192	78.67	14.37	1452.67	1134.67	78.07	35.36
S_2F_5	0.169	0.222	73.33	14.72	1196.00	939.33	78.54	32.80
S_2F_6	0.241	0.286	72.67	13.96	961.33	716.67	74.47	30.65
S_2F_7	0.189	0.199	72.33	13.01	900.00	667.68	74.15	31.32
SE ±	**0.010**	**0.016**	**1.983**	**0.355**	**43.93**	**36.35**	**1.37**	**1.209**
CD at 5%	**0.030**	**0.046**	**NS**	**NS**	**128.42**	**NS**	**4.00**	**NS**
For 15 January sowing % increase over control by F_2				25.8 %	80.2%	149.4%	38.2%	34.6%

Contd…

Treatments	Seed yield Kg/plot (kg)	Seed yield Kg/ha (kg)	Germination (%)	Root shoot length (cm)	Dry matter content (g)	Vigour index I	Vigour index II
S_1F_1	289.89	1449.47	79.33 (62.95)	29.50	0.153	2342.17	12.10
S_1F_2	511.14	2555.73	93.00 (74.73)	37.33	0.209	3472.67	19.50
S_1F_3	353.96	1769.82	82.00 (64.89)	35.50	0.201	2909.67	16.50
S_1F_4	447.36	2236.80	84.33 (66.72)	33.50	0.180	2823.17	15.13
S_1F_5	370.14	1850.70	78.50 (62.36)	34.50	0.163	2707.83	12.83
S_1F_6	292.13	1460.67	81.67 (64.65)	28.70	0.181	2342.30	14.80
S_1F_7	314.18	1570.90	87.67 (69.64)	31.00	0.167	2721.67	14.67
S_2F_1	107.02	535.12	76.67 (61.11)	19.50	0.129	1491.17	9.83
S_2F_2	265.89	1329.47	77.67 (61.80)	26.00	0.156	2016.67	12.10
S_2F_3	173.78	868.90	79.33 (62.95)	24.83	0.172	1942.53	13.67
S_2F_4	222.00	1110.00	81.33 (64.43)	24.00	0.173	1960.50	14.07
S_2F_5	188.95	944.80	76.00 (60.65)	24.83	0.158	1890.50	12.03
S_2F_6	142.72	713.63	76.67 (61.11)	20.33	0.159	1554.33	12.17
S_2F_7	180.75	903.77	81.17 (64.33)	21.83	0.156	1769.83	12.63
SE ±	**17.12**	**85.58**	**1.20**	**1.581**	**0.007**	**135. 36**	**0.635**
CD at 5%	**50.04**	**250.16**	**3.50**	**NS**	**0.020**	**NS**	**1.85**
% increase over control	148.5%	148.5%	1.30%	33.3%	20.9%	35.2%	23.1%

temperatures and foliar application of chemicals (PGR). During the month of December 2015, the range of maximum temperature was 29.0 to 33^{O}C while, in the month of March 2016, the range of maximum temperature was 34.5 to 39 ^{O}C. It was observed that the temperature elevated by 5.5 to 6.0^{O}C during the flowering period of January sowing.

Effect of temperature: (Normal sowing and sowing under elevated temperature)

Temperature during normal sowing and sowing under elevated temperature had significant effect on seed yield and quality of sorghum irrespective of PGR spraying. Pollen viability (85.42%), panicle length (16.99 cm) no. of spikelets/plant (1313.58), no. of filled spikelets (1115.66), seed set (84.42%), seed yield per plant (43.05 g), seed yield/plot (368.40 kg), seed yield / ha (1842.02 kg), germination (83.79%), root shoot length (32.86 cm), dry matter content (0.179 g), vigour index I (2759.92) and vigour index II (15.08) were significantly higher at normal sowing (15th October sowing date). The chlorophyll stability index was lower in normal sowing date. The average temperature at the time of flowering was 29 to 33^{O}C during normal sowing and 34.5 to 39 ^{O}C at sowing under elevated temperature.

Effect foliar application of PGRs

Foliar application of PGRs had significant effect on seed yield and quality of sorghum irrespective of temperature during different sowings. Panicle length (16.71 cm), no. of spikelets (1604.00), no. of filled spikelets (1381.33), seed set (85.97 %), seed yield per plant (43.47 g), seed yield/plot (388.52 kg), seed yield/ha (1942.60 kg), germination (85.33%), root shoot length (31.66 cm), dry matter content (0.187 g), vigour index I (2744.67) and vigour index II (15.80) were significantly higher in foliar application of salicylic acid (800 ppm) followed by ascorbic acid (10 ppm) + citric acid (1.3%) irrespective of sowing time.

Interaction effect

The interaction effect of temperature during normal sowing and sowing under elevated temperature and foliar application of PGRs had significant effect on seed yield and seed quality parameters. Number of spikelets per plant (1646.33), seed set (90. 40%), seed yield/plot (511.14 kg) and seed yield/ha (2555.74 kg) were significantly higher in foliar application of salicylic acid (800 ppm) at normal sowing. At elevated temperature, the panicle length (12.54 cm), no. of spikelets (866.67), no. of filled spikelets (511.33), seed set (59.00%), seed yield /plant (28.07 g), seed yield/plot (107.02 kg), seed yield/ha (535.12 kg), germination (76.67%), root shoot length (19.50 cm), vigour index I (1491.17) and vigour index II (9.83) was significantly lower in control than the PGRs sprayings. The effect of elevated temperature could be mitigated with the spray of salicylic acid (800 ppm), which could increase the panicle length (25.8 %), no. of spikelets (80.2%), no. of filled spikelets (149.4%), seed set (38.2%), seed yield /plant (34.6%), seed yield/plot (148.5%), seed yield/ha (148.5%), germination (1.30%), root shoot length (33.3%), dry matter content (20.9%), vigour index I (35.2%) and vigour index II (23.1%) as compared to control at elevated temperature sowing.

VNMKV, Parbhani

Sorghum variety: Parbhani Moti; **Sowing Date:** 28/10/2016 & 28/11/2016

Results: 1st sowing was done on 1/07/2016 and 2nd sowing will be done in Jan 2017. The weather data during the crop period is given in table 152. During 1st sowing three genotypes were sown and two foliar sprays of different chemicals were applied to the effect of elevated temperature. The observation of 1st sowing were recorded and presented in table 153. The significantly highest seed setting (84.35%), 100 seed weight (2.08g) and seed yield (21.55qha^{-1}) were recorded in G_1 (CSH-14). Whereas among the chemical treatments, significantly highest seed setting (86.58%) and seed yield (22.74qha^{-1}) was recorded in T_3. In the data on interaction effect, the treatment $G_1 T_3$ i.e. Sorghum hybrid CSH-14 and two foliar spray of salicylic acid (400ppm) was significantly superior in the seed setting (88.83%) and seed yield(22.55 q/ha) and vigour index (7.13).

STRU, Parbhani sorghum field

Table 152: Monthly Weather data for the year 2016 recorded at Meteorological Observatory, Dr.PDKV., Akola

Month	T MAX (ºC)		T MIN (ºC)		BSH (hrs)		Ws (km/hr)		RHI (%)		RHII (%)		RF (mm)		CRF (mm)	Rainy Days	
	N	A	N	A	N	A	N	A	N	A	N	A	N	A		N	A
June	37.2	37.6	25.6	27.0	7.2	6.4	14.9	9.8	71	67	41	37	150.5	146.5	146.5	7.9	8
July	32.5	30.0	23.7	24.3	4.5	2.7	11.9	8.2	84	87	61	68	212.2	376.1	522.6	12.6	16
August	30.4	30.6	23.0	23.8	4.1	4.5	11.4	7.1	87	85	68	64	215.7	91.0	613.6	9.3	8
September	32.5	31.1	22.2	23.2	6.6	5.3	7.9	5.5	84	89	57	62	111.1	128.2	741.8	7.5	8
October	33.7	31.4	18.6	18.7	8.4	7.5	4.8	1.4	76	84.8	39	47.3	52.3	90.5	832.3	2.3	5
November	31.6	31.1	14.1	11.2	8.7	8.6	4.7	0.3	70.0	83.0	31.0	30.8	20.0	0.0	832.3	1.2	0
December	28.3	30.0	10.6	10.4	8.8	8.2	4.6	0.8	70.0	84.2	30.0	34.6	8.4	0.0	832.3	0.9	0

Table 153: Chlorophyll Index, Yield attributing characters and Seed quality parameters in Sorghum (1st Sowing)

Treatments	Chlorophyll Index before spray	Chlorophyll Index after spray	Seed setting (%)	100 seed wt. (g)	Seed yield/ Plant (g)	Seed yield (qha^{-1})	Germination (%)	Seedling length (cm)	Vigour Index
Hybrid/ Varieties									
G_1	55.64	46.20	84.35	2.08	24.64	20.55	85.500	25.73	2,200
G_2	50.27	41.24	82.74	1.97	24.13	20.44	84.800	26.57	2,253
G_3	53.41	44.55	82.29	1.99	22.92	19.09	83.350	25.81	2,150
SE(m)±	2.33	1.27	0.45	0.05	0.36	0.18	0.438	0.33	27.59
CD at 5%	N/S	3.62	1.30	N/S	1.07	0.53	1.274	N/S	80.20

Chemical treatments									
T_0	49.36	40.98	79.22	1.69	24.53	21.15	84.833	22.31	1,891
T_1	49.06	41.95	83.31	1.87	21.61	19.32	83.667	24.83	2,075
T_2	56.73	43.35	83.99	2.08	22.85	19.28	85.000	24.61	2,093
T_3	62.30	47.67	86.58	2.15	26.91	22.74	87.167	27.51	2,399
T_4	50.53	45.67	86.52	2.11	24.53	20.53	85.667	27.65	2,369
T_5	53.43	42.70	82.01	1.96	24.70	20.33	84.833	26.35	2,235
T_6	66.13	44.52	82.64	2.37	24.88	20.05	84.667	27.23	2,303
T_7	72.86	46.90	81.80	1.88	22.50	17.78	83.000	25.13	2,082
T_8	50.46	42.40	82.04	1.93	22.20	18.61	83.167	27.00	2,249
T_9	45.50	43.80	83.16	2.08	24.25	20.51	83.500	27.73	2,315
SE(m)±	2.33	2.33	0.82	0.09	0.67	0.33	0.800	0.61	50.37
CD at 5%	N/S	3.62	2.38	0.27	1.95	0.96	2.325	1.79	146.43
Interaction effect (A x B)									
G_1T_0	49.36	37.06	81.00	2.02	25.00	20.60	85.500	19.55	1,671
G_1T_1	49.06	41.30	84.59	1.97	20.80	18.05	84.500	21.20	1,790
G_1T_2	56.73	45.16	86.90	2.15	24.15	19.65	87.500	25.75	2,253
G_1T_3	62.30	50.20	88.83	2.37	27.00	22.55	88.500	26.10	2,310
G_1T_4	50.53	47.96	88.25	2.14	25.50	20.75	85.000	27.95	2,376
G_1T_5	53.43	48.80	83.08	2.05	23.10	19.36	85.500	28.30	2,419
G_1T_6	66.13	52.63	82.25	2.56	25.45	21.00	87.500	26.50	2,319
G_1T_7	72.86	53.86	81.42	1.90	25.10	18.87	82.000	25.70	2,105
G_1T_8	50.46	43.06	82.83	1.81	25.00	22.15	86.000	29.75	2,559
G_1T_9	45.50	41.93	84.41	1.86	25.30	22.55	83.000	26.50	2,197
G_2T_0	47.36	39.96	79.50	1.46	24.30	21.85	84.000	24.10	2,022
G_2T_1	45.20	44.93	83.56	2.04	23.70	21.55	84.000	27.85	2,336
G_2T_2	49.46	40.93	81.36	1.81	21.80	18.25	84.500	26.00	2,196
G_2T_3	55.00	47.86	86.07	1.94	27.55	22.91	87.500	29.05	2,543
G_2T_4	63.80	39.83	86.22	1.92	25.10	20.87	86.500	29.00	2,507
G_2T_5	47.30	37.53	80.89	2.23	24.80	20.62	84.500	25.35	2,141
G_2T_6	49.33	37.96	81.81	2.20	24.90	20.15	85.500	26.45	2,260
G_2T_7	49.10	38.03	82.70	2.08	23.10	19.37	85.500	23.20	1,983
G_2T_8	52.06	41.60	82.48	1.95	20.50	17.77	81.000	25.85	2,094
G_2T_9	44.06	43.76	82.81	2.07	25.55	21.10	85.000	28.85	2,449
G_3T_0	52.00	45.93	77.18	1.58	24.30	21.01	85.000	23.30	1,978
G_3T_1	50.63	39.63	81.79	1.61	20.35	18.36	82.500	25.45	2,099
G_3T_2	55.43	43.96	83.72	2.30	22.60	19.93	83.000	22.10	1,832
G_3T_3	65.03	44.96	84.84	2.15	26.20	22.75	85.500	27.40	2,344
G_3T_4	53.16	49.23	85.09	2.26	23.00	19.99	85.500	26.00	2,223
G_3T_5	51.33	41.76	82.06	1.61	26.20	21.01	84.500	25.40	2,146
G_3T_6	54.10	42.96	83.87	2.35	24.30	19.010	81.000	28.75	2,329
G_3T_7	50.23	48.80	81.29	1.67	19.30	15.100	81.500	26.50	2,158
G_3T_8	48.26	42.53	80.81	2.03	21.10	15.920	82.500	25.40	2,094
G_3T_9	53.96	45.70	82.27	2.32	21.90	17.880	82.500	27.85	2,297
SE(m)±	7.38	4.04	1.42	0.16	1.16	0.576	1.386	1.07	87.25
CD at 5%	N/S	N/S	N/S	0.47	N/S	1.675	N/S	3.11	253.63

Rice

PJTSAU, Hyderabad & IIRR, Hyderabad (This experiment is jointly conducted by PJTSAU and ICAR-IIRR)

Methodology

Sowing dates: Two dates of sowing (Normal sowing and delayed sowing)

Varieties: MTU 1010, Erramallelu, Tellahamsa

Treatments: The following chemicals were used for the foliar spray. Two sprays were given at vegetative stage and seed filling stage.

T_0	Control	T_5	α-Tocopherol (150 ppm)
T_1	Glycine betaine (600 ppm)	T_6	KCl 1%
T_2	Salicylic acid (800 ppm)	T_7	Brassinolides (0.3 ppm)
T_3	Salicylic acid (400 ppm)	T_9	Brassinolides (10 ppm)
T_4	Ascorbic acid (10 ppm) + Citric acid (1.3%)		

Result (2015-16): Under high temperature conditions, reduction in yield was noticed, and the significant reduction was observed in Tellahamsa. Similar trend was observed w.r.t. yield attributing characters. Among the treatments, ascorbic acid (10 ppm) + citric acid (1.3%) imposed on Tellahamsa recorded highest seed yield per plant (50.42 g/plant) under normal conditions and 50% reduction was noticed under delayed conditions. Harvested produce obtained from late sowing exhibited decrease in germination (%) and the decrease in germination was found significant with Tellahamsa variety. However, Erramallelu and MTU 1010 did not show any difference due to delayed plantings. On the other hand, maximum reduction in root length, shoot length, seedling length and seedling vigour index I was noticed due to delayed sowing as compared to normal date of planting. Maximum reduction in seedling characters was noticed with Erramallelu variety (Table 154-161).

Table 154: SPAD reading for different varieties of rice under normal and late sowings during R*abi*, 2015-16

SPAD reading					
Tellahamsa		**Erramallelu**		**MTU 1010**	
Normal	**Late**	**Normal**	**Late**	**Normal**	**Late**
36.65	44.64	37.32	45.89	35.68	43.69
36.35	39.72	36.62	40.64	34.69	41.86
40.38	40.35	41.36	41.28	40.05	42.31
42.88	43.92	43.00	44.50	40.24	41.01

Table 155: Chlorophyll content of different varieties of rice under normal and late sowings during *Rabi*, 2015-16

Variety	**Chlorophyll a (mg/g)**		**Chlorophyll b (mg/g)**		**Total Chlorophyll (mg/g)**		**C (xanthophylls + Carotene)**	
	Normal	**Late**	**Normal**	**Late**	**Normal**	**Late**	**Normal**	**Late**
Tellahamsa	1.640	1.844	0.370	0.536	2.010	2.380	5.465	6.597
Erramallelu	1.775	1.631	0.509	0.626	2.285	2.256	6.868	6.174
MTU 1010	1.870	1.779	0.569	0.517	2.439	2.296	7.073	6.110

Table 156: Yield attributing characters of different varieties of rice under normal and late sowings during *Rabi*, 2015-16

Trt.	Plant height (cm)								Number of panicles/plant							
	Normal				Late				Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	84.6	78.2	81.6	81.5	91.5	72.3	77.1	80.3	15.9	18.4	13.7	16.0	15.4	18.2	13.3	15.6
T_2	95.5	76.5	76.3	82.8	91.8	74.5	74.9	80.4	17.4	16.5	14.7	16.2	16.5	15.1	13.8	15.1
T_3	98.1	74.7	79.1	84.0	87.5	74.5	75.4	79.1	19.6	16.7	15.7	17.3	14.3	15.7	15.6	15.2
T_4	96.4	77.3	79.4	84.4	89.4	74.5	75.5	79.8	22.5	17.4	14.7	18.2	14.1	16.1	13.4	14.5
T_5	94.5	72.3	77.7	81.5	87.1	75.2	74.3	78.9	22.4	18.5	15.6	18.8	14.9	15.3	15.3	15.2
T_6	91.0	77.2	79.4	82.5	83.0	74.0	74.3	77.1	19.1	18.0	16.6	17.9	14.3	17.2	15.9	15.8
T_7	92.9	74.8	80.0	82.6	88.6	74.5	74.9	79.3	19.8	18.0	15.4	17.7	14.7	17.0	13.5	15.1
T_8	95.1	74.2	75.1	81.5	88.0	72.7	73.5	78.1	18.4	16.5	16.2	17.0	14.6	16.6	14.5	15.2
T_9	83.4	75.8	79.9	79.7	87.8	73.2	73.0	78.0	17.1	16.7	15.0	16.3	13.9	15.9	14.1	14.6
Mean	92.4	75.7	78.7	82.3	88.3	73.9	74.8	79.0	19.1	23.6	15.3	17.3	14.7	17.4	14.4	15.2
	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)
Ai.-Aj.	0.55	0.78	1.90	2.74	0.55	0.78	1.91	2.91	0.51	0.72	1.77	12.90	0.20	0.28	0.68	11.8
Bi.-Bj.	0.65	0.92	1.83		0.66	0.94	1.87		0.64	0.91	1.81		0.48	0.68	1.36	
AiBi-AiBj	1.13	1.59	3.18		1.15	1.62	3.24		1.11	1.57	3.14		0.84	1.18	2.36	
AiBi-AjBi	1.20	1.69	3.54		1.22	1.72	3.59		1.17	1.65	3.44		0.81	1.15	2.32	

T_1: Control; T_2: Glycine betaine (600 ppm); T_3: Salicylic acid (800 ppm); T_4: Salicylic acid (400 ppm); T_5: Ascorbic acid (10 ppm) + Citric acid (1.3%); T_6: α-Tocopherol (150 ppm); T_7: KCl 1%; T_8: Brassinolides (0.3 ppm); T_9: Brassinolides (10 ppm)

Table 157: Yield attributing characters of different varieties of rice under normal and late sowings during *Rabi*, 2015-16

Trt.	Panicle length (cm)								Seed yield/plant (g)							
	Normal				Late				Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	23.3	24.8	22.5	23.5	22.5	21.9	20.8	21.7	29.36	36.38	26.79	30.8	27.61	30.07	21.72	26.5
T_2	23.2	23.9	21.5	22.9	23.0	23.8	19.1	22.0	34.70	33.45	28.04	32.1	30.77	28.29	24.87	28.0
T_3	22.6	23.6	21.9	22.7	22.6	23.1	21.5	22.4	32.20	32.53	26.59	30.4	25.88	29.87	26.16	27.3
T_4	23.2	23.0	22.0	22.7	23.0	22.9	20.3	22.1	48.19	33.95	25.28	35.8	25.87	30.46	24.78	27.0
T_5	24.0	23.4	21.9	23.1	22.6	22.4	21.0	22.0	50.42	31.57	29.18	37.1	25.41	33.04	25.81	28.1
T_6	23.1	24.8	21.8	23.2	22.1	23.1	20.0	21.7	44.64	37.51	26.36	36.2	24.57	32.89	25.39	27.6
T_7	22.9	24.0	21.7	22.9	17.9	23.6	20.1	20.5	45.35	41.38	25.08	37.3	22.84	28.61	21.91	24.5
T_8	24.0	24.0	21.4	23.1	23.2	23.4	20.4	22.3	43.87	36.53	33.99	38.1	22.69	27.98	22.80	24.5
T_9	23.7	24.0	21.7	23.1	22.3	23.6	20.0	22.0	33.91	34.27	23.87	30.7	23.15	29.57	21.73	24.8
Mean	23.3	23.9	21.8	23.0	22.1	23.1	20.4	21.9	40.3	35.3	27.24	34.3	25.42	30.09	23.91	26.5
	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)
Ai.-Aj.	0.14	0.20	0.49	3.07	0.34	0.49	1.19	9.69	0.49	0.69	1.68	19.42	0.42	0.59	1.45	9.79
Bi.-Bj.	0.20	0.29	0.57		0.61	0.86	1.72		1.92	2.72	5.42		0.75	1.06	2.11	
AiBi-AiBj	0.35	0.50	1.00		1.06	1.50	2.99		3.33	4.71	9.38		1.30	1.83	3.65	
AiBi-AjBi	0.36	0.51	1.06		1.06	1.49	3.05		3.18	4.49	9.00		1.29	1.83	3.73	

Table 158: Germination (%) of different varieties of rice under normal and late sowings during *Rabi*, 2015-16

Trt.	Germination (%)								Root length (cm)							
	Normal				Late				Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	99.0	99.5	100.0	99.5	94.5	100.0	99.8	98.1	15.2	14.7	12.4	14.1	11.0	6.1	10.0	9.0
T_2	100.0	100.0	99.8	99.9	94.8	99.5	99.8	98.0	16.7	14.5	12.8	14.7	8.8	6.3	10.4	8.5
T_3	100.0	100.0	99.3	99.8	97.3	100.0	100.0	99.1	14.7	11.5	13.2	13.2	7.2	6.0	10.4	7.9
T_4	100.0	99.0	100.0	99.7	95.5	99.8	99.5	98.3	16.7	12.3	14.1	14.3	8.0	6.7	9.9	8.2
T_5	99.5	99.8	100.0	99.8	97.3	100.0	98.3	98.5	16.5	11.7	13.1	13.7	9.4	7.8	9.8	9.0
T_6	99.8	99.8	100.0	99.8	94.5	100.0	100.0	98.2	14.8	10.9	12.8	12.9	7.8	6.2	8.6	7.5
T_7	100.0	99.8	100.0	99.9	97.8	100.0	100.0	99.3	15.2	8.5	11.7	11.8	8.3	7.6	10.5	8.8
T_8	99.8	100.0	100.0	99.9	95.8	99.5	100.0	98.4	15.4	9.0	11.9	12.1	8.8	10.0	10.7	9.8
T_9	99.3	99.8	99.8	99.6	93.8	99.8	100.0	97.8	14.2	9.6	14.5	12.8	8.2	9.3	10.8	9.4
Mean	99.7	99.7	99.9	99.8	95.7	99.8	99.7	98.4	15.5	11.4	12.9	13.3	8.6	7.3	10.1	8.7
	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)
Ai.-Aj.	0.05	0.08	0.18	0.51	0.34	0.48	1.17	1.43	0.27	0.38	0.93	9.90	0.20	0.28	0.68	10.07
Bi.-Bj.	0.15	0.21	0.41		0.41	0.57	1.14		0.38	0.54	1.07		0.25	0.36	0.71	
AiBi-AiBj	0.25	0.36	0.72		0.70	0.99	1.98		0.66	0.93	1.85		0.44	0.62	1.23	
AiBi-AjBi	0.25	0.35	0.70		0.74	1.05	2.20		0.68	0.96	1.97		0.46	0.65	1.34	

Table 159: Shoot length (cm) of different varieties of rice under normal and late sowings during *Rabi*, 2015- 16

Trt.	Shoot length (cm)								Seedling length (cm)							
	Normal				Late				Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	12.1	11.8	14.1	12.7	5.8	6.6	10.5	7.6	27.3	26.4	26.6	26.8	16.8	12.7	20.4	16.7
T_2	12.5	12.4	16.1	13.7	5.3	7.0	10.1	7.5	29.3	26.9	28.9	28.3	14.1	13.3	20.5	16.0
T_3	11.6	14.3	18.5	14.8	5.3	7.8	10.5	7.9	26.4	25.8	31.8	28.0	12.5	13.7	20.9	15.7
T_4	12.1	12.3	15.4	13.3	5.5	7.5	10.8	7.9	28.8	24.6	29.5	27.6	13.5	14.2	20.6	16.1
T_5	12.5	13.7	14.8	13.7	5.3	7.2	9.9	7.5	29.0	25.4	27.9	27.4	14.7	15.1	19.7	16.5
T_6	9.8	13.3	17.4	13.5	5.3	6.8	9.9	7.3	24.7	24.2	30.2	26.4	13.0	13.0	18.5	14.8
T_7	12.5	12.9	16.1	13.8	5.7	7.7	11.4	8.3	27.7	21.4	27.8	25.6	14.0	15.2	22.0	17.1
T_8	11.2	13.0	17.7	14.0	5.7	8.4	11.5	8.5	26.6	22.0	29.5	26.0	14.5	18.4	22.2	18.4
T_9	15.6	10.7	16.3	14.2	5.4	7.8	11.8	8.3	29.8	20.2	30.9	27.0	13.6	17.1	22.6	17.8
Mean	12.2	12.7	16.3	13.7	5.5	7.4	10.7	7.9	27.7	24.1	29.2	27.0	14.1	14.7	20.8	16.6
	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)
Ai.-Aj.	0.10	0.15	0.35	11.65	0.12	0.17	0.42	6.65	0.21	0.29	0.72	7.26	0.23	0.33	0.81	6.85
Bi.-Bj.	0.46	0.65	1.30		0.15	0.21	0.43		0.57	0.80	1.60		0.33	0.46	0.92	
AiBi-AiBj	0.80	1.13	2.25		0.26	0.37	0.74		0.98	1.39	2.76		0.57	0.80	1.60	
AiBi-AjBi	0.76	1.08	2.15		0.27	0.39	0.81		0.95	1.34	2.70		0.58	0.82	1.70	

Table 160: Yield attributing characters of different varieties of rice under normal and late sowings during *Rabi*, 2015-16

Treatments	Test weight (g)/plant							
	Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	2.27	1.93	2.20	2.13	1.96	1.59	1.95	1.83
T_2	2.23	1.70	2.03	1.99	2.20	1.66	1.97	1.94
T_3	2.30	1.67	2.07	2.01	2.19	1.62	1.89	1.90
T_4	2.23	1.84	2.08	2.05	2.19	1.62	1.93	1.91
T_5	2.14	1.69	2.07	1.97	2.11	1.50	1.84	1.82
T_6	2.24	1.70	2.01	1.98	2.12	1.49	1.96	1.86
T_7	2.29	1.76	2.15	2.07	2.19	1.68	1.88	1.92
T_8	2.28	1.81	2.06	2.05	2.11	1.53	1.91	1.85
T_9	2.11	1.83	2.16	2.03	1.96	1.70	1.95	1.87
Mean	2.23	1.77	2.09	2.03	2.11	1.60	1.92	1.88
Ai.-Aj.	0.05	0.07	0.18	0.72	0.01	0.01	0.02	2.79
Bi.-Bj.	0.20	0.29	0.57		0.02	0.02	0.04	
AiBi-AiBj	0.35	0.50	1.00		0.03	0.04	0.07	
AiBi-AjBi	0.34	0.48	0.95		0.03	0.04	0.07	

Table 161: Seedling vigour index – I of different varieties of rice under normal and late sowings during *rabi*, 2015-16

Treatments	Test weight (g)/plant							
	Normal				Late			
	Tella-hamsa	Erra-mallelu	MTU 1010	Mean	Tella-hamsa	Erra-mallelu	MTU 1010	Mean
T_1	2707	2632	2660	2666	1582	1273	2038	1631
T_2	2927	2687	2880	2831	1335	1326	2044	1568
T_3	2635	2583	3153	2791	1219	1375	2093	1562
T_4	2879	2435	2945	2753	1288	1421	2053	1587
T_5	2883	2532	2789	2735	1432	1507	1938	1625
T_6	2461	2416	3025	2634	1234	1297	1847	1459
T_7	2768	2135	2776	2559	1366	1521	2199	1696
T_8	2656	2198	2954	2602	1384	1831	2219	1811
T_9	2956	2018	3078	2684	1275	1706	2260	1747
Mean	2764	2404	2918	2695	1346	1473	2077	1632
	S.Em.	S.Ed	C.D.	C.V. (%)	S.Em.	S.Ed	C.D.	C.V. (%)
Ai.-Aj.	20.06	28.38	69.43	7.36	21.63	30.59	74.85	6.75
Bi.-Bj.	57.23	80.93	161.33		31.80	44.97	89.64	
AiBi-AiBj	99.12	140.78	279.43		55.07	77.88	155.26	
AiBi-AjBi	95.58	135.17	272.16		56.25	79.55	163.91	

UAS, Bengaluru

Experimental details:

Variety	**:**	BR-2555
Date of sowing	**:**	11-07-2016
Date of planting	**:**	03-08-2016

Results: The field experiment was carried out during *Kharif*, 2016 at Zonal Agricultural Research Station, VC Farm, Mandya. The trial was laid under FRBD with three replications. The observations *viz.,* Chlorophyll index, Radical content of leaf, Pollen viability, Seed set percentage, 100 seed weight, Seed yield per plant, Seed yield per plot, Germination and vigour of seed were recorded both at field and 5^0C enhanced elevated temperature conditions. The data on the field observations has been analyzed and the laboratory data is yet to be computed. However, the experiment is in progress and to be completed.

TNAU, Coimbatore

Results: Rice variety Co(R) 51 is raised in the main field as well as in elevated temperature chamber, where the crop is grown in field condition (Not the pot culture). Crop is in tillering stage.

Elevated temperature growth chambers

KKV, Dapoli

Variety: Karjat -3;

Results: The data revealed that significantly highest seed yield/plant, seed yield/plot (kg), 100 seed weight (gm), pollen viability %, seed set %, germination % and vigour index were recorded in 1st sowing (normal planting) as compared to stress condition. Among the treatments, salicylic acid (800 ppm) recorded significantly highest 100 seed weight (2.25 gm), seed yield/plant (24.93 gm), seed yield/plot (5.22 kg), germination % after harvest (95.00%) and vigour index (3156.16). However among interaction effect, S_1T_2 recorded significantly highest seed yield/plot (5.31 kg), seed yield/plant (29.86 gm), 100 seed weight (2.33 gm), seed set % (93.51%) and vigour index (3512.33) (Table 162).

Table 162: Effects of sowing methods on yield and yield attributing traits and seed quality parameters in rice

Treatment	Chlorophyll stability index before spray	Chlorophyll stability index after spray	Pollen Viability %	Seed set %	100 seed weight (gm)	Seed yield/plant (gm)	Seed yield/plot (kg)	Germination (%) after harvest	Vigour index after harvest
Varieties									
S_1- 1st Sowing	0.28	0.24	94.85 (77.18)	90.19 (71.94)	2.22	23.95	5.15	92.44 (74.27)	3028.80
S_2- 2nd Sowing	0.23	0.21	92.86 (74.84)	88.69 (70.39)	2.05	17.88	4.08	88.72 (70.53)	2541.38
SE± (m)	**0.01**	**0.006**	**0.55**	**0.43**	**0.01**	**0.44**	**0.11**	**0.24**	**17.01**
CD (5%)	**0.03**	**0.019**	**1.62**	**1.27**	**0.03**	**1.29**	**0.32**	**0.71**	**50.22**
Treatments									
T_1-Control	0.28	0.24	92.69 (74.62)	86.51 (68.53)	1.84	16.62	3.93	88.00 (69.77)	2398.75
T_2-Salycyclic Acid (800 PPM)	0.35	0.30	94.15 (76.21)	91.42 (73.08)	2.25	24.93	5.22	95.00 (77.24)	3156.16
T_3-Salycyclic Acid (400 PPM)	0.21	0.18	94.39 (76.57)	89.52 (71.21)	2.22	23.28	5.03	93.16 (74.88)	3031.00
T_4-Ascorbic acid (10 PPM) + Citric acid 1.3%	0.25	0.22	93.59 (75.76)	89.74 (71.52)	2.15	20.67	4.27	88.67 (70.40)	2604.67
T_5-Alpha tocopherol (150 PPM)	0.23	0.20	94.87 (77.42)	89.97 (71.61)	2.14	18.87	4.55	88.17 (69.99)	2665.00
T_6-KCL (1%)	0.24	0.22	93.44 (75.48)	89.48 (71.05)	2.20	21.15	4.70	90.50 (72.10)	2855.00
SE± (m)	**0.02**	**0.011**	**0.95**	**0.75**	**0.02**	**0.76**	**0.19**	**0.42**	**29.47**
CD (5%)	**0.05**	**0.033**	**NS**	**2.21**	**0.06**	**2.24**	**0.56**	**1.24**	**86.98**

Treatment	Chlorophyll stability index before spray	Chlorophyll stability index after spray	Pollen Viability %	Seed set %	100 seed weight (gm)	Seed yield/plant (gm)	Seed yield/plot (kg)	Germination (%) after harvest	Vigour index after harvest
Interaction (VXC)									
S_1T_1	0.30	0.26	94.71 (76.82)	87.18 (69.20)	2.03	17.26	4.87	89.67 (71.25)	2466.16
S_1T_2	0.38	0.32	95.26 (77.60)	93.51 (75.25)	2.33	29.86	5.31	96.66 (79.47)	3512.33
S_1T_3	0.22	0.18	96.68 (79.47)	91.42 (73.03)	2.29	28.13	5.28	94.33 (76.21)	3333.00
S_1T_4	0.25	0.22	95.26 (77.63)	92.09 (73.87)	2.22	23.53	5.03	91.00 (72.53)	2821.00
S_1T_5	0.24	0.20	94.47 (76.76)	88.11 (69.85)	2.20	21.20	5.23	90.66 (72.25)	2931.33
S_1T_6	0.29	0.25	92.73 (74.81)	88.82 (70.44)	2.27	23.73	5.18	92.33 (73.90)	3109.00
S_2T_1	0.27	0.22	90.67 (72.42)	85.83 (67.86)	1.66	15.96	2.99	86.33 (68.29)	2331.33
S_2T_2	0.32	0.27	93.03 (74.82)	89.33 (70.91)	2.17	20.00	5.13	93.32 (75.01)	2800.00
S_2T_3	0.19	0.16	92.10 (73.66)	87.63 (69.39)	2.16	18.43	4.79	92.00 (73.56)	2729.00
S_2T_4	0.23	0.21	91.92 (73.88)	87.40 (69.18)	2.08	17.80	3.50	86.33 (68.27)	2388.33
S_2T_5	0.21	0.19	95.27 (78.09)	91.83 (73.36)	2.08	16.53	3.87	85.67 (67.72)	2398.67
S_2T_6	0.19	0.18	94.16 (76.16)	90.13 (71.36)	2.13	18.56	4.22	88.67 (70.30)	2601.00
SE± (m)	**0.03**	**0.016**	**1.34**	**1.06**	**0.03**	**1.07**	**0.26**	**0.59**	**41.67**
CD (5%)	**NS**	**NS**	**NS**	**3.13**	**0.08**	**3.17**	**0.79**	**NS**	**123.02**

Note : T_1 - Glycine betaine (600 ppm), T_7 - Brassinolides (0.3 ppm), T_8 - Brassinolides (10 ppm) excluded from experiment.

Mustard

CAZRI, Jodhpur

Results:

The results obtained in the experimentation are tabulated in Table 163. Total chlorophyll content was maximum when the crop was treated with α-Tocopherol-150 ppm (0.020 g/l) and the treatment was followed by Salicylic acid- 800 ppm (0.019 g/l) and ascorbic acid-100 ppm (0.019 g/l). However, the differences between the treatments were statistically non- significant. Seed yield data showed that the crop sprayed with glycine betaine (600 ppm) recorded maximum seed yield (1942 kg/ha), followed by Ascorbic acid-100 ppm (1882 kg/ha) and α-Tocopherol-150 ppm (1868 kg/ha). The data on seed quality parameters viz. germination % and vigour index were also recorded at 3 months interval and the difference between the treatments were found statistically non-significant.

In the first year of experimentation the following conclusion could be drawn, the crops sprayed with α-Tocopherol-150 ppm recorded more chlorophyll content, which followed by Salicylic acid-800 ppm and ascorbic acid-100 ppm. Yield data showed that crops sprayed with glycine betaine-600 ppm recorded more seed yield, which was followed by ascorbic acid-100 ppm and α-Tocopherol-150 ppm.

CSAUA&T, Kanpur

Mustard Experiment Field view

Table 163: Effect of Different Chemical Spray on Yield and Quality Parameters in Mustard

Treatments	Chlorophyll content (g/l)		Seed yield (g/plant)	Seed yield (Kg/ha)	Germination %			Vigour Index		
	Before spray	After spray			April 2016	July 2016	October 2016	April 2016	July 2016	October 2016
T_1	0.015	0.017	19.7	1493	98	97	95	1476.5	1387.5	1342.1
T_2	0.016	0.016	22.3	**1942**	99	98	98	1608.5	1468.5	1454.9
T_3	0.017	**0.019**	**23.1**	1678	98	98	95	1684.9	1522.6	1464.5
T_4	0.015	0.013	**24.0**	1828	**99**	98	95	1680.0	1543.0	1432.1
T_5	0.016	0.016	19.0	1725	**99**	98	96	1673.4	1575.9	1462.4
T_6	0.016	**0.020**	**25.1**	**1868**	**99**	98	97	**1695.4**	1603.8	1456.3
T_7	0.014	0.015	18.9	1560	98	97	95	**1808.4**	1547.9	1443.1
T_8	0.016	**0.019**	18.0	1683	**99**	98	97	1616.1	1616.2	1417.7
T_9	0.015	0.015	16.3	**1882**	**99**	98	98	1590.1	1506.6	1552.7
CD at 5%	-	-	-	-	-	-	1.49	-	-	-
S.Em±	0.002	0.002	2.23	190.86	0.48	0.58	0.495	105.08	92.2	34.12
CV	17.8	19.69	19.2	18.9	0.84	1.03	0.89	11.04	10.44	4.08

T_1- Control; T_2- Glycine betaine (600 ppm); T_3-Salicylic acid (800 ppm); T_4- Salicylic acid (400 ppm); T_5- Ascorbic acid (10 ppm) + Citric acid (1.3%) ; T_6- á-Tocopherol (150 ppm); T_7- KCl (1%); T_8- Glycine betaine (800 ppm); T_9- Ascorbic Acid (100 PPM)

Variety: Mustard (Rohini); **Dates of sowing:** *Rabi* season 2015-16 on two sowing date (Ist: 03 November & 2nd: 17 November 2015)

Results: The performance of D_1T_6 was found superior over D_2 and other chemicals with respect to pollen viability (75.33%), No. of siliqua/plant (363.33), No. of seeds/siliqua (12.66), seed yield/plant (10.74 g), seed yield/plot (2.14 kg) and test weight (2.26 g); while maximum chlorophyll intensity (52.50) was recorded in D_1T_2. The minimum No. of days taken to approach 50% flowering (60.33) and maximum No. of primary branches/ plant (6.20) were recorded in D_1T_3. Maximum seedling length (17.49 cm) and seed vigour index-I (1557.54) were found in D_2T_6. While highest seedling dry weight (0.055 g) and seed vigour index-II (4.72) were found in D_1T_7. The maximum No. of secondary branches per plant (20.10) and highest germination (90%) were found in D_1T_5. However, it can be concluded that the performance of D_1 is better than D_2 and T_6 performed best followed by T_5 (Table 164-165).

Table 164: Effect of sowing date and various chemicals spray on flowering, maturity, growth and yield contributing characters of mustard during *Rabi* season 2015-16

Treat-ments	Chlorophyll Intensity (after spray)			Days to 50% Flowering			Pollen Viability (%)			Number of Primary Branches			Number of Secondary Branches			Number of Siliqua / Plant		
	D_1	D_2	Mean	D_1	D_2	Mean	D_1	D_2	Mean	D_1	D_2	Mean	D_1	D_2	Mean	D_1	D_2	Mean
T_1	49.06	44.24	**46.65**	63.85	69.50	**66.67**	72.00	72.33	**72.16**	4.73	4.33	**4.73**	13.46	13.00	**13.23**	260.00	251.66	**255.83**
T_2	52.50	47.73	**50.11**	62.33	66.33	**64.33**	74.33	73.00	**73.66**	5.40	4.93	**5.40**	15.00	14.46	**14.73**	323.00	191.66	**307.33**
T_3	50.82	44.92	**47.87**	60.33	67.00	**63.66**	75.00	73.00	**74.00**	6.20	5.06	**6.20**	18.40	16.26	**17.33**	350.66	301.00	**325.83**
T_4	47.40	46.33	**46.86**	63.33	67.33	**65.33**	74.66	74.33	**74.50**	5.33	4.80	**5.33**	14.93	14.40	**14.66**	316.00	294.66	**305.33**

T_5	50.16	47.06	**48.16**	61.00	69.00	**65.00**	75.33	74.00	**74.66**	5.46	4.06	**5.46**	20.10	18.43	**19.26**	330.67	307.33	**319.00**
T_6	51.13	47.87	**49.50**	60.66	67.66	**64.16**	75.33	75.33	**75.33**	3.86	4.40	**3.86**	18.10	17.33	**17.71**	363.33	320.33	**341.83**
T_7	47.46	47.30	**47.38**	61.66	68.33	**65.00**	74.33	74.33	**74.33**	4.86	4.13	**4.86**	17.46	16.33	**16.90**	318.00	305.33	**311.66**
Mean	49.79	46.49	**48.14**	60.85	67.95	**64.40**	74.42	73.76	**74.04**	5.12	4.53	**5.12**	16.78	15.74	**16.23**	323.09	296.00	**309.54**
	D	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D**	**D**	**T**	**D×T**	**D**	**T**	**D×T**
SE (d)	0.65	1.22	**1.73**	0.64	1.19	**1.69**	0.38	0.71	**1.00**	0.21	0.39	**0.21**	0.33	0.62	**0.87**	5.28	9.89	**13.99**
CD (p=0.05)	1.35	N.S.	**N.S.**	1.31	N.S.	**3.48**	N.S.	1.46	**N.S.**	0.43	0.81	**N.S.**	0.68	1.27	**N.S.**	0.61	1.15	**N.S.**

Table 165: Effect of sowing date and various chemicals spray on flowering, maturity, growth and yield contributing characters of mustard during *Rabi* season 2015-16

Treatments	Number of seeds / Siliqua			Days to Maturity			Seed Yield Plant^{-1} (gm)			Seed Yield Plot^{-1} (kg)			Test Weight (gm)			Germination (%)		
	D_1	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**
T_1	8.66	7.66	**8.16**	130.00	127.33	**128.66**	7.83	7.51	**7.67**	1.56	1.50	**1.53**	3.96	3.83	**3.90**	86 (68.03)*	85 (67.22)*	**85.5 (67.62)***
T_2	11.00	9.66	**10.33**	133.66	129.33	**131.50**	8.50	8.04	**8.27**	1.70	1.60	**1.65**	4.11	4.53	**4.32**	87 (69.27)*	88 (69.74)*	**87.5 (69.49)***
T_3	11.66	10.00	**10.83**	133.00	128.66	**130.83**	9.16	9.06	**9.11**	1.83	1.81	**1.82**	4.09	4.60	**4.34**	88 (69.81)*	87 (68.93)*	**87.5 (69.37)***
T_4	10.00	8.00	**9.00**	132.33	128.00	**130.16**	8.56	8.46	**8.51**	1.71	1.69	**1.70**	4.65	4.50	**4.57**	87 (69.46)*	87 (69.19)*	**87 (69.32)***
T_5	12.00	8.33	**10.16**	135.00	130.66	**132.83**	10.33	9.95	**10.14**	2.06	1.98	**2.02**	5.10	5.00	**5.05**	90 (71.92)*	89 (71.05)*	**89.5 (71.48)***
T_6	12.66	10.66	**11.66**	134.33	130.00	**132.16**	10.74	10.53	**10.64**	2.14	2.10	**2.12**	5.26	5.13	**5.20**	88 (69.77)*	89 (70.72)*	**88.5 (70.24)***
T_7	10.33	9.00	**9.66**	131.00	128.00	**129.50**	9.33	8.91	**9.12**	1.86	1.78	**1.82**	4.86	4.60	**4.73**	86 (68.08)*	87 (68.99)*	**86.5 (68.54)***
Mean	10.90	9.04	**9.97**	132.76	128.85	**130.80**	9.21	8.92	**9.06**	1.84	1.78	**1.81**	4.58	4.62	**4.60**	87.42 (69.47)*	87.42 (69.40)*	**87.42 (69.43)***
	D	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**
SE (d)	0.30	0.56	**0.79**	0.36	0.67	**0.95**	0.16	0.31	**0.44**	0.05	0.09	**0.13**	0.11	0.20	**0.29**	0.61	1.14	**1.61**
CD (p=0.05)	0.61	1.15	**N.S.**	0.74	1.38	**N.S.**	N.S.	0.64	**N.S.**	N.S.	0.19	**N.S.**	N.S.	0.42	**N.S.**	N.S.	N.S.	**N.S.**

(*) Angular value

Treatments	Seedling Length (cm)			Vigour Index – I			Seedling Dry Weight/ 10 Seeds (mg)			Vigour Index – II		
	D_1	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**	**D_1**	**D_2**	**Mean**
T_1	14.15	14.18	**14.17**	1218.15	1204.81	**1204.81**	0.045	0.042	**0.044**	3.89	3.53	**3.71**
T_2	15.86	15.56	**15.71**	1385.88	1369.53	**1377.70**	0.042	0.042	**0.042**	3.64	3.69	**3.66**
T_3	15.62	15.90	**15.76**	1374.12	1384.06	**1379.09**	0.036	0.038	**0.037**	3.19	3.30	**3.25**
T_4	15.16	15.68	**15.42**	1330.21	1368.11	**1349.16**	0.043	0.046	**0.045**	3.79	4.05	**3.92**
T_5	17.01	17.35	**17.18**	1537.61	1551.60	**1544.61**	0.049	0.054	**0.051**	4.39	4.80	**4.60**
T_6	17.20	17.49	**17.34**	1512.96	1557.54	**1535.25**	0.049	0.050	**0.049**	4.32	4.40	**4.36**
T_7	15.19	15.66	**15.42**	1306.12	1360.06	**1333.09**	0.055	0.055	**0.055**	4.72	4.76	**4.74**
Mean	15.74	15.97	**15.85**	1380.72	1399.39	**1390.05**	0.046	0.047	**0.046**	3.99	4.08	**4.03**
	D	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**	**D**	**T**	**D×T**
SE (d)	0.28	0.53	**0.75**	24.23	45.33	**64.11**	0.003	0.006	**0.008**	0.16	0.30	**0.43**
CD (p=0.05)	N.S.	1.09	**N.S.**	N.S.	93.20	**N.S.**	N.S.	N.S.	**N.S.**	N.S.	0.62	**N.S.**

Experiment 7 : **Integrated Approach for enhancing seed yield and quality in Millets**

Objectives : To standardize suitable seed quality enhancement techniques to enhance the production potential of millets.

Crops : Centres

Finger Millet : UAS, Bangalore; ANGRAU, Hyderabad; UAS, Dharwad; KKV, Dapoli; HPKV, Palampur, IGKV, Raipur; JNKVV, Jabalpur

Foxtail Millet : ANGRAU, Hyderabad; TNAU, Coimbatore; UAS, Dharwad

Kodo Millet : JNKVV, Jabalpur; TNAU, Coimbatore; and ANGRAU, Hyderabad

Proso Millet : ANGRAU, Hyderabad; UAS, Bangalore

Little Millet : JNKVV, Jabalpur and TNAU, Coimbatore

SMALL MILLETS TREATMENT DETAILS	
No of treatments	**Main plots** (Sowing methods and spacing): **02** **Sub-plots** (Nutrient management): **04**
Treatment details	
I. Main Plot treatments (Sowing methods)	
S_1 – 30 x 10 cm – sown at 3-4 cm depth	
S_2 – Transplanting with spacing of 30 x 10 cm (raising a nursery and transplanting at 21 days in wet field capacity of soil)	
Note 1. For raising seedlings to plant one ha of main field, select 12.5 cents (500 m^2) of nursery area near a water source, where water does not stagnate. Mix 37.5 kg of super phosphate with 500 kg of FYM or compost and spread the mixture evenly on the nursery area. Plough two or three times with a mould board plough or five times with a country plough. Form raised beds by marking units of 6 plots each of size 3 m x 1.5 m. Provide 30 cm space between plots for irrigation. Excavate the soil from the interspace and all around to a depth of 15 cm to form channels and spread the soil removed from the channels on the bed and level it. 2. 4-5 days before removing plants, spray the nursery with the fungicide Mancozeb 75 % W.P. @ 2 gm / liter ♣ Transplant the seedlings from the nursery into the main field when they are only 15-25 days old. ♣ Before transplanting, irrigate nursery for approximately 2 hours in advance, to moisten and loosen the soil for removing the plants easily if the soil is dry in that time. ♣ Carefully uproot the seedlings, keeping the soil intact around the roots; if possible lift them out with a trowel or spade as this gives support to the soil and helps to keep it intact with the roots. ♣ Transfer the uprooted seedlings to the main plot within the next 30 minutes, before the roots and soil can dry out. The spacing will be 10 x 10 inches by using a rope or a marker. ♣ Transplant the seedlings at a shallow depth in the pits; do not press or injure the roots while placing the seedlings at the intersection of planting lines. 3. Micronutrients: magnesium (20 kg per acre) and calcium (6 kg per acre) or dolomite limestone (40 kg per acre). Apply these micronutrients, 20-25 days before transplantation in the field or 25-30 days after transplantation by sprinkling.	
II. Sub-Plot treatments (Nutrient management)	
N_1 – No fertilizer	
N_2 – 125 kg Neem + 1250 kg Vermi compost per ha or 12.5 tons FYM/ha	
N_3 – 50 kg Urea + 50 kg Super phosphate and 50 kg Muriate of potash per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax spay at flowering	
N_4 - 125 kg Neem + 1250 kg Vermicompost (or) 12.5 tons FYM/ha + 50 kg Urea + 50 kg super phosphate and 50 kg Muriate of potash per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax spay	

III. Sub-sub-plot treatments (Priming)		
P_1 – Control - No priming		
P_2 - Hydropriming for 6 h (Finger millet, Kodo millet), 8 h (Foxtail millet, Proso millet, and Little millet) by adopting seed to solution ratio of 1:1 and then mixing in 2.5-3 gm / kg of Carbendazim (Bavistin) with the seeds and leaving the mixture for 24 hours before sowing		
P_3 – Seed priming with 2 % KH_2PO_4 for 6 h (Finger millet and Kodo millet), 8 h (Foxtail millet, Proso millet and Little millet) by adopting seed to solution ratio of 1:1 and then mixing in 2.5-3 gm / kg of Carbendazim (Bavistin) with the seeds, and leaving the mixture for 24 hours before sowing		
P_4 – Seed priming with 20 % liquid *Pseudomonas fluorescens*		
Design		Split Plot Design
No. of replications		2
Plot size	**Gross plot size**	1.2 m × 5.0 m (6.0 m^2)
Space between plots		60 cm
Recommended dose of fertilizer (NPK)		75 kg P_2O_5 and 25 kg K_2O per ha or best recommended fertilizer dosage for your state, region or zone
Cultivar		Any recommended (bunch or spreading type) cultivar appropriate for seed production season
Source fertilizers		
1. Nitrogen		Urea (46 % N)
2. Phosphorus		Single super phosphate (SSP) (16 % P_2O_5)
3. Potassium		Muriate of potash (MOP) (60 % K_2O)
		OR
1. Nitrogen and Phosphorus		Diammonium Phosphate (DAP) (18 % N and 46% P_2O_5)
2. Potassium		Muriate of potash (MOP) (60 % K_2O)
Pest / disease control ▪ **Blast:** Seed treatment, mixing 2.5 gm/kg of Carbendazim (Bavistin) for at least 30 minutes. ▪ **Seedling blight:** Spray Mancozeb 75 % WP @ 2 gm per liter in the nursery 15 days before sowing or 15 days after transplantation. ▪ **Downy mildew:** Spray the crop with Mancozeb 75 % W.P. @ 2 gm per liter of water at the onset of the disease, or when symptoms are seen in 5-10% of the plants. ▪ **Stem borer:** Use regent granules or its liquid form in the amount of 7 kgs / acre. 1 ml of the chemical should be mixed with 2 liters of water.		

Finger Millet

UAS, Bengaluru

Crop: Finger millet (Ragi) Variety: ML-365

Results:

Effect of sowing methods on plant growth, seed yield and quality attributes

The sowing methods had a significant effect on most of the growth and yield parameters except for field emergence, days to first flowering and chlorophyll content (Table-1). The plant height (108.36cm), number of tillers (12.29), panicle weight (4.98kg/plot) seed yield (64.78g/plant; 3.13kg/plot and 52.15q/ha) and seed recovery (98.49 %) differed significantly and they were highest in S_2 (among transplanted method of sowing with spacing of 30 cm x 10 cm) as compared to direct sowing with a spacing of 30 cm x 10cm. However, the seed quality parameters did not differ significantly among the sowing methods. But highest germination (84.34 %) and vigour index I (1528) were noticed in transplanted method.

Effect of nutrient management on plant growth, seed yield and quality attributes

Among the four nutrient management treatments, N_4 (125kg Neem + 1250kg vermicompost per ha + 50kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing with urea at 3 to 4 weeks after transplanting + 2% Borax at flowering stage) showed superiority with respect to growth and yield parameters *viz.,* field emergence (92.56%), minimum number of days to first flowering (65.68), plant height (111.48 cm), tillers (12.86), panicle weight (5.108 kg per plot), seed yield (62.01g/plant; 3.20kg/ plot & 53.37q/ha) and seed recovery (99.04 %). This was closely followed by N_3 (50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3 to 4 weeks after transplanting+2% Borax) with recorded seed yield of 59.18g/plant; 3.06kg/plot & 51.02 q/ha and seed recovery (98.51%). They were lowest in control N_1 (56.58g/plant; 2.33kg/plot; 38.82q/ha and 96.62%, respectively). However, the nutrient management treatments did not had any significant effect on chlorophyll content but it was highest in N_4 (45.02). The seed quality parameters also differed significantly among the nutrient management treatments (Table-1a). Test weight (3.596g), germination (87.81%) and vigour indices (1595 & 140) was recorded highest among N_4. The lowest of all was recorded in control without any fertilizer application.

Effect of priming on plant growth, seed yield and quality attributes

The priming treatment had significant effect on plant growth, seed yield and quality attributes of ragi *cv.* ML-365 (Table-1 & 1a). The field emergence (92.12%), chlorophyll content (45.86 SPAD 502 *plus* values), plant height (105.77cm), tillers (13.15), panicle weight (4.914 kg/plot), seed yield (69.850g/plant: 3.316 kg/plot; 55.27q/ha), seed recovery (98.17%), were significantly higher in P_3 (priming of seeds with 2% KH_2PO_4 for 6h). This was closely followed by P_4 (priming of seeds with 20 % liquid *Pseudomonas fluorescens)* with seed yield (61.94g/plant; 2.93kg/plot and 48.75q/ha) and seed recovery (97.95%). While the non primed seeds performed poor both in terms of growth and yield. The same priming treatment *viz.,* P_4 showed better performance in terms of germination (86.31%), 1000 seed weight (3.628g) and vigour index-II (141).

Interaction effect on the plant growth, seed yield and quality attributes

Among the two way interactions, sowing method (S) x nutrient management (N) was found significant for most of the plant growth, yield and quality parameters (Table 2 & 2a). The interaction of S_2N_4 showed superiority in terms of field emergence (93.25%), plant height (113.15cm), tillers (14.30), panicle weight (6.01kg/plot), seed yield (62.19q/ha) and seed recovery (99.44%).While the interaction between S_1N_1 showed poor performance in terms of growth and yield (39.09q/ha). The interactions of sowing method (S) x priming treatments (P) were found significant for most of the traits studied. The overall results showed that the higher seed yield (85.87q/ha), chlorophyll content (45.93 SPAD 502 *plus* values), seed recovery (98.39%) and germination (85.87%) was noticed in the interaction of S_2P_3 (transplanting *vs.* priming seeds with 2% KH_2PO_4 for 6h). This was almost on par with S_2P_4 (transplanting *vs.* priming of seeds with 20% liquid *Pseudomonas fluorescens).* The lowest seed yield (33.64q/ha) was recorded in S_1P_1 *(*among transplanted method of sowing with no priming treatments)**.**

The interaction of priming (P) with nutrient management (N) showed significant effect on plant growth, seed yield and quality attributes of ragi *cv.* ML-365 (Table-2 & 2a). The field emergence (96.75%), plant height (114.70cm), tillers/plant (14.55), panicle weight per plot (5.610 kg), seed yield (63.37q/ha) and seed recovery (99.51%) was reported highest among the interaction P_3N_4 *viz.,* priming of seeds with 2% KH_2PO_4 and supply of inorganic and organic fertilizers along with borax spray. While lowest of all was recorded among the interaction P_1N_1 with recorded seed yield (31.16q/ha).

Interaction effect of sowing methods, nutrient management and seed priming on plant growth, seed yield and quality attributes

The interaction of S_2 (transplanting 21 days old seedlings with spacing of 30 x 10cm), N_4 (application of 125 kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2 % Borax at flowering stage) and P_3 (priming seeds with 2 % KH_2PO_4 for 6h) showed significant effect on the plant height (118.10cm), no. of tillers/plant (16.50), panicle weight/plot (6.368kg), seed yield/plant (90.90g), seed yield/plot (4.248kg) and seed yield/ha (70.80q). The seed yield (32.02q) and contributing components were lowest among the interactions in $S_1N_1P_1$ (direct sowing with spacing 30cm x 10cm without any priming and fertilizer application). The B: C ratio was calculated to know the effect of treatments on the economic returns. The benefit cost ratio was highest among the interaction of $S_2N_3P_3$ (4.11) followed by $S_2N_3P_4$ (3.67) (Table 4). On overall, the returns were found to be higher among the transplanted method of sowing with N_3 (50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2 % Borax) and N_4 (125 kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) fertilizer application and priming with P_3 (with 2% KH_2PO_4 for 6h) and P_4 (20% liquid *Pseudomonas fluorescens* for 6h).

Conclusion:

Transplanted method of sowing (S_2) showed superiority in seed yield (52.15q/ha) over the direct method of sowing (41.26q/ha) and was found economical for finger millet seed production. Among the four nutrient treatments, application of N_4 (125 kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) followed by N_3 (50 Kg Urea + 50 Kg SSP and 50 Kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) showed superiority with respect to all the recorded growth, yield and contributing characters over the rest of the nutrient management treatments both in case of direct sown and transplanted.

Among different priming treatments, seed priming with 2% KH_2PO_4 for 6h alone or in combination with N_4 recorded higher seed yield (63.37q/ha) followed by seed priming with 20% liquid *Pseudomonas fluorescens* in combination with N_3 (59.37q/ha) under both direct and transplanted conditions. Hence, these treatments could be advocated and practically used to enhance the seed yield and quality in finger millet (ragi) (Table 166-172).

Table 166: Effects of sowing methods, nutrient management and priming on the seed quality attributes of Finger Millet (ragi) cv. ML-365

Treatment	Test wt. (g)	Germination (%)	Seedling Vigour Index	
			I	II
Sowing method				
S_1	3.611	81.28	1464	135
S_2	3.270	84.34	1528	130
Mean	**3.4405**	**82.81**	**1496**	**132.5**
SEm±	**0.079**	**0.220**	**19.51**	**0.892**
CD (p=0.05)	**1.433**	**3.970**	**350.63**	**16.038**
CV (%)	**13.11**	**1.51**	**7.38**	**3.81**
Nutrient Management				
N_1	3.356	81.65	1430	128
N_2	3.398	76.50	1401	127

N_3	3.411	85.31	1556	134
N_4	3.596	87.81	1595	140
Mean	**3.44025**	**82.8175**	**1495.5**	**132.25**
SEm±	**0.066**	**0.384**	**21.07**	**3.186**
CD (p=0.05)	**0.231**	**1.330**	**72.90**	**11.026**
CV (%)	**7.78**	**1.86**	**5.63**	**9.62**
Priming treatments				
P_1	3.236	81.06	1484	122
P_2	3.425	81.62	1471	131
P_3	3.628	86.31	1522	141
P_4	3.473	82.25	1506	136
Mean	**3.4405**	**82.81**	**1495.75**	**132.5**
SEm±	**0.051**	**0.334**	**22.00**	**2.876**
CD (p=0.05)	**0.150**	**0.976**	**64.21**	**8.393**
CV (%)	**5.98**	**1.62**	**5.88**	**8.68**

Table 167: Effects of sowing methods, nutrient management and priming on growth and seed yield parameters in ragi *cv. ML-365*

Treatment	Field emergence (%)	Days to 1st flowering	Chlorophyll content (SPAD -502 Plus Value)	Plant height (cm)	No. of tillers	Panicle weight (kg/ plot)	Seed yield (g/ plant)	Seed yield (kg /plot)	Seed yield (q/ha)	Seed recovery (%)
Sowing method										
S_1	86.34	66.96	43.53	100.30	10.98	4.010	52.925	2.476	41.26	97.38
S_2	88.03	67.12	44.18	108.36	12.29	4.981	64.775	3.129	52.15	98.49
Mean	**87.185**	**67.04**	**43.855**	**104.33**	**11.635**	**4.4955**	**58.85**	**2.8025**	**46.705**	**97.935**
SEm±	**0.353**	**0.066**	**0.205**	**0.386**	**0.609**	**0.051**	**0.645**	**0.014**	**0.239**	**0.011**
CD(0.05P)	**6.352***	**1.191***	**3.696***	**6.947**	**10.967**	**0.922**	**11.592**	**0.257**	**4.294**	**0.198**
CV (%)	**2.29**	**0.56**	**2.65**	**2.16**	**29.69**	**6.46**	**6.20**	**2.89**	**2.89**	**0.06**
Nutrient Management										
N_1	81.62	68.62	43.45	100.11	10.74	3.882	56.575	2.329	38.82	96.62
N_2	85.31	67.06	42.75	100.64	10.77	4.289	57.637	2.617	43.61	97.57
N_3	89.25	66.81	44.21	105.10	12.17	4.703	59.175	3.061	51.02	98.51
N_4	92.56	65.68	45.02	111.48	12.86	5.108	62.012	3.202	53.37	99.04
Mean	**87.185**	**67.042**	**43.857**	**104.33**	**11.635**	**4.4955**	**58.849**	**2.802**	**46.705**	**97.935**
SEm±	**0.435**	**0.271**	**0.718**	**0.954**	**0.373**	**0.233**	**0.775**	**0.089**	**1.485**	**0.206**
CD(0.05P)	**1.506**	**0.940**	**2.484***	**3.301**	**1.290**	**0.808**	**2.683**	**0.308**	**5.139**	**0.715**
CV (%)	**2.0**	**1.62**	**6.55**	**3.66**	**12.82**	**20.78**	**5.27**	**12.72**	**12.72**	**0.84**
Priming treatments										
P_1	79.62	67.06	41.74	102.77	10.07	4.368	47.825	2.380	39.67	97.90
P_2	86.94	67.37	43.35	104.43	11.32	4.346	55.787	2.588	43.14	97.73
P_3	92.12	66.81	45.86	105.77	13.15	4.914	69.850	3.316	55.27	98.17
P_4	90.06	66.93	44.49	104.35	12.00	4.352	61.937	2.925	48.75	97.95
Mean	**87.185**	**67.042**	**43.86**	**104.33**	**11.635**	**4.495**	**58.849**	**2.802**	**46.707**	**97.937**
SEm±	**0.490**	**0.320**	**0.173**	**0.428**	**0.236**	**0.118**	**0.553**	**0.035**	**0.584**	**0.179**
CD(0.05P)	**1.430**	**0.934**	**0.507**	**1.250**	**0.689**	**0.345**	**1.616**	**0.102**	**1.704**	**0.525**
CV (%)	**2.25**	**1.91**	**1.59**	**1.64**	**8.11**	**10.53**	**3.76**	**5.00**	**5.00**	**0.73**

Table 168: Interaction effect of sowing method, Nutrient management and Priming on plant growth, seed yield and quality parameters of Finger Millet (ragi) *cv.* ML-365

Interaction	Field emergence (%)	Days to 1st flowering	Chlorophyll (SPAD 502 Plus Value	Plant height (cm)	No. of tillers	Panicle weight (kg/ plot)	Seed yield (g/plant)
S_1N_1	77.75	68.62	43.14	93.60	9.72	3.884	49.550
S_1N_2	87.00	66.75	43.47	95.10	10.85	4.045	56.225
S_1N_3	88.75	66.75	43.06	102.72	11.92	3.906	56.250
S_1N_4	91.87	65.75	44.45	109.81	11.42	4.205	49.675
S_2N_1	85.50	68.62	43.76	106.62	11.75	3.880	63.600
S_2N_2	83.62	67.37	42.04	106.17	10.70	4.533	59.050
S_2N_3	89.75	66.87	45.36	107.47	12.42	5.499	62.100
S_2N_4	93.25	65.62	45.58	113.15	14.30	6.011	74.350
Mean	**87.186**	**67.043**	**43.857**	**104.33**	**11.63**	**4.495**	**58.85**
S.Em±	**0.615**	**0.384**	**1.015**	**1.349**	**0.527**	**0.330**	**1.096**
CD(0.05P)	**2.129**	**1.330**	**3.513**	**4.668**	**1.825**	**1.143**	**3.794**
S_1P_1	79.12	67.00	41.14	99.50	9.67	3.800	45.975
S_1P_2	86.25	67.12	42.99	101.16	10.52	3.861	51.650
S_1P_3	92.12	66.75	45.78	101.45	12.22	4.559	59.525
S_1P_4	87.87	67.00	44.21	99.12	11.50	3.820	54.550
S_2P_1	80.12	67.12	42.33	106.05	10.47	4.936	49.675
S_2P_2	87.62	67.62	43.71	107.70	12.12	4.832	59.925
S_2P_3	92.12	66.87	45.93	110.10	14.07	5.270	80.175
S_2P_4	92.25	66.87	44.77	109.57	12.50	4.884	69.325
Mean	**87.183**	**67.043**	**43.857**	**104.33**	**11.633**	**4.495**	**58.85**
S.Em±	**0.693**	**0.452**	**0.246**	**0.605**	**0.334**	**0.167**	**0.783**
CD(0.05P)	**2.022**	**1.321**	**0.717**	**1.767**	**0.974**	**0.488**	**2.286**
P_1N_1	74.25	69.00	40.78	96.30	9.35	3.771	44.70
P_1N_2	77.75	67.25	40.67	101.35	8.60	4.434	47.25
P_1N_3	81.00	66.75	42.15	102.95	10.75	4.702	48.90
P_1N_4	85.50	65.25	43.33	110.50	11.60	4.566	50.45
P_2N_1	81.00	69.00	42.74	100.65	10.60	3.953	53.90
P_2N_2	83.25	67.50	42.25	98.60	10.50	3.843	56.30
P_2N_3	89.25	67.00	43.87	106.00	12.05	4.465	56.05
P_2N_4	94.25	66.00	44.52	112.47	12.15	5.125	56.90
P_3N_1	88.75	68.00	46.26	103.15	12.25	4.396	68.75
P_3N_2	89.00	66.50	44.23	102.15	12.60	4.504	66.85
P_3N_3	94.00	66.75	46.37	103.10	13.20	5.147	70.10
P_3N_4	96.75	66.00	46.56	114.70	14.55	5.610	73.70
P_4N_1	82.50	68.50	44.01	100.35	10.75	3.406	58.95
P_4N_2	91.25	67.00	43.86	100.45	11.40	4.375	60.15
P_4N_3	92.75	66.75	44.43	108.35	12.70	4.498	61.65
P_4N_4	93.75	65.50	45.66	108.25	13.15	5.130	67.00
Mean	**87.187**	**67.046**	**43.855**	**104.33**	**11.637**	**4.495**	**58.85**
S.Em±	**0.980**	**0.640**	**0.348**	**0.856**	**0.472**	**0.236**	**1.107**
CD(0.05P)	**2.860**	**1.869**	**1.015**	**2.500**	**1.378**	**0.691**	**3.233**

Table 169: Interaction effect of sowing method, Nutrient management and Priming on plant growth, seed yield and quality parameters of ragi *cv.* ML-365

Interaction	Seed yield (kg /plot)	Seed yield (q/ha)	Seed recovery (%)	Test weight (g)	Germination (%)	Seed Vigour Index	
						I	II
S_1N_1	2.345	39.09	96.13	3.438	81.12	1432	128
S_1N_2	2.431	40.52	97.05	3.556	76.25	1402	124
S_1N_3	2.453	40.89	97.71	3.563	84.50	1512	146
S_1N_4	2.673	44.55	98.64	3.886	83.25	1509	142
S_2N_1	2.313	38.55	97.12	3.275	82.12	1429	129
S_2N_2	2.802	46.71	98.10	3.241	76.75	1400	129
S_2N_3	3.669	61.15	99.31	3.258	86.12	1601	122
S_2N_4	3.731	62.19	99.44	3.306	92.37	1681	139
Mean	**2.802**	**46.706**	**97.9375**	**3.440**	**82.81**	**1495.75**	**132.37**
S.Em±	**0.126**	**2.100**	**0.292**	**0.094**	**0.543**	**29.796**	**4.506**
CD(p=0.05)	**0.436**	**7.268**	**1.012**	**0.327**	**1.881**	**103.099**	**15.594**
S_1P_1	2.018	33.64	97.60	3.397	78.75	1475	127
S_1P_2	2.150	35.83	96.67	3.586	78.12	1378	124
S_1P_3	3.081	51.36	97.94	3.787	86.75	1529	138
S_1P_4	2.653	44.22	97.31	3.673	81.50	1473	150
S_2P_1	2.742	45.70	98.20	3.075	83.37	1492	117
S_2P_2	3.026	50.44	98.79	3.263	85.12	1564	137
S_2P_3	3.551	59.18	98.39	3.468	85.87	1514	143
S_2P_4	3.196	53.27	98.58	3.273	83.00	1539	122
Mean	**2.802**	**46.705**	**97.935**	**3.440**	**82.81**	**1495.5**	**132.25**
S.Em±	**0.049**	**0.826**	**0.254**	**0.072**	**0.473**	**31.116**	**4.067**
CD(p=0.05)	**0.144**	**2.410**	**0.742**	**0.212**	**1.381**	**90.811**	**11.870**
P_1N_1	1.869	31.16	97.15	3.08	76.25	1331	115
P_1N_2	2.208	36.80	97.64	3.282	72.75	1390	98
P_1N_3	2.661	44.35	98.33	3.270	86.00	1620	150
P_1N_4	2.783	46.38	98.50	3.312	89.25	1594	125
P_2N_1	2.101	35.03	96.47	3.387	82.00	1532	115
P_2N_2	2.345	39.09	97.23	3.320	75.50	1363	125
P_2N_3	2.909	48.48	98.30	3.417	87.00	1545	126
P_2N_4	2.997	49.95	98.93	3.575	82.00	1445	156
P_3N_1	2.860	47.67	96.54	3.545	88.50	1495	141
P_3N_2	3.040	50.67	97.74	3.622	82.25	1484	144
P_3N_3	3.562	59.37	98.88	3.515	87.50	1565	130
P_3N_4	3.802	63.37	99.51	3.830	87.00	1543	148
P_4N_1	2.486	41.43	96.34	3.415	79.75	1364	143
P_4N_2	2.874	47.90	97.69	3.370	75.50	1368	140
P_4N_3	3.113	51.88	98.54	3.442	80.75	1495	129
P_4N_4	3.227	53.78	99.21	3.667	93.00	1798	133
Mean	**2.802**	**46.706**	**97.937**	**3.440**	**82.812**	**1495.75**	**132.375**
S.Em±	**0.070**	**1.168**	**0.359**	**0.102**	**0.669**	**44.00**	**5.752**
CD(0.05P)	**0.204**	**3.409**	**1.050**	**0.300**	**1.953**	**128.43**	**16.787**

Table 170: Interaction effect of sowing method, nutrient management and priming on plant growth and seed yield parameters of Finger Millet (ragi) *cv.ML-365*

Interactions	Field emergence (%)	Days to 1st flowering	Chlorophyll content (SPAD 502 Plus Value)	Plant height (cm)	No. of tillers	Panicle weight (kg / plot)	Seed yield (g/ plant)
$S_1N_1P_1$	73.00	69.50	39.32	94.20	8.70	3.603	39.10
$S_1N_1P_2$	75.50	69.00	42.44	94.60	9.50	4.260	50.20
$S_1N_1P_3$	85.00	67.50	46.52	95.30	10.60	4.304	55.80
$S_1N_1P_4$	77.50	68.50	44.28	90.30	10.10	3.369	53.10
$S_1N_2P_1$	79.00	66.50	41.36	97.00	8.60	4.269	46.80
$S_1N_2P_2$	87.00	67.00	43.51	90.00	9.80	3.238	53.90
$S_1N_2P_3$	93.00	66.50	44.68	98.60	12.70	4.672	67.50
$S_1N_2P_4$	89.00	67.00	44.33	94.80	12.30	4.000	56.70
$S_1N_3P_1$	83.50	65.50	42.29	99.20	10.70	3.767	53.20
$S_1N_3P_2$	93.00	66.00	43.54	105.40	11.90	3.735	55.90
$S_1N_3P_3$	97.50	66.00	46.62	100.60	13.00	4.406	58.30
$S_1N_3P_4$	93.50	65.50	45.37	105.70	12.10	3.719	57.60
$S_1N_4P_1$	81.00	66.50	41.61	107.60	10.70	3.562	44.80
$S_1N_4P_2$	89.50	66.50	42.46	114.65	10.90	4.211	46.60
$S_1N_4P_3$	93.00	67.00	45.31	111.30	12.60	4.853	56.50
$S_1N_4P_4$	91.50	67.00	42.87	105.70	11.50	4.192	50.80
$S_2N_1P_1$	75.50	68.50	42.25	98.40	10.00	3.940	50.30
$S_2N_1P_2$	86.50	69.00	43.04	106.70	11.70	3.646	57.60
$S_2N_1P_3$	92.50	68.50	46.00	111.00	13.90	4.489	81.70
$S_2N_1P_4$	87.50	68.50	43.74	110.40	11.40	3.444	64.80
$S_2N_2P_1$	76.50	68.00	39.98	105.70	8.60	4.598	47.70
$S_2N_2P_2$	79.50	68.00	41.00	107.20	11.20	4.448	58.70
$S_2N_2P_3$	85.00	66.50	43.79	105.70	12.50	4.336	66.20
$S_2N_2P_4$	93.50	67.00	43.39	106.10	10.50	4.750	63.60
$S_2N_3P_1$	87.50	66.00	44.38	106.70	10.80	5.638	44.60
$S_2N_3P_2$	95.50	66.00	45.50	106.60	12.20	5.196	56.20
$S_2N_3P_3$	96.00	65.00	47.44	105.60	13.40	5.888	81.90
$S_2N_3P_4$	94.00	65.50	45.95	111.00	13.30	5.276	65.70
$S_2N_4P_1$	81.00	66.75	42.70	113.40	12.50	5.569	56.10
$S_2N_4P_2$	89.00	67.00	45.29	110.30	13.40	6.039	67.20
$S_2N_4P_3$	95.00	66.75	46.51	118.10	16.50	6.368	90.90
$S_2N_4P_4$	94.00	66.75	46.00	110.80	14.80	6.068	83.20
Mean	**87.1875**	**67.03906**	**43.85844**	**104.33**	**11.637**	**4.495**	**58.85**
SEm±	**1.386**	**0.905**	**0.492**	**1.211**	**0.668**	**0.334**	**1.566**
CD(0.05P)	**4.045**	**2.643**	**1.436**	**3.535**	**1.949**	**0.977**	**4.572**

Table 171: Interaction effect of sowing methods, nutrient management and seed priming on plant growth, seed yield and quality parameters of Finger Millet (ragi) *cv.ML-365*

Interaction	Seed yield (kg / plot)	Seed yield (q/ha)	Seed recovery (%)	Test weight (g)	Germination (%)	Seedling Vigour Index	
						I	II
$S_1N_1P_1$	1.921	32.02	97.59	3.240	76.00	1281	115
$S_1N_1P_2$	1.973	32.89	95.30	3.460	76.50	1424	107
$S_1N_1P_3$	2.918	48.63	96.08	3.585	93.50	1636	131
$S_1N_1P_4$	2.569	42.82	95.54	3.470	78.50	1386	157
$S_1N_2P_1$	1.787	29.79	97.21	3.400	73.50	1436	103
$S_1N_2P_2$	2.004	33.40	96.01	3.540	71.50	1250	114
$S_1N_2P_3$	3.035	50.57	97.86	3.650	81.50	1490	122
$S_1N_2P_4$	2.899	48.31	97.12	3.635	78.50	1432	157
$S_1N_3P_1$	2.086	34.76	98.03	3.375	80.00	1559	169
$S_1N_3P_2$	2.242	37.36	96.82	3.575	93.00	1611	114
$S_1N_3P_3$	3.018	50.30	98.33	3.725	85.50	1443	147
$S_1N_3P_4$	2.468	41.14	97.66	3.580	79.50	1435	152
$S_1N_4P_1$	2.279	37.99	97.57	3.575	85.50	1624	120
$S_1N_4P_2$	2.381	39.69	98.56	3.770	71.50	1226	158
$S_1N_4P_3$	3.356	55.93	99.51	4.190	86.50	1547	154
$S_1N_4P_4$	2.677	44.61	98.93	4.010	89.50	1639	135
$S_2N_1P_1$	1.817	30.29	96.70	2.920	76.50	1381	115
$S_2N_1P_2$	2.230	37.16	97.64	3.315	87.50	1639	123
$S_2N_1P_3$	2.803	46.71	97.00	3.505	83.50	1353	150
$S_2N_1P_4$	2.402	40.04	97.15	3.360	81.00	1341	129
$S_2N_2P_1$	2.629	43.81	98.07	3.165	72.00	1343	94
$S_2N_2P_2$	2.686	44.77	98.46	3.100	79.50	1476	135
$S_2N_2P_3$	3.046	50.76	97.61	3.595	83.00	1478	166
$S_2N_2P_4$	2.850	47.50	98.27	3.105	72.50	1304	122
$S_2N_3P_1$	3.236	53.93	98.62	3.165	92.00	1681	130
$S_2N_3P_2$	3.576	59.60	99.78	3.260	81.00	1478	138
$S_2N_3P_3$	4.107	68.45	99.44	3.305	89.50	1687	114
$S_2N_3P_4$	3.757	62.62	99.41	3.305	82.00	1553	107
$S_2N_4P_1$	3.286	54.77	99.43	3.050	93.00	1563	129
$S_2N_4P_2$	3.613	60.22	99.30	3.380	92.50	1664	154
$S_2N_4P_3$	4.248	70.80	99.52	3.470	87.50	1538	143
$S_2N_4P_4$	3.777	62.95	99.50	3.325	96.50	1957	131
Mean	**2.802**	**46.70**	**97.93**	**3.440**	**82.812**	**1495.46**	**132.34**
SEm±	**0.099**	**1.652**	**0.508**	**0.145**	0.9464	**62.232**	**8.134**
CD(0.05P)	**0.289**	**4.821**	**1.485**	**0.424**	2.762	**181.624**	**23.741**

Table 172: Benefit Cost Ratio as influenced by integrated approaches for increasing seed yield of Finger Millet (ragi) cv ML-365 (cost of cultivation per ha.)

Treat ments	Cost A	Cost B	Cost C	Total Cost (Rs.)	Yield (q/ha)	Total returns (Rs.)	Net returns (Rs.)	* B : C Ratio
$S_1N_1P_1$	37,200	155	0	37,355	32.02	1,10,469	73,114	1.96
$S_1N_1P_2$	37,200	155	03.37	37,358	32.89	1,13,470	76,113	2.04
$S_1N_1P_3$	37,200	155	85.37	37,440	48.63	1,67,773	130,334	3.48
$S_1N_1P_4$	37,200	155	150	37,505	42.82	1,47,729	110,224	2.94
$S_1N_2P_1$	37,200	155	16,875	54,230	29.79	1,02,775	48,546	0.89
$S_1N_2P_2$	37,200	155	16,878	54,233	33.4	1,15,230	60,997	1.12
$S_1N_2P_3$	37,200	155	16,960	54,315	50.57	1,74,466	120,152	2.21
$S_1N_2P_4$	37,200	155	17,025	54,380	48.31	1,66,669	112,290	2.06
$S_1N_3P_1$	37,200	155	7,004	44,359	34.76	1,19,922	75,563	1.70
$S_1N_3P_2$	37,200	155	7,008	44,363	37.36	1,28,892	84,529	1.90
$S_1N_3P_3$	37,200	155	7,089	44,445	50.3	1,73,535	129,090	2.90
$S_1N_3P_4$	37,200	155	7,154	44,509	41.14	1,41,933	97,424	2.19
$S_1N_4P_1$	37,200	155	23,880	61,235	37.99	1,31,065	69,831	1.14
$S_1N_4P_2$	37,200	155	23,883	61,238	39.69	1,36,930	75,693	1.24
$S_1N_4P_3$	37,200	155	23,965	61,320	55.93	1,92,958	131,639	2.15
$S_1N_4P_4$	37,200	155	24,030	61,385	44.61	1,53,904	92,520	1.51
$S_2N_1P_1$	38,920	155	0.00	39,075	30.29	1,04,500	65,426	1.67
$S_2N_1P_2$	38,920	155	3.37	39,078	37.16	1,28,202	89,124	2.28
$S_2N_1P_3$	38,920	155	85.37	39,160	46.71	1,61,149	121,990	3.11
$S_2N_1P_4$	38,920	155	150	39,225	40.04	1,38,138	98,913	2.52
$S_2N_2P_1$	38,920	155	16,875	55,950	43.81	1,51,144	95,195	1.70
$S_2N_2P_2$	38,920	155	16,878	55,953	44.77	1,54,456	98,504	1.76
$S_2N_2P_3$	38,920	155	16,960	56,035	50.76	1,75,122	119,087	2.12
$S_2N_2P_4$	38,920	155	17,025	56,100	47.5	1,63,875	107,775	1.92
$S_2N_3P_1$	38,920	155	7,004	46,079	53.93	1,86,058	139,980	3.04
$S_2N_3P_2$	38,920	155	7,008	46,083	59.6	2,05,620	159,537	3.46
$S_2N_3P_3$	38,920	155	7,089	46,165	68.45	2,36,152	189,988	4.11
$S_2N_3P_4$	38,920	155	7,154	46,229	62.62	2,16,039	169,810	3.67
$S_2N_4P_1$	38,920	155	23,880	62,955	54.77	1,88,956	126,002	2.00
$S_2N_4P_2$	38,920	155	23,883	62,958	60.22	2,07,759	144,801	2.29
$S_2N_4P_3$	38,920	155	23,965	63,040	70.8	2,44,260	181,220	2.87
$S_2N_4P_4$	38,920	155	24,030	63,105	62.95	2,17,177	154,073	2.44
Mean								

UAS, Dharwad

Date of sowing: 14-07-2016; **Date of transplanting:** 5-08-2016

Results: Direct sowing was superior over transplanting since the seed yield per plant, per plot and yield per hectare and also seed quality parameters like seed recovery, germination percentage, seedling vigour index were significantly high in direct sowing. Among the fertilizer combination N_4: 125 kg Neem + 1250 kg vermicompost (or) 12.5 tons FYM/ha + 50 kg Urea + 50 kg super phosphate and 50 kg muriate of potash per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax spay was significant over rest of combinations. Seed priming with (P_4) *Pseudomonas fluorescens* @ 20% liquid was superior over other seed priming chemicals. Treatment combination of $S_1N_4P_3$ was significant over rest of combinations (Table 173-175).

Table 173: Effect of treatment combination on plant growth parameters of finger millet

Treat.	Field Emergence (%)	Plant ht at 30 DAS (cm)	Plant ht at harvest (cm)	Days to flowering	No. of Tillers/plant
S_1	81	17.41	55.50	51	5.06
S_2	77	16.71	54.86	51	5.52
SEm±	**2.22**	**0.28**	**0.45**	**0.42**	**0.09**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**0.26**
N_1	75	16.69	56.02	52	5.14
N_2	79	16.28	53.96	50	5.22
N_3	80	17.94	54.69	51	5.35
N_4	82	17.32	56.05	52	5.46
SEm±	**3.13**	**0.40**	**0.64**	**0.59**	**0.13**
CD at 5%	**NS**	**1.15**	**NS**	**NS**	**NS**
P_1	88	16.19	56.18	52	5.15
P_2	83	17.30	55.14	51	5.10
P_3	78	17.76	54.02	50	5.44
P_4	67	16.99	55.38	51	5.48
SEm±	**3.13**	**0.40**	**0.64**	**0.59**	**0.13**
CD at 5%	**9.04**	**NS**	**NS**	**NS**	**NS**

Table 174: Effect of treatment combination on plant growth parameters of finger millet

Treat.	Panicle weight/plot (g)	Seed yield per plant (g)	Seed yield per plot (kg)	Seed yield per Ha (q)	Test weight (g)
S_1	5.68	9.98	1.23	38.45	2.04
S_2	5.61	9.86	1.21	37.90	2.19
SEm±	**0.05**	**0.08**	**0.04**	**0.43**	**0.07**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**
N_1	5.73	10.07	1.23	39.09	2.15
N_2	5.52	9.70	1.19	37.39	2.18

N_3	5.59	9.83	1.13	37.74	2.05
N_4	5.73	10.07	1.32	38.48	2.08
SEm±	**0.07**	**0.11**	**0.05**	**0.61**	**0.10**
CD at 5%	**NS**	**NS**	**NS**	**NS**	**NS**
P_1	5.75	10.10	1.38	39.38	2.06
P_2	5.64	9.91	1.18	38.47	2.15
P_3	5.53	9.71	1.17	37.13	2.09
P_4	5.67	9.95	1.14	37.72	2.15
SEm±	**0.07**	**0.11**	**0.05**	**0.61**	**0.10**
CD at 5%	**NS**	**NS**	**0.16**	**NS**	**NS**

Table 175: Effect of treatment combination on plant growth parameters of finger millet

Treat.	Seed recovery (%)	Seed Germination (%)	Seedling length (cm)	Seedling Vigour Index
S_1	90	71.32	17.47	2323
S_2	82	65.25	13.91	1699
SEm±	**0.33**	**0.26**	**0.57**	**72**
CD at 5%	**0.95**	**0.75**	**1.65**	**208**
N_1	85	67.71	16.63	2111
N_2	86	68.41	18.13	2335
N_3	86	68.11	14.38	1834
N_4	87	68.91	13.63	1764
SEm±	**0.47**	**0.37**	**0.81**	**102**
CD at 5%	**NS**	**NS**	**2.33**	**295**
P_1	86.30	68.39	14.00	1805
P_2	85.37	67.66	16.56	2103
P_3	86.33	68.42	16.19	2081
P_4	86.66	68.68	16.00	2055
SEm±	**0.47**	**0.37**	**0.81**	**102**
CD at 5%	**NS**	**NS**	**NS**	**NS**

KKV, Dapoli (Variety: Dapoli Nagli-1)

Results: In main plot, sowing methods, transplanting recorded significantly highest number of tillers (3.66), panicle weight/plot (1.73 kg), seed yield/plant (19.39 gm), seed yield/plot (0.95 kg), seed yield/acre (632.49 kg), germination % (80.22 %) and vigour index (929.71). In sub-plot, nutrient management, N_4 recorded significantly highest panicle weight/plot (1.96 kg), seed yield/plant (20.57 gm), seed yield/plot (1.18 kg) and seed yield/acre (785.4) kg. In sowing methods (S) x Fertilizer (N) interaction, S_2N_4 recorded significantly highest panicle weight/plot (2.21 kg), seed yield/plant (22.45 gm), seed yield/plot (1.44 kg) and seed yield/acre (959.16 kg). In nutrient management (N) x Priming (P) interaction, treatment combination N_4P_3 recorded significantly highest panicle weight/plot (2.03 kg) and seed yield/plant (22.66 gm), it might be due to fertilizer as well as Neem and vermicompost effect. In three way interactions, treatment combination $S_2N_4P_4$ was found significantly highest for seed yield/plant (25.48 gm), seed yield/plot (1.93 kg) and seed yield/acre (1283.32 kg), it is due to healthy and vigorous seedlings transplanted at 21 days along with 125 kg Neem + 1250 kg vermicompost/ha and 50 kg each of Urea + super phosphate + murate of potash/ha +top dressing urea at 3-4 weeks after translating + 2 % Borax spray at flowering (Table 176-181).

Table 176: Effect of Sowing Methods, Nutrient Management, Priming and their Interactions in Finger Millet Variety Dapoli Nagli-1

Main Plot	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle weight/ plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Weight (g)	Seed Recovery (%)	G (%)	Vigour Index
Sowing (A)													
S_1	25.55	91.16	8.43	84.13	3.08	1.43	16.13	0.69	458.54	0.20	75.48 (60.40)	75.53 (60.40)	820.38
S_2	30.51	100.41	9.24	82.56	3.66	1.73	19.39	0.95	632.49	0.22	80.18 (63.67)	80.22 (63.68)	929.74
SE(m)	0.22	0.29	0.03	0.884	0.02	0.01	0.14	0.01	8.99	0.002	0.68	0.22	9.58
CD (0.05)	4.08	5.25	0.70	NS	0.43	0.18	2.64	0.24	161.63	0.006	NS	3.97	31.99
Sub Plot													
Fertilizer (B)													
N_1	23.07	91.46	7.61	85.06	3.00	1.31	15.51	0.59	392.91	0.20	73.68 (59.20)	75.94 (60.68)	839.61
N_2	25.72	91.95	8.34	84.88	3.36	1.45	16.70	0.61	405.41	0.21	75.98 (60.72)	76.69 (61.20)	847.26
N_3	29.32	96.51	8.87	82.31	3.51	1.60	18.26	0.90	598.33	0.21	79.72 (63.25)	77.88 (62.01)	877.74
N_4	34.00	103.22	10.51	81.13	3.59	1.96	20.57	1.18	785.41	0.22	81.95 (64.97)	81.00 (64.25)	935.63
SE(m)	0.36	1.46	0.12	0.14	0.09	0.02	0.18	0.01	10.87	0.003	0.48	0.14	13.55
CD (0.05)	1.25	5.03	0.43	0.49	0.31	0.09	0.62	0.05	37.54	0.008	1.68	0.49	45.24
Priming (P)													
P_1	26.38	94.17	8.23	83.69	2.95	1.45	14.48	0.68	450.41	0.20	74.64 (59.85)	76.94 (61.38)	863.78
P_2	28.88	96.19	8.97	83.69	3.46	1.56	17.74	0.80	535.83	0.21	78.47 (62.43)	76.81 (61.29)	841.13
P_3	29.25	96.31	9.16	82.50	3.34	1.64	19.99	0.88	589.16	0.21	79.70 (63.33)	78.25 (62.25)	889.41
P_4	27.59	96.48	8.98	83.50	3.72	1.67	18.81	0.91	606.66	0.21	78.52 (62.52)	79.50 (63.23)	905.92
SE(m)	0.563	0.69	0.13	0.22	0.06	0.02	0.18	0.02	14.64	0.002	0.63	0.23	15.36
CD (0.05)	1.645	NS	0.38	0.66	0.19	0.08	0.54	0.06	42.75	0.007	1.84	0.68	44.86

(Figures in parenthesis are arcsine values)

Table 177: Interaction effects of Sowing (S) X Fertilizer (N) in finger millet

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt /plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
S_1N_1	19.18	89.68	6.87	85.38	2.81	1.25	14.34	0.59	391.66	0.20	70.03 (56.81)	73.00 (58.70)	794.10
S_1N_2	21.92	87.48	7.54	86.13	3.09	1.35	15.37	0.54	359.16	0.20	73.46 (58.98)	74.38 (59.63)	804.54
S_1N_3	28.43	89.43	8.70	83.00	3.29	1.40	16.11	0.71	471.66	0.21	78.41 (62.30)	75.50 (60.34)	827.54
S_1N_4	32.66	98.08	10.59	82.00	3.13	1.72	18.70	0.92	611.66	0.20	80.03 (63.50)	79.25 (62.92)	855.34
S_2N_1	26.96	93.25	8.36	84.75	3.19	1.36	16.68	0.59	394.16	0.20	77.32 (61.58)	78.88 (62.67)	885.11
S_2N_2	29.51	96.43	9.14	83.63	3.64	1.55	18.03	0.68	451.66	0.21	78.51 (62.47)	79.00 (62.78)	889.99
S_2N_3	30.21	103.60	9.05	81.63	3.74	1.81	20.40	1.09	724.99	0.22	81.03 (64.19)	80.25 (63.69)	927.94
S_2N_4	35.34	108.36	10.43	80.25	4.06	2.21	22.45	1.44	959.16	0.24	83.86 (66.44)	82.75 (65.59)	1015.92
SE (m)	0.51	2.06	0.18	0.20	0.13	0.03	0.25	0.02	15.38	0.004	0.69	0.20	19.16
CD (0.05)	1.77	NS	0.62	0.70	NS	0.13	0.88	0.08	53.09	0.012	NS	0.69	NS

Table 178: Interaction effects of Sowing (S) X Priming (P) in finger millet

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt / plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
S_1P_1	24.41	89.28	7.96	84.38	2.95	1.25	14.03	0.56	371.66	0.20	73.40 (59.10)	75.00 (60.06)	822.18
S_1P_2	26.46	92.78	8.65	84.38	3.13	1.44	16.20	0.70	468.33	0.20	76.52 (61.08)	74.13 (59.47)	794.28
S_1P_3	27.03	91.25	8.56	83.63	2.88	1.54	17.67	0.74	491.66	0.21	76.03 (60.70)	78.38 (62.29)	870.24
S_1P_4	24.29	91.35	8.53	84.13	3.36	1.49	16.62	0.75	502.49	0.21	75.99 (60.71)	74.63 (59.76)	794.82
S_2P_1	28.36	99.06	8.50	83.00	2.95	1.65	14.94	0.79	529.16	0.20	75.89 (60.60)	78.88 (62.70)	905.39
S_2P_2	31.29	99.60	9.28	83.00	3.79	1.68	19.29	0.91	603.33	0.22	80.41 (63.78)	79.50 (63.11)	887.97
S_2P_3	31.48	101.38	9.76	81.38	3.81	1.74	22.32	1.03	686.66	0.22	83.37 (65.95)	78.13 (62.20)	908.58
S_2P_4	30.90	101.60	9.43	82.88	4.08	1.86	21.01	1.07	710.83	0.22	81.05 (64.34)	84.38 (66.70)	1017.01
SE (m)	0.79	0.98	0.18	0.32	0.09	0.04	0.26	0.03	20.71	0.003	0.89	0.33	21.73
CD (0.05)	NS	NS	NS	NS	0.27	0.11	0.77	NS	NS	NS	NS	0.97	63.44

Table 179: Interaction effects of Fertilizer (N) X Priming (P) in finger millet

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt /plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
N_1P_1	20.43	89.80	6.95	86.25	2.68	1.15	12.59	0.55	365.00	0.20	70.17 (56.93)	74.00 (59.32)	820.45
N_1P_2	23.80	91.85	8.07	84.75	3.20	1.31	15.47	0.63	420.00	0.19	72.94 (58.67)	74.75 (59.87)	804.48
N_1P_3	23.38	92.05	7.73	84.50	2.68	1.37	17.98	0.61	403.33	0.21	77.58 (61.80)	77.75 (61.83)	890.40
N_1P_4	24.68	92.15	7.71	84.75	3.45	1.41	16.00	0.58	383.33	0.20	74.02 (59.39)	77.25 (61.70)	843.10
N_2P_1	24.34	89.60	8.31	84.75	2.95	1.36	14.78	0.53	355.00	0.19	72.69 (58.48)	77.50 (61.72)	859.24
N_2P_2	27.25	91.55	8.04	85.25	3.30	1.44	15.75	0.57	378.33	0.21	77.55 (61.71)	73.50 (59.05)	789.89
N_2P_3	26.45	94.20	8.59	83.50	3.23	1.63	19.19	0.75	500.00	0.21	78.91 (62.86)	77.25 (61.54)	844.99
N_2P_4	24.83	92.45	8.44	86.00	3.98	1.37	17.07	0.58	388.33	0.22	74.79 (59.84)	78.50 (62.50)	894.94
N_3P_1	29.50	95.95	8.13	82.75	2.98	1.49	14.31	0.77	514.99	0.22	76.84 (61.21)	77.75 (62.05)	854.23
N_3P_2	30.75	97.15	9.22	83.00	3.85	1.51	18.56	0.97	643.33	0.21	80.44 (63.73)	77.00 (61.32)	870.19
N_3P_3	29.33	94.35	9.03	80.50	3.73	1.54	20.14	0.84	559.99	0.22	79.90 (63.35)	75.25 (60.14)	838.53
N_3P_4	27.70	98.60	9.12	83.00	3.50	1.88	20.01	1.01	674.99	0.21	81.71 (64.69)	81.50 (64.54)	948.01
N_4P_1	31.28	101.33	9.53	81.00	3.20	1.81	16.26	0.85	566.66	0.20	78.88 (62.77)	78.50 (62.42)	921.23
N_4P_2	33.70	104.20	10.54	81.75	3.48	1.98	21.19	1.05	701.66	0.22	82.95 (65.61)	82.00 (64.92)	899.95
N_4P_3	37.85	104.65	11.30	81.50	3.75	2.03	22.66	1.34	893.32	0.23	82.41 (65.30)	82.75 (65.48)	983.73
N_4P_4	33.18	102.70	10.67	80.25	3.95	2.03	22.18	1.47	979.99	0.23	83.57 (66.18)	80.75 (64.19)	937.61
SE (m)	1.12	1.39	0.26	0.45	0.13	0.05	0.37	0.04	29.29	0.005	1.26	0.47	30.73
CD (0.05)	NS	NS	NS	1.33	0.39	0.16	1.09	0.12	85.51	0.014	NS	1.37	NS

Table 180: Interaction effects of Sowing (S) X Nutrient (N) X Priming (P) in finger millet on seed quality parameters

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt /plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
$S_1N_1P_1$	17.65	87.40	5.49	86.00	3.05	1.03	11.93	0.57	376.66	0.20	66.32 (54.54)	72.50 (58.34)	779.95
$S_1N_1P_2$	20.25	91.20	7.43	86.00	2.90	1.24	13.51	0.56	373.33	0.18	69.64 (56.54)	71.00 (57.39)	745.50
$S_1N_1P_3$	19.85	89.60	7.46	85.00	2.25	1.39	17.02	0.65	430.00	0.21	73.76 (59.16)	77.50 (61.66)	887.45

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt /plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
$S_1N_1P_4$	18.95	90.50	7.09	84.50	3.05	1.36	14.91	0.58	386.66	0.21	70.41 (57.02)	71.00 (57.39)	763.50
$S_1N_2P_1$	21.38	83.70	7.73	86.50	2.80	1.13	14.79	0.42	280.00	0.19	71.20 (57.52)	74.00 (59.32)	778.88
$S_1N_2P_2$	21.55	86.10	7.62	86.50	2.95	1.33	15.26	0.52	346.66	0.20	75.74 (60.47)	69.50 (56.45)	760.60
$S_1N_2P_3$	22.75	89.60	7.67	85.00	2.55	1.62	15.63	0.69	456.66	0.20	72.92 (58.62)	80.50 (63.77)	859.30
$S_1N_2P_4$	22.00	90.50	7.15	86.50	4.05	1.33	15.79	0.53	353.33	0.21	73.97 (59.31)	73.50 (58.99)	819.38
$S_1N_3P_1$	27.70	86.90	8.04	83.00	3.20	1.20	13.54	0.50	330.00	0.21	76.16 (60.74)	71.50 (57.71)	788.55
$S_1N_3P_2$	30.10	94.20	8.77	84.00	3.65	1.48	15.99	0.86	569.99	0.20	79.69 (63.19)	76.50 (60.97)	834.03
$S_1N_3P_3$	30.40	88.80	8.25	81.50	3.35	1.42	18.04	0.59	393.33	0.22	78.47 (62.34)	75.00 (59.98)	820.55
$S_1N_3P_4$	25.50	87.80	9.74	83.50	2.95	1.49	16.89	0.89	593.33	0.20	79.33 (62.93)	79.00 (62.70)	867.03
$S_1N_4P_1$	30.90	99.10	10.56	82.00	2.75	1.65	15.89	0.75	500.00	0.19	79.91 (63.59)	82.00 (64.87)	941.33
$S_1N_4P_2$	33.95	99.60	10.79	81.00	3.00	1.72	20.04	0.88	583.33	0.21	81.02 (64.14)	79.50 (63.05)	837.00
$S_1N_4P_3$	35.10	97.00	10.86	83.00	3.35	1.75	19.99	1.03	686.66	0.21	78.97 (62.68)	80.50 (63.77)	913.65
$S_1N_4P_4$	30.70	96.60	10.17	82.00	3.40	1.78	18.89	1.02	676.66	0.21	80.23 (63.57)	75.00 (59.97)	729.38

Table 181: Interaction effects of Sowing (S) X Nutrient (N) X Priming (P) in seed quality parameters in finger millet

	Plant Ht. at 30 DAS (cm)	Plant Ht. at Harvest (cm)	Total Chlorophyll Content (mg/g)	Days to First Flr. (Days)	No. of Tillers	Panicle wt / plot (kg)	Seed Yield/ Plant (g)	Seed Yield/ Plot (kg)	Seed Yield/ Acre (kg)	100 Seed Wt. (g)	Seed Recovery (%)	G (%)	Vigour Index
$S_2N_1P_1$	23.20	92.20	8.41	86.50	2.30	1.27	13.24	0.53	353.33	0.20	74.02 (59.33)	75.50 (60.30)	860.95
$S_2N_1P_2$	27.35	92.50	8.70	83.50	3.50	1.39	17.44	0.70	466.66	0.21	76.24	78.50	863.45
$S_2N_1P_3$	26.90	94.50	7.99	84.00	3.10	1.35	18.94	0.57	376.66	0.21	81.41 (64.43)	78.00 (62.00)	893.35
$S_2N_1P_4$	30.40	93.80	8.33	85.00	3.85	1.46	17.09	0.57	380.00	0.19	77.64 (61.76)	83.50 (66.00)	922.70
S_2N2P_1	27.30	95.50	8.88	83.00	3.10	1.58	14.78	0.65	430.00	0.20	74.19 (59.45)	81.00 (64.13)	939.60
$S_2N_2P_2$	32.95	97.00	8.46	84.00	3.65	1.55	16.23	0.62	410.00	0.22	79.36 (62.95)	77.50 (61.66)	819.18
$S_2N_2P_3$	30.15	98.80	9.51	82.00	3.90	1.65	22.75	0.82	543.33	0.22	84.90 (67.10)	74.00 (59.32)	830.68
$S_2N_2P_4$	27.65	94.40	9.73	85.50	3.90	1.41	18.34	0.64	423.33	0.22	75.60 (60.37)	83.50 (66.00)	970.50
$S_2N_3P_1$	31.30	105.00	8.22	82.50	2.75	1.79	15.09	1.05	699.99	0.23	77.52 (61.67)	84.00 (66.40)	919.90

$S_2N_3P_2$	31.40	100.10	9.67	82.00	4.05	1.55	21.14	1.08	716.66	0.21	81.19 (64.27)	77.50 (61.66)	906.35
$S_2N_3P_3$	28.25	99.90	9.81	79.50	4.10	1.66	22.24	1.09	726.66	0.22	81.33 (64.37)	75.50 (60.30)	856.50
$S_2N_3P_4$	29.90	109.40	8.49	82.50	4.05	2.27	23.14	1.14	756.66	0.22	84.08 (66.45)	84.00 (66.39)	1029.00
$S_2N_4P_1$	31.65	103.55	8.51	80.00	3.65	1.98	16.64	0.95	633.33	0.20	77.84 (61.96)	75.00 (59.97)	901.13
$S_2N_4P_2$	33.45	108.80	10.30	82.50	3.95	2.24	22.34	1.23	819.99	0.23	84.87 (67.08)	84.50 (66.79)	962.90
$S_2N_4P_3$	40.60	112.30	11.74	80.00	4.15	2.31	25.34	1.65	1099.99	0.25	85.85 (67.92)	85.00 (67.19)	1053.80
$S_2N_4P_4$	35.65	108.80	11.17	78.50	4.50	2.29	25.48	1.93	1283.32	0.26	86.90 (68.79)	86.50 (68.41)	1145.85
SE(m)	1.59	1.97	0.37	0.64	0.19	0.08	0.53	0.06	41.42	0.007	1.78	0.66	43.46
CD (0.05)	NS	5.76	1.10	1.88	0.55	0.23	1.55	0.18	120.93	0.019	NS	1.94	126.89

HPKV, Palampur

Results: The sowing methods had a significant effect on branches per plant, panicle weight and seed yield which were significantly higher under transplanting method over direct sowing method. However, direct sowing and transplanting methods did not differ significantly and were at par with respect to field emergence, plant height, days to flowering and all quality parameters *viz*. 100-seed weight, seed recovery seed germination and vigour index. The nutrient management treatments had significant effect on growth, seed yield and quality of finger millet. Treatment N_4 (organic and inorganic fertilizers) produced significantly higher seed yield, panicle weight, 100 seed weight, seed germination and vigour index followed by N_3 (pure chemical fertilizers). The lowest of all parameters were recorded under control N_1 (No fertilizer). Significant differences in field emergence, days to flowering and seed recovery were not observed among different nutrient treatments and all treatment were at par with each other. The priming treatment P_3 (priming with 2% KH_2PO_4 for 6 hrs by adopting seed to solution ratio of 1:1 and then mixing in 2.5-3 gm / kg of Carbendazim with the seeds, and leaving the mixture for 24 hours before sowing was found to enhance seed yield and field emergence significantly over P_1 (control) and P_2 (hydropriming) and it remained at par with P_4 (priming with 20% liquid *Pseudomonas fluorescens*) (Table 182-183).

Table 182: Effect of planting methods, nutrient management and priming on seed quality

Treatments	100-seed weight (g)	Seed recovery (%)	Germination (%)	Vigour Index
Sowing methods				
S_1	0.2978	90.89	90.56	1336.2
S_2	0.2987	91.04	90.68	1342.6
SE (m) ±	0.002	0.028	0.012	0.659
CD (5%)	NS	NS	NS	NS
Nutrient Management				
N_1	0.291	90.86	88.39	1194.9
N_2	0.297	90.87	90.7	1287.4
N_3	0.303	91.03	91.45	1418.8
N_4	0.304	91.19	91.93	1459.5
SE (m) ±	0.004	0.412	0.386	24.913
CD (5%)	0.013	NS	1.34	46.49

Priming				
P_1	0.299	90.56	90.45	1314.4
P_2	0.3	90.88	90.8	1327.6
P_3	0.302	91.45	90.32	1347.1
P_4	0.298	91.02	90.87	1349.9
SE (m) ±	0.062	0.500	0.250	17.171
CD (5%)	NS	NS	NS	NS

Table 183: Effect of planting methods, nutrient management and priming on growth, yield parameter and seed yield

Treatments	Field emergence (%)	Plant height at harvest (cm)	Days to flowering	Branches/ plant	Panicle weight/ plot (g)	Seed yield/ plant (g)	Seed yield /plot (g)	Seed yield (q/ha)
Sowing methods								
S_1	93.80	98.30	70.80	5.29	1.89	3.729	559.4	12.43
S_2	94.10	101.40	71.10	7.43	2.05	4.371	655.7	14.57
SE (m) ±	0.074	0.201	0.027	0.083	0.01	0.014	1.246	0.078
CD (5%)	NS	NS	NS	1.58	0.19	0.28	23.51	1.48
Nutrient Management								
N_1	93.20	96.50	71.30	4.95	0.90	2.478	371.7	8.26
N_2	93.60	97.60	71.20	5.20	1.42	3.267	490.1	10.89
N_3	93.80	100.40	70.50	7.40	2.56	4.542	681.3	15.14
N_4	94.20	103.80	70.30	8.20	2.87	5.889	883.4	19.63
SE (m) ±	0.38	0.867	0.417	0.426	0.192	0.123	17.10	0.423
CD (5%)	NS	3.01	NS	1.48	0.67	0.43	59.37	1.47
Priming								
P_1	89.40	98.00	71.00	6.50	1.23	2.778	416.7	9.26
P_2	92.60	98.30	70.50	6.60	1.96	3.501	525.2	11.67
P_3	97.5	100.6	70.4	6.6	2.416	4.461	812.3	18.05
P_4	96.1	99.5	70.2	6.2	2.134	5.415	669.2	14.87
SE (m) ±	0.404	1.164	0.352	0.147	0.116	0.192	29.933	0.360
CD (5%)	1.48	NS	NS	NS	0.34	0.56	87.39	1.05

Foxtail Millet

TNAU, Coimbatore

Results: Direct sowing recorded increased seed yield per plant and seed yield per plot compare to transplanted crop. Direct sowing and transplanting are on par in producing number of tillers per plant. The nutrient dosage of 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2% Borax spray recorded the maximum number of tillers in the direct sowing and transplanting methods. Priming with 20% liquid *Pseudomonas fluorescens* recorded the maximum number of tillers 6.4 compared to control.

The nutrient dosage of 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2% Borax spray recorded the maximum plant height (79.7 cm and 79.6 cm) respectively in the direct sowing and transplanting methods followed by 125 kg neem + 1250 kg vermi per ha + 50kg urea +50 kg Super phosphate + 50kg Murate of potash + Top dressing urea + 2% Borax spray (78.5 and 78.2cm), where as the control recorded 72.2cm and 74.1 cm in direct sowing and transplanting respectively. Priming with 2% KH_2PO_4 recorded

the maximum plant height (79.3cm) followed by priming with 20% liquid *Pseudomonas fluorescens* recorded (78.7 cm), where as the control recorded the lowest plant height of 74.4cm.

Fertilizer application of 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray recorded highest plant height (79.7 cm), number of tillers (6.8) and resultant seed quality. In direct sowing, the treatment with 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50kg muriate of potash +Top dressing urea + 2% borax spray recorded the highest single plant seed yield (13.0 g) and seed yield per plot (2.91kg) followed by the treatment 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray (12.8g and 2.49 kg respectively). At the same time, in transplanting, the same treatment recorded significantly lesser seed yield per plot of 2.39 kg.

Priming treatments improved the seed yield attributing characters compared to control. Priming with 20% liquid *Pseudomonas fluorescens* combined with 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray under direct sowing recorded the highest single plant seed yield (14.0 gm) and seed yield per plot (2.68 kg)followed by priming with 2% KH_2PO_4 with the fertilizer treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray (13.8gm and 2.62 kg respectively) under direct sowing method, which were on par. The same treatments recorded significantly lesser seed yield per plant (12.6 and 12.4 g) and seed yield per plot (2.45 and 2.39kg respectively) under transplanting condition (Table 184-195).

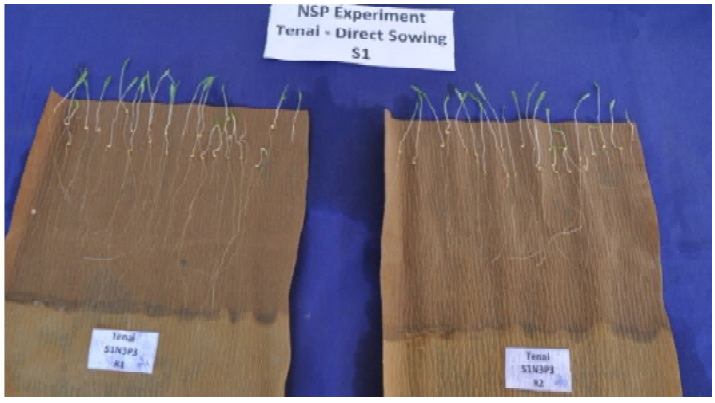
Salient findings:

1. Transplanted crop establishment was delayed by 15 days and it reaches harvestable maturity 12 days later than direct sown crop.
2. Priming with 20 % liquid *Pseudomonas fluorescens* combined with nutrient application of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray under direct sowing recorded the highest single plant seed yield and seed yield per plot.

Field view

Maturity difference of Direct sown and Transplanted crops

Resultant seed germination



Seedling growth

Table 184: Effect of sowing method, nutrient application and seed priming on number of tillers in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	4	5.4	5.3	5.5	4.1	5.2	5.3	5.1	4.9
P_2	5.3	5.5	7.2	7.6	5.2	5.7	6.9	6.5	6.2
P_3	5.5	5.2	6.7	6.8	5.7	5	6.4	6.5	5.9
P_4	6.3	6.7	7.8	6.5	5.7	5.8	7	5.9	6.4
Mean	5.3	5.7	6.8	6.6	5.2	5.4	6.4	6	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.178	0.179	0.176	0.357	0.253	0.281	0.278		
CD (P = 0.05)	0.357	0.357	0.757	0.714	0.505	0.816	0.533		

Table 185: Effect of sowing method, nutrient application and seed priming on plant height (cm) in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	70.7	74.1	77.2	72.7	72.7	75.2	77.9	75.0	74.4
P_2	72.6	77.4	81.2	79.9	74.0	78.4	78.4	78.2	77.9
P_3	73.1	83.2	81.0	79.4	75.1	78.3	81.8	80.4	79.3
P_4	72.2	80.3	79.3	81.1	74.4	78.2	80.1	79.3	78.7
Mean	72.2	78.8	79.7	78.5	74.1	77.5	79.6	78.2	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.67	0.95	0.72	1.34	1.34	1.12	1.32		
CD (P = 0.05)	2.89	1.90	1.44	3.45	2.69	2.26	2.74		

Table 186: Effect of sowing method, nutrient application and seed priming on chlorophyll content in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	20.4	23.8	26.9	22.4	22.4	24.9	27.6	24.7	24.1
P_2	22.3	27.1	30.9	29.6	23.7	28.1	28.1	27.9	27.2
P_3	22.8	32.9	30.7	29.1	24.8	28	31.5	30.1	28.7
P_4	21.9	30	29	30.8	24.1	27.9	29.8	29	27.8
Mean	21.9	28.5	29.4	28.0	23.8	27.2	29.3	27.9	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.71	0.87	0.56	1.18	1.15	1.51	1.22		
CD (P = 0.05)	1.42	1.74	1.32	2.36	2.30	3.10	2.44		

Table 187: Effect of sowing method, nutrient application and seed priming on number of panicle per plant in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	6.8	8.3	8	8.3	7.2	8.3	7.8	8	7.8
P_2	7.7	8.4	9.5	8.9	8.3	9.6	8.4	9.2	8.8
P_3	6.2	8.2	9.2	8.9	8.5	8.6	8.6	9.4	8.5
P_4	8.2	9.2	9.2	9.3	8.6	8.5	9.4	8.6	8.9
Mean	7.2	8.5	9.0	8.9	8.2	8.8	8.6	8.8	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.69	0.18	0.24	0.36	0.25	0.28	0.34		
CD (P = 0.05)	1.32	0.48	0.54	0.72	0.51	0.58	0.68		

Table 188: Effect of sowing method, nutrient application and seed priming on days to first flowering in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	52.2	52.4	52.3	52.4	61.4	61.4	61.2	61.7	56.9
P_2	52.4	52.0	52.1	52.1	60.4	60.7	61.0	60.5	56.4
P_3	51.4	51.4	51.4	51.4	60.1	60.5	60.5	60.1	55.9
P_4	51.2	51.2	51.6	51.4	60.1	60.1	60.3	60.4	55.8
Mean	51.8	51.8	51.9	51.8	60.5	60.7	60.8	60.7	56.9
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.69	NS	0.24	0.36	NS	NS	0.34		
CD (P = 0.05)	1.32		0.54	0.72			0.68		

Table 189: Effect of sowing method, nutrient application and seed priming on 100 seed weight (gm) in foxtail millet.

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	0.73	0.73	0.68	0.70	0.68	0.53	0.75	0.70	0.68
P_2	0.73	0.68	0.83	0.80	0.63	0.70	0.78	0.80	0.74
P_3	0.73	0.73	0.80	0.80	0.70	0.55	0.73	0.73	0.72
P_4	0.70	0.75	0.85	0.75	0.63	0.70	0.80	0.78	0.74
Mean	0.73	0.73	0.80	0.78	0.65	0.63	0.78	0.75	0.73
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.69	0.85	0.47	1.17	0.95	0.58	0.65		
CD (P = 0.05)	1.43	1.76	0.97	2.42	1.97	1.20	1.35		

Table 190: Effect of sowing method, nutrient application and seed priming on single plant yield (gm) in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	10.2	11.6	11.4	11.4	9.9	11.4	11.5	11.5	11.2
P_2	11.5	11.3	13.5	13.5	11	12.1	12.8	12.6	12.4
P_3	11.6	11.8	12.5	13.8	11.5	11.5	12.2	12.3	12.2
P_4	11.8	12.7	14.0	13.1	11.2	11.8	13	12.9	12.6
Mean	11.3	11.9	12.8	13.0	10.9	11.7	12.4	12.3	
	P	N	S	PXN	PXS	SXN			
SEd	0.12	0.12	0.11	0.24	0.17	0.19			
CD (P = 0.05)	0.24	0.24	0.51	0.49	0.35	0.55			

Table 191: Effect of sowing method, nutrient application and seed priming on seed yield per plot (kg) in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	1.96	2.24	2.20	2.60	2.02	2.20	2.22	2.22	2.21
P_2	2.22	2.18	2.62	3.02	2.24	2.34	2.48	2.44	2.44
P_3	2.24	2.28	2.42	2.94	2.34	2.22	2.36	2.38	2.40
P_4	2.28	2.46	2.72	3.08	2.28	2.28	2.52	2.50	2.52
Mean	2.18	2.29	2.49	2.91	2.22	2.26	2.40	2.39	
	P	N	S	PXN	PXS	SXN			
SEd	1.45	1.32	1.54	1.17	1.25	1.49			
CD (P = 0.05)	2.90	2.34	3.14	2.34	2.50	3.98			

Table 192: Effect of sowing method, nutrient application and seed priming on resultant seed germination in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	98.0	98.0	99.0	99.0	98.0	99.0	97.0	97.0	98.1
P_2	97.0	99.0	98.0	97.0	99.0	97.0	98.0	98.0	97.9
P_3	98.0	98.0	98.0	98.0	98.0	98.0	96.0	96.0	97.5
P_4	98.0	98.0	99.0	98.0	98.0	98.0	98.0	98.0	98.1
Mean	97.8	98.3	98.5	98.0	98.3	98.0	97.3	97.3	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.73	0.45	0.93	0.43	0.59	0.47	0.49		
CD (P = 0.05)	1.49	0.92	1.90	0.88	1.20	0.96	1.03		

Table 193: Effect of sowing method, nutrient application and seed priming on resultant seed shoot length (cm) in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	4.51	4.56	4.31	4.49	4.31	3.71	4.61	4.43	4.37
P_2	4.58	4.31	4.92	4.81	4.10	4.41	4.78	4.81	4.59
P_3	4.51	4.58	4.81	4.88	4.41	3.81	4.51	4.54	4.51
P_4	4.42	4.60	5.01	4.67	4.11	4.41	4.81	4.76	4.60
Mean	4.51	4.51	4.76	4.71	4.23	4.09	4.68	4.64	4.52
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.72	0.85	0.61	0.52	0.54	0.67	0.85		
CD (P = 0.05)	1.50	1.77	1.27	1.08	1.12	1.39	1.77		

Table 194: Effect of sowing method, nutrient application and seed priming on resultant seed root length (cm) in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	10.49	10.54	10.29	10.47	10.29	9.69	10.59	10.41	10.35
P_2	10.56	10.29	10.90	10.79	10.08	10.39	10.76	10.79	10.57
P_3	10.49	10.56	10.79	10.86	10.39	9.79	10.49	10.52	10.49
P_4	10.40	10.58	10.99	10.65	10.09	10.39	10.79	10.74	10.58
Mean	10.49	10.49	10.74	10.69	10.21	10.07	10.66	10.62	10.50
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.61	0.66	0.70	0.81	0.70	0.75	0.68		
CD (P = 0.05)	1.24	1.34	1.42	1.64	1.42	1.52	1.38		

Table 195: Effect of sowing method, nutrient application and seed priming on resultant seed vigour index in foxtail millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	1470	1475	1446	1486	1431	1331	1474	1435	1444
P_2	1474	1440	1545	1518	1404	1441	1522	1523	1483
P_3	1470	1479	1529	1538	1445	1333	1451	1450	1462
P_4	1452	1503	1578	1507	1392	1456	1529	1514	1491
Mean	1467	1474	1525	1512	1418	1390	1494	1481	1470
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	59	61	67	59	69	71	62		
CD (P = 0.05)	120	124	136	120	140	144	126		

UAS, Dharwad

Date of sowing: 14-07-2016; **Date of transplanting:** 5-08-2016

Results: Direct sowing resulted in higher plant height, no. of tillers/plant, seed yield compared to transplanting but both were on par in field emergence (%) and days to flowering. The 1000 seed weight was higher in transplanted crop. Among the nutrient treatments, N_4 (125 kg neem + 1250 kg vermicompost per ha + 50 kg urea + 50 kg SSP + 50 kg MOP per ha + Top dressing of urea at 3-4 weeks after transplanting + 2% borax) was produced the seed yield, plant height and number of tillers compared to all other treatments. Among the priming methods, seed yield was highest in seed priming with 20% liquid *Pseudomonas fluorescens* for 6 h but test weight was highest in hydro-primed seeds (Table 196-198).

Table 196: Effect of treatment combination on plant growth parameters of foxtail millet

Treatments	Field Emergence (%)	Plant ht. at 30 DAS (cm)	Plant ht at harvest (cm)	Days to flowering	No. of Tillers/plant
S_1	75.69	18.46	95.82	45.52	4.89
S_2	74.17	17.52	86.56	45.33	3.55
SEm±	**0.67**	**0.32**	**0.39**	**0.50**	**0.02**
CD at 5%	**NS**	**0.91**	**1.14**	**NS**	**0.05**
N_1	74.75	17.57	82.21	45.47	3.82
N_2	75.36	18.02	89.23	45.18	4.12
N_3	75.24	18.46	95.12	44.63	4.39
N_4	74.37	17.91	98.21	46.43	4.53
SEm±	**0.95**	**0.45**	**0.56**	**0.71**	**0.03**
CD at 5%	**NS**	**NS**	**1.61**	**NS**	**0.08**
P_1	71.90	17.23	89.81	45.83	4.15
P_2	73.14	17.85	89.63	44.33	4.15
P_3	76.35	18.77	91.98	45.89	4.25
P_4	78.33	18.11	93.34	45.65	4.32
SEm±	**0.95**	**0.45**	**0.56**	**0.71**	**0.03**
CD at 5%	**2.74**	**NS**	**1.61**	**NS**	**0.08**

Table 197: Effect of treatment combination on plant growth parameters of foxtail millet

Treatments	Panicle weight/plot (g)	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield per Ha (q)	1000 Seed weight (g)
S_1	6.99	8.58	928.48	15.47	3.04
S_2	6.91	5.17	674.31	11.24	3.14
SEm±	**0.11**	**0.03**	**3.50**	**0.06**	**0.04**
CD at 5%	**NS**	**0.09**	**10.10**	**0.17**	**NS**
N_1	6.98	6.26	726.38	12.11	3.11
N_2	7.32	6.71	783.13	13.05	3.10
N_3	6.63	7.15	834.48	13.91	3.04
N_4	6.87	7.38	861.60	14.36	3.10
SEm±	**0.16**	**0.04**	**4.95**	**0.08**	**0.06**
CD at 5%	**0.45**	**0.12**	**14.29**	**0.24**	**NS**
P_1	6.90	6.77	789.26	13.15	3.08
P_2	7.00	6.76	787.71	13.13	3.22
P_3	6.60	6.94	808.32	13.47	3.07
P_4	7.30	7.04	820.29	13.67	2.99
SEm±	**0.16**	**0.04**	**4.95**	**0.08**	**0.06**
CD at 5%	**0.45**	**0.12**	**14.29**	**0.24**	**NS**

Table 198: Effect of treatment combination on plant growth parameters of foxtail millet

Treatments	Seed recovery (%)	Seed Germination (%)	Seedling length cm)	Seedling Vigour Index	Seed Recovery (%)
S_1	87.43	84.77	23.06	1960	87.43
S_2	63.50	73.59	22.00	1634	63.50
SEm±	**0.33**	**0.34**	**0.10**	**16**	**0.33**
CD at 5%	**0.95**	**0.99**	**0.28**	**45**	**0.95**
N_1	68.40	71.45	20.28	1463	68.40
N_2	73.74	77.46	22.05	1710	73.74
N_3	78.58	82.56	23.51	1943	78.58
N_4	81.13	85.25	24.27	2071	81.13
SEm±	**0.47**	**0.48**	**0.14**	**22**	**0.47**
CD at 5%	**1.35**	**1.40**	**0.40**	**64**	**1.35**
P_1	74.32	77.98	22.19	1742	74.32
P_2	74.18	77.83	22.15	1735	74.18
P_3	76.12	79.86	22.72	1827	76.12
P_4	77.24	81.05	23.06	1882	77.24
SEm±	**0.47**	**0.48**	**0.14**	**22**	**0.47**
CD at 5%	**1.35**	**1.40**	**0.40**	**64**	**1.35**

Kodo millet

JNKVV, Jabalpur

Results: The experiment was conducted with variety JK 439. Sowing of both direct sown and nursery raised was done on 24.06.2016 and transplanting was done on 25.07.2016. The seeds were treated with carbandazim @ 2.5g kg^{-1} seeds before sowing.

Effect of sowing methods on plant growth, seed yield and quality attributes

The direct sowing of kodo millet at spacing of 30 x 10 cm (S_1) was found superior in terms of field emergence, plant height, panicle weight per plot, seed yield per plant, seed yield per plot and seed yield (q/ha) as compared to transplanting after 21 days at spacing 30 x 10 cm (S_2). While, chlorophyll content , days to flowering, number of branches, days to maturity and 100 seed weight were recorded higher in transplanting after 21 days at spacing 30 x 10 cm (S_2).

Effect of nutrient management on plant growth, seed yield and quality attributes

The nutrient management treatments had significant effect on plant growth, seed yield and quality of kodo millet. Highest seed yield per plant, number of branches, seed yield per plot, 100 seed weight and seed yield (q/ha) were recorded among N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage). This was closely followed by N_3 (50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing with urea at 4 weeks after transplanting + 2% Borax spray at flowering stage)

Effect of priming on plant growth, seed yield and quality attributes

The priming treatment had significant effect on plant growth, seed yield and quality attributes. Highest chlorophyll content, panicle weight per plot, seed yield per plant, seed yield per plot and seed yield (q/ha) were noticed in P_4 (Seed Priming with 20% liquid *Pseudomonas flurescens*) followed by P_3 (Seed priming with 2% KH_2PO_4 for 6 hour).

Interaction effect of sowing method, nutrient management and priming on plant growth, seed yield and quality attributes

Considering different treatments, seed priming with P_3 (Seed priming with 2% KH_2PO_4 for 6 hour) with N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage) recorded higher seed yield in both sowing condition. It was closely followed by the seed priming with P_4 (Seed priming with 20% liquid *Pseudomonas flourescens* in combination with N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage) under both direct sown and transplanted condition (Table 199).

Conclusion: The direct sowing with fertilizer dose 125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage and seed priming with 2% KH_2PO_4 for 6 hour were found better for yield and its attributing traits.

Table 199: Yield and yield attributing characters of Kodo millet as influenced by different method of planting, nutrient management and priming

Main plot (Sow. met.)	Sub plot (Nutrient Mgt)	Sub-sub Plot (Priming)	Field Em. %	Plant Ht.	Chloro phyll cont.	Days to first flr.	No. of branc hes	Panicle wt./plot (kg)	Days to mat.	Seed yield/ plant (g)	Seed yield/ plot (kg)	100 seed wt. (g)	Seed Yield q/ha	G %	VI- I
Direct sown	N_1	P_1	72.25	55.83	25.72	80.00	3.50	2.45	112.50	3.96	0.90	0.43	15.00	37.50	487.55
		P_2	83.00	52.75	30.10	80.00	2.83	2.20	112.50	4.66	0.91	0.37	15.17	48.50	654.00
		P_3	71.50	45.85	25.83	82.00	4.00	1.70	113.50	4.58	0.87	0.42	14.42	54.00	960.70
		P_4	70.75	52.67	31.08	80.00	3.33	2.05	113.50	4.83	0.86	0.35	14.33	48.00	775.80
	N_2	P_1	68.00	61.67	27.97	81.00	2.83	2.50	115.00	5.01	1.04	0.43	17.25	62.00	1034.40
		P_2	62.50	58.83	28.80	80.50	3.00	1.85	112.50	4.78	1.06	0.32	17.58	48.00	763.50
		P_3	68.25	61.83	29.27	81.00	3.00	2.35	113.50	5.41	1.11	0.44	18.42	53.50	857.10
		P_4	62.00	50.25	29.50	81.50	3.00	2.40	114.00	5.20	1.14	0.41	18.92	47.50	769.35
	N_3	P_1	63.00	63.00	28.70	81.00	3.00	1.70	114.00	5.19	1.02	0.39	16.92	77.25	1191.65
		P_2	65.00	65.66	34.13	82.00	2.83	2.10	114.00	5.95	1.10	0.44	18.33	48.50	518.95
		P_3	63.50	64.17	32.77	80.00	3.17	2.00	112.50	4.92	0.98	0.39	16.33	51.00	764.70
		P_4	81.50	67.83	37.30	80.00	3.00	1.85	113.50	5.02	0.98	0.40	16.33	43.50	658.50
	N_4	P_1	54.00	61.00	25.82	84.00	3.00	2.35	112.50	7.08	1.56	0.47	25.92	60.50	1064.35
		P_2	50.25	54.17	24.67	83.00	2.83	1.70	112.50	5.89	1.32	0.42	21.92	44.50	718.65
		P_3	63.75	62.50	27.73	84.50	3.33	1.70	113.50	6.64	1.45	0.41	24.08	69.00	1054.10
		P_4	42.75	65.33	28.81	84.50	3.33	1.85	113.50	6.53	1.37	0.41	22.83	61.50	1005.60
Transplanted	N_1	P_1	20.50	58.33	36.33	86.00	4.00	1.15	119.00	3.81	0.81	0.46	13.50	47.00	682.80
		P_2	22.00	59.33	37.28	90.00	3.00	1.40	123.00	4.20	0.82	0.41	13.67	58.50	883.50
		P_3	20.50	65.00	32.50	88.00	3.67	1.80	121.00	4.00	0.73	0.35	12.08	46.25	752.08
		P_4	21.50	54.00	27.80	91.50	4.50	1.55	124.50	4.11	0.84	0.41	14.00	43.00	702.20
	N_2	P_1	23.00	50.83	34.63	90.50	4.33	1.30	123.50	3.94	0.78	0.51	12.92	50.00	758.10
		P_2	21.50	56.16	36.40	89.50	3.83	1.65	112.50	3.95	0.80	0.43	13.25	40.50	466.20
		P_3	22.50	59.00	33.78	87.50	3.66	1.15	120.50	3.86	0.78	0.42	12.92	47.25	771.13
		P_4	22.50	58.33	44.56	86.50	4.33	1.25	119.50	4.01	0.79	0.36	13.17	55.00	910.10
	N_3	P_1	23.50	63.17	40.76	85.00	4.66	1.25	118.00	3.95	0.79	0.42	13.08	51.50	902.80
		P_2	19.50	54.00	43.45	87.50	4.00	0.95	120.50	4.39	0.86	0.45	14.33	56.00	821.60
		P_3	21.00	51.83	41.53	85.50	4.16	1.05	118.50	3.97	0.79	0.36	13.08	59.00	881.00
		P_4	24.50	47.33	34.75	89.50	4.00	1.35	122.50	5.19	1.06	0.43	17.58	57.00	1071.60
	N_4	P_1	21.00	53.50	33.25	87.50	4.67	1.05	120.50	4.82	0.92	0.44	15.33	66.50	1250.20
		P_2	21.00	56.83	24.36	86.50	4.33	1.25	119.50	5.57	1.14	0.39	18.92	60.50	979.40
		P_3	23.00	59.50	33.30	87.50	3.66	1.20	120.50	5.46	1.14	0.47	18.92	46.00	686.80
		P_4	21.00	53.00	37.67	88.50	3.83	1.05	121.50	5.33	1.15	0.37	19.17	57.50	893.00
(Main plot)		Direct sown	65.13	58.96	29.26	81.56	3.12	2.05	113.31	5.26	1.10	0.41	18.36	53.42	829.93
		Transplanting	21.78	56.26	35.77	87.94	4.04	1.28	121.07	4.41	0.88	0.42	14.74	52.59	838.28
(Sub plot)		No fertilizer	73.84	55.47	30.83	84.69	3.60	1.79	117.44	4.27	0.84	0.40	14.02	47.84	737.33
		N_1	43.78	57.11	33.11	84.06	3.50	1.81	117.63	4.52	0.93	0.41	15.55	50.47	791.23
		N_2	45.19	45.19	36.67	83.81	3.60	1.53	116.69	4.82	0.95	0.41	15.75	55.47	851.35
		N_3	37.09	37.09	29.45	85.75	3.62	1.52	116.75	5.72	1.25	0.42	20.89	58.25	956.51
Priming (Sub-sub plot)		No priming	43.16	58.41	31.65	84.38	3.75	1.72	116.88	4.72	0.97	0.44	16.24	56.53	921.48
		P_2	43.09	57.22	32.40	84.88	3.33	1.64	117.13	4.92	1.00	0.40	16.65	50.63	725.73
		P_3	44.25	58.70	32.09	84.50	3.58	1.62	116.69	4.85	0.98	0.41	16.28	53.25	840.95
		P_4	43.31	56.09	33.93	85.25	3.66	1.67	117.81	5.03	1.02	0.39	17.04	51.63	848.27
Main plot		CD 5%	7.46	2.99	0.47	0.72	0.27	0.21	0.60	0.24	0.05	0.02	0.78	6.11	155.36
Sub plot		CD 5%	10.55	4.24	0.67	1.03	0.38	0.30	0.85	0.35	0.06	0.03	1.11	8.64	219.72
Sub sub plot		CD 5%	14.92	4.24	0.67	1.03	0.38	0.30	0.85	0.35	0.06	0.03	1.11	12.22	219.72

TNAU, Coimbatore

Results: Number of tillers and panicle per plant were on par in direct sowing and transplanting methods. The direct sowing under control recorded the plant height of 54.5 cm where as the transplanted crop under control recorded 50.6 cm, which is 4 cm lesser than direct sown crop. The fertilizer treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea + 50 kg Super phosphate + 50 kg murate of potash + Top dressing urea + 2% Borax spray in direct sowing recorded the higher plant height of 62.1 cm compared to tranplanted crop (56.7 cm). This fertilizer treatment also could not overcome the reduced plant growth in transplanted crop. At the same time, the days to first flowering was significantly differed in direct sowing. it recorded the delay of 12 days irrespective of the priming and fertilizer treatments.

Single plant seed yield and seed yield per plot differed significantly in direct sown and transplanted crop. The direct sowing under control recorded the single plant yield of 7.3 g and 1.03 kg where as the transplanted crop under control recorded 4.9 g and 0.67 kg, respectively. The fertilizer treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2% Borax spray in direct sowing recorded the higher single plant yield of 8.4 gm and seed yield per plot of 1.19 kg compared to transplanted crop (5.5 gm and 0.77 kg, respectively).

Fertilizer application of 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2% Borax spray recorded highest plant height (61.9cm), number of tillers (7.9) and resultant seed quality. Priming treatments improved the seed yield attributing characters compared to control. Hydro priming and priming with 20 % liquid *Pseudomonas fluorescens*, increased the single plant seed yield to 8.0 gm compared to the control (7.1 gm). Priming with 20 % liquid *Pseudomonas fluorescens* combined with the treatment of 125 kg neem + 1250 kg vermi per ha+ 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2 % Borax spray under direct sowing recorded the highest single plant seed yield (8.9 gm) and seed yield per plot (1.28 kg). The same treatment recorded lesser seed yield per plot (0.74 kg) under transplanted condition (Table 200-211).

Conclusion

- Direct sowing performed significantly better than transplanting in seed yield and its attributing characters.
- Direct sowing crop recorded higher plant height compared to transplanted crop.
- Transplanted crop establishment was delayed by 12 days and it reaches harvestable maturity 16 days later than direct sown crop.
- Direct sowing recorded higher single plant seed yield and seed yield per plot.
- Priming with 20 % liquid *Pseudomonas fluorescens* combined with the treatment of 125 kg neem + 1250 kg vermi per ha+ 50 kg urea +50 kg Super phosphate + 50 kg Muriate of potash + Top dressing urea + 2% Borax spray under direct sowing recorded the highest single plant seed yield and seed yield per plot.

Table 200: Effect of sowing method, nutrient application and seed priming on number of tillers in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	5.2	6.6	6.5	6.7	5.3	6.4	6.5	6.3	6.2
P_2	6.5	6.7	8.4	8.8	6.4	6.9	8.1	7.7	7.4
P_3	6.7	6.4	7.9	8	6.9	6.2	7.6	7.7	7.2
P_4	7.5	7.9	9	7.7	6.9	7	8.2	7.1	7.7
Mean	6.4	6.9	7.9	7.8	6.3	6.6	7.6	7.2	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	1.58	2.87	1.87	1.85	1.71	2.59	2.99		
CD (P = 0.05)	3.22	5.84	3.78	3.76	3.48	5.24	6.02		

Table 201: Effect of sowing method, nutrient application and seed priming on plant height (cm) in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	53.0	56.4	59.5	55.0	49.2	51.7	54.4	51.5	53.8
P_2	54.9	59.7	63.5	65.2	50.5	54.9	54.9	54.7	57.3
P_3	55.4	65.5	63.3	61.7	51.6	56.8	58.3	56.9	58.7
P_4	54.5	62.6	61.6	66.4	50.9	56.7	56.6	57.8	58.1
Mean	54.5	61.1	62.0	62.1	50.6	55.0	56.1	56.7	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	1.49	2.59	1.93	4.12	5.8	4.89	2.52		
CD (P = 0.05)	3.12	5.43	4.05	8.65	12.18	10.26	5.29		

Table 202: Effect of sowing method, nutrient application and seed priming on chlorophyll content in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	38.3	41.7	44.8	40.3	40.3	42.8	45.5	42.6	42.0
P_2	40.2	45	48.8	50.5	41.6	46	46	45.8	45.5
P_3	40.7	50.8	48.6	47	42.7	47.9	49.4	48	46.9
P_4	39.8	47.9	46.9	51.7	42	47.8	47.7	46.9	46.3
Mean	39.8	46.4	47.3	47.4	41.7	46.1	47.2	45.8	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.65	0.52	0.38	0.85	0.63	1.22	1.10		
CD (P = 0.05)	1.30	1.04	0.76	1.70	1.26	2.44	2.20		

Table 203: Effect of sowing method, nutrient application and seed priming on number of panicle per plant in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	8.1	9.6	9.3	9.6	8.5	9.6	9.1	9.3	9.1
P_2	9	9.7	10.8	10.2	9.6	10.9	9.7	10.5	10.1
P_3	7.5	9.5	10.5	10.2	9.8	9.9	9.9	10.7	9.8
P_4	9.5	10.5	10.5	10.6	9.9	9.8	10.7	9.9	10.2
Mean	8.5	9.8	10.3	10.2	9.5	10.1	9.9	10.1	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.77	1.13	1.12	1.64	2.32	2.43	2.51		
CD (P = 0.05)	1.57	2.28	2.24	3.33	4.65	4.94	5.06		

Table 204: Effect of sowing method, nutrient application and seed priming on days to first flowering in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	74.7	74.9	74.8	74.9	86.9	86.9	86.7	87.2	80.9
P_2	74.9	74.5	74.6	74.6	85.9	86.2	86.5	86	80.4
P_3	73.9	73.9	73.9	73.9	85.6	86	86	85.6	79.9
P_4	73.7	73.7	74.1	73.9	85.6	85.6	85.8	85.9	79.8
Mean	74.3	74.3	74.4	74.3	86	86.2	86.3	86.2	21.2
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.72	NS	0.31	0.38	NS	NS	0.32		
CD (P = 0.05)	1.46		0.62	0.76			0.64		

Table 205: Effect of sowing method, nutrient application and seed priming on 100 seed weight (gm) in kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	0.45	0.43	0.54	0.58	0.42	0.58	0.43	0.43	0.48
P_2	0.38	0.51	0.41	0.38	0.59	0.38	0.47	0.41	0.44
P_3	0.46	0.42	0.44	0.42	0.45	0.44	0.41	0.38	0.43
P_4	0.43	0.53	0.51	0.48	0.44	0.48	0.41	0.46	0.47
Mean	0.43	0.47	0.48	0.46	0.48	0.47	0.43	0.42	0.45
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.79	0.95	0.57	1.27	1.05	0.68	0.75		
CD (P = 0.05)	1.659	1.995	1.197	2.667	2.205	1.428	1.575		

Table 206: Effect of sowing method, nutrient application and seed priming on single plant yield (gm) in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	7	7.4	7.1	7.3	3.9	4.7	4.7	4.9	5.9
P_2	7.3	7.3	8.4	8.6	5	5.5	6.4	5.9	6.8
P_3	7.5	7.5	7.7	8.6	5.5	4.6	5.9	5.9	6.7
P_4	7.3	7.9	8.6	8.9	5.1	5.2	6	5.3	6.8
Mean	7.3	7.5	8	8.4	4.9	5.0	5.8	5.5	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.83	1.1	0.7	1.47	2.13	2.21	1.63		
CD (P = 0.05)	1.74	2.24	1.40	2.95	4.2	4.43	3.25		

Table 207: Effect of sowing method, nutrient application and seed priming on single plant yield (kg) in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	0.99	1.05	1.01	1.04	0.53	0.65	0.65	0.68	0.82
P_2	1.04	1.04	1.20	1.23	0.69	0.77	0.90	0.83	0.96
P_3	1.07	1.07	1.10	1.23	0.77	0.63	0.83	0.83	0.94
P_4	1.04	1.13	1.23	1.28	0.71	0.72	0.84	0.74	0.96
Mean	1.03	1.07	1.13	1.19	0.67	0.69	0.80	0.77	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	1.08	1.24	0.65	1.56	2.24	2.16	1.98		
CD (P = 0.05)	2.16	2.48	1.30	3.12	4.48	4.32	3.96		

Table 208: Effect of sowing method, nutrient application and seed priming on resultant seed germination in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	96	95	97	97	96	97	95	94	96
P_2	95	96	95	95	97	95	96	95	96
P_3	96	95	96	95	95	96	94	96	95
P_4	96	97	96	96	96	96	96	95	96
Mean	96	96	96	96	96	96	95	95	96
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.31	0.38	0.46	0.36	0.58	0.4	0.42		
CD (P = 0.05)	0.65	0.79	0.96	0.75	1.21	0.84	0.88		

Table 209: Effect of sowing method, nutrient application and seed priming on resultant seed shoot length (cm) in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	6.20	5.92	7.09	7.42	5.90	7.42	5.05	4.92	6.24
P_2	5.42	6.76	5.76	5.42	7.53	5.46	6.31	5.76	6.05
P_3	6.29	5.86	6.09	5.90	6.17	6.09	4.81	4.42	5.70
P_4	5.96	6.99	6.76	6.42	6.09	6.42	5.78	6.25	6.33
Mean	5.97	6.38	6.43	6.29	6.42	6.35	5.49	5.34	6.08
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.46	0.59	0.35	0.26	0.28	0.41	0.59		
CD (P = 0.05)	0.96	1.24	0.73	0.54	0.58	0.86	1.23		

Table 210: Effect of sowing method, nutrient application and seed priming on resultant seed root length (cm) in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	10.63	10.35	11.52	11.85	10.33	11.85	9.48	9.35	10.67
P_2	9.85	11.19	10.19	9.85	11.96	9.89	10.74	10.19	10.48
P_3	10.72	10.29	10.52	10.33	10.60	10.52	9.24	8.85	10.13
P_4	10.39	11.42	11.19	10.85	10.52	10.85	10.21	10.68	10.76
Mean	10.40	10.81	10.86	10.72	10.85	10.78	9.92	9.77	10.51
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.39	0.44	0.48	0.59	0.48	0.53	0.46		
CD (P = 0.05)	0.82	0.92	1.01	1.24	1.01	1.11	0.97		

Table 211: Effect of sowing method, nutrient application and seed priming on resultant seed vigour index in Kodo millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	1611	1551	1800	1870	1553	1870	1376	1346	1622
P_2	1452	1729	1520	1452	1885	1459	1632	1520	1581
P_3	1628	1540	1590	1547	1599	1590	1325	1275	1512
P_4	1565	1780	1729	1659	1590	1659	1530	1614	1641
Mean	1564	1650	1660	1632	1657	1645	1466	1439	1589
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	33	35	41	33	43	45	36		
CD (P = 0.05)	68	74	86	69	90	95	76		

Proso millet

UAS, Bangalore

Treatment Details:

Date of sowing : 02-08-2016

Date of transplanting : 23-08-2016

Results

Effect of sowing methods on plant growth, seed yield and quality attributes of proso millet *cv.* TNAU-145

The field emergence (70.16%), plant height (78.32cm), panicle weight/plot (1.423kg) and seed yield (20.287g/plant; 0.638kg/plot and 15.21q/ha) were recorded higher in direct method of sowing (S_1) over the transplanted condition. The sowing methods did not influence the chlorophyll content, days to 50% flowering and seed quality attributes significantly but, all these parameters were highest in direct sowing method.

Effect of nutrient management on plant growth, seed yield and quality attributes of proso millet *cv.* TNAU-145

The seed yield and yield attributing characters *viz.* field emergence (69.50%), tillers/plant (13.93), panicle weight (1.631kg/plot), seed yield/plant (19.387g), seed yield/plot (0.619kg), seed yield/ha (14.75q) and seed recovery (81.05%) were found higher in N_4 (125 kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) followed by N_3 (50 Kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2 % Borax). This was followed by N_3 (50 kg Urea + 50 kg SSP and 50 Kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2 % Borax) with seed yield (0.554kg/plot and 13.19q/ha) and seed recovery (80.82%) over control (N_1) with seed yield (10.97q/ha) and seed recovery (75.11%) (Table 212).

Effect of priming on plant growth, seed yield and quality attributes of proso millet *cv.* TNAU-145

The field emergence (69.62%), tillers/plant (13.51), panicle weight (1.581kg/plot), seed yield (18.087g/plant; 0.604kg/plot and 14.39q/ha), seed recovery (84.92%), test weight (5.769g), germination (93.93%) and vigour indices (1791 & 2273) were recorded highest among P_4(*priming of seeds with* 20% liquid *pseudomonas fluorescens*. This was almost on par with P_3 (priming of seeds with 2% KH_2PO_4 for 6hr) with seed yield/ha (13.41q) and seed recovery (81.60%). The seed yield (11.30q/ha) and seed recovery (72.21%) was numerically lowest among the unprimed seeds (Table 213).

Interaction effect on the plant growth, seed yield and quality attributes of proso millet *cv.* TNAU-145

Significant highest field emergence (75.37%), no. of tillers/plant (16.47), panicle weight (1.811kg/plot), seed yield (27.20g/plant; 0.724kg/plot & 17.25q/ha) and seed recovery (83.26%) was reported among the direct sowing method (S_1) with N_4 (125 Kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) followed b N_3 (50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) fertilizer application. This was almost on par with S_1N_3 with recorded yield (15.49q/ha). The lowest yield was recorded among S_2N_1 (8.64q/ha). In case of sowing (S) x priming (P) interactions, S_1P_4 recorded significantly higher field emergence (73.37%), tillers/plant (14.15), seed yield/plant (24.75g), seed yield/plot (0.708kg), seed yield/ha

(16.87q), seed recovery (85.22%), germination (94.37%) and vigour indices (1802 & 2313). This was closely followed by S_1P_3 (15.84q/ha) and lowest among S_2P_1 (8.78q/ha and seed recovery 68.78%). In nutrient management (N) and priming (P) interactions, the treatment combination of N_4P_4 recorded significantly higher field emergence (75.0%), minimum number of days to 50% flowering (46.50), tillers/plant (15.30), panicle weight (1.95kg/plot), seed yield/plant (23.70g), seed yield/plot (0.71kg), seed yield/hectare (16.97q) and seed recovery (88.08%) (Table 214).

Interaction effect of sowing method, nutrient management and priming on plant growth, seed yield and quality attributes of proso millet *cv.* TNAU-145

Significantly higher field emergence (80.50%), tillers/plant (17.70), panicle weight (2.28kg/plot), seed yield (32.60g/plant; 0.83kg/plot & 19.67q/ha) were noticed among the interactions of $S_1N_4P_4$ (direct sowing with application of N_4 (125 kg Neem + 1250 kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) followed by N_3 (50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) dose of fertilizers and seed priming with 20% liquid *Pseudomonas fluorescens* for 6h. This was closely followed by $S_1N_4P_3$ with better seed yield (18.22q/ha). However, seed yield was lowest (7.40q/ha) in $S_2N_1P_1$ (transplanted method of sowing without any fertilizer application and priming treatments) (Table 215-217).

Conclusion: The direct sowing method recorded significantly higher seed yield (15.21q/ha) and its contributing components. Seed yield (14.75q) and yield parameters were found to be higher with the application of N_4 (125 kg Neem + 1250 Kg vermicompost per ha + 50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) followed by N_3 (50 kg Urea + 50 kg SSP and 50 kg MOP per ha + Top dressing urea at 3-4 weeks after transplanting + 2% Borax) and seed priming with 2% KH_2PO_4 for 6h (14.39q/ha).

Table 212: Effects of sowing methods, nutrient management and seed priming on the seed quality of resultant crop of proso millet *cv.* TNAU-145

Treatment	Test weight (g)	Germination (%)	Seedling Vigour Index	
			I	II
Sowing method				
S_1	5.717	92.06	1674	2065
S_2	5.697	90.84	1646	1970
Mean	**5.707**	**91.45**	**1660**	**2017.5**
SEm±	**0.022**	**0.287**	**7.958**	**28.56**
CD (p=0.05)	**0.404**	**5.161**	**142.98**	**513.12**
CV (%)	**2.234**	**1.77**	**2.71**	**8.00**
Nutrient Management				
N_1	5.640	89.62	1601	1824
N_2	5.695	91.00	1632	1920
N_3	5.738	92.18	1673	2013
N_4	5.755	93.00	1734	2313
Mean	**5.707**	**91.45**	**1660**	**2017.5**
SEm±	**0.022**	**0.244**	**14.817**	**27.02**
CD (p=0.05)	**0.077**	**0.844**	**51.270**	**93.49**
CV (%)	**1.56**	**1.067**	**3.56**	**5.35**

Priming treatments				
P_1	5.631	88.12	1517	1748
P_2	5.678	90.81	1623	1953
P_3	5.749	92.93	1710	2096
P_4	5.769	93.93	1791	2273
Mean	**5.706**	**91.447**	**1660.25**	**2017.5**
SEm±	**0.028**	**0.228**	**18.116**	**41.93**
CD (0.05P)	**0.082**	**0.668**	**52.872**	**122.39**
CV (%)	**1.97**	**1.00**	**4.36**	**8.31**

Table 213: Effects of sowing methods, nutrient management and seed priming on growth and seed yield parameters of proso millet *cv.* TNAU-145

Treatments	Field emergence (%)	Days to 50% flowering	Chlorophyll content	Plant height (cm)	No. of tillers	Panicle weight (kg/ plot)	Seed yield (g/ plant)	Seed yield (kg /plot)	Seed yield (q/ha)	Seed recovery (%)
Sowing method										
S_1	70.16	46	44.129	78.32	13.27	1.423	20.287	0.638	15.21	81.25
S_2	60.37	53.03	44.038	63.66	11.03	1.155	9.668	0.440	10.49	76.87
Mean	**65.265**	**49.515**	**44.083**	**70.99**	**12.15**	**1.289**	**14.977**	**0.539**	**12.85**	**79.06**
SEm±	**0.442**	**0.862**	**0.140**	**0.813**	**0.154**	**0.001**	**0.419**	**0.0003**	**0.008**	**0.452**
CD(0.05P)	**7.940**	**15.483**	**2.517**	**14.609**	**2.779**	**0.027**	**7.543**	**0.006**	**0.151**	**8.121**
CV (%)	**3.85**	**9.845**	**1.79**	**6.47**	**7.19**	**0.678**	**15.85**	**0.370**	**0.37**	**3.234**
Nutrient Management										
N_1	60.94	51.37	41.591	67.68	10.9	1.009	11.250	0.460	10.971	75.11
N_2	63.81	49.81	42.798	69.01	11.35	1.163	12.825	0.524	12.494	79.26
N_3	65.50	49.18	46.235	73.40	12.42	1.352	16.450	0.554	13.199	80.82
N_4	69.50	47.68	45.708	73.87	13.93	1.631	19.387	0.619	14.752	81.05
Mean	**64.937**	**49.51**	**44.083**	**70.99**	**12.15**	**1.288**	**14.978**	**0.539**	**12.854**	**79.06**
SEm±	**0.398**	**0.417**	**1.107**	**1.064**	**0.721**	**0.002**	**0.400**	**0.001**	**0.0390**	**0.417**
CD(0.05P)	**1.379**	**1.443**	**3.830**	**3.682**	**2.497**	**0.009**	**1.384**	**0.005**	**0.135**	**1.443**
CV (%)	**2.455**	**3.371**	**10.05**	**5.99**	**23.75**	**0.896**	**10.68**	**1.21**	**1.216**	**2.11**
Priming treatments										
P_1	60.75	50.44	41.316	69.51	10.52	1.028	12.287	0.474	11.30	72.21
P_2	63.25	50.00	42.530	69.86	11.45	1.209	14.437	0.516	12.29	77.52
P_3	66.12	49.00	45.652	71.53	13.12	1.338	15.100	0.563	13.41	81.60
P_4	69.62	48.62	46.835	73.06	13.512	1.581	18.087	0.604	14.39	84.92
Mean	**64.935**	**49.515**	**44.083**	**70.99**	**12.150**	**1.289**	**14.977**	**0.539**	**12.847**	**79.0625**
SEm±	**0.280**	**0.263**	**0.834**	**0.557**	**0.269**	**0.003**	**0.278**	**0.001**	**0.029**	**0.360**
CD (0.05P)	**0.819**	**0.768**	**2.434**	**1.63**	**0.787**	**0.009**	**0.812**	**0.003**	**0.087**	**1.051**
CV (%)	**1.73**	**2.127**	**7.57**	**3.14**	**8.87**	**0.97**	**7.433**	**0.928**	**0.928**	**1.82**

Table 214: Interaction effect of sowing method, nutrient management and priming on plant growth, seed yield and quality parameters of proso millet *cv.* TNAU-145

Interaction	Field emergence (%)	Days to 50% flowering	Chlorophyll Content	Plant height (cm)	No. of tillers	Panicle weight (kg/ plot)	Seed yield (g/plant)
S_1N_1	66.37	47.75	41.840	77.57	11.35	1.101	14.375
S_1N_2	68.00	47.00	42.007	76.65	12.30	1.279	16.225
S_1N_3	70.875	45.62	46.850	79.82	12.97	1.502	23.350
S_1N_4	75.375	43.62	45.817	79.25	16.47	1.811	27.200
S_2N_1	58.125	55.00	41.342	57.80	10.45	0.917	8.125
S_2N_2	59.625	52.62	43.590	61.37	10.40	1.047	9.425
S_2N_3	60.125	52.75	45.620	66.97	11.87	1.203	9.550
S_2N_4	63.625	51.75	45.600	68.50	11.40	1.452	11.575
Mean	**65.265**	**49.513**	**44.083**	**70.991**	**12.151**	**1.289**	**14.978**
S.Em±	**0.563**	**0.590**	**1.565**	**1.505**	**1.020**	**0.004**	**0.565**
CD(0.05P)	**1.950**	**2.042**	**5.417**	**5.208**	**3.532**	**0.014**	**1.957**
S_1P_1	68.50	46.62	42.062	75.87	11.85	1.163	16.250
S_1P_2	67.87	46.25	43.327	76.95	12.52	1.355	19.750
S_1P_3	70.87	45.62	45.107	78.75	14.57	1.441	20.400
S_1P_4	73.37	45.50	46.017	81.72	14.15	1.734	24.750
S_2P_1	55.62	54.25	40.570	63.15	9.20	0.893	8.325
S_2P_2	58.62	53.75	41.732	62.78	10.37	1.063	9.125
S_2P_3	61.37	52.37	46.197	64.31	11.67	1.234	9.800
S_2P_4	65.87	51.75	47.652	64.40	12.87	1.428	11.425
Mean	**65.261**	**49.513**	**44.083**	**70.991**	**12.15**	**1.288**	**14.978**
S.Em±	**0.396**	**0.372**	**1.179**	**0.788**	**0.381**	**0.004**	**0.393**
CD(0.05P)	**1.158**	**1.086**	**3.442**	**2.300**	**1.113**	**0.012**	**1.148**
P_1N_1	56.50	52.50	39.310	68.05	9.15	0.838	10.650
P_1N_2	60.50	50.50	39.520	67.70	9.75	0.914	10.750
P_1N_3	60.75	49.75	42.815	70.65	10.45	1.018	11.800
P_1N_4	65.25	49.00	43.620	71.65	12.75	1.342	15.950
P_2N_1	59.75	52.00	41.320	65.60	10.40	0.977	11.000
P_2N_2	62.50	50.25	41.850	67.45	9.90	1.076	12.700
P_2N_3	63.75	49.50	43.535	72.80	12.10	1.223	15.500
P_2N_4	67.00	48.25	43.415	73.62	13.40	1.561	18.550
P_3N_1	62.00	50.25	41.870	65.55	11.75	1.029	11.350
P_3N_2	65.00	49.75	42.155	66.225	13.15	1.231	13.000
P_3N_3	66.75	49.00	50.810	78.90	13.30	1.422	16.700
P_3N_4	70.75	47.00	47.775	75.45	14.30	1.668	19.350
P_4N_1	65.50	50.75	43.865	71.55	12.30	1.191	12.000
P_4N_2	67.25	48.75	47.670	74.67	12.60	1.432	14.850
P_4N_3	70.75	48.50	47.780	71.25	13.85	1.747	21.800
P_4N_4	75.00	46.50	48.025	74.77	15.30	1.953	23.700
Mean	**64.937**	**49.515**	**44.083**	**70.992**	**12.153**	**1.288**	**14.978**
S.Em±	**0.561**	**0.526**	**1.668**	**1.114**	**0.539**	**0.006**	**0.556**
CD (0.05P)	**1.638**	**1.536**	**4.868**	**3.253**	**1.57**	**0.182**	**1.624**

Table 215: Interaction effect of sowing method, nutrient management and seed priming on plant growth, seed yield and quality parameters of proso millet *cv.* TNAU-145

Interaction	Seed yield (kg /plot)	Seed yield (q/ha)	Seed recovery (%)	Test weight (g)	Germination (%)	Seedling Vigour Index	
						I	II
S_1N_1	0.558	13.30	78.17	5.640	90.25	1614	1876
S_1N_2	0.621	14.79	80.37	5.707	91.75	1665	1975
S_1N_3	0.650	15.49	83.20	5.746	93.12	1685	2038
S_1N_4	0.724	17.25	83.26	5.775	93.12	1732	2372
S_2N_1	0.363	8.64	72.06	5.640	89.00	1588	1773
S_2N_2	0.428	10.19	78.14	5.683	90.25	1600	1865
S_2N_3	0.458	10.90	78.45	5.730	91.25	1661	1988
S_2N_4	0.514	12.25	78.84	5.735	92.87	1737	2254
Mean	**0.539**	**12.851**	**79.061**	**5.707**	**91.451**	**1660.25**	**2017.62**
S.Em±	**0.002**	**0.055**	**0.590**	**0.031**	**0.345**	**20.95**	**38.21**
CD(0.05P)	**0.008**	**0.191**	**2.041**	**0.109**	**1.194**	**72.507**	**132.22**
S_1P_1	0.580	13.81	75.64	5.616	88.62	1513	1829
S_1P_2	0.601	14.30	80.65	5.687	92.00	1644	1989
S_1P_3	0.665	15.84	83.49	5.767	93.25	1738	2129
S_1P_4	0.708	16.87	85.22	5.797	94.37	1802	2313
S_2P_1	0.369	8.78	68.78	5.647	87.62	1521	1667
S_2P_2	0.432	10.28	74.38	5.668	89.62	1603	1916
S_2P_3	0.461	10.00	79.71	5.731	92.62	1681	2063
S_2P_4	0.500	11.92	84.62	5.741	93.50	1781	2234
Mean	**0.5395**	**12.725**	**79.06125**	**5.70675**	**91.45**	**1660.375**	**2017.5**
SEm±	**0.001**	**0.042**	**0.509**	**0.039**	**0.323**	**25.620**	**59.31**
CD(0.05P)	**0.005**	**0.123**	**1.486**	**0.116**	**0.944**	**74.773**	**173.09**
P_1N_1	0.420	10.01	61.14	5.517	85.00	1472	1552
P_1N_2	0.459	10.92	74.17	5.645	87.50	1467	1684
P_1N_3	0.509	12.11	77.04	5.675	89.50	1510	1723
P_1N_4	0.510	12.14	76.49	5.690	90.50	1618	2035
P_2N_1	0.449	10.69	73.02	5.605	90.50	1590	1764
P_2N_2	0.487	11.59	78.77	5.675	90.00	1601	1822
P_2N_3	0.528	12.57	80.40	5.690	91.00	1638	2002
P_2N_4	0.602	14.33	77.87	5.742	91.75	1663	2224
P_3N_1	0.466	11.09	81.78	5.720	91.25	1632	1871
P_3N_2	0.565	13.45	80.49	5.715	92.25	1680	2007
P_3N_3	0.569	13.56	82.38	5.772	93.75	1756	2108
P_3N_4	0.653	15.55	81.75	5.790	94.50	1770	2397
P_4N_1	0.5075	12.08	84.52	5.717	91.75	1711	2110
P_4N_2	0.587	13.99	83.60	5.747	94.25	1782	2167
P_4N_3	0.610	14.54	83.48	5.815	94.50	1788	2221
P_4N_4	0.712	16.97	88.08	5.797	95.25	1885	2596
Mean	**0.539**	**12.849**	**79.061**	**5.707**	**91.453**	**1660.18**	**2017.68**
SEm±	**0.002**	**0.059**	**0.720**	**0.056**	**0.457**	**36.232**	**83.87**
CD(0.05P)	**0.007**	**0.1741**	**2.102**	**0.164**	**1.336**	**105.745**	**244.78**

Table 216: Interaction effect of sowing methods, nutrient management and seed priming on plant growth and seed yield parameters of proso millet *cv.* TNAU-145

Interactions	Field emergence (%)	Days to 50% flowering	Chlorophyll content	Plant height (cm)	No. of tillers	Panicle weight (kg /plot)	Seed yield (g /plant)
$S_1N_1P_I$	71.00	48.50	39.87	76.60	10.1	0.962	13.4
$S_1N_1P_2$	62.50	48.50	41.92	78.00	10.7	1.087	13.9
$S_1N_1P_3$	64.50	46.50	41.34	74.40	12.8	1.141	14.6
$S_1N_1P_4$	67.50	47.50	44.23	81.30	11.8	1.214	15.6
$S_1N_2P_1$	64.50	47.50	40.68	71.40	10.6	1.083	13.1
$S_1N_2P_2$	67.50	47.00	42.89	73.20	10.7	1.249	16.5
$S_1N_2P_3$	69.50	47.00	41.29	76.70	14.7	1.306	17.0
$S_1N_2P_4$	70.50	46.50	43.17	85.30	13.2	1.480	18.3
$S_1N_3P_1$	67.00	46.00	42.98	74.10	11.3	1.219	16.2
$S_1N_3P_2$	69.00	45.50	44.35	81.20	12.8	1.353	22.2
$S_1N_3P_3$	72.50	45.50	50.78	85.90	13.9	1.472	22.5
$S_1N_3P_4$	75.00	45.50	49.29	78.10	13.9	1.965	32.5
$S_1N_4P_1$	71.50	44.50	44.72	81.40	15.4	1.386	22.3
$S_1N_4P_2$	72.50	44.00	44.15	75.40	15.9	1.732	26.4
$S_1N_4P_3$	77.00	43.50	47.02	78.00	16.9	1.846	27.5
$S_1N_4P_4$	80.50	42.50	47.38	82.20	17.7	2.278	32.6
$S_2N_1P_1$	52.50	56.50	38.75	59.50	8.2	0.713	7.9
$S_2N_1P_2$	57.00	55.50	40.72	53.20	10.1	0.867	8.1
$S_2N_1P_3$	59.50	54.00	42.40	56.70	10.7	0.918	8.1
$S_2N_1P_4$	63.50	54.00	43.50	61.80	12.8	1.169	8.4
$S_2N_2P_1$	56.50	53.50	38.36	64.00	8.9	0.745	8.4
$S_2N_2P_2$	57.50	53.50	40.81	61.70	9.1	0.903	8.9
$S_2N_2P_3$	60.50	52.50	43.02	55.75	11.6	1.156	900
$S_2N_2P_4$	64.00	51.00	52.17	64.05	12.0	1.385	11.4
$S_2N_3P_1$	54.50	53.50	42.65	67.20	9.6	0.818	7.4
$S_2N_3P_2$	58.50	53.50	42.72	64.40	11.4	1.094	8.8
$S_2N_3P_3$	61.00	52.50	50.84	71.90	12.7	1.372	10.9
$S_2N_3P_4$	66.50	51.50	46.27	64.40	13.8	1.529	11.1
$S_2N_4P_1$	59.00	53.50	42.52	61.90	10.1	1.299	9.6
$S_2N_4P_2$	61.50	52.50	42.68	71.85	10.9	1.389	10.7
$S_2N_4P_3$	64.50	50.50	48.53	72.90	11.7	1.490	11.2
$S_2N_4P_4$	69.50	50.50	48.67	67.35	12.9	1.629	14.8
Mean	**65.265**	**49.515**	**44.083**	**70.993**	**12.153**	**1.289**	**42.821**
SEm±	**0.793**	**0.744**	**2.358**	**1.576**	**0.763**	**0.008**	**0.787**
CD(0.05P)	**2.316**	**2.173**	**6.884**	**4.601**	**2.226**	**0.025**	**2.297**

Table 217: Interactions effects of sowing methods, nutrient management and seed priming on plant growth, seed yield and quality parameters of proso millet *cv.* TNAU-145

Interactions	Seed yield (kg/plot)	Seed yield (q/ha)	Seed recovery (%)	Test weight (g)	Germination (%)	Seedling Vigour Index	
						I	II
$S_1N_1P_1$	0.530	12.61	69.13	5.460	5.67	1505	1600
$S_1N_1P_2$	0.554	13.19	76.78	5.630	5.71	1612	1819
$S_1N_1P_3$	0.573	13.65	82.96	5.710	5.76	1644	1922
$S_1N_1P_4$	0.577	13.73	83.79	5.760	5.79	1696	2162
$S_1N_2P_1$	0.553	13.16	73.02	5.635	88.50	1500	1725
$S_1N_2P_2$	0.553	13.17	81.19	5.685	92.00	1650	1884
$S_1N_2P_3$	0.672	16.00	81.26	5.725	92.50	1709	2082
$S_1N_2P_4$	0.706	16.82	86.03	5.785	94.00	1801	2208
$S_1N_3P_1$	0.601	14.32	78.36	5.660	89.50	1457	1879
$S_1N_3P_2$	0.626	14.90	82.04	5.660	92.50	1646	1989
$S_1N_3P_3$	0.651	15.50	85.89	5.820	94.50	1794	2031
$S_1N_3P_4$	0.724	17.25	86.51	5.845	96.00	1845	2256
$S_1N_4P_1$	0.636	15.15	82.05	5.710	90.00	1590	2115
$S_1N_4P_2$	0.670	15.96	82.60	5.775	92.50	1667	2266
$S_1N_4P_3$	0.765	18.22	83.86	5.815	94.50	1804	2480
$S_1N_4P_4$	0.826	19.67	84.53	5.800	95.50	1866	2626
$S_2N_1P_1$	0.311	7.40	53.14	5.575	83.50	1439	1504
$S_2N_1P_2$	0.344	8.20	69.26	5.580	90.00	1568	1709
$S_2N_1P_3$	0.358	8.53	80.59	5.730	91.00	1620	1821
$S_2N_1P_4$	0.438	10.42	85.26	5.675	91.50	1726	2058
$S_2N_2P_1$	0.365	8.69	75.32	5.655	86.50	1434	1643
$S_2N_2P_2$	0.420	10.01	76.35	5.665	88.00	1553	1760
$S_2N_2P_3$	0.458	10.91	79.72	5.705	92.00	1651	1932
$S_2N_2P_4$	0.469	11.16	81.17	5.710	94.50	1762	2126
$S_2N_3P_1$	0.416	9.91	75.72	5.690	89.50	1563	1567
$S_2N_3P_2$	0.430	10.23	78.76	5.720	89.50	1631	2015
$S_2N_3P_3$	0.488	11.63	78.87	5.725	93.00	1719	2185
$S_2N_3P_4$	0.497	11.83	80.45	5.785	93.00	1731	2186
$S_2N_4P_1$	0.384	9.14	70.93	5.670	91.00	1647	1956
$S_2N_4P_2$	0.533	12.70	73.15	5.710	91.00	1660	2183
$S_2N_4P_3$	0.541	12.89	79.64	5.765	94.50	1736	2314
$S_2N_4P_4$	0.599	14.26	91.62	5.795	95.00	1904	2566
Mean	**0.539625**	**12.850**	**79.060**	**5.707**	**80.888**	**1660.3**	**2017.78**
SEm±	**0.003**	**0.084**	**1.018**	**0.079**	**0.647**	**51.241**	**118.61**
CD(0.05P)	**0.010**	**0.246**	**2.972**	**0.232**	**1.889**	**149.547**	**346.18**

Little millet

JNKVV, Jabalpur

Results: The experiment was conducted with variety JK 8. Sowing of both direct sown and nursery raised was done on 24.06.2016 and transplanting was done on 25.07.2016.

Effect of sowing methods on plant growth, seed yield and quality attributes

The direct sowing at spacing of 30 x 10 cm (S_1) was found superior in terms of field emergence, plant height, chlorophyll content, seed yield per plant, seed yield per plot and seed yield (q/ha) as compared to transplanting after 21 days at spacing 30 x 10 cm (S_2). While, days to first flowering, number of branches and 100 seed weight were recorded higher in transplanting after 21 days at spacing 30 x 10 cm (S_2).

Effect of nutrient management on plant growth, seed yield and quality attributes

Highest seed yield per plant, chlorophyll content, number of branches, panicle weight per plot, seed yield per plot and seed yield (q/ha) were recorded in N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage) followed by N_3 (50 kg Urea + 50 kg Super phosphate and 50 kg Murate of potash per ha + Top dressing with urea at 4 weeks after transplanting + 2% Borax spray at flowering stage)

Effect of priming on plant growth, seed yield and quality attributes

Highest chlorophyll content, seed yield per plant, seed yield per plot and seed yield (q/ha) were noticed in P_3 (Seed priming with 2% KH_2PO_4 for 6 hour) followed by P_4 (Seed Priming with 20% liquid *Pseudomonas fluorescens*).

Interaction effect of sowing method, nutrient management and priming on on plant growth, seed yield and quality attributes

Considering different treatments, seed priming with P_3 (seed priming with 2% KH_2PO_4 for 6 hour) with N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg super phosphate and 50 kg muriate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage) recorded higher seed yield under both transplanted and direct sown condition. It was closely followed by seed priming with P_4 (Seed priming with 20% liquid *Pseudomonas fluorescens*) in combination with N_4 (125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg Super phosphate and 50 kg muriate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage) under both direct sown and transplanted condition (Table 218).

Conclusion: It is concluded that direct sowing with fertilizer dose 125 kg Neem + 1250 kg Vermi compost/ ha + 50 kg Urea + 50 kg super phosphate and 50 kg muriate of potash per ha + Top dressing urea at 4 weeks after transplanting + 2% Borax spray at flowering stage and seed priming with 2% KH_2PO_4 for 6 hour were found better for yield and its attributing traits.

Table 218: Yield and yield attributing characters of little millet as influenced by different method of planting, nutrient management and priming

Main plot (Sow. met.)	Sub plot (Nutrient Mgt)	Sub-sub Plot (Pri-ming)	Field Em. %	Plant Ht.	Chlo-rophyll cont.	Days to first flr.	No. of branches	Panicle wt./ plot (kg)	Days to mat.	Seed yield/ plant (g)	Seed yield/ plot (kg)	100 seed wt. (g)	Seed Yield q/ha	G %	VI- I
Direct sown	N_1	P_1	115.50	59.00	26.77	56.00	4.83	0.38	87.00	2.17	0.31	0.20	5.20	49.12	586.98
		P_2	72.00	60.45	30.33	56.50	3.66	0.40	88.00	2.14	0.31	0.16	5.10	55.00	680.53
		P_3	84.75	60.90	34.42	58.00	4.50	0.41	86.00	2.16	0.30	0.22	5.03	73.00	925.80
		P_4	81.00	62.25	32.80	57.50	4.33	0.48	88.00	2.06	0.30	0.27	5.07	71.50	932.16
	N_2	P_1	92.25	55.95	28.60	59.00	4.17	0.35	87.00	2.18	0.32	0.17	5.33	62.00	758.10
		P_2	87.25	58.40	31.70	59.00	4.00	0.45	88.00	2.20	0.33	0.24	5.43	69.00	826.95
		P_3	64.50	58.65	30.50	59.00	4.50	0.48	85.00	2.35	0.32	0.18	5.32	73.25	856.16
		P_4	68.50	50.15	27.55	59.00	5.17	0.50	86.00	2.20	0.33	0.19	5.45	60.50	751.35
	N_3	P_1	123.25	60.41	29.37	58.50	4.66	0.62	87.00	2.39	0.35	0.20	5.85	54.00	716.85
		P_2	84.00	52.55	27.33	58.50	5.00	0.65	86.50	2.42	0.37	0.22	6.13	57.00	714.35
		P_3	94.25	55.23	32.60	57.50	4.00	0.68	87.00	2.62	0.34	0.22	5.72	48.50	581.10
		P_4	99.25	66.09	30.53	59.00	5.33	0.70	85.50	2.22	0.34	0.21	5.65	66.00	801.07
	N_4	P_1	66.25	61.33	33.03	57.00	4.17	0.60	87.00	2.37	0.33	0.19	5.45	70.50	857.90
		P_2	95.00	64.17	31.77	58.00	5.00	0.65	85.00	2.58	0.36	0.17	6.03	67.00	805.41
		P_3	84.50	58.00	33.07	57.50	6.15	0.75	87.00	2.74	0.41	0.18	6.83	27.25	321.32
		P_4	41.50	67.00	29.67	54.50	5.83	0.69	87.00	2.72	0.39	0.24	6.50	43.50	461.61
Trans-planted	N_1	P_1	21.00	52.66	25.86	75.50	8.17	0.65	87.00	2.13	0.31	0.22	5.22	57.33	697.78
		P_2	19.50	47.67	24.97	75.00	7.50	0.58	86.50	2.15	0.33	0.23	5.45	46.12	571.96
		P_3	21.00	43.00	26.25	76.00	7.13	0.55	86.00	2.16	0.34	0.22	5.70	68.99	776.13
		P_4	21.00	42.00	24.81	75.50	7.66	0.55	87.00	2.20	0.32	0.22	5.38	59.00	752.52
	N_2	P_1	19.00	53.83	22.43	73.50	7.67	0.50	88.00	2.27	0.33	0.20	5.47	61.50	702.37
		P_2	18.00	46.67	30.15	74.00	9.83	0.58	87.00	2.31	0.34	0.22	5.65	44.75	502.57
		P_3	19.00	50.50	30.23	73.00	7.33	0.68	86.00	2.32	0.35	0.22	5.77	64.25	748.51
		P_4	22.00	42.83	24.58	76.50	8.83	0.73	85.50	2.41	0.33	0.20	5.52	55.25	614.92
	N_3	P_1	24.50	46.67	21.22	75.00	7.33	0.53	86.50	2.34	0.34	0.21	5.72	55.99	690.18
		P_2	21.50	47.33	29.18	73.00	8.83	0.57	86.00	2.40	0.33	0.23	5.53	53.75	656.12
		P_3	18.50	55.00	29.22	74.50	6.33	0.63	85.00	2.46	0.34	0.24	5.67	44.75	547.41
		P_4	19.50	51.17	17.73	75.50	8.00	0.65	86.00	2.53	0.36	0.22	6.07	76.00	1116.55
	N_4	P_1	21.00	45.67	23.29	73.50	8.50	0.59	87.00	2.32	0.30	0.22	5.00	62.00	774.51
		P_2	22.50	43.00	20.75	76.00	8.17	0.63	86.50	2.42	0.34	0.23	5.73	48.75	515.10
		P_3	17.50	45.16	31.00	75.50	7.00	0.68	85.50	2.56	0.36	0.20	6.00	60.25	722.26
		P_4	23.50	48.00	28.60	75.50	7.33	0.65	85.00	2.49	0.35	0.20	5.83	40.75	457.35
Sowing methods (Main plot)		Direct sown	84.55	59.41	30.63	57.84	4.70	0.55	86.69	2.35	0.34	0.20	5.63	59.20	723.60
		Transplanting	20.56	47.57	25.64	74.84	7.85	0.61	86.28	2.34	0.34	0.22	5.61	56.22	677.89
Nutrient Management (Sub plot)		No fertilizer	54.47	53.49	28.27	66.25	5.97	0.50	86.94	2.15	0.32	0.22	5.27	60.01	740.49
		N_2	48.81	52.12	28.22	66.63	6.44	0.53	86.56	2.28	0.33	0.20	5.49	61.31	720.12
		N_3	60.59	54.31	27.15	66.44	6.18	0.63	86.19	2.42	0.35	0.22	5.79	57.00	727.96
		N_4	46.34	54.04	28.90	66.06	6.52	0.66	86.25	2.53	0.36	0.20	5.92	52.50	614.43
Priming (Sub-sub plot)		No priming	60.22	54.44	26.32	66.13	6.18	0.53	87.06	2.27	0.32	0.20	5.40	59.06	723.09
		P_2	52.47	52.53	28.27	66.25	6.50	0.56	86.69	2.33	0.34	0.21	5.63	55.17	659.13
		P_3	50.50	53.30	30.91	66.38	5.87	0.61	85.94	2.42	0.35	0.21	5.75	57.53	684.84
		P_4	47.03	53.68	27.03	66.63	6.56	0.62	86.25	2.35	0.34	0.22	5.68	59.06	735.94
Main plot		**CD 5%**	13.07	3.94	0.92	0.73	0.53	0.06	0.44	0.02	NS	0.01	0.03	8.70	120.70
Sub plot		**CD 5%**	18.49	5.57	1.30	1.03	0.75	0.09	0.63	0.02	NS	0.02	0.04	12.31	170.69
Sub sub plot		**CD 5%**	18.49	5.57	1.30	1.03	0.75	0.09	0.63	0.02	NS	0.02	0.04	12.31	170.69

TNAU, Coimbatore

Results: Direct sowing was significantly better than transplanted crop in little millet in terms of seed yield but the resultant seed quality of direct sown transplanting crop was on par in performance. Number of tillers and panicle per plant were on par in direct sowing and transplanting methods. The direct sowing under control recorded the plant height of 79.6 cm where as the transplanted crop under control recorded 60.5 cm, which was 20 cm lesser than direct sown crop. The fertilizer treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray in diirect sowing recorded the higher plant height of 87.2 cm compared to tranplanted crop (64.6 cm). This fertilizer treatment also could not overcome the reduced plant growth in transplanted crop. Days to first flowering differed significantly in direct sowing and transplanting. Transplanted crop was 12 days late in days to first flowering irrespective of priming and fertilizer treatments.

The direct sowing under control recorded single plant yield of 5.9 gm and seed yield per plot of 0.96 kg where as the transplanted crop under control recorded single plant yield of 4.0 gm and seed yield per plot of 0.65 kg. The fertilizer treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray in direct sowing recorded the higher single plant yield of 6.8 gm and seed yield per plot of 1.13 kg compared to transplanted crop (4.8 g and 0.77 kg, respectively). Nutrient application and priming have significant difference in the parameters studied. Fertilizer application of 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray recorded highest Number of tillers (10.5), panicles per plant (9.3) and resultant seed quality.

Priming with 20 % liquid *Pseudomonas fluorescens* combined with the treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray under direct sown recorded the highest single plant seed yield (7.5 gm) and seed yield per plot (1.24 kg) followed by priming with 20% liquid *Pseudomonas fluorescens* with the fertilizer treatment of 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray (7.4gm and 1.22 kg respectively) under direct sowing method, which are on par. But the same treatments under transplanted condition recorded the single plant seed yield of 4.8 and 4.9 g and seed yield per plot of 0.80 and 0.83, respectively (Table 219-230).

Hence it is recommended that Priming with 20% liquid *Pseudomonas fluorescens* combined with the treatment of 125 kg neem + 1250 kg vermi per ha + 50 kg urea +50 kg super phosphate + 50 kg muriate of potash + Top dressing urea + 2% Borax spray under direct sown or priming with 20 % liquid *Pseudomonas fluorescens* with the fertilizer treatment of 50 kg urea +50 kg Super phosphate + 50 kg Murate of potash + Top dressing urea + 2% Borax spray (7.4g) under direct sowing method may be followed for the seed production.

Table 219: Effect of sowing method, nutrient application and seed priming on number of tillers in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	6.7	8.1	8	8.2	6.8	7.9	8	7.8	7.7
P_2	8	8.2	9.9	10.3	7.9	8.4	9.6	9.2	8.9
P_3	8.2	7.9	9.4	9.5	8.4	7.7	9.1	9.2	8.7
P_4	9	9.4	10.5	9.2	8.4	8.5	9.7	8.6	9.2
Mean	8.0	8.4	9.5	9.3	7.9	8.1	9.1	8.7	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	2.85	4.14	3.14	3.12	2.98	3.86	4.26		
CD (P = 0.05)	8.23	8.26	6.38	6.26	6.12	7.94	8.64		

Table 220: Effect of sowing method, nutrient application and seed priming on plant height (cm) in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	78.1	81.5	84.6	80.1	59.1	61.6	64.3	61.4	71.3
P_2	80	84.8	88.6	90.3	60.4	64.8	64.8	64.6	74.8
P_3	80.5	90.6	88.4	86.8	61.5	66.7	68.2	66.8	76.2
P_4	79.6	87.7	86.7	91.5	60.8	66.6	66.5	65.7	75.6
Mean	79.6	86.2	87.1	87.2	60.5	64.9	66.0	64.6	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	2.32	3.42	2.76	4.95	6.63	5.72	3.35		
CD (P = 0.05)	4.68	6.96	5.38	9.66	13.34	11.28	6.74		

Table 221: Effect of sowing method, nutrient application and seed priming on days to first flowering in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	53.5	53.7	53.6	53.7	65.7	65.7	65.5	66	59.7
P_2	53.7	53.3	53.4	53.4	64.7	65	65.3	64.8	59.2
P_3	52.7	52.7	52.7	52.7	64.4	64.8	64.8	64.4	58.7
P_4	52.5	52.5	52.9	52.7	64.4	64.4	64.6	64.7	58.6
Mean	53.1	53.1	53.2	53.1	64.8	65	65.1	65	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.55	NS	0.22	0.23	NS	NS	0.18		
CD (P = 0.05)	1.10		0.44	0.46			0.36		

Table 222: Effect of sowing method, nutrient application and seed priming on number of panicle per plant in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	5.5	6.9	6.8	7	5.6	6.7	6.8	6.6	6.5
P_2	6.8	7	8.7	9.1	6.7	7.2	8.4	8	7.7
P_3	7	6.7	8.2	8.3	7.2	6.5	7.9	8	7.5
P_4	7.8	8.2	9.3	8	7.2	7.3	8.5	7.4	8.0
Mean	6.8	7.2	8.3	8.1	6.7	6.9	7.9	7.5	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	1.21	1.78	1.54	1.64	2.12	2.08	2.32		
CD (P = 0.05)	2.36	3.68	3.26	3.52	4.32	4.16	4.78		

Table 223: Effect of sowing method, nutrient application and seed priming on Chlorophyll content in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	59.3	62.7	65.8	61.3	61.3	63.8	66.5	63.6	63.0
P_2	61.2	66	69.8	71.5	62.6	67	67	66.8	66.5
P_3	61.7	71.8	69.6	68	63.7	68.9	70.4	69	67.9
P_4	60.8	68.9	67.9	72.7	63	68.8	68.7	67.9	67.3
Mean	60.8	67.4	68.3	68.4	62.7	67.1	68.2	66.8	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.42	0.27	0.66	0.73	0.37	1.19	1.07		
CD (P = 0.05)	0.84	0.44	1.22	1.46	0.74	2.38	2.16		

Table 224: Effect of sowing method, nutrient application and seed priming on 100 seed weight in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	0.26	0.23	0.21	0.22	0.23	0.22	0.23	0.23	0.23
P_2	0.23	0.21	0.25	0.28	0.39	0.18	0.27	0.21	0.25
P_3	0.26	0.22	0.24	0.22	0.25	0.24	0.22	0.24	0.24
P_4	0.23	0.33	0.31	0.28	0.24	0.28	0.21	0.26	0.27
Mean	0.25	0.25	0.25	0.25	0.28	0.23	0.23	0.23	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.56	0.72	0.34	1.04	0.82	0.45	0.52		
CD (P = 0.05)	1.22	1.56	0.72	2.14	1.72	0.92	1.06		

Table 225: Effect of sowing method, nutrient application and seed priming on single plant yield (gm) in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	5.8	4.2	5.8	6.1	4.2	2.7	4.3	4.5	4.7
P_2	5.9	5.6	6.9	6.9	3.8	4.9	4.7	4.5	5.4
P_3	6.2	4.9	6.4	7	3.9	5.1	4.9	5.1	5.4
P_4	5.5	5.9	7.4	7.5	4.1	3.9	5.5	4.9	5.6
Mean	5.9	5.2	6.6	6.8	4.0	4.2	4.9	4.8	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.56	0.83	0.38	1.21	1.86	1.92	1.36		
CD (P = 0.05)	1.12	1.68	0.76	2.42	3.74	3.86	2.76		

Table 226: Effect of sowing method, nutrient application and seed priming on single plant yield (kg) in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	0.95	0.68	0.95	1.00	0.68	0.42	0.70	0.73	0.76
P_2	0.97	0.92	1.14	1.14	0.61	0.80	0.76	0.73	0.88
P_3	1.02	0.80	1.05	1.16	0.63	0.83	0.80	0.83	0.89
P_4	0.90	0.97	1.22	1.24	0.66	0.63	0.90	0.80	0.92
Mean	0.96	0.84	1.09	1.13	0.65	0.67	0.79	0.77	
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	1.24	1.12	1.45	2.24	1.64	1.82	1.27		
CD (P = 0.05)	2.35	2.26	2.92	4.46	3.28	3.64	2.54		

Table 227: Effect of sowing method, nutrient application and seed priming on resultant seed germination in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	91	91	92	93	91	93	90	90	91
P_2	91	92	91	91	92	91	91	91	91
P_3	91	91	91	91	91	91	90	92	91
P_4	91	92	92	92	91	92	91	91	92
Mean	91	92	92	92	91	92	91	91	91
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	NS	0.24	NS	0.22	NS	0.26	0.28		
CD (P = 0.05)		0.48		0.44		0.52	0.56		

Table 228: Effect of sowing method, nutrient application and seed priming on resultant seed shoot length (cm) in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	4.45	4.57	5.64	6.07	4.55	6.07	3.70	3.57	4.83
P_2	4.07	4.61	4.41	4.07	6.18	4.11	4.96	4.41	4.60
P_3	4.54	4.51	4.74	4.55	4.82	4.74	3.46	4.07	4.43
P_4	4.61	5.64	5.41	5.07	4.74	5.07	4.43	4.90	4.98
Mean	4.42	4.83	5.05	4.94	5.07	5.00	4.14	4.24	4.71
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.54	0.67	0.43	0.34	0.36	0.49	0.67		
CD (P = 0.05)	1.14	1.16	0.88	0.68	0.72	0.98	1.36		

Table 229: Effect of sowing method, nutrient application and seed priming on resultant seed root length (cm) in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	8.24	8.66	8.13	8.46	8.94	8.46	8.09	9.96	8.62
P_2	8.46	9.80	8.80	8.46	10.57	8.50	9.35	8.80	9.09
P_3	9.33	8.90	9.13	8.94	9.21	9.13	9.85	9.46	9.24
P_4	9.00	10.03	9.80	9.46	9.13	9.46	8.82	9.29	9.37
Mean	8.76	9.35	8.97	8.83	9.46	8.89	9.03	9.38	9.08
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	0.12	0.17	0.21	0.32	0.21	0.26	0.19		
CD (P = 0.05)	0.25	0.36	0.44	0.62	0.44	0.54	0.42		

Table 230: Effect of sowing method, nutrient application and seed priming on resultant seed vigour index in little millet

Treatments	S_1				S_2				
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4	Mean
P_1	1250	1231	1456	1532	1232	1532	1065	1217	1314
P_2	1137	1325	1201	1137	1547	1144	1307	1201	1250
P_3	1267	1220	1267	1227	1276	1267	1197	1240	1245
P_4	1243	1447	1399	1332	1267	1332	1210	1291	1315
Mean	1224	1306	1331	1307	1331	1319	1195	1237	1281
	P	N	S	PXN	PXS	SXN	SXNXP		
SEd	24	26	32	24	34	36	27		
CD (P = 0.05)	48	54	66	52	70	72	56		

Experiment 8 : Planting windows for quality seed production of soybean in offseason

Objective:

1. To standardize best planting date for off season soybean seed production

Centres and varieties

1. UAS- Dharwad (Dharwad and Haveri) - DB 21 (Oct. to January end)
2. UAS, Bangalore - JS 335 (Mandya) (in paddy fallows Nov. to Jan.)

3. MAU, Parbhani - MAUS 162 (Oct. to January end)
4. PJTSAU, Hyderabad - JS 335 (Andhra and Telangana) (Oct. to January end)
5. UAS, Raichur - JS 335 and DSV 21 (Nov. to January)
6. JNKVV, Jabalpur - JS 20-34 and JS 20-29 (Nov. to Jan. End)
7. MPKV, Rahuri - JS 335 and MAUS 162 (Sept. to January)

Methodology:

Design	:	FRBD	**Replication**	:	Three
Plot size	:	3.6 m × 5.0 m	**Sowing**	:	Ridges and furrow sowing
Spacing	:	45×5 cm			

Fertilizer & Micro nutrients - 50% higher dose than RDF 20:80:40 kg/ha ((415kgDAP /ha)), Ridge sowing + soil application of $ZnSO_4$ @ 30 kg/ha along with foliar spray @ 0.5% at 48 and 56 days after sowing

Observations to be recorded:

A. Growth and yield parameters

1. Field emergence (%)
2. Days to 50% flowering
3. Plant height (cm)
4. Number of primary branches per plant
5. Number of pods per plant
6. Days to flowering
7. Days to maturity
8. Number of seeds per pod
9. Seed yield per ha.
10. Harvest index (%)

B. Pod characteristics

1. Days to 1st flower bud
2. Days to 1st flower
3. Days to pod maturity
4. Length of pods (cm)
5. Diameter of pods (cm)
6. Shattering (%)

C. Seed Morphometry (Image Analysis)

1. Length of seed (mm)
2. Width of seed (mm)
3. Area of seed (mm^2)
4. Seed Diameter (mm)
5. Seed perimeter (mm)
6. Seed roundness

D. Biochemical parameters

1. Protein content (%)
2. Oil content (%)

Storage Study: The seeds from offseason production will be evaluated for seed quality parameters at monthly interval: Germination (%); Moisture Content; Seed Vigour; Seed Mycoflora and Electrical conductivity

UAS Bangalore

Variety : JS-335; **Sowing Dates:** First sowing was done on 9-11-2016 and later sowings at every 15 days interval

Results: The first off-season sowing of soybean variety JS-335 was carried out on 9-11-2016 and later sowings were carried out at 15 days interval. Totally six sowings were carried out and the trial was laid under FRBD with

three replications. The field observations *viz.* field emergence (%) and plant height have been recorded and the crop is at vegetative stage and experiment is in progress.

General view of the crop in the field

PJTSAU, Hyderabad

Experimental details (2016-17)

Variety : JS 335, Basar and DSB 1

Season and Dates of sowing

SRTC, Hyderabad: 06.09.2016, 21.09.2016, 5.10.2016, 9.11.2016, 23.11.2016, 9.12.2016, 23.12.2016 and 09.1.2017. Crop sown on 06.09.2016, 21.09.2016 and 5.10.2016 failed to germinate due to incessant rains. Crop is at flowering to podding stage and the experiment is in progress.

RARS, Palem: Sowing of JS 335, DSB 1 and Basar was done on 06.09.2016, 21.09.2016, 6.10.2016 and 26.11.2016. Crop sown on 06.09.2016 is harvested and recording of data is in progress. The the experiment is in progress.

RARS, Warangal: Sowing of Basar variety was done on 15.09.2016, 29.09.2016, 14.10.2016, 29.10.2016, 15.11.2016, 30.11.2016, 15.12.2016 and 29.10.2016. Crop sown on 15.09.2016 is harvested and recording of data is in progress.

Result (2015-16)

SRTC, Hyderabad (*Kharif*): Sowing of soybean variety, JS 335 on 01.07.2015 has resulted in a seed yield of 5.32 q/ha. As the sowings were delayed by 15 days and 45 days, the reduction in yield was 18.52% and 50.87%, respectively. The per cent reduction in pod number and test weight was 57.64% and 9.25%, respectively. However, the seed from later sowings i.e., August sowing exhibited maximum seedling vigour of 2401 with a germination of 89% in contrast to sowing on 01.07.2015. The per cent reduction in oil was 21.64% when the sowing was delayed by 45 days. Similar decrease in length, width, thickness, area and perimeter of the seed was also noticed by delayed sowings (Table 231-232).

ARS, Mudhole (*Rabi*): Sowing of soybean variety, JS 335 on 17.10.2015 has resulted in a seed yield of 4.02 q/ha. As the sowings were delayed by 15 days and 30 days, the reduction in yield was 39.3% and 76.9%, respectively. Similar reduction in pod number and test weight was noticed with delayed sowings. The seed obtained from the crop sown on 17.10.2015 recorded higher germination (99.5%) and seedling vigour (2990) as compared to sowings done on 02.11.2015 (99.3 and 1576) and 17.11.2015 (97.3 and 1443) (Table 233-234).

ARS, Adilabad (summer): Sowing of JS 335 was done on 13.1.2016, 20.1.2016 and 27.1.2016. Due to higher temperatures, plant growth and plant height were not satisfactory and even after continuous irrigations, pods were dried without any seed set.

Field view of offseason soybean (Basar) at RARS, Warangal

Table 231: Influence of sowing dates on seed quality parameters of JS 335 during *Kharif*, 2015

Dates of sowing	Germination (%)		Root length (cm)		Shoot length (cm)		Total seedling length (cm)		Seedling vigour index I	
	0 M	IM	0 M	IM	0 M	IM	0 M	IM	0 M	IM
01.07.2015	79.6	78.2	12.7	9.4	11.8	8.4	23.9	17.9	1905	1400
15.07.2015	89.9	83.7	13.1	8.7	11.2	8.5	24.9	17.2	2239	1440
14.08.2015	88.6	83.7	15.4	9.7	11.8	8.0	27.1	17.7	2401	1484
Mean	86.0	81.9	13.7	9.3	11.6	8.3	25.3	17.6	2182	1443
S.Em.	2.76	2.48	0.55	0.33	0.41	0.38	0.90	0.41	108.65	60.03
S.Ed.	3.91	3.51	0.78	0.46	0.58	0.54	1.27	0.58	153.63	84.9
C.D.	**8.51**	**7.66**	**1.70**	**1.01**	**1.27**	**1.18**	**2.78**	**1.26**	**334.90**	**185.1**
C.V.(%)	**8.50**	**8.03**	**10.64**	**9.31**	**9.41**	**12.16**	**9.42**	**6.14**	**13.17**	**11.0**

Table 232: Influence of dates of sowing on seed morphometric parameters of JS 335 during *Kharif*, 2015

Dates of sowing	Seedling dry weight (g)		SVI II		Electrical conductivity (µs)	Protein content (%)	Oil (%)
	0 M	IM	0 M	IM			
01.07.2015	1.04	1.10	82.9	82.3	37.8	37.32	27.62
15.07.2015	0.88	1.10	79.1	88.9	40.3	33.94	26.51
14.08.2015	0.87	0.80	77.2	68.6	39.2	36.08	20.40
Mean	0.93	0.98	79.7	79.9	39.11	35.78	24.84
S.Em.	0.03	0.02	3.70	3.19	1.73	0.65	0.57
S.Ed.	0.04	0.03	5.23	4.51	2.44	0.92	0.81
C.D.	**0.09**	**0.07**	**11.40**	**9.83**	**6.78**	**2.55**	**2.24**
C.V.(%)	**8.42**	**5.79**	**12.28**	**10.6**	**7.64**	**3.15**	**3.98**

Table 233: Influence of sowing dates on yield and yield components of JS 335 during *Rabi*, 2015 (ARS, Mudhole)

Dates of sowing	Days to 50% flowering	Plant height (cm)	Number of branches/ plant (no.)	Pods/ plant (no.)	100 seed weight (g)	Seed yield/ plant (g)	Seed yield/ plot	Seed yield/ ha
17.10.2015	35.8	36.5	7.4	49.1	8.32	17.10	1.81	4.02
02.11.2015	37.3	30.0	5.5	37.3	7.62	10.23	1.10	2.44
17.11.2015	39.2	28.0	4.4	30.3	7.83	5.98	0.42	0.93
Gr. Mean	37.4	31.5	5.8	38.9	7.92	11.11	1.11	2.47
S.Em.	0.43	1.29	0.29	2.50	0.24	0.61	0.04	0.08
S.Ed.	0.61	1.83	0.40	3.54	0.33	0.86	0.05	0.12
C.D.	**1.36**	**4.07**	**0.90**	**7.88**	**0.73**	**1.91**	**0.12**	**0.26**
C.V.(%)	**2.83**	**10.06**	**12.13**	**15.75**	**7.87**	**13.38**	**8.12**	**8.12**

Table 234: Influence of sowing dates on seed quality parameters of JS 335 during *Rabi*, 2015 (ARS, Mudhole)

Dates of sowing	Germination (%)	Root length (cm)	Shoot length (cm)	Total seedling length (cm)	Seedling vigour index - I
17.10.2015	99.5	16.7	13.3	30.1	2990
02.11.2015	99.3	6.6	9.3	15.9	1576
17.11.2015	97.3	6.3	8.5	14.8	1443
Gr. Mean	98.7	9.9	10.4	20.3	2003
S.Em.	0.53	0.30	0.40	0.51	53.27
S.Ed.	0.75	0.43	0.57	0.72	75.32
C.D.	**1.61**	**0.92**	**1.21**	**1.54**	**161.18**
C.V. (%)	**1.52**	**8.68**	**10.93**	**7.12**	**7.52**

JNKVV, Jabalpur

Results: The experiment was laid out using two soybean varieties viz., JS 20-34 and JS 20-29 in FRBD with seven sowing dates. The first date of sowing was 20.11.2015 and subsequently six sowings were done in 15 days interval. The observation on yield and its attributing characters were recorded as per the technical programme. JS 20-34 is early maturing variety compared to JS 20-29 which is a late maturing variety. The early sowing dates yielded higher than the late sowing dates. JS 20-29 yielded better than JS 20-34 in all the dates of sowing. Both the varieties yielded almost negligible in the late sowing dates due to its late maturity characteristic and environmental factors. The size of seeds also declined significantly with late sowing dates. Protein and oil quality also deteriorated with late sowing dates due to various environmental factors (Table 235).

Conclusion: Therefore, it is concluded that the variety JS 20-29 and JS 20-34 could be recommended for sowing upto December 20, as these dates found at par for yield and other parameters.

Table 235: Effect of planting windows on yield and attributing traits for quality seed production of soybean in off-season (2015-16)

Main treatment	Sub treatment	Field emergence (%)	Days to 50% flowering	Plant height (cm)	No. of branches/ plant	No. of pods/ plant	Days to flowering	Days to maturity
JS 20-34	20.11.15	62.00	59.00	26.20	1.40	13.10	63.50	80.00
	5.12.15	44.50	56.00	32.17	2.17	18.33	61.50	118.00
	20.12.15	40.50	54.50	25.00	2.00	20.17	61.50	113.00
	5.1.16	44.50	60.00	24.50	1.83	6.17	64.50	108.00
	20.1.16	41.00	47.00	21.51	2.33	5.50	53.00	99.00
	5.2.16	86.00	39.00	27.17	2.00	5.83	45.00	91.00
	20.2.16	93.50	34.00	24.83	1.67	3.67	42.00	85.00
JS 20-29	20.11.15	57.50	83.00	85.67	1.00	261.00	88.50	150.00
	5.12.15	41.50	80.00	82.66	1.00	189.83	85.00	143.00
	20.12.15	41.00	79.00	75.50	2.00	220.50	84.00	134.00
	5.1.16	61.50	75.00	80.50	1.67	27.00	79.50	121.00
	20.1.16	69.00	66.00	76.33	2.33	15.50	71.00	109.00
	5.2.16	68.00	60.00	79.33	1.17	22.00	64.50	98.00
	20.2.16	83.50	53.00	70.66	1.67	8.00	57.50	91.00
Varieties	JS 20-34	58.86	49.93	25.91	1.91	10.39	55.86	99.14
	JS 20-29	60.29	70.86	78.66	1.55	106.26	75.71	120.86
	Sem±	0.56	0.15	2.45	0.17	9.73	0.28	0.00
	CD 5%	1.21	0.33	5.29	0.37	21.01	0.62	0.00
Sowing Dates	20.11.15	59.75	71.00	55.93	1.20	137.05	76.00	115.00
	5.12.15	43.00	68.00	57.41	1.58	104.08	73.25	130.50
	20.12.15	40.75	66.75	50.25	2.00	120.33	72.75	123.50
	5.1.16	53.00	67.50	52.50	1.75	16.58	72.00	114.50
	20.1.16	55.00	56.50	48.92	2.33	10.50	62.00	104.00
	5.2.16	77.00	49.50	53.25	1.58	13.92	54.75	94.50
	20.2.16	88.50	43.50	47.75	1.67	5.83	49.75	88.00
	Sem±	1.48	0.41	6.48	0.45	25.73	0.76	0.00
	CD 5%	3.21	0.88	13.99	0.97	55.59	1.63	0.00

Contd.

Main treatment	Sub treatment	No. of seeds/pod	Seed yield (q/ha)	HI (%)	Days to 1st flower bud initiation	Days to first flower	Days to pod maturity	Length of pods (cm)	Diameter of pods (cm)
JS 20-34	20.11.15	2.70	7.19	58.52	53.50	56.00	80.00	4.13	0.88
	5.12.15	2.66	5.49	56.22	50.50	52.50	118.00	3.98	0.87
	20.12.15	2.50	2.78	52.70	49.00	51.50	113.00	3.87	0.75
	5.1.16	1.66	0.69	48.11	55.00	57.50	108.00	3.80	0.80
	20.1.16	1.17	0.41	47.68	41.50	*43.00*	99.00	2.75	0.79
	5.2.16	1.33	0.35	43.99	35.00	37.00	91.00	2.21	0.77
	20.2.16	1.33	0.11	42.12	29.00	31.00	85.00	1.84	0.73

JS 20-29	20.11.15	2.83	9.47	49.73	76.50	78.50	150.00	4.05	0.86
	5.12.15	2.67	7.45	53.34	74.00	76.00	143.00	4.43	0.77
	20.12.15	2.67	6.55	50.93	73.50	74.50	134.00	4.33	0.74
	5.1.16	1.83	1.31	46.86	68.50	71.00	121.00	4.44	0.77
	20.1.16	1.50	0.49	47.01	60.50	62.00	109.00	3.19	0.71
	5.2.16	1.00	0.56	43.13	61.00	63.00	98.00	2.58	0.75
	20.2.16	1.17	0.37	43.34	76.50	78.50	91.00	1.60	0.69
Varieties	JS 20-34	1.91	2.43	49.90	44.79	46.93	99.14	3.22	0.80
	JS 20-29	1.95	3.74	47.76	70.07	71.93	120.86	3.52	0.75
	Sem±	0.13	0.06	0.24	0.25	0.27	0.00	0.06	0.02
	CD 5%	0.27	0.14	0.53	0.55	0.59	0.00	0.14	0.04
Sowing Dates	20.11.15	2.77	8.33	54.12	65.00	67.25	115.00	4.09	0.87
	5.12.15	2.66	6.47	54.78	62.25	64.25	130.50	4.21	0.82
	20.12.15	2.58	4.66	51.82	61.25	63.00	123.50	4.10	0.75
	5.1.16	1.75	1.00	47.48	61.75	64.25	114.50	4.12	0.79
	20.1.16	1.33	0.45	47.34	51.00	52.50	104.00	2.97	0.75
	5.2.16	1.17	0.45	43.56	48.00	50.00	94.50	2.39	0.76
	20.2.16	1.25	0.24	42.73	52.75	54.75	88.00	1.72	0.71
	Sem±	0.33	0.16	0.65	0.67	0.73	0.00	0.16	0.05
	CD 5%	0.71	0.36	1.40	1.45	1.57	0.00	0.36	0.10

MPKV, Rahuri

Experimental details:

Variety: Phule Agrani

The planting windows are as follows:

***A) Kharif* 2015**

S_1: 1 June S_2: 15 June S_3: 30 June S_4: 15 July S_5 : 30 July

B) *Rabi* 2015

S_6:15 September S_7: 1 October S_8: 15 October S_9 : 30 October S_{10} : 15 November

C) Summer 2016

S_{11}: 15 December S_{12}: 30 December S_{13}: 15 January S_{14}: 30 January S_{15} : 15 February

Results: The soybean at different sowing dates had significant effect on phenology, morphometry, seed yield and quality. Seed sown at 15th June (S_2) recorded the highest field emergence (73.25%), days to 1st flower bud (38. 33), days to 1st flower open (41.33), days to 50% flowering (47.00), number of primary branches/plant (13.40), number of pods/plant (174.80), pod length (4.24 cm), 100 seed weight (11.76 g), seed yield/plot (3.494 kg), seed yield/ha (1941.58 kg). seed length (6.69 mm), seed width (4.88 mm), surface area (76.67 mm) and

roundness (89.41mm). For the alternative window of seed production of soybean, the sowing at 15th January was found to be the best in offseason sowing. The data presented in Table 6 revealed that the seed harvested from June sowing maintained their seed quality as per IMSCS up to 8 month. The seed quality decreased as storage period extended (Table 236-238).

Exprimental plot at MPKV, Rahuri

Table 236: Effect of sowing dates on phenology, yield and seed quality of soybean

Treatments Sowing at	Field emergence (%)	Days to 1st flower bud	Days to 1st flower open	Days to 50% flowering	Plant height (cm)	No. of primary branches/ plant	No. of pods/ plant	No. of seeds/ pod	Length of pod (cm)	Days to maturity
1st June (S_1)	64.75 (53.58)	38.33	41.33	46.33	82.27	10.67	128.93	2.93	3.71	93.67
15th June (S_2)	73.25 (58.85)	38.33	41.33	47.00	84.33	13.40	174.80	2.93	4.24	97.67
30th June (S_3)	70.17 (56.88)	37.00	42.00	46.33	85.33	11.93	150.53	2.67	3.95	94.67
15th July (S_4)	40.92 (39.74)	37.33	40.00	45.00	68.53	10.40	119.87	2.60	3.68	92.67
30th July (S_5)	36.17 (36.95)	38.00	43.00	46.00	62.33	7.13	79.20	2.40	3.18	92.67
15th September (S_6)	35.83 (36.75)	35.67	41.00	43.33	40.17	7.00	78.67	2.00	3.73	91.67
1st October (S_7)	47.42 (43.50)	37.67	40.67	45.33	36.50	7. 33	49.00	2.00	3.30	97.00
15th October (S_8)	56.33 (48.62)	37.67	42.00	47.67	54.67	10.67	50.00	2.00	3.63	97.00
30th October (S_9)	51.67 (45.94)	36.00	40.00	42.67	53.00	7. 33	79.00	2.00	2.97	98.67
15th November (S_{10})	38.58 (38.38)	35.33	39.67	42.33	46.33	9.67	43.67	2.33	3.33	104.33
15th December (S_{11})	70.17 (56.89)	32.33	36. 33	40.67	46.00	12.67	39.00	2.67	3.97	92.00
30th December (S_{12})	66.95 (54.91)	31.67	35.67	41.33	43.67	11.33	90.00	2.67	3.77	98.33
15th January (S_{13})	59.17 (50.33)	32.33	36.00	42.33	44.00	8.67	96.67	2.67	3.70	94.33
30th January (S_{14})	44.08 (41.54)	37.33	37.33	42.33	40.67	8.00	35.00	2.67	3.20	90.33
15th February (S_{15})	35.75 (36.60)	32.67	32.67	41.33	33.33	6. 33	32.33	2.00	2.70	90.00
SE ±	**1.77**	**0.406**	**0.324**	**0.363**	**2.27**	**0.675**	**7.85**	**0.202**	**0.130**	**0.493**
CD at 5%	**5.16**	**1.181**	**0. 942**	**1.057**	**6.60**	**1.965**	**22.86**	**0.587**	**0.379**	**1.435**

Table 237: Yield, seed morphometry and biochemical parameters influenced due to different sowing dates in soybean

Treatments	100 seed weight (g)	Seed yield/ plot (kg)	Seed yield/ ha (kg)	Seed length (mm)	Seed width (mm)	Surface area (mm)	Roundness (mm)	Protein content (%)	Oil content (%)
1st June (S_1)	10.90	2.444	1357.76	6.47	4.48	74.00	87.59	35.47	17.07
15th June (S_2)	11.76	3.494	1941.28	6.69	4.88	76.67	89.41	37.33	17.49
30th June (S_3)	11.14	2.731	1517.02	6.59	4.54	74.60	88.25	37.45	19.79
15th July (S_4)	10.87	2.418	1343.51	6.18	4.66	70.00	83.85	36.72	17.15
30th July (S_5)	10.72	2.286	1276.65	6.10	3.89	67.50	79.49	36.06	15.93
15th September (S_6)	7.63	0.807	448.52	5.17	3.82	64.81	75.47	36.08	17.43
1st October (S_7)	7.19	0.898	499.08	5.43	3.51	66.46	72.51	37.16	18.04
15th October (S_8)	8.68	1.775	986.12	5.26	3.66	63.52	71.99	36.64	18.53
30th October (S_9)	6.21	0.702	389.82	5.28	3.73	55.20	73.33	36.65	18.31
15th November (S_{10})	8.34	0.964	535.56	5.30	3.53	55.69	72.13	36.58	18.72
15th December (S_{11})	9.60	1.656	920.19	5.46	3.85	61.86	74.12	36.40	18.91
30th December (S_{12})	6.27	1.857	1031.49	5.69	3.60	62.19	72.84	36.69	18.12
15th January (S_{13})	9.25	2.087	1159.45	5.37	3.66	65.21	71.86	37.12	18.16
30th January (S_{14})	5.51	0.625	347.04	5.80	3.14	53.35	71.89	36.75	17.58
15th February (S_{15})	4.88	0.580	322.22	5.15	3.14	50.71	70.26	36.92	16.17
SE ±	**0.158**	**0.131**	**72.61**	**0.118**	**0.067**	**0.669**	**0.626**	**0.507**	**0.395**
CD at 5%	**0. 459**	**0.185**	**211.42**	**0.342**	**0.194**	**1.941**	**1.818**	**NS**	**1.146**

Table 238: Effect of sowing dates on seed quality of soybean during storage

Treatments	Germination (%)					Root shoot length (cm)				
	Initial	60 DAS	120 DAS	180 DAS	240 DAS	Initial	60 DAS	120 DAS	180 DAS	240 DAS
1st June (S_1)	80.3 (63.69)	79.0 (62.75)	76.7 (61.15)	75.3 (60.26)	69.67 (56.58)	29.97	25.87	24.07	21.07	17.17
15th June (S_2)	96.0 (78.59)	91.0 (72.56)	89.7 (71.25)	84.0 (66.72)	75.00 (60.00)	33.40	30.03	28.23	25.23	21.33
30th June (S_3)	93.7 (75.58)	91.7 (73.39)	88.3 (70.02)	83.7 (66.25)	77.00 (61.33)	32.73	29.77	27.97	24.96	21.07
15th July (S_4)	81.0 (64.15)	81.0 (64.21)	77.7 (61.82)	76.00 (60.69)	72.3 (58.26)	31.47	29.67	27.87	24.86	20.96
30th July (S_5)	89.3 (70.91)	84.3 (66.66)	82.7 (65.38)	80.7 (63.90)	71.7 (57.84)	26.53	24.33	22.53	19.53	15.63
15th September (S_6)	82.3 (65.12)	79.0 (62.70)	75.3 (60.19)	73.0 (58.67)	67.7 (55.34)	32.30	30.27	28.47	25.47	21.57
1st October (S_7)	90.0 (71.71)	85.7 (67.89)	80.3 (63.77)	77.3 (61.60)	69.0 (56.16)	31.57	29.53	27.73	24.73	20.83
15th October (S_8)	80.3 (63.67)	78.0 (62.02)	75.3 (60.23)	72.7 (58.49)	69.7 (56.57)	34.03	22.97	21.17	18.17	14.27
30th October (S_9)	89.7 (71.38)	84.7 (67.00)	83.0 (65.70)	76.0 (60.69)	72.7 (58.47)	27.07	30.17	28. 36	25.37	21.47
15th November (S_{10})	82.3 (65.13)	78.7 (62.48)	74.7 (59.78)	70.3 (56.98)	68.7 (55.95)	25.32	22.83	21.03	18.03	14.13

15th December (S_{11})	93.7 (75.46)	90.3 (71.89)	85.0 (67.23)	75.0 (59.99)	71.7 (57.84)	31.77	28.90	27.10	24.10	20.20
30th December (S_{12})	93.0 (74.65)	88.3 (70.05)	84.0 (66.53)	78.7 (62.51)	70.7 (57.19)	32.30	29.20	27.40	24.40	20.50
15th January (S_{13})	90.7 (72.33)	85.7 (67.80)	85.0 (67.32)	79.0 (62.70)	72.3 (58.26)	34.03	31.26	29.47	26.47	22.57
30th January (S_{14})	79.7 (63.17)	75.3 (60.20)	72.7 (58.47)	68.0 (55.55)	64.0 (53.12)	25.16	23.32	21.53	18.53	14.62
15th February (S_{15})	78.0 (62.01)	74.0 (59. 33)	72. 3 (58.25)	68.0 (55.54)	66.0 (54.34)	23.10	21.80	20.00	17.00	13.10
SE ±	**1.194**	**1. 229**	**1. 360**	**1.489**	**1.023**	**0.889**	**0.989**	**0.989**	**0.989**	**0.989**
CD at 5%	**3.466**	**3.566**	**3.948**	**4.320**	**2.968**	**2.579**	**2.869**	**2.869**	**2.869**	**2.869**

Contd…Effect of sowing dates on seed quality of soybean during storage.

Treatments	Dry matter content					Vigour Index I					Vigour Index II				
	Initial	60 DAS	120 DAS	180 DAS	240 DAS	Initial	60 DAS	120 DAS	180 DAS	240 DAS	Initial	60 DAS	120 DAS	180 DAS	240 DAS
1st June (S_1)	1.09	0.98	0.79	0.74	0.69	2405.9	2041.9	1843. 4	1585.2	1195.5	87.2	77.1	60.2	55.9	48.9
15th June (S_2)	1.28	1.17	0.98	0.89	0.84	3206.5	2733.9	2532.5	2123.9	1601.8	122.6	106.2	87.6	74.2	63.0
30th June (S_3)	1.11	1.00	0.81	0.76	0.72	3064.0	2727.6	2469.9	2087.3	1622.7	104.0	91.7	71.6	64.0	55.5
15th July (S_4)	1.07	0.96	0.77	0.74	0.66	2548.9	2405.5	2166.5	1892.4	1517.3	86.5	77.7	59.8	56.3	47.6
30th July (S_5)	1.03	0.92	0.73	0.68	0.64	2370.1	2052.1	1865.9	1577.8	1113.9	92.4	78.0	60.8	55.1	46.0
15th September (S_6)	1.23	1.12	0.94	0.78	0.66	2660.4	2390.9	2144.3	1858.8	1459.8	101.8	89.0	70.5	56.9	44.6
1st October (S_7)	1.09	0.97	0.79	0.71	0.66	2839.6	2533.7	2230.7	1915.2	1435.1	97.9	83.8	63.5	55.2	45.1
15th October (S_8)	0.98	0.86	0.68	0.65	0.61	2736.4	1791.2	1595.9	1322.1	996.1	78.3	67.5	50.7	46.8	42.7
30th October (S_9)	1.23	1.11	0.93	0.68	0.68	2430.2	2561.4	2360.9	1936.0	1562.3	109.8	94. 3	76.6	51.7	48.9
15thNovember (S_{10})	0.98	0.87	0.68	0.64	0.61	2084.3	1798.5	1573.7	1270.1	969.6	80.7	68.5	50.9	45.2	41.7
15th December (S_{11})	1.16	1.05	0.86	0.69	0.64	2975.6	2612.7	2303.4	1807.4	1446.0	108.7	94.9	73.2	51.4	45.9
30th December (S_{12})	1.10	0.99	0.80	0.62	0.62	3002.9	2579.2	2302.2	1920.2	1449.0	101.9	87.0	66.6	48.5	43.6
15th January (S_{13})	1.23	1.15	0.96	0.80	0.73	3087.8	2678.4	2507.1	2091.6	1632.9	113.7	98.0	81.0	63.2	52.6
30th January (S_{14})	0.94	0.83	0.72	0.68	0.65	2004.2	1756.1	1565.6	1263.2	934.4	75.1	62.7	52.4	46.2	41.6
15th February (S_{15})	0.96	0.85	0.72	0.69	0.65	1802.6	1612.6	1445. 3	1155.5	867.4	74.6	62.7	52.2	46.7	43.0
SE ±	**0.063**	**0.063**	**0.058**	**0.043**	**0.064**	**90.57**	**105.06**	**108.47**	**104.60**	**75.91**	**5.18**	**5.12**	**4.75**	**3. 33**	**3.17**
CD at 5%	**0.182**	**0.182**	**0.169**	**0.126**	**NS**	**262.84**	**304.92**	**314.80**	**303.59**	**220.3**	**15.04**	**14.8**	**13.78**	**9.67**	**9.19**

Experiment 9 : Encrustation enabled direct seeding technology of small seeded crops

Objectives :

1. To study efficacy of direct seeding of encrusted small seeded vegetable crops.
2. Evaluation of seed encrusting and seed pelleting with applied additives & actives

Crop	:	Centres
Onion (Pusa Red)		IARI, New Delhi; UAS, Dharwad; JNKVV, Jabalpur; RARI, Durgapura
Carrot (Pusa Fudhira)	:	IARI, New Delhi; UAS, Dharwad
Mustard (Pusa Vijay)	:	UAS, Dharwad; JNKVV, Jabalpur; OUAT, Bhubaneswar

Berseem (BJ 1 or Wardan) : ANGRAU, Hyderabad; JNKVV, Jabalpur

Rape seed (TS 44) : AAU, Jorhat; ICAR RC NEHR- Manipur Centre

Observations

1. Emergence after 15 days and 45 days
2. Plant height
3. Seedling vigour in field
4. Phonological parameters
5. Disease and pest rating
6. Fruit and seed yield parameters
7. All the yield attributing characters

   Onion : No. of branches, bulb weight, bulb diameter and bulb yield

   Carrot : Plant height, no. of leaves, root diameter, root length, fresh weight of roots / plant and yield / plant

   Sesame : Days to 50% flowering, days to maturity, plant height, no. of capsules, no. of seeds / capsule, 1000 seed weight and seed yield / plant

   Mustard : Plant height, no. of branches, siliqua per plant, seeds per siliqua, test weight of 100 seeds and seed yield / plant

   Berseem : Plant height, no. of tillers / plant, plant height, days to 50 % flowering (from cut date), days to maturity, no. of flowers / inflorescence, no. of seeds / inflorescence, ovule to seed ratio, no. of seeds, length of inflorescence, 1000 seed weight and seed yield (q/ha)

   Rapeseed : Plant height, no. of primary branches at harvest, no. of secondary branches at harvest, siliqua / plant, seeds / siliqua, seed yield / plant and test weight of 100 seeds
8. Final plant stand
9. Seed quality
10. Economics and Benefit : Cost ratio

Onion (Pusa Red)

IARI, New Delhi

Results (2015-16): The data on effect of treatments, sowing dates and methods of planting on onion bulb yield (t/ha) have been given in table 1. Significant effect of treatments, sowing methods and sowing dates was observed on bulb yield in onion.

The seeds encrusted with 1:1.2 buildup with Thiram and Mycorrhiza (T_4) resulted in significantly higher bulb yield (24.8t/ha) as compared to all other treatments. The bulb yield in transplanted crop was significantly higher (25.8 t/ha) than the direct seeded crop (19.3 t/ha). It was mainly because of the poor plant stand in direct seeded plots. It was also observed that the bulb yield in November 7th sowing was significantly higher than the crop sown on November 27. This could be attributed to 20 days longer period available for the early crop to

Table 239: Effect of treatments, sowing dates and methods of planting on bulb yield (t/ha) in onion

Sowing Method	Sowing Dates	Treatments					
		T_1	T_2	T_3	T_4	T_5	Mean
Direct	Nov 7*	28.80	31.20	34.66	36.00	28.54	**31.84**
	Nov 27	05.90	07.40	09.30	05.90	05.70	**6.84**
	Mean	**17.35**	**19.3**	**21.98**	**20.95**	**17.12**	**19.34**
Transplanted*	Nov 7	30.84	38.34	30.04	40.04	25.04	**32.86**
	Nov 27	19.26	18.96	19.46	17.24	19.24	**18.83**
	Mean	**25.05**	**28.65**	**24.75**	**28.64**	**22.14**	**25.84**
Grand Mean		**21.20**	**23.98**	**23.37**	**24.80**	**19.63**	**22.59**

CD (p=0.05) Sowing Method (A) = 0.93	**CD (p=0.05) AXBXC = 2.94**	
CD (p=0.05) Sowing Dates (B) = 0.93	**AXB=1.31**	**BXC=2.08**
CD (p=0.05) Treatments (C) = 1.47	**AXC=2.08**	

convert more resources from source to sink. The interaction effects were also found to be significant. Significantly highest yield (40.04 t/ha) was observed in transplanted crop of November 7th sown crop of encrusted seeds with 1:1.2 buildup with Thiram and Mycorrhiza (T_4) which was followed by transplanted crop of November 7th sown crop of hydro-primed for 16h at 20^{0}C (T_2). The significantly lowest bulb yield (5.7t/ha)) was observed in November 27th sown direct seeded crop of encrusted 1:1.2 buildup with Thiram and Genius coat TM (T_5) seeds (Table 239).

Non significant differences between sowing methods were observed in no. of leaves, pseudostem length (cm), equatorial diameter (cm) and Bulb weight (g). Rest of the parameters observed were significantly better in direct seeded crop than the transplanted. All the parameters except neck thickness were better in November 7th sown crop than that of November 27th sown crop. Significant variability was observed among different treatments with respect to plant and bulb parameters in onion. Minimum plant height (48.8cm), 4th leaf width (1.18cm), equatorial diameter (5.36cm) and Av. Bulb weight (74.9g) and maximum pseudostem diameter (1.94cm) and neck thickness (1.11cm) were observed in Control (Table 240).

Table 240: Effect of treatments, sowing dates and methods of planting on onion plant and bulb parameters

Parameters	Sowing Method		Sowing Dates		Treatments	
	Direct	Transptd.	Nov.7	Nov. 27	Mini. (Tr)	Max. (Tr)
Plant height (cm)	51.6	47.9	56.5	43.1	48.8(T_1)	50.5(T_2)
4th leaf length (cm)	41.2	38.3	45.0	34.5	38.8(T_4)	40.8(T_2)
4th leaf width (cm)	1.34	1.08	1.37	1.05	1.18(T_1)	1.24(T_5)
No. of leaves	10.3-NS	10.1	10.7	9.8	9.9(T_2)	10.6(T_4)
Pseudostem length (cm)	16.0-NS	16.1	22.3	9.9	15.0(T_4)	16.7(T_2)
Pseudostem diameter (cm)	2.07	1.75	2.20	1.62	1.88(T_2)	1.94(T_1)
Polar diameter (cm)	4.83	4.44	5.14	4.12	4.54(T_3)	4.70(T_5)
Equatorial diameter (cm)	5.39-NS	5.45	5.74	5.10	5.36(T_1)	5.55(T_3)
Neck thickness (cm)	1.09	1.16	1.02	1.15	1.08(T_2)	1.11(T_1)
Av. Bulb weight (g)	81.3-NS	75.6	100.0	56.9	74.9(T_1)	86.4(T_4)
TSS (^{0}B)	13.8	14.3	14.4	13.7	13.6(T_5)	14.6(T_2)
Marketable Yield (t/ha)	19.3	25.8	32.4	12.8	19.6(T_5)	24.8(T_4)

The primed seeds resulted in maximum Plant height (50.5cm), 4th leaf length (40.8cm), pseudostem length (16.7cm), and TSS (14.6^{0}B) and marketable yield (t/ha), though maximum Av. Bulb weight (86.4g) was obtained in seeds Encrusted with 1:1.2 buildup with Thiram and Mycorrhiza.

Summary of finding of last years' experiment:

- The hydro-primed seeds resulted in highest first count (85%) and germination (75%), whereas, it was lowest (42 and 30%, respectively) in seeds encrusted with Thiram and Genius coat TM.
- Highest emergence (25.45%) was noticed in T_3 (Encrusted with Thiram build-up).
- November 7th sowing was better than November 27th Sowing wrt bulb yield/ha.
- Yield in transplanted onion was significantly more than direct seeded crop.
- 1:1.2 Buildup with Thiram and Mycorrhiza in transplanted onion resulted in highest yield.
- All the yield attributing parameters were significantly better in 1st (Nov. 7) sowing.
- Significantly higher marketable yield was obtained in transplanted onion.
- Variability was observed among different treatments with respect to plant and bulb parameters in onion.

Transplanted (1st Sowing: Jan 6, 2016)

Direct (1st Sowing: Nov 7, 2015- In Nursery)

Direct (2nd Sowing: Nov 27, 2015)

Transplanted (2nd Sowing: Jan 27, 2016)

Results (2016-17):

Initial Quality Assessment

All the parameters except root and shoot length showed non-significant differences. Significantly higher root length (6.18cm) and shoot length (11.5cm) was recorded in control. Among other treatments, the highest root length (4.18cm) and shoot length (7.38cm) was observed in seed encrusted with Thiram only and Thiram + Genius coat, respectively (Table 241).

Table 241: Mean values of initial seed quality parameters in different treatments

Parameters/Treatments	FC (%)	Ger (%)	Abn (%)	DS (%)	FUG (%)	RL (cm)	SL (cm)
Control	81.0 (64.2)	60.0 (50.8)	21.0 (27.3)	4.0 (11.5)	15.0 (22.8)	6.18	11.50
Thirum Only	85.0 (67.3)	55.0 (47.9)	31.0 (33.9)	4.0 (11.5)	10.0 (18.4)	4.18	6.87
Thirum + Bioensure	86.0 (68.1)	71.0 (57.5)	15.0 (22.8)	5.0 (12.9)	9.0 (17.5)	3.66	6.76
Thirum + Genius coat	87.0 (68.9)	65.0 (53.8)	22.0 (28.0)	6.0 (14.2)	7.0 (15.6)	2.71	7.38
Mean	**84.8 (67.1)**	**62.8 (52.4)**	**22.3 (28.2)**	**4.8 (12.7)**	**10.3 (18.7)**	**4.18**	**8.13**
CD (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**1.02**	**1.38**

* Figures in parentheses are arcsine transformed values

Direct seeded **Transplanted**

Field View of Onion crop in Direct seeded and Transplanted plots

The data on mean values of initial seed vigour parameters, field emergence (%) and speed of Germination in different treatments has been depicted in table 4. The perusal of data revealed that neither of treatment resulted in significant differences in any of the seed vigour parameters vis. field emergence percent and speed

of germination, except total seedling length. The control resulted in significantly higher total seedling length (17.68cm) than any of the encrustation treatment. However, it was observed that numerically higher values of field emergence percent (77.08%) and speed of germination (40.81) were noticed in seed encrusted with Thiram+Genius coat (Table 242).

Table 242: Effect of seed encrustation on seed quality parameters in onion.

Parameters/Treatments	TSL (cm)	Dry Wt.	VI-I	VI-II	FE (%)	SOG
Control	17.68	0.022	1072.14	1.28	60.83(51.28)	37.92
Thiram Only	11.05	0.027	607.60	1.50	63.33(52.76)	36.49
Thiram + Bioensure	10.42	0.032	746.64	2.29	67.08(55.02)	39.37
Thiram + Genius coat	10.09	0.018	662.70	1.14	77.08(61.43)	40.81
Mean	**12.31**	**0.02**	**772.27**	**1.55**	**67.08(55.02)**	**38.65**
CD (p=0.05)	**2.02**	**NS**	**NS**	**NS**	**NS**	**NS**

* Figures in parentheses are arcsine transformed values

JNKVV, Jabalpur

Results (2015-16): The experiment was laid out with onion variety Madhvi during *Rabi* 2015-16. From perusal of data, it can be concluded that there is no significant difference in the yield of onion by the application of chemical treatments. Nursery rising is the best suitable method for onion in comparison to direct sown (Table 243).

Table 243: Effect of encrustation enabled direct seeding technology on different traits of Onion during 2015-16

Treat.	Emergence 15 DAS (%)	Emergence 45 DAS (%)	Seedling Vigour	No. of branches	Plant height (cm)	Days to 50% flowering	Days to maturity	Bulb weight (gm)	Bulb diameter (cm)	Bulb yield (q/ha)
T_1	38.25	52.00	1352.58	2.92	20.00	150.75	174	174.16	7.18	275.44
T_2	46.00	50.50	1242.15	3.92	21.92	150.00	174	217.50	8.31	216.46
T_3	38.50	48.00	1246.58	3.92	20.58	149.50	174	276.66	8.84	169.42
T_4	47.25	51.75	1457.69	3.92	19.33	149.00	174	195.00	7.70	221.13
T_5	41.00	48.75	1369.67	3.25	20.25	151.75	174	266.11	8.56	129.72
Sed±	**1.87**	**1.91**	**56.67**	**0.08**	**1.15**	**0.54**	**0.00**	**16.66**	**0.31**	**24.08**
CD	**4.07**	**4.16**	**123.48**	**0.17**	**2.50**	**1.18**	**0.00**	**36.29**	**0.67**	**52.47**

Results (2016-17): The experiment was laid out with onion variety Madhvi as per technical programme during *Rabi* 2016-17 (Table 244). Sowing of was done on 15.11.2016 in three replication with spacing 30 x 15 cm in RCBD. The experiment is in progress

Table 244: Effect of encrustation enabled direct seeding technology on different traits of onion during 2016-17

Treatments	Emergence after 15 days	Seedling vigour in field
T_1	80.00	1234.80
T_2	82.50	1126.48
T_3	84.75	1462.68
T_4	84.00	1386.55
T_5	83.75	1282.07
Sed±	**3.57**	**69.21**
CD	**8.07**	**156.56**

T_1: Control (no treatment - for nursery rising); T_2: Control - no treatment - for seed drill direct sowing; T_3: Encrusted 1:1.2 buildup with Thiram - for seed drill direct sowing; T_4: Encrusted 1:1.2 buildup with Thiram and Mycorrhiza - for seed drill direct sowing; T_5: Encrusted 1:1.2 buildup with Thiram and Genius coat TM - for seed drill direct sowing

Carrot (Pusa Rudhira)

IARI, New Delhi

Results: The seed germination studies of encrusted carrot seeds cv. Pusa Rudhira exhibited very low germination and vigour under lab conditions. The encrustation of carrot seeds restricted seed germination and reduced seedling vigour as studied under lab conditions. The field performance of encrustation carrot seeds revealed that encrustation delayed initial field emergence. All the seed encrustation treatments showed lower field emergence and speed of emergence than non-encrusted seeds. The initial field emergence in encrusted seeds observed at 15 DAS was significantly lower than non-encrusted seeds, whereas the encrusted seeds picked up growth by 45 DAS and the field emergence was marginally lower than non-encrusted seeds. However, the encrusted seeds showed better early seedling and vegetative growth after emergence. The plant height, number of leaves/plant, root weight and plant biomass was significantly higher in encrusted seeds than non-encrusted seeds. Among seed encrustation treatments; T_3 (Encrusted with Thiram + Genius coat) showed better performance in terms of plant height, biomass, root growth and early induction of flowering than other treatments. Transplanting of seedlings was not successful in carrot and the crop growth was poor with stunted and deformed roots. The stecklings from each treatment were selected and transplanted for seed production. The experiment is in progress for generating information on effect of seed encrustation on seed yield and quality of carrot (Table 245-246).

Table 245: Effect of seed encrustation on seed germination and vigour of carrot seeds

Treatments	Seed germination (%)	Seedling length (cm)	Seedling dry weight(g)	Vigour Index I	Vigour IndexII
T_0	51.5	7.4	0.95	381.1	48.92
T_1	45.5	4.6	0.79	209.3	35.95
T_2	50.5	5.4	0.88	272.7	44.44
T_3	46.5	4.9	0.83	227.8	38.60
CD (0.05)	2.08	0.98	0.09	22.08	3.01

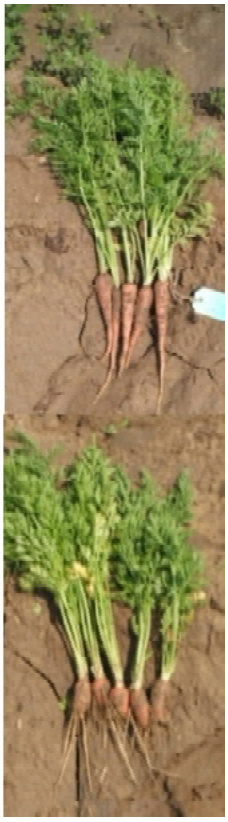
Table 246: Effect of seed encrustation on field emergence, vegetative characters and root yield of carrot variety Pusa Rudhira

Treatments	Field emergence (%)		Plant height (cm)	Leaves/ plant	Root wt/ plant (g)	Plant Biomass (g)	Root length(cm)	Root diameter (cm)
	15 DAS	45 DAS	90DAS	90DAS	90DAS		70DAS	70DAS
T_0	21.9	42.24	52.4	6.0	65.9	100.9	14.5	2.0
T_1	18.2	40.52	59.6	6.0	68.7	115.4	15.2	2.1
T_2	6.9	37.70	68.9	7.6	72.4	125.4	16.6	2.3
T_3	7.3	38.21	64.6	7.3	75.6	132.4	16.9	2.4
T_4	*	*	28.7	5.2	20.4	57.6	3.4	3.2
CD (0.05)	3.51	2.1	5.6	1.2	4.1	11.5	2.1	0.21

Comparative evaluation of seed germination in encrusted seeds of carrot


Vegetative growth in encrusted (L) and non-encrusted seeds (R)


Early induction of flowering in encrusted seed treatment Thiram+ Genius coat ™ (L) as compared with non-encrusted seeds (R)



Root growth in transplanting treatment (L) and in direct seeded treatment (R)

Mustard (Pusa Vijay)

NDUA&T, Faizabad

Season & Year of Start: *Rabi*, 2016-17

Results: The experiment has been conducted on mustard as per technical programs during *Rabi* 2016-17. Since the seed materials were made available quite late, the crop is at flowering stage in good condition.

CSAUA&T, Kanpur

Results: The sowing was done on 3.12.2016; all the normal agronomical practices have been followed. The data have been recorded on field emergence (15 days), seedling length and SV-I and presented in following table, which shows that T_1 performing better than others. The experiment is under progress.

Treatment	Emergence %	Seedling length (cm)	Seed vigour index-I
T_1	75	29.2	2190.0
T_2	74	22.6	1672.4
T_3	73	20.8	1518.4

Berseem (JB 1 or Wardan)

JNKVV, Jabalpur

Results (2015-16): From the initial observations, it was observed that field emergence was good for treatment T_1 (no treatment- direct sowing) followed by T_2 (no treatment- sowing with seed drill). No. of seeds/ inflorescence was seen better in Treatment T_4 (Encrusted 1:1.2 Buildup with Thiram and Mycorrhiza) and T_2 (no treatment- sowing with seed drill). Seed yield was maximum in Treatment T_5 (4.51 q/ha) (Encrusted 1:1.2 Buildup with Thiram and Genius coat- for seed drill direct sowing) which was at par to treatment T_3 (4.30 q/ha) (Encrusted 1:1.2 Buildup with Thiram- for seed drill direct sowing) and treatment T_4 (4.08 q/ha) (Encrusted 1:1.2 Buildup with Thiram and Mycorrhiza- for seed drill direct sowing). Thus, experiment revealed that use of Thiram and Genius coat have beneficial effect on berseem in relation to its yield parameters (Table 247).

Table 247: Effect of encrustation enabled direct seedling technology on various yield attributing traits of Berseem during 2015-16

Trt.	Emergence 15DAS	Emergence 45DAS	Seedling Vigour	Plant height (cm)	branches/ plant	Days to 50% flr. (from cut date) 27.1.2016	Days to maturity	No. of flowers/ inflorescence	No. of seeds /inflorescence	Ovule to seed ratio	Length of inflorescence (cm)	1000 seed weight (g)	Seed yield q/ha	Days to maturity
T_1	76.75	76.00	879.05	80.17	48.58	36.75	169	101.00	65.66	0.65	2.05	2.53	3.84	169
T_2	76.25	76.75	1123.25	79.91	47.83	36.75	169	100.67	68.41	0.68	2.34	2.82	4.00	169
T_3	70.75	73.75	1130.35	82.67	44.75	36.50	169	100.58	66.00	0.65	1.90	3.07	4.30	169
T_4	72.00	74.25	1048.65	79.33	46.25	36.00	169	103.50	68.08	0.66	2.22	2.66	4.08	169
T_5	75.75	73.00	983.50	80.66	47.66	36.00	169	103.25	52.00	0.50	2.13	2.69	4.51	169
Sed m±	**0.86**	**1.57**	**29.01**	**1.26**	**3.00**	**0.38**	**0**	**3.72**	**6.11**	**0.05**	**0.09**	**0.17**	**0.28**	**0**
CD @ 5%	**1.88**	**3.43**	**63.21**	**2.74**	**6.54**	**0.82**	**0**	**8.11**	**13.32**	**0.11**	**0.20**	**0.38**	**0.62**	**0**

T_1: Control (no treatment - for nursery rising); T_2: Control - no treatment - for seed drill direct sowing; T_3: Encrusted 1:1.2 buildup with Thiram - for seed drill direct sowing; T_4: Encrusted 1:1.2 buildup with Thiram and Mycorrhiza - for seed drill direct sowing; T_5: Encrusted 1:1.2 buildup with Thiram and Genius coat TM - for seed drill direct sowing

Fig 1: Field view of effect of encrustation enabled direct seedling technology in Berseem

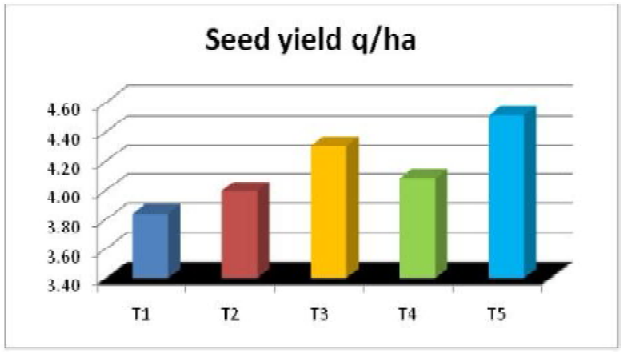


Fig 2: Effect of encrustation enabled direct seedling technology on seed yield of Berseem

Results (2016-17): The experiment was conducted with Barseem variety Wardan as per technical programme during *Rabi* 2016-17. Sowing of was done on 15.11.2016 in three replication with spacing 40 x 15 cm in RCBD. The experiment is in field.

The observed data upto 30 days are presented in table 248.

Table 248: Effect of encrustation enabled direct seeding technology on different traits of Berseem during 2016-17

Treatments	Emergence after 15 days	Seedling Vigour in field
T_1	86.25	1307.24
T_2	86.75	1316.56
T_3	88.00	1312.85
T_4	89.25	1250.85
T_5	85.75	1516.86
Sed±	**3.08**	**130.46**
CD	**8.61**	**295.14**

Rapeseed (TS 44)

ICAR RC NEHR, Manipur

Results: The crop is in pre-flowering stage. The experiment is in progress.

Rape seed (TS 44)

Experiment 10 : Efficacy of hydrogels (Pusa hydrogel and herbal hydrogel) on seed yield, quality and water use efficiency on wheat

Objective:

1. To test the efficacy of hydrogel on seed yield, quality and water use efficiency in wheat.

ICAR- IISS, Mau

Methodology

Date of sowing: 07.12.2016 **Design: Split plot design**

Treatments

Main Plot

S_1 : Sowing under normal moisture + Skip irrigation (3 irrigations)

S_2 : Sowing under normal moisture + Normal irrigation (6 irrigations)

S_3 : Sowing under restricted moisture + Skip irrigation (3 irrigations)

S_4 : Sowing under restricted moisture + Normal irrigation (6 irrigations)

Sub Plot

T_1 : Control

T_2 : Soil application of Pusa hydrogel

T_3 : Seed coated with Herbal hydrogel

Variety

V_1 : HD2967 (Suitable for normal irrigation)

V_2 : HD 3043 (Suitable for limited irrigation)

Note: The crop is in pre-flowering stage. The experiment is in progress.

Field view of experiment on hydrogel to enhance seed yield under moisture stress condition

Plants under restricted moisture at sowing with limited irrigation

Wheat Plants under Restricted Moisture at Sowing with Normal Irrigation

Wheat Plants under Normal Moisture at Sowing with Normal Irrigation

ICAR- IARI, New Delhi

Results: Seed germination studies showed no effect of seed coating with Herbal hydrogel on seed germination and vigour of both the wheat varieties under lab condition (Table 249). The efficacy of hydrogels (Pusa hydrogel

and Herbal hydrogel) was studied on wheat varieties; HD 2967 and HD 3043 under restricted and normal irrigation condition. The results showed non- significant effect of soil application of Pusa hydrogel and Herbal hydrogel on field emergence, speed of emergence and early seedling growth (seedling fresh and dry weight) in wheat (Table 250). Both the hydrogels failed to show any significant effect on plant vegetative growth (plant height) and flowering induction (initiation of flowering and 50% flowering) in both the varieties (Table 251). The irrigation scheduling and moisture levels had evident effect on seedling emergence, early plant growth and days to flowering, wherein plants showed early emergence, better seedling growth, more plant height under normal moisture and irrigation levels than under restricted moisture and skip irrigation conditions.

Table 249: Effect of seed coating with herbal hydrogel on seed germination and vigour in wheat

Variety	Treatment*	Seed germination (%)	Seedling length (cm)	Seedling dry weight(g)	Vigour index I	Vigour index II
HD2967	T_0	100	37.92	0.463	3792.00	46.36
	T_2	99.5	38.56	0.488	3836.72	48.55
	T_0	99.5	34.51	0.424	3433.74	42.18
HD3043	T_2	99.5	34.23	0.430	3405.88	42.78

*T_1: Pusa hydrogel was applied in the soil along with seed; seed germination test was not conducted

Table 250: Effect of seed coating with hydrogels on field emergence, speed of emergence and seedling growth in wheat

Trt.	Field emergence (21 DAS)		Speed of emergence		Seedling fresh weight (g)		Seedling dry weight (g)	
	Sowing under restricted moisture	Sowing under normal moisture	Sowing under restricted moisture	Sowing under normal moisture	Sowing under restricted moisture	Sowing under normal moisture	Sowing under restricted moisture	Sowing under normal moisture
V_1T_0	52.70	56.12	148.64	166.92	22.23	32.23	3.44	4.64
V_1T_1	50.41	55.50	146.62	162.15	23.95	30.54	3.43	4.59
V_1T_2	51.25	56.91	148.90	165.55	20.84	31.03	3.38	4.66
V_2T_0	44.62	48.70	138.57	150.80	16.90	26.85	2.91	3.37
V_2T_1	45.62	48.29	134.35	148.82	16.67	25.68	2.88	3.27
V_2T_2	46.54	49.24	139.26	149.45	15.52	26.76	2.72	3.38

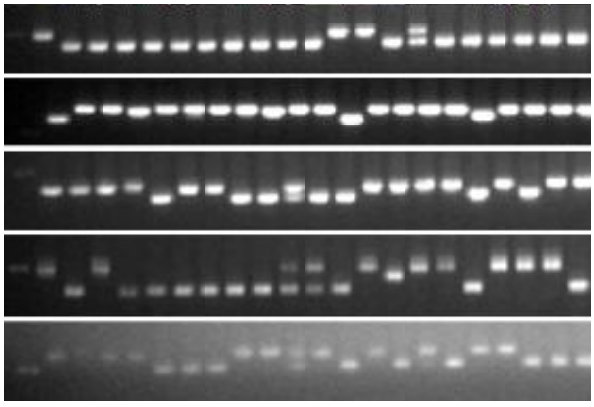
Table 251: Effect of seed coating with hydrogels on plant height and days to 50% flowering in wheat

Trt.	Plant height (cm)				Days to 50% flowering			
	Sowing under restricted moisture + skip irrigation	Sowing under restricted moisture + normal irrigation	Sowing under normal moisture + normal irrigation	Sowing under + normal moisture + skip irrigation	Sowing under restricted moisture + skip irrigation	Sowing under restricted moisture + normal irrigation	Sowing under normal moisture + normal irrigation	Sowing under normal moisture + skip irrigation
V_1T_0	86.9	91.6	94.6	91.8	92.5	94.0	93.5	93.2
V_1T_1	86.7	93.8	94.2	91.9	92.5	94.5	93.5	93.3
V_1T_2	88.5	90.3	91.3	93.3	92.3	94.2	93.5	93.5
V_2T_0	103.1	106.1	114.0	111.8	91.5	93.5	92.2	91.5
V_2T_1	101.0	107.4	115.5	111.9	92.3	93.5	92.2	92.4
V_2T_2	102.2	107.5	113.0	111.5	91.5	93.5	92.5	91.5

Experimental layout of wheat crop

Field emergence under normal moisture (L) and restricted moisture conditions (R)

Seed Physiology Storage and Testing



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ICAR

B. Seed Physiology Storage and Testing

Experiment 1: Identification of seed vigour traits in field crops

Background

Seed vigour is an important trait which significantly contributes to initial crop establishment, especially under sub-optimal conditions, and is also helpful in avoiding the competition from obnoxious weeds for nutrient and water during initial establishment phase. Thus seed vigour becomes a prerequisite for crop cultivation under sub-optimal conditions, and especially in the perspective of climate change scenario. In general, hybrids are known for high yielding potential than their parents even under sub-optimal conditions. The key issue, whether the hybrid vigour is associated with the seed vigour especially with seed longevity still remains obscure in most of the field crops. In rice, there are reports that hybrid seed lose germinability rapidly than the parental lines. In general, during storage seed loses vigour first than the viability, this makes seed testing and prediction for field conditions less realistic. If seed vigour in varieties and hybrids, and its association with each other including seed longevity is known, it would be easy to identify varieties or hybrids suitable for a particular field conditions.

Objective

To understand seed vigour traits in hybrid and inbred crop plants, i.e., rice, maize, sunflower and pearl millet.

Year of start: *Kharif* 2014

Crops		Centres
Paddy	:	PJTSAU, Hyderabad; AAU, Jorhat; UAS, Bengaluru; PAJANCOA, Karaikal; JNKVV, Jabalpur; ICAR- RC NEH, Tripura
Maize	:	PAU, Ludhiana; NDUAT, Faizabad; HPKVV, Palampur
Pearl millet	:	SKNAU, Durgapura; CCSHAU, Hisar; MPKV, Rahuri
Sunflower	:	PDKV, Akola
Cotton	:	VNMKV, Parbhani

Crop: Paddy

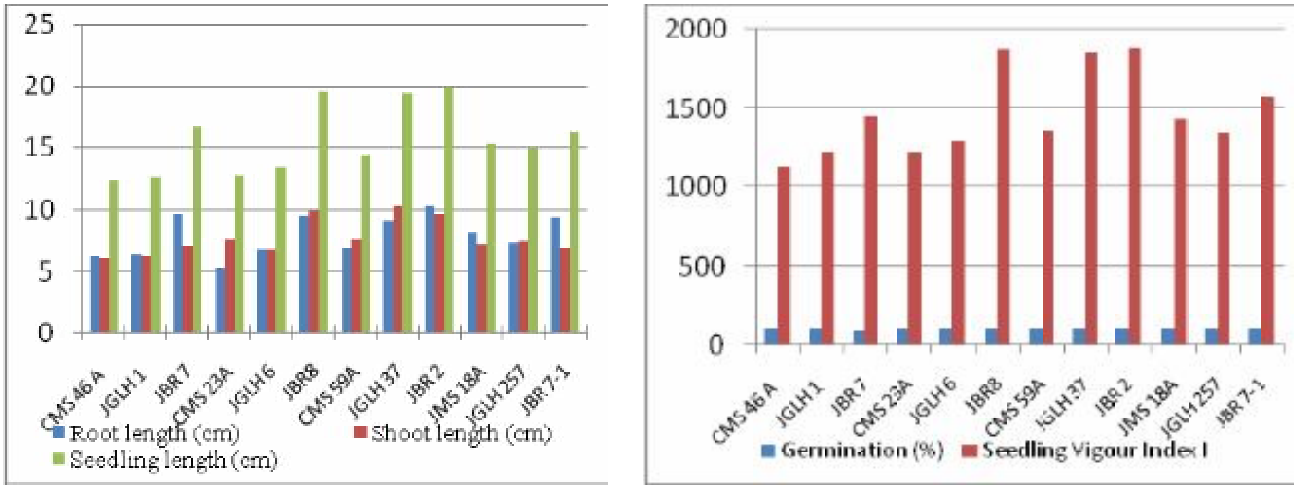
PJTSAU, Hyderabad

Experimental details: Four promising rice hybrids and their parental lines were selected for this study. The varieties and hybrids were developed at Regional Agricultural Research station, Jagtial, Telangana. Across the entire restorer lines significantly higher values were recorded for germination, root length, shoot length, seedling length and seed vigour Index I. Among hybrids JGLH 37 and their parental lines recorded highest seedling length and seed vigour Index I. For the root parameters R-lines showed higher values than A-lines and hybrids.

Table 1: Various seed vigour parameters recorded in four hybrids and their parental lines.

S. No	Hybrids	Germination (%)	Root length (cm)	Shoot length (cm)	Seedling length (cm)	Seedling Vigour Index I
JGLH 1 = CMS 46A / JBR 7						
1	CMS 46 A	92	6.3	6.0	12.3	1127.6
2	JGLH 1	96	6.4	6.3	12.7	1218.2

3	JBR 7	87	9.6	7.1	16.7	1450.7
JGLH 6 = CMS 23A / JBR 8						
4	CMS 23A	95	5.3	7.6	12.8	1215.0
5	JGLH 6	96	6.8	6.8	13.5	1294.8
6	JBR8	96	9.5	10.0	19.5	1869.0
JGLH 37 = CMS 59A / JBR 2						
7	CMS 59A	94	6.9	7.6	14.5	1359.9
8	JGLH 37	95	9.1	10.3	19.4	1847.4
9	JBR 2	94	10.3	9.6	19.9	1882.8
JGLH 257 = JMS 18A / JBR 7-1						
10	JMS 18A	93	8.2	7.2	15.4	1434.8
11	JGLH 257	91	7.3	7.5	14.9	1352.1
12	JBR 7-1	97	9.4	6.9	16.3	1583.0
Mean		94	7.9	7.8	15.7	1469.6
CD		3.1	1.1	0.8	1.5	167.9
CV		1.9	8.7	6.3	5.6	6.7



A B

Figure 1: (A) Root, shoot and seedling length of four hybrids and their parental lines in rice; (B) germination (%) and Seedling Vigour Index I of four hybrids and their parental lines.

This experiment has been conducted for more than three years and it is clear that hybrids are having higher seedling vigour than the parental lines.

AAU, Jorhat

Experimental details: Total 9 varieties were selected for this study from BSP unit Jorhat. The crop was harvested at maturity in the 2nd week of December 2016, days to maturity varied between 2 and 7 days in each variety except Monohar Sali which is having the longest crop maturity period. The normal recommended agronomical practices were followed and fertilizer dose of 40:20:20 ($N:P_2O_5:K_2O$) was applied to maintain healthy crop stand.

Results: Observations were recorded and the analyzed data are presented in the following table. Significant variation was observed among the varieties for the observed characters.

Table 2: Initial seed and seedling characteristics

Variety	Mean						
	Initial mc (%)	Germination (%)	Root Length (mm)	Shoot length (mm)	Seedling dry weight (mg)	SVI-I	SVI-II
Gitesh	13.32	87.58	9.41	11.68	103.53	1846	9092
Aghuni Bora	14.29	85.96	8.87	12.93	135.17	1874	11619
Keteki Joha	12.29	94.35	5.79	14.82	104.56	1944	9865
Luit	12.44	81.14	6.37	13.37	177.60	1601	14411
Manohar Sali	11.65	82.77	12.54	15.24	187.32	2300	15505
Ranjit	14.23	95.78	12.23	13.23	142.63	2438	13662
Lachit	12.21	79.92	12.38	9.80	133.03	1773	10630
Mahsuri	9.92	84.87	9.39	11.80	108.60	1798	9216
Bahadur	14.31	96.12	7.50	12.87	178.36	1957	17143
SE (M)	0.20	0.50	0.07	0.10	0.13	17.83	72
CD (P=0.05)	0.57	1.45	0.21	0.29	0.36	51.83	210
CV	1.68	0.52	0.58	0.75	0.07	1.01	0.68

Table 3: Seed vigour characters at 30 days and at maturity

Variety	Mean									
	Chlorophyll content		Root shoot ratio	Root volume (ml)	Root mass (g)	Shoot mass (g)	Leaf area (cm^2)	1000 seed mass (g)	No. of tillers $plant^{-1}$	Grain yield (g/m^2)
	Chl *a*	Chl *b*								
Gitesh	4.77	1.49	0.74	62.33	42.96	65.68	16.92	17.66	12.14	203.6
Aghuni Bora	8.15	2.36	0.52	71.68	39.46	65.35	27.24	22.79	13.10	205.0
Keteki Joha	5.05	1.53	0.32	63.99	38.80	74.11	24.16	15.64	16.51	204.6
Luit	5.43	1.50	0.43	80.89	39.54	66.30	14.96	23.67	11.74	196.2
Manohar Sali	5.08	1.64	0.83	103.75	40.95	76.18	22.52	22.17	10.40	210.5
Ranjit	7.78	2.71	1.22	63.34	41.36	66.72	11.85	24.58	13.66	210.9
Lachit	5.07	1.49	1.48	70.31	39.80	73.69	20.24	18.94	14.12	183.1
Mahsuri	4.07	1.49	0.69	75.70	42.68	60.90	22.50	18.92	11.83	202.9
Bahadur	4.28	1.27	0.71	73.65	41.97	74.31	11.87	16.85	14.95	206.6
SE (M)	0.18	0.11	0.03	1.36	0.28	0.52	0.47	0.31	0.23	1.04
CD (P=0.05)	0.53	0.32	0.09	3.97	0.81	1.52	1.36	0.91	0.67	3.03
CV	9.93	19.05	0.46	1.32	0.68	0.71	3.94	1.66	1.64	0.57

Gitesh Lachit Keteki Bahadur Luit Mahsuri

Figure 2: Rice varieties grown under field conditions and tested for seed vigour traits.

Higher vigour index was observed in Bahadur followed by Manohar Sali and Luit with 17143, 15505 and 14411 respectively. In terms of grain yield, Ranjit recorded highest yield of 210.9g/m^2 which can be mainly attributed to the higher chlorophyll content (Chl *a*: 7.78 and Chl *b*: 2.71) and test weight (24.58). Manohar Sali recorded relatively higher values across all the seed and seedling characteristics recorded with the grain yield of 210.5g/m^2. However information on hybrids and parental lines would have been better to achieve target, so that selection of A, B and R lines for developing hybrid and hybrid seed production system would have been taken care.

UAS, Bengaluru

Experimental details: Hybrid: KRH-4 with parental lines (CRMS-32A & MSN-36). Sowings of the same were taken up on 23-7-2016 as per the technical programme. Growth parameters recorded at 30 days after sowing in field: Leaf area per plant, length and width of all leaves on 10 selected plants in each plot and calculated, individual leaf areas were summarized to get total leaf area/plant. Chlorophyll contents were determined by using DMSO (Dimethyl sulfoxide).

Figure 3: Seed of paddy hybrid (husked and un-husked)

Table 4: Initial seed quality parameters of paddy hybrid KRH-4 with its parental lines

Hybrid / parental lines	Seed moisture content (%)	Germination (%)	Speed of germination	Primary root length (cm)	Secondary root length (cm)	Shoot length (cm)
KRH-4	13.79	94.00	18.65	15.18	4.34	7.82
CRMS-32A	13.60	85.00	14.75	16.60	3.34	6.42
MSN-36	13.13	86.00	13.59	13.63	3.68	6.44
Mean	13.51	88.00	15.66	15.14	3.79	6.89
S Em±	0.02	1.32	0.30	0.54	0.11	0.54
CD (@5%)	0.06	5.95	0.93	1.69	0.36	1.66
CV (%)	0.32	2.11	4.31	8.10	7.03	11.50

Table 5: Initial seed quality parameters of paddy hybrid KRH-4 with its parental lines

Hybrid / parental lines	Root dry weight (mg/seedling)	Shoot dry weight (mg/seedling)	Seedling Vigour Index-I	Seedling Vigour Index-II	Root to shoot ratio
KRH-4	2.88	4.28	2162	677	0.82
CRMS-32A	3.00	3.58	1956	559	0.67
MSN-36	2.32	3.82	1726	528	0.65
Mean	2.73	3.89	1813	546	0.72
S.Em±	0.19	0.17	82.74	19.36	0.07
CD (@5%)	0.60	0.54	254.96	59.67	0.21
CV (%)	12.07	10.17	10.20	7.927	2.13

Table 6: Growth parameters of KRH-4 hybrid with its parental lines at 30 days after sowing

Hybrid/ parental lines	Leaf area per plant (cm^2)	Chlorophyll-a	Chlorophyll-b	Carotenoids	Root volume (ml)	Root length (cm)
KRH-4	105.40	21.93	4.87	5.08	0.86	17.60
CRMS-32A	57.80	15.45	3.37	4.33	0.84	18.90
MSN-36	58.60	16.53	3.24	4.94	0.84	18.60
Mean	73.93	17.97	3.83	4.78	0.85	18.37
S Em±	2.73	0.32	0.79	0.23	0.03	0.26
CD (@5%)	8.43	0.99	2.45	0.73	0.09	0.80
CV (%)	8.27	4.03	12.50	11.10	8.06	3.18

Table 7: Growth parameters of KRH-4 hybrid with its parental lines at 30 days after sowing

Hybrid/ parental lines	Shoot length (cm)	Root dry wt. (mg/plant)	Shoot dry wt. (mg/plant)	Root to shoot ratio
KRH-4	43.40	41.3	61.5	0.41
CRMS-32A	37.40	31.6	40.2	0.51
MSN-36	31.20	23.6	31.8	0.60
Mean	37.33	32.12	44.17	0.51
S Em±	1.51	2.23	2.34	0.02
CD (@5%)	4.65	10.03	10.55	0.08
CV (%)	9.05	9.82	7.50	11.98

Table 8: Studies on root parameters after 90 days of sowing

Hybrid / parental lines	Root volume (ml)	Root length (cm)	Shoot length (cm)	Root dry wt. (mg/plant)	Shoot dry wt. (mg/plant)	Root to shoot ratio
KRH-4	10.30	44.5	74.3	381.5	577.4	0.60
CRMS-32A	10.40	49.5	46.1	410.0	389.6	1.08
MSN-36	15.00	39.4	69.6	300.5	469.7	0.57
Mean	11.90	44.47	63.33	363.6	478.3	0.75
S.Em±	0.40	0.86	0.96	2.53	1.41	0.02
CD (@5%)	1.25	2.67	2.96	11.40	6.36	0.06
CV (%)	7.67	4.36	3.40	0.98	0.41	6.32

Table 9: Growth parameters of KRH-4 hybrid with its parental lines at harvesting stage

Hybrid / parental lines	No. of tillers / plant	No. of tillers having panicle	Field emergence (%)	Plant height at maturity (cm)	Days to maturity	1000 seed weight (g)
KRH-4	52.00	51.00	90.00	79.80	158.00	18.73
CRMS-32A	29.00	27.00	71.00	50.80	-	-
MSN-36	31.00	29.00	73.00	57.20	153.00	18.12
Mean	40.00	36.00	78.00	63.00	155.00	18.42
S Em±	0.76	0.82	0.81	1.18	-	0.18
CD (@5%)	2.25	2.43	2.40	3.50	-	0.27
CV (%)	6.36	7.22	1.98	4.23	-	1.00

Figure 4: Field view and root system at 90 days after sowing.

The F_1 rice hybrid, KRH-4 recorded higher speed of germination (18.65), vigour index I and II (2162 and 677), leaf area per plant (105.40 cm^2) along with significantly higher chlorophyll a, b and carotenoids content and other seed quality and growth parameters compared to its parental lines CRMS-32A and MSN-36, including yield parameters. Various root and shoot traits associated with seed vigour (Table 5 to 8) showed that even though the hybrid had higher root: shoot ratio at the initial stage at 30 DAS, MSN-36 recorded maximum root growth and at 90 DAS the ratio was highest in the A line (CRMS-32A) with 1.08. Further, studies on seed storability would assist in deriving meaningful conclusions and assist in selection of parental lines for developing hybrid rice, and its seed production.

ICAR- RC NEH, Tripura

Experimental details: An investigation was carried out to study the seedling vigour traits using nine rice varieties, which comprises seven from seed chain viz., MTU 1010, IR-64, Swarna, Samba Mahsuri, Shahbagidhan, Gomati, Tripura Nirogi and two local landraces viz., Lalgura and Kanaktara. Seed Vigour Index I and II were recorded highest in Lalgura, Kanaktara and Tripura Nirogi (Table 10). As indicated by the results, no correlation could be drawn between the germination percentage, SV-I and SV-II which has no relationship with the final yield. These results clearly show that number of tillers per plant is more important to determine the yield of a variety (Fig 5).

Table 10: Seedling vigour characteristics in rice seedling at 30 days after emergence

Variety	Initial mc (%)	Germination (%)	Root Length (cm)	Shoot Length (cm)	Root dry mass (g)	Shoot dry mass (g)	SV-I	SV-II
MTU1010	12.80	87.30	12.00	13.20	0.57	2.47	2210.45	265.17
IR-64	12.50	91.30	13.30	10.70	0.65	2.47	2190.91	284.89
Lalgura	13.20	99.30	12.20	14.80	0.62	2.23	2688.55	283.67
Kanaktara	13.90	97.30	16.80	16.80	0.89	2.90	3267.83	368.97
Swarna	13.40	95.30	10.60	10.50	1.00	2.50	2023.21	334.30
Samba Mahsuri	14.20	100.00	14.10	10.20	0.43	2.47	2432.67	289.33
Shahbagidhan	13.80	93.30	13.00	14.00	0.66	2.50	2530.95	294.31
Gomati	14.40	79.30	13.40	10.10	0.49	2.47	1875.27	231.75
Tripura Nirogi	14.00	94.00	14.70	12.50	0.97	2.70	2688.40	344.98
SE±(M)	0.14	1.69	1.28	0.56	0.16	0.19	141.64	17.47
CD(P=0.05)	0.43	4.99	3.78	1.65	0.49	0.57	417.83	51.54
CV%	2.51	4.20	22.15	10.3	55.4	17.81	13.43	13.46

Table 11: Growth parameters recorded at maturity

Variety	R:S	Root dry mass (g)	Shoot dry mass (g)	1000 SW (g)	Tillers per plant	Grain yield
MTU1010	0.28	32.37	114.17	20.67	11.50	225.18
IR-64	0.50	49.87	99.58	22.83	19.77	315.07
Lalgura	0.29	26.33	91.32	21.33	8.50	218.37
Kanaktara	0.36	31.00	88.56	17.33	12.27	199.75
Swarna	0.47	40.40	85.27	18.83	23.70	404.63
Samba Mahsuri	0.33	28.20	85.83	13.33	23.83	288.36
Shahbagidhan	0.38	29.80	79.31	21.67	12.07	206.47
Gomati	0.40	41.73	109.72	15.00	24.17	317.70
Tripura Nirogi	0.44	28.83	114.17	19.67	15.40	229.47
SE±(M)	0.04	4.74	9.59	1.02	1.71	59.24
CD(P=0.05)	0.12	13.9	28.3	3.03	5.07	174
CV%	24.7	31.9	24.2	12.51	23.63	59

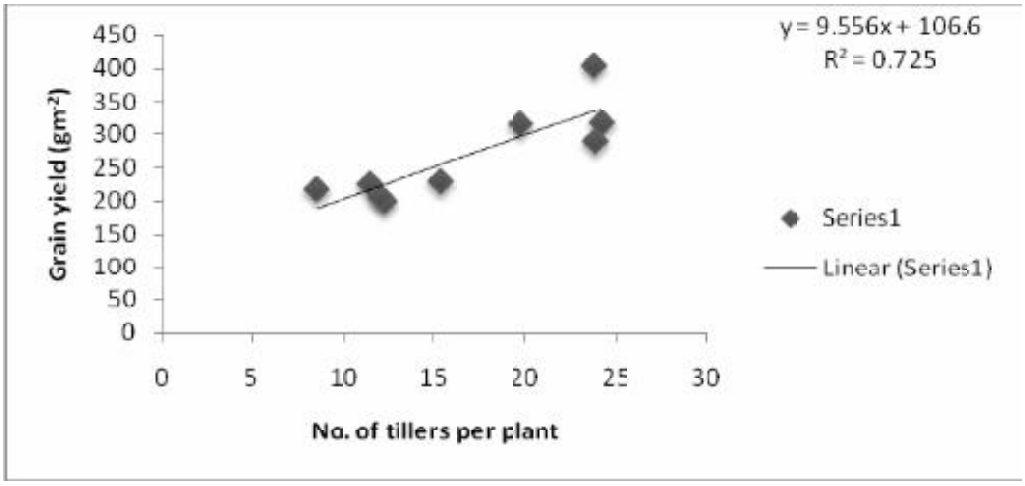


Fig.5: Relationship between the number of tillers per plant and grain yield in the nine varieties studied

PAJANCOA&RI, Karaikal

Experimental details:

Crop	:	Hybrid rice DRRH 2
No. of hybrids	:	1
No. of samples	:	4 (IR68897 A, IR 68897B and DR 714-1-2R of DRRH2)
Seed source	:	ICAR-IIRR, Hyderabad

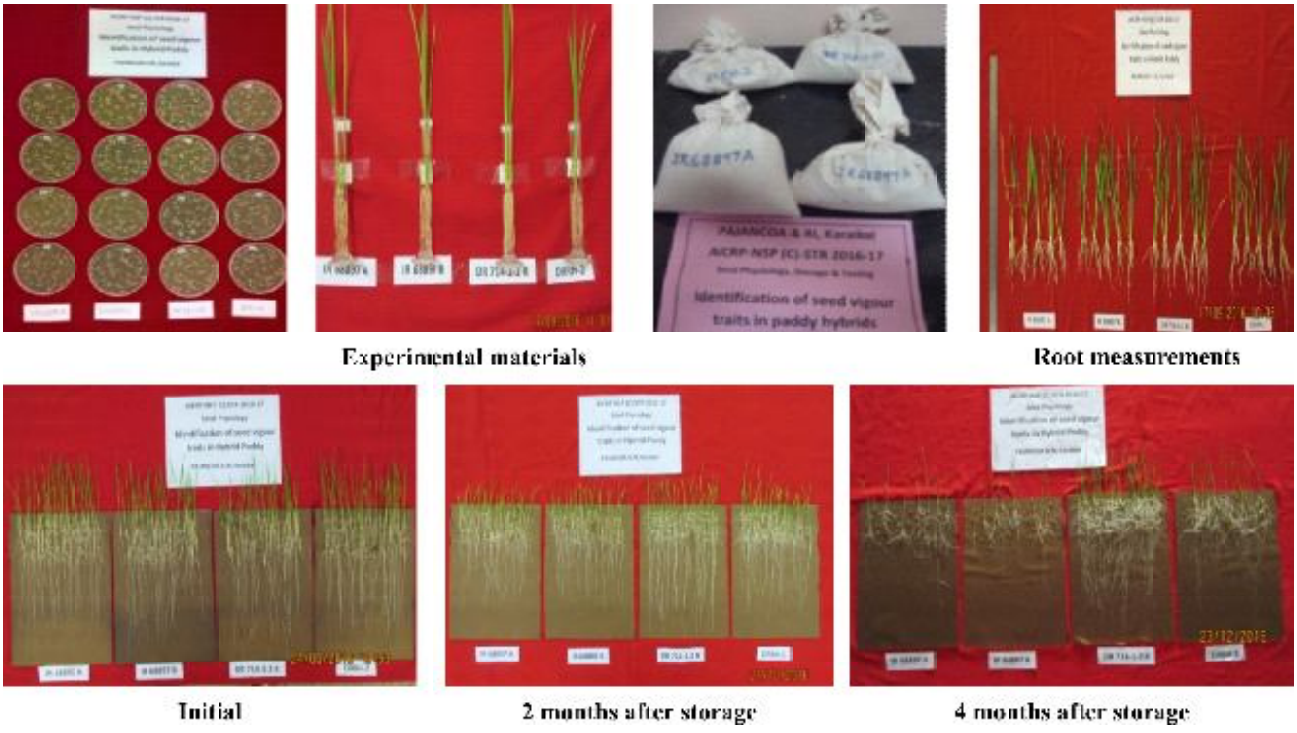


Figure 6: Seed storage in rice hybrid DRRH 2 and its parental lines under ambient conditions

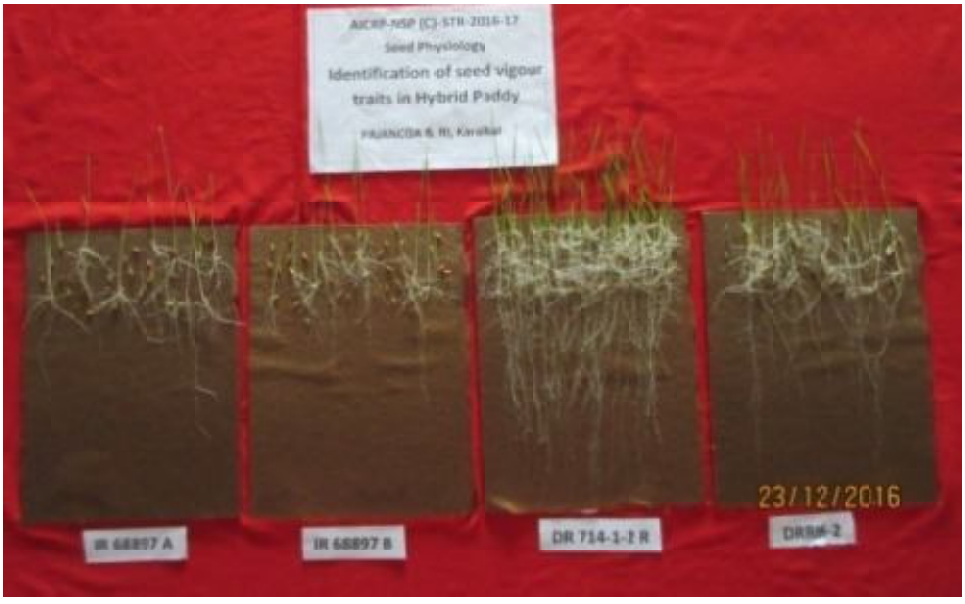


Figure 7: Seed storability in rice hybrid DRRH 2 and its parental lines after four months under ambient storage

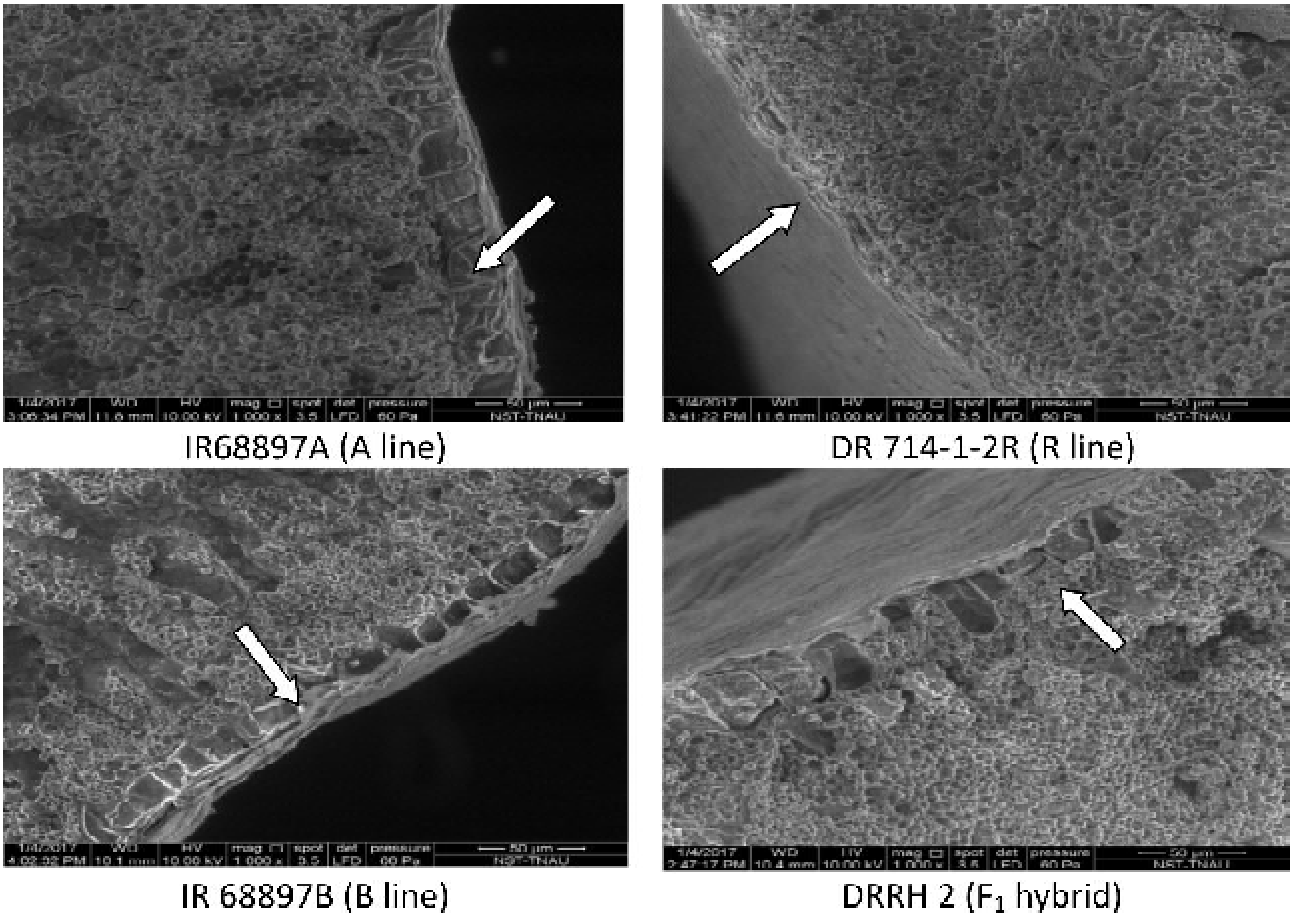


Figure 8: Integrity of aleurone layer in rice hybrid DRRH 2 and its parental lines during storage under SEM

Laboratory evaluation: The results revealed that under laboratory evaluation on seed vigour traits *viz.,* speed of germination, seedling length, dry weight of seedlings and vigour indices, the performance of B line followed by R line was better than F_1 hybrid and A line.

Observations in 30 days old seedlings (Field evaluation): The field emergence was significantly higher in R line (92) and was also on par with B line (88). In Total chlorophyll content both R line (1.96) and F_1 hybrid (1.78) were on par and recorded maximum. The total carotenoids content didn't differ significantly among F_1 hybrid (2.857), R line (2.942) and B line (2.847). However, A line (2.393) registered significantly lower carotenoids. Similarly, F_1 hybrid (5.611) and B line (6.159) were on par and recorded maximum leaf area/plant. The observation on shoot length at vegetative stage indicated that the F_1 hybrid (26.13) excelled other parental lines by producing significantly longer shoots. However, except R line, other genotypes didn't differ significantly in primary root length and R line had produced the shortest primary root length. In root weight and root: shoot ratio also F_1 hybrid and R line were on par and registered maximum.

Seed storability under ambient condition: The results on four months stored data revealed that except R line, the rest of the genotypes were failed to maintain IMSCS for seed germination (80%) and indicated that R line is found to be a good storer as compared to F_1 hybrid and other parental lines. It is also evident from the Scanning Electron Microscope analysis on the integrity of Aleurone layer that the aleurone layer was completely disintegrated in B line followed by A line and F_1 hybrid, while it was rigid in R line.

Table 12: Seed storability of rice hybrid DRRH 2 and its parental lines under ambient storage condition during 2016-17

Genotypes (G)	Seed germination (%)			
	Initial	2 months	4 months	Mean
IR68897A	91.0	80.0	20.0	63.7
IR68897B	95.0	79.0	18.0	64.0
DR714-1-2R	95.0	95.0	94.0	94.7
DRRH 2-F_1	80.0	82.0	46.0	68.7
Mean	82.9	78.5	51.1	
CD (P=0.05)	2.2	1.9	3.9	

Table 13: Identification of seed vigour traits in rice hybrid DRRH 2 during 2016-17

Genotypes	Shoot length at vegetative (cm)	Primary root length (cm)	Secondary root length (cm)	Root volume (cc)	Root weight (g)	Shoot weight (g)	R:S
					Vegetative		
IR68897A	24.57	13.44	10.90	0.47	0.065	0.212	0.30
IR68897B	24.26	13.19	11.11	0.45	0.056	0.195	0.28
DR714-1-2R	23.33	12.55	11.11	0.46	0.070	0.209	0.33
DRRH 2-F_1	26.13	13.48	11.38	0.41	0.067	0.209	0.32
Mean	24.57	13.16	11.12	0.44	0.064	0.206	0.31
S Ed.	0.49	0.31	NS	0.02	0.003	NS	0.01
CD (P=0.05)	1.05	0.67		0.04	0.006		0.03

Table 14: Identification of seed vigour traits in rice hybrid DRRH 2 during 2016-17

Genotypes	SG	Germination (%)	Shoot length (cm)	Root length (cm)	Dry weight of seedling (g)	Vigour index I	Vigour index II	Chlorophyll a	Chlorophyll b	Total chlorophyll	Total carotenoid	Leaf area / plant	Field emergence (%)
								(mg/g of fresh weight)					
IR68897A	20.98	91	14.00	19.03	0.128	2988	11.53	1.198	0.222	1.420	2.393	5.411	87
IR68897B	23.85	95	14.33	18.97	0.135	3146	12.71	1.510	0.145	1.654	2.847	6.159	88
DR714-1-2R	22.20	95	13.76	22.44	0.128	3420	12.02	1.685	0.282	1.966	2.942	5.440	92
DRRH 2	20.43	80	14.51	19.32	0.134	2687	10.69	1.535	0.248	1.783	2.857	5.611	85
Mean	21.87	90.3	14.15	19.94	0.131	3060	11.74	1.482	0.224	1.706	2.760	5.655	88
S Ed	0.49	1.96	0.26	0.40	0.002	85.0	0.25	0.086	0.015	0.071	0.149	0.266	1.8
CD (P=0.05)	1.04	4.15	0.55	0.85	0.004	180.2	0.52	0.182	0.032	0.150	0.316	0.563	3.9

Out of 20 vigour traits studied under both laboratory and field conditions only in 18 traits significant differences were observed in rice hybrid DRRH 2 and its parental lines. Among the 18 vigour traits, the performance of F_1 hybrid was better in field traits especially on pigment parameters (chlorophyll and carotenoids) and growth parameters (leaf area/plant, shoot length and primary root length) than laboratory vigour traits followed by R line and B line. During storage, the parental lines A and B are having only 20 and 18% germinability, respectively, after 4 months of storage however the F_1 hybrid was showed double the germinability than its parental lines, after the same storage period. The R line showed about 94% germinability, after 4 months of storage. Thus, it is obvious that hybrid vigour is not associated with seed longevity or storability. In addition, study on aleurone layer structure may be conducted taking data on total amylase activity in germinating seeds of hybrid and parental lines. This could be a real indication of seed vigour. This study need to be confirmed on a number of hybrids, so that it can be helpful in selection of parents in hybrid seed production programme which need to be considered before development of hybrids.

JNKVV, Jabalpur

Experimental details

Design	:	RBD
Replication	:	6
Plot Size	:	5m x 5 m.
Treatments		Rice hybrid along with its parental lines. (JRH 5)

Results: Rice hybrid JRH 5 along with its parental lines (A, B & R lines) was transplanted during *Kharif* 2016 to understand seed vigour traits. The results showed that rice hybrid JRH5 recorded significant variations amongst the parental R, A and B lines. The chlorophyll content at 30 days after planting was higher in hybrid JRH5 (39.13) which were significantly superior to R, A and B lines. Root profile study exhibited that primary root length (26.52 cm), secondary root length (19.16 cm), root volume (17.87ml.), root dry weight (2.93g.), No. of root/plant (158.47) were significantly maximum in JRH 5 as compared to parental lines (Table 15). The yield and yield attributing traits were recorded highest in rice hybrid JRH 5 (886 g/m^2). Which were significantly superior over parental lines, whereas, the lowest yield was noted in A line (167.91 g/m^2) (Table 17). With respect to seedling traits, germination was recorded maximum in rice hybrid JRH-5 (94%) as compared to R, A and B lines, vigour index-I (VI-I) and vigour Index-II (VI-II) also showed superiority in JRH-5 as compared to its parental lines (Table 18).

Table 15: Root profile at 30 days after planting of hybrid rice and its parents

Observation	JRH 5	R Line	A Line	B Line	SEm ±	CD 5%
Chlorophyll content	39.130	35.665	37.597	36.965	0.965	2.908
Primary root length (cm)	26.527	17.615	18.545	16.995	0.419	1.264
Secondary root length (cm)	19.610	16.875	16.763	18.410	0.447	1.347
Root volume (ml)	17.870	10.750	16.183	13.710	0.308	0.927
Root weight(g)	2.933	2.678	2.325	2.873	0.065	0.196
Shoot dry weight(g)	8.543	5.823	6.450	5.722	0.091	0.276
Number of roots/plant	158.473	134.813	121.093	132.882	1.562	4.709
Root density	0.164	0.250	0.143	0.209	0.01	0.020
Root shoot ratio	0.345	0.0460	0.360	0.502	0.011	0.034

Temperature during grains ripening stage: At the time of grain ripening stage i.e. between 29th October to 25th November 2016 the average weekly temperature ranged between 28^{o}C and 11.1^{o}C (Table 16)

Table 16: Weekly temperatures at the time of grain ripening of hybrid rice JRH 5.

Standard Meteorological day	Period	Temperature (^{o}C)	
		Max.	Min.
44	29th Oct. – 05th Nov. 2016	29.7	13.6
45	05th Nov. – 11th Nov. 2016	27.7	12.3
46	12th Nov. – 18th Nov. 2016	28.3	10.6
47	19th Nov. – 25th Nov. 2016	28.8	8.1

Table 17: Performance for yield and its components of hybrid rice JRH5 and its parental line at JNKVV, Jabalpur.

Observation	JRH 5	R line	A line	B line	SEm±	CD 5%
Plant height (cm)	102.0	101.1	66.3	92.3	2.07	6.25
Number of panicles / plant	8.7	8.1	10.3	8.8	0.40	1.22
Panicle length (cm)	23.7	21.0	22.9	22.4	0.45	1.38
Number of filled grains/panicle	135.5	144.5	30.8	127.6	4.69	14.15

Observation	JRH 5	R line	A line	B line	SEm±	CD 5%
Number of unfilled grains/panicle	16.6	25.6	57.8	32.8	3.7	11.27
1000 seed weight (g)	27.2	26.3	20.8	22.7	0.09	0.27
Days to maturity	104.3	107.0	109.6	107.1	0.39	1.18
Plant population / m^2	47.0	44.5	42.8	43.8	0.72	2.173
Biomass / g/m^2	1825.1	1309.0	761.1	1083.4	26.02	78.44
Yield /g/m^2	886.6	565.6	167.91	442.9	12.68	38.22
Harvest index	0.48	0.42	0.22	0.40	0.68	2.06

Table 18: Expression of seedling traits of hybrid rice JRH 5 and its parental lines before storage

Observation	Hybrid	R line	A line	B line	SEm±	CD 5%
Germination (%)	94	88	90	89	1.67	5.34
Shoot length (cm)	16.8	15.3	12.3	13.6	0.41	1.30
Root length (cm)	9.2	8.8	8.0	8.6	0.42	1.33
Seedling length (cm)	26.1	24.1	20.3	22.2	0.58	1.84
Seedling dry weight (g)	0.2	0.2	0.2	0.2	0.001	0.003
V-I	2453	2121	1825	1977	64	212
VI-II	13	11	10	12	0.14	0.44

Figure 9: View of experimental plots (Hybrid Rice JRH-5)

Conclusion: Hybrid rice JRH 5 had better seedling traits, roots profile characters, yield and other important yield attributing traits as compared to its parental lines viz. R, A and B lines. Experiment on rice varieties and hybrids conducted at different centres indicated that hybrid vigour is closely associated with seed vigour which is helpful in establishing crop stand but not with the seed longevity. However data on seed vigour is not sufficient to relate it with hybrid vigour i.e. seed longevity and seed vigour during storage.

Crop: Maize

Year of start: Summer 2015

PAU, Ludhiana

Experimental details: Hybrid (PMH1) and its parents (LM 13 -Female and LM 14-Male), Date of sowing: June 11, 2016, Row/plant distance: 60/20 cm, Plot size: 24 m^2.

Results: Vigour index- I and II was higher in hybrid maize at seven days old seedlings (2905.5 and 63.77) with higher speed of germination (8.66). leaf area in 30 days old seedlings was significantly higher (209.76 cm^2) than the parental lines along with chlorophyll content of 2.53mg/g. Seed test weight at maturity and seed yield was highest in hybrid which can be attributed to the higher vigour and early establishment. Overall, LM 14 (male parent) indicated poor vigour (Table 19-21).

Table 19: Seedling vigour characteristics at 7 DAS in hybrid maize and its parental lines

Genotype	Germination %	Seed mc (%)	Speed of ger.	Emergence (%)	Seedling length (cm)	Seedling dry weight (g)	Vigour Index I	Vigour Index II
Hybrid	97.5	9.5	8.66	92.5	29.8	0.654	2905.5	63.8
LM 13	96	10.5	7.98	86.8	26	0.538	2496	51.6
LM14	88.6	9.5	6.95	78	22.2	0.504	1966.9	44.6
CD 5%	8.75	1.06	1.58	13.42	6.98	0.14	864.48	17.8

Table 20: Seedling vigour characteristics at 30 DAS in hybrid maize and its parental lines

Genotype	Root lt. (cm)	Shoot lt. (cm)	Root shoot ratio	Shoot weight (g)		Root weight (g)		Leaf area per plant (cm^2)	Chloro-phyll content (mg/g)
				Fresh wt.	Dry wt.	Fresh wt.	Dry wt.		
Hybrid	21.3	62.5	0.34	291.78	57.99	40.07	12.84	209.76	2.53
LM 13	20.6	59.6	0.35	122.45	23.79	21.56	7.079	115.2	1.98
LM14	12.5	37.8	0.33	36.65	8.79	7.03	2.295	68.38	1.35
CD 5%	8.99	24.80	0.01	238.51	46.33	30.43	9.70	132.31	1.08

Table 21: Seed vigour observations at maturity in hybrid maize and its parental lines

Genotype	Number of rows/cob	Number of seeds/cob	1000- seed weight (g)	Grain yield kg (Plot m^{-2})
Hybrid	14.2	496.4	290.49	0.658
LM 13	12.15	180.1	262.21	0.198
LM14	11.3	83.35	182.49	0.172
CD at 5%	3.70	536.69	139.13	0.67

HPKVV, Palampur

Experimental details: Palam Shankar Makka-2 maize hybrid along with its inbreds (Bajim-08-26 and Bajim-08-27) seeds was used for experiment. After recording initial observations on different parameters in the laboratory, the experiment was planted in the Experimental Farm in RBD with six replications during *Kharif* 2016.

Results: The data recorded during 2016-17 revealed significant variation in first count (%), final count (%), field emergence (%), speed of germination, seedling length (cm), seedling dry weight (g), vigour index-I, vigour index-II, seed moisture content (%), root volume (cm^3), root density (g/cm^3), chlorophyll content (mg/g), carotenoid content (mg/g), primary root length (cm), secondary roots length (cm), leaf area (cm^2), dry weight of roots (g), dry weight of shoot (g), root: shoot ratio (dry wt. basis), shoot length, plant height (cm), row per cob, seeds per cob, 1000-seed weight (g) andseed yield (q/ha). Further, first count, final count, field emergence, speed of germination, seedling dry weight, seedling length, vigour index-I, vigour index-II, shoot length, root volume, root density, chlorophyll content, carotenoid content, primary root length, secondary roots length, leaf area, dry weight of roots, dry weight of shoot and 1000-seed weight showed a significant positive correlation with the seed yield.

Conclusion: First count, final count, field emergence, speed of germination, seedling dry weight, seedling length, vigour index-I (final count x seedling length), vigour index-II (final count x seedling dry wt.), shoot length, root volume, root density, chlorophyll content, carotenoid content, primary root length, secondary roots length, leaf area, dry weight of roots, dry weight of shoot and 1000-seed weight were identified as good indicators of seed yield in hybrid maize.

Crop: Pearl millet

SKNAU, Durgapura

Experimental details: Five hybrids i.e. RHB 173, RHB 177, GHB 538, HHB 67 and GHB 558 were taken for study. In laboratory, initial moisture content and germination percentage was measured. The germination tests were done with paper towel method. All the hybrids were then sown in pots and observation of growth and physiological parameters were taken at 30 day after sowing.

Results: Observations indicated that five hybrids varied significantly for germination, growth and physiological parameters (Table 22- 24). The variation among initial moisture content were not significant. Chlorophyll and carotenoid content were maximum in RHB 173 and minimum in GHB 558. Membrane stability index and antioxidants were also found maximum in RHB 173. The seedling vigour indices indicated that high yielding varieties exhibited high vigour in the initial growth stages. Root and shoot traits such as root length, shoot length, root shoot ratio, effective tillers etc. were also recorded highest in RHB 173 followed by RHB 177 (Table 22). Field experiment revealed that the yield was highest in RHB 173 followed by RHB 177. It was found minimum in GHB 558. Our results indicate that seedling length, root: shoot ratio and anti-oxidative activities might have helped the RHB 173 to exhibit more yield under rainfed conditions. The 1000 seed weight also found to be associated with grain yield of pearl millet hybrids and again RHB 173 and RHB 177 reflected better over other hybrids (Fig. 8). Overall, performance of RHB 173 was found best which was closely followed by RHB 177. The GHB 558 performed least for most of the parameters.

Table 22: Seed germination percentage and moisture content in bajra hybrids

Character	Pearl millet hybrid					SEm±	C. D. at 5%
	RHB 173	RHB 177	GHB 538	HHB 67	GHB 558		
Seed *mc* (%)	8.10	9.90	8.97	8.89	8.92	1.36	NS
Germination (%)	94.24	87.92	88.30	85.53	86.2	1.61	7.24

Table 23: Root and shoot vigour traits and physiological parameters in bajra

Name of hybrid	At 30 days after emergence							
	Seedling vigour index I	Seedling vigour index II	Root : Shoot ratio	Chlorophyll content ($mg.g^{-1}$. F.W.)	Carotenoid content ($mg.g^{-1}$. F.W.)	Membrane stability index	MDA content ($nmolg^{-1}$ F.W)	Catalase (ug H_2O_2 reduced g^{-1} F.W. min^{-1})
RHB 173	3940	191	0.201	2.03	0.85	66.44	7.44	17.49
RHB 177	3665	179	0.163	1.94	0.76	61.35	9.49	15.67
GHB 538	3281	165	0.115	1.77	0.70	57.97	8.04	14.29
HHB 67	3309	170	0.174	1.82	0.89	62.28	8.28	17.66
GHB 558	2790	163	0.113	1.64	0.78	52.11	10.29	12.44
S Em±	132	5.61	0.007	0.079	0.039	2.82	0.54	0.62
C. D. at 5%	416	17.69	0.022	0.249	0.123	8.90	1.72	1.96

Table 24: Yield and yield contributing parameters in bajra hybrids

Hybrid	Shoot length (cm)	Shoot dry weight (g)	Leaf area per plant (cm^2)	Days to maturity	Productive tiller per plant	Grain yield per plant (g)	Harvest index (%)	1000- seed weight (g)
RHB 173	170	26.06	337.6	75	2.67	8.47	24.90	11.57
RHB 177	163	27.26	294.8	70	2.67	8.07	23.37	11.46

Hybrid	Shoot length (cm)	Shoot dry weight (g)	Leaf area per plant (cm^2)	Days to maturity	Productive tiller per plant	Grain yield per plant (g)	Harvest index (%)	1000- seed weight (g)
GHB 538	155	20.12	244.3	74	2.33	6.97	19.54	10.87
HHB 67	160	22.51	262.6	69	2.33	7.85	22.25	10.58
GHB 558	147	20.07	248.9	73	2.67	6.51	21.55	10.21
S Em±	4.65	0.94	9.79	0.41	0.33	0.32	0.83	0.21
C. D. at 5%	14.67	2.98	37.94	1.23	NS	1.01	3.76	0.66

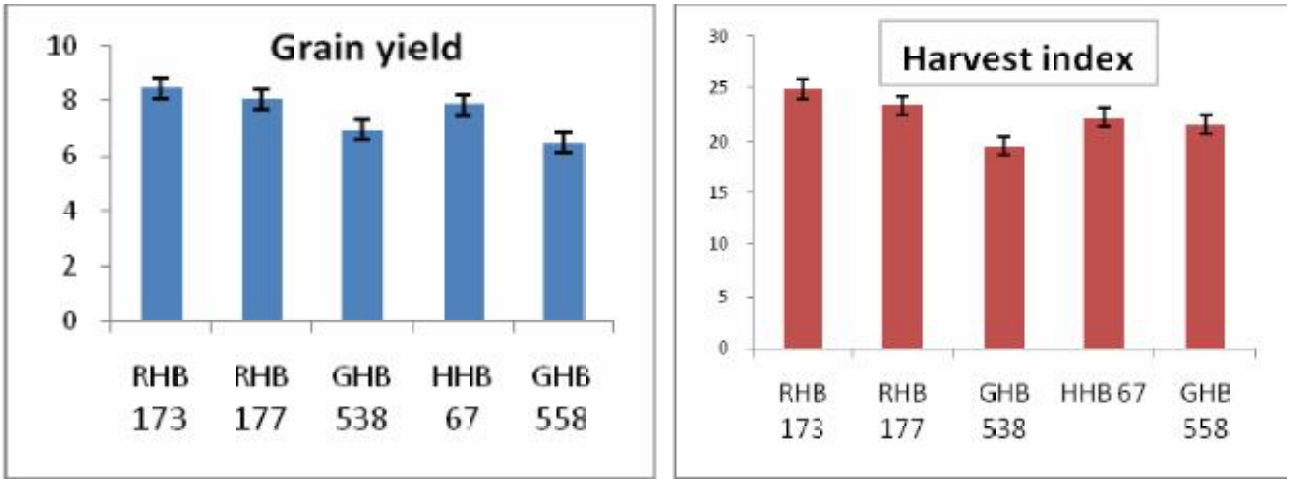


Figure 9: Grain yield (g/plant) and harvest index (%) in bajra hybrids

CCSHAU, Hisar

Results: Results indicated that six hybrids varied significantly for various growth and physiological parameters except for productive tillers per plant and root shoot ratio. Seedling vigour Index, root length, shoot length, root volume and germination were found maximum in Hybrid HHB-272 while 1000 seed weight and yield was recorded maximum in HHB-197. Among six hybrids taken for study, HHB-272 was found best followed by HHB-197.

Table 25: Performance for yield and yield attributes of different hybrids in pearl millet

Hybrids	Days to flowering	Days to maturity	Plant Height (cm)	Panicle length (cm)	Panicle girth (cm)	Productive tillers ($Plant^{-1}$)	Seed yield/plot (5×4m) (kg)	At 35 days after emergence				
								Chl	SL (cm)	RL (cm)	RV (mL)	Root shoot ratio
HHB-67i	42	67.00	172	22.3	2.29	2.37	4.2	42.7	87	11.0	6.50	0.13
HHB-197	46	72.00	176	22.1	2.60	2.57	5.59	46.5	82	9.16	2.00	0.11
HHB-223	46	77.00	189	22.6	2.59	2.49	5.28	56.	76	11.8	2.00	0.16
HHB-226	47	74.67	156	21.0	2.60	2.34	4.14	51.4	91	10.3	2.16	0.12
HHB-234	48	76.33	169	23.1	2.20	2.27	3.54	47.5	74	9.50	1.50	0.13
HHB-272	45	74.33	161	20.2	2.80	3.88	4.85	40.1	101	12.8	3.16	0.13
C.D. 5 %	1.75	2.07	5.23	0.81	0.03	N.S.	0.24	6.48	11.1	2.42	0.64	NS

Table 26: Seed vigour traits of different hybrids in pearl millet

Hybrids	1000 seed weight (g)	Germination (%)	Seedling length (cm)	Vigour Index-I
HHB-67i	6.85	68.33	31.00	2119.33
HHB-197	11.25	81.33	33.33	2712.00
HHB-223	10.05	79.33	31.33	2482.67
HHB-226	8.42	78.33	28.66	2246.33
HHB-234	4.54	77.00	27.00	2079.67
HHB-272	9.32	90.33	35.00	3161.67
C.D. at 5 %	0.17	3.09	4.41	354.48

Crop: Sunflower

Dr. PDKV, Akola

Experimental details: Two hybrids (PKVSH-952 and PKV-27), one variety (TAS-82) and the parental lines of PKVSH-952 (CMS-302A and AKSF-6R) were selected for study. Data recorded on root profile, yield and yield attributing characters as per the technical programme are presented in table 27. In general, PKVSH-952 performed better than other hybrid and their parental lines. In hybrid PKVSH-952, significantly higher root length (15.7 cm), shoot length (49.9 cm), root volume (21.6 cm^3), dry weights of root (4 g) were recorded. In addition, the same hybrid recorded significantly higher seed yield (17.17q ha^{-1}). In seed quality parameter after harvesting, the hybrid PKVSH-952 exhibited higher seed germination (92.66 %) and vigour index II (21.63). The harvested seeds are packed in cloth bag and stored for one cropping season.

Table 27: Seed quality parameters of sunflower

Treatments	100 seed wt. (g)	Seed moisture (%)	Seed germination (%)	Seedling length (cm)	Seedling dry wt. (g)	Vigour Index II
G_1 PKVSH– 952	5.10	9.70	92.66	24.66	0.23	21.63
G_2 PKVSH-27	4.90	9.40	89.33	22.77	0.23	20.57
G_3 TAS-82	5.00	9.30	87.33	21.20	0.22	19.52
G_4 CMS -302 A	4.70	9.40	81.00	22.24	0.19	15.91
G_5 AKSF-6 R	5.00	9.50	87.33	21.90	0.22	19.18
SE m±	0.08	0.18	1.84	0.64	0.01	0.66
CD @ 5%	0.26	NS	6.01	2.09	0.02	2.14

Figure 10: STRU field- Sunflower

Crop: Cotton

VNMKV, Parbhani

Results: Experiment was initiated with hybrid cotton NHH-44 and NHH-206 along with parental lines. Field trial was conducted during *Kharif* 2016 and at 30 days observations were recorded *viz*. shoot length, root length, total height, number of leaves, leaf area and chlorophyll content. 30 days old seedlings dry weight was also recorded. Results on hybrid cotton NHH-44 and NHH-206 along with parental lines showed variations in seed weight, seed moisture content and seed germination (Table 28), seed germination ranged between 71.3 to 84.3 %, seed moisture content between 8.27 to 11.60%. Hybrid NHH-206 significantly differed for seedling growth rate, speed of germination and VI-II. Seedlings observations of 30 days also varied among hybrids and parental lines (Table 29 & 30), parental line AC 738 recorded higher dry matter than the other lines. Thus higher vigour was measured in hybrid cotton as compared to parental lines.

Fig. 11: Cotton crop in the field

Table 28: Observations of cotton hybrids and parental lines

Name of Hybrid & parental lines	1000 Seed wt. (g)	Seed moisture (%)	Seed germination (%)	Seed Density (m^3)	SG	Seedling growth rate	VI-I	VI-II
NHH 44 (Hybrid)	49.24	8.6	71.33	1.07	27.49	2.88	1295	2.21
AC-738 (M)	64.19	8.9	74.33	1.13	30.59	2.41	1140	2.64
BN-1 (F)	68.43	8.0	73.33	1.20	31.03	2.85	1346	3.13
NHH-206 (Hybrid)	57.01	10.0	81.33	1.00	35.32	3.46	1811	4.10
NH-625 (M)	53.28	8.2	72.33	1.13	29.43	2.65	1242	2.13
NH-615 (F)	58.85	11.6	84.33	1.10	33.77	3.67	1920	3.85
SE±	2.78	0.20	2.08	0.04	0.41	0.19	107	0.49
CD 5%	8.70	0.64	6.56	0.14	1.30	0.60	337	1.56
CV (%)	8.24	3.82	4.74	7.13	2.30	11.13	12.73	28.71

Table: 29: Observations of thirty-day old seedlings in cotton hybrids and parental lines

Name of Hybrid & parental lines	Shoot length (cm)	Root length (cm)	Total height (cm)	Number of leaves	Leaf area (cm^2)	Leaf chlorophyll (mg/g)
NHH 44 (Hybrid)	20.83	8.57	29.4	6	24.96	7.30
AC-738 (M)	31.83	11.93	43.8	8	54.87	8.54
BN-1 (F)	16.57	9.30	25.9	5	8.58	8.03
NHH-206 (Hybrid)	22.40	10.80	33.2	6	17.86	5.14
NH-625 (M)	18.73	10.03	28.8	6	15.79	5.52
NH-615 (F)	22.70	8.37	31.1	6	21.52	6.78
SE±	1.45	1.10	1.58	5.57	3.77	0.59
CD 5%	4.56	3.46	4.97	1.75	11.87	1.80
CV (%)	11.33	19.41	8.55	15.66	27.33	14.92

Table 30: Observations on cotton hybrids and parental lines on 30 days old seedling

Name of Hybrid & parental lines	Shoot Dry wt. (g)	Root Dry wt. (g)	Leaves Dry wt. (g)	Total Dry wt. (g)
NHH 44 (Hybrid)	0.20	0.10	0.47	0.77
AC-738 (M)	0.50	0.31	1.65	2.46
BN-1 (F)	0.08	0.03	0.15	0.25
NHH-206 (Hybrid)	0.20	0.07	0.43	0.71
NH-625 (M)	0.12	0.04	0.29	0.45
NH-615 (F)	0.21	0.07	0.43	0.71
SE±	0.05	0.03	0.12	0.19
CD 5%	0.16	0.11	0.38	0.62
CV (%)	40.00	59.55	37.28	38.56

Overall Conclusions: This experiment aimed at understanding the seed vigour traits which contribute ultimately to the productivity. Rice hybrids showed higher seedling vigour than the parental lines which result in rapid field emergence followed by the rapid development of root and shoot and its components including yield parameters. The higher root: shoot recorded in CRMS 32A is one such character which can be exploited for better utilization of soil moisture and subsequent yield gain under moisture stress conditions. This trait can also contribute to early establishment of seedlings with higher seed vigour resulting in more number of tillers and leaf area index at pre-anthesis stage. Higher vigour, higher number of tillers per plant, as observed in hybrids, is more important to determine the yield but these does not speak anything about the seed longevity and seed vigour during storage. Further, this experiment in the entire crop needs to be reviewed in the background of the information given above in the introductory part (background). The basic need of the experiment is to develop hybrid crops and taking care in hybrid seed production programmes for storability of seeds. Seed vigour data coupled seed storability of hybrid and parental lines would make seed testing and prediction for field conditions more realistic.

Experiment 2: Identification of variety and hybrid specific SSR markers in field crops

Background: Maintenance of genetic purity in seed production chain is extremely important to exploit the full potential of newly developed varieties and hybrids. The grow out test for maintaining genetic purity is time consuming, therefore, we need a quick method to identify a variety or hybrid in seed chain with the help of specific molecular markers. Thus the experiment is aimed to assess the genetic purity of hybrids and varieties with the help of specific SSR markers.

Objective:

To identify unique marker for varietal identification and maintenance of genetic purity

Year of start: 2011-2012

Crops	:	Centres
Rice	:	PJTSAU, Hyderabad; UAS, Bangalore; TNAU, Coimbatore; HPKVV, Palampur; ICAR-IISS, Mau; JNKVV, Jabalpur, AAU, Jorhat, ICAR-RC NEH, Tripura
Maize	:	UAS, Dharwad; PAU, Ludhiana; UAS, Raichur
Pearl millet	:	RAU, Durgapura
Soybean	:	UAS, Raichur; MPKV, Rahuri; VNMKV, Parbhani

Crop: Paddy

PJTSAU, Hyderabad

Experimental details: Varieties, Hybrids and their parental lines: MTU 7029, WGL 23985, Krishna, WGL 283, JGL 17004, Siddi, JGL 11470, Somanath, CMS 46A, CMS 46B, JBR 7, CMS 23A, CMS 23B, JBR 8 were used in the present study. Seeds of paddy varieties, hybrids parental lines were collected from different Agricultural Stations of PJTSAU. Genomic DNA isolations was made and studied for DNA fingerprinting through electrophoresis/PCR analysis employing a set of 18 SSR markers. Out of 18 SSR markers, 12 SSRs showed polymorphism between the varieties and two hybrids parental lines.

Results: RM 19, RM 55, RM 124, RM 11, RM 105, RM 133, RM 144, RM 152 and RM171 showed polymorphism within 8 rice varieties. Consistency of bands was checked by repeating the reaction twice and the reproducible bands were scored in all the samples for each of the primers separately. Seven markers viz., RM 19, RM55, RM 11, RM 105, RM 133, RM 144 and RM 152 clearly distinguished 8 rice varieties. MTU 7029 showed polymorphism with RM 19, RM 55, RM 124, RM 105, RM 133 and RM 144. Similarly varieties WGL 23985, Krishna, JGL 11470 and WGL 283 with RM 19, Siddhi, JGL 11470, Somanath with RM 171 showed polymorphism. RM 11 showed polymorphism with variety JGL 17004 and RM 144 and RM 152 showed polymorphism with Siddhi. A total of 18 SSR markers were employed for fingerprinting of 6 rice hydrids and its parental lines. Markers RM 11, RM 19, RM 171 showed polymorphism for 6 rice hybrids its parental lines. Two Markers clearly distinguished 6 rice hybrids and their parental lines. JBR 7 showed polymorphism with RM 1. Similarly JBR 8 showed polymorphism with RM 19 and RM 171.

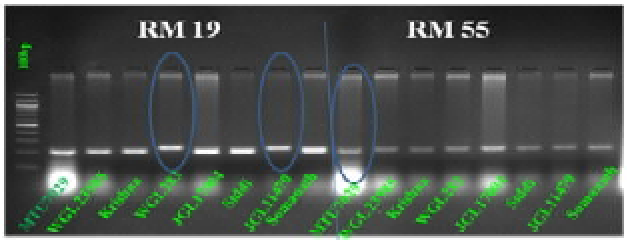


Fig. 1: RM 19 & RM 55

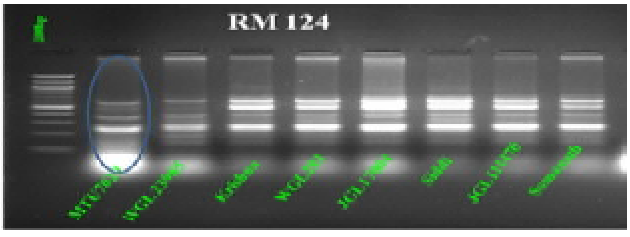


Fig. 2: RM 124

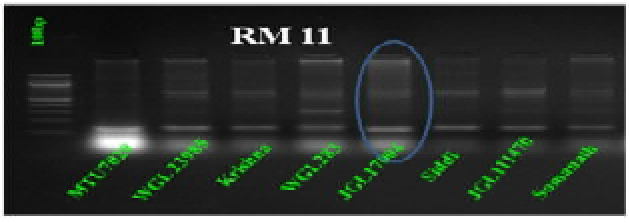


Fig. 3: RM 11

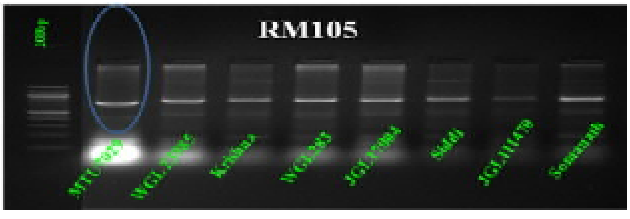


Fig. 4: RM 105

Fig. 5: RM 133

Fig. 6: RM 144

Fig. 7: RM 171

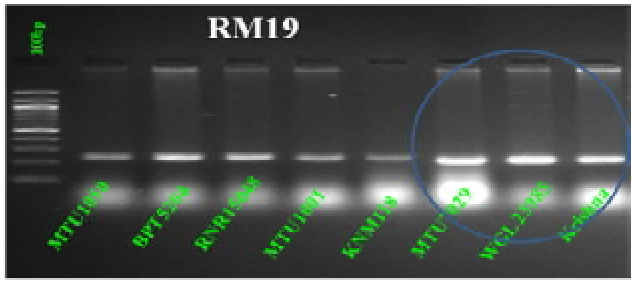


Fig. 8: RM 19

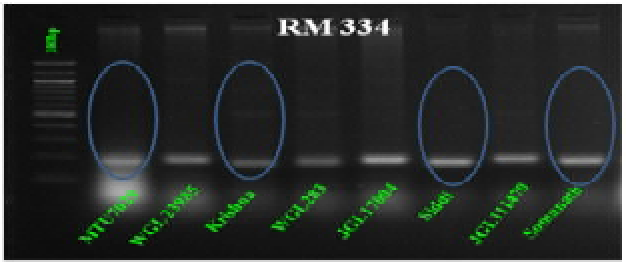


Fig. 9: RM 334

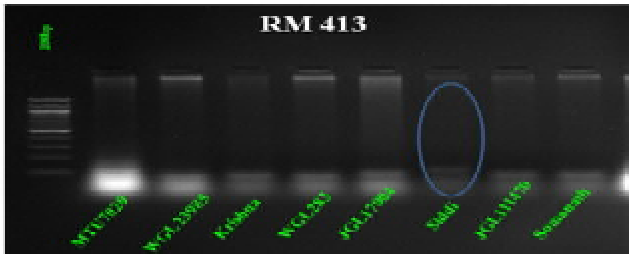


Fig. 10: RM 413

Fig. 11: RM 452

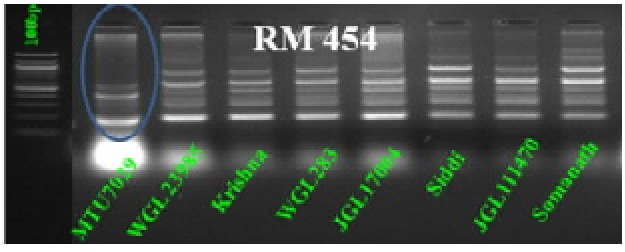


Fig. 12: RM 454

Fig. 13: RM 19

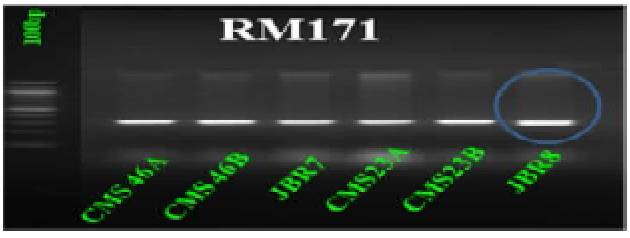


Fig. 14: RM 171

UAS Bengaluru

Experimental details: Freshly harvested pure seeds of rice varieties, hybrids and parental lines were collected from Paddy Breeding Unit, ZARS, VC Farm, Mandya. DNA quantification was done by both Agarose gel (0.8%) and Nano-photometer. Screening of these lines with identified polymorphic markers was carried for validation of identified markers and also some new primers were studied along with previously identified primers.

Table 1: List of paddy varieties and hybrids used for the study

Type	Genotype
Variety	MTU-1010, MTU 1001, Rathna Choodi, Jaya, MAS 946-1, JGL 1798, BR 2655, Jyothi, Thanu, Thunga, Gangavathi Sona, Mandya Sona 1, BPT 5204, MAS 26, Raksha, Mandya Sona 2, Mandya Sona 3, KMP 153, Thellahamsa, Rajamudi, IR 64, KMP 200, Rasi, KMP 201, IR 30864, CTH 3, KMP 175, KMP 128, ARB 6
Hybrid	KRH 4 (CRMS 32A & MSN 36); KRH 2 (IR 58025 & KMR 3)

Results: Among two hybrids unique polymorphic markers for KRH-2 (RM 9106 and RM 9310) and KRH-4 (RM 81057, RM 10103 and Rm9a2) hybrids were identified (Fig. 15A-15D). Some primers (RM 9a3, RM 9a9 and RM 836) amplified in both the hybrids with different base pairs and some primers (RM 983, RM 982, RM 906 and RM 98) amplified with same base pair. The primers which amplified with different base pairs were tested for multiplex PCR also (Fig. 15-17).

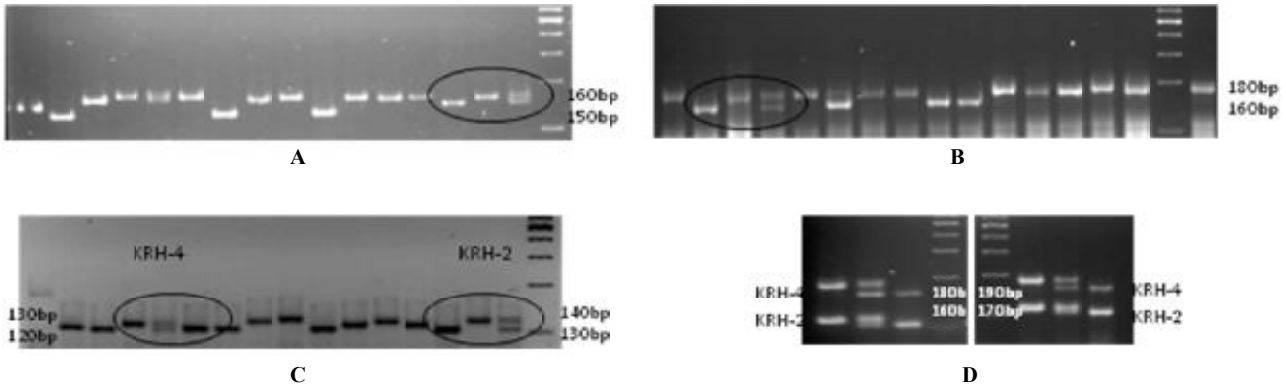


Figure 15. A. Unique SSR marker for KRH-2 hybrid, B. Unique SSR marker for KRH-4 hybrid, C. Unique SSR marker for both KRH-2& KRH-4 hybrids, D. Multiplexing of KRH-2 KRH-4 hybrid.

Table 2: Identified unique SSR markers for varietal identification to maintain genetic purity

Varieties/Hybrids	Unique Polymorphic SSR Markers	SSR marker combinations suitable for multiplexing
BR-2655	RM 10103	RM 10103 + RM 982
Jyothi	RM 961,RM 9 & RM 19	RM 9106 + RM 98
KCP-1	RM 551	RM 982 + RM 81057
Thanu	RM 19 & RM 3323	RM 982 + RM 9310
Jaya	RM 10107 & RM 551	RM 9a9 + RM 913
MTU1010	RM 9a2,RM 258,RM 836&RM 231	RM 982 + RM 9310
MTU1001	RM 9a9	RM 982 + RM 81057
Thunga	RM 55	-
IR-30864	RM 53	-
BPT-5204	RM 334	-
CTH-1(KH-14)	RM 1912, RM 3323	-
MAS-26	RM 9a3	-
KRH-2	RM 9106, RM 10107,& RM 231	RM 9a9 + RM 913
KRH-4	RM 81057, RM 346 & RM 251	RM 9a9 + RM 906

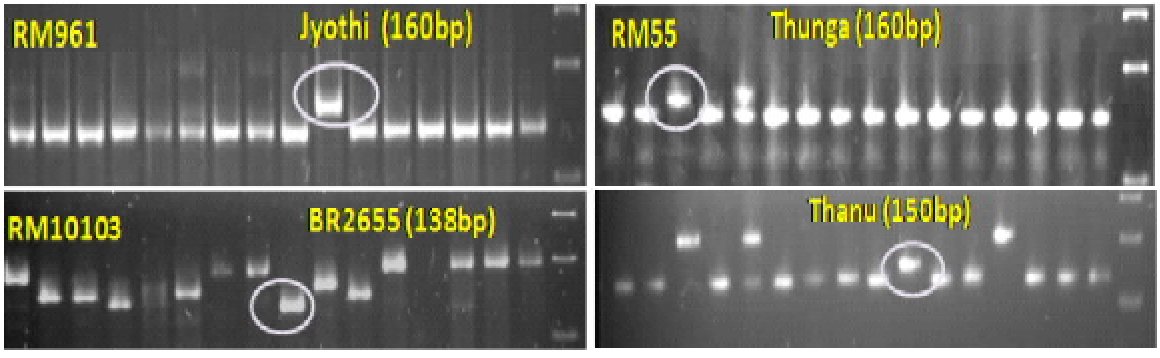
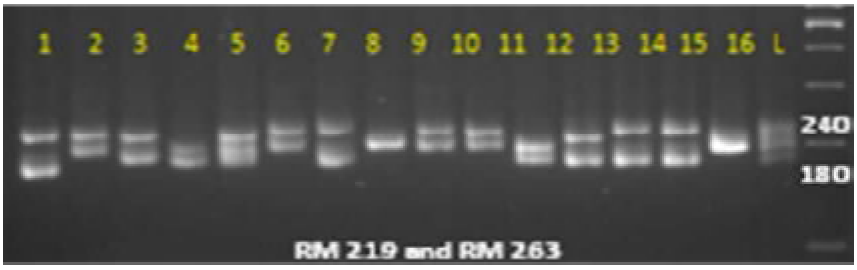


Figure 16: Unique SSR markers identified for varieties



1:BR-2655, 2:Jyothi, 3:KCP-1, 4:Thanu, 5:Jaya, 6:MTU1010, 7:MTU1001, 8:Thunga, 9:IR-30864, 10:BPT-5204, 11:CTH-1(KH-14), 12:MAS-26, 13:KRH-2, 14:KRH-4,15:CRMS-32A,16:MSN-36

Figure 17: Multiplexing of varieties with identified polymorphic primers

Conclusion: Out of 84 microsatellite primers studied, fifty six were found to be polymorphic markers among the thirty rice lines and two hybrids. Thirty nine markers amplified a specific allele among these lines, experiment is in progress.

TNAU, Coimbatore

Results: Four new rice varieties viz. CO (R) 51, ADT (R) 50, CR 1009 sub 1 and TKM 13 have been taken for this study. Experiment is in progress. So far 60 markers have been tested for polymorphism

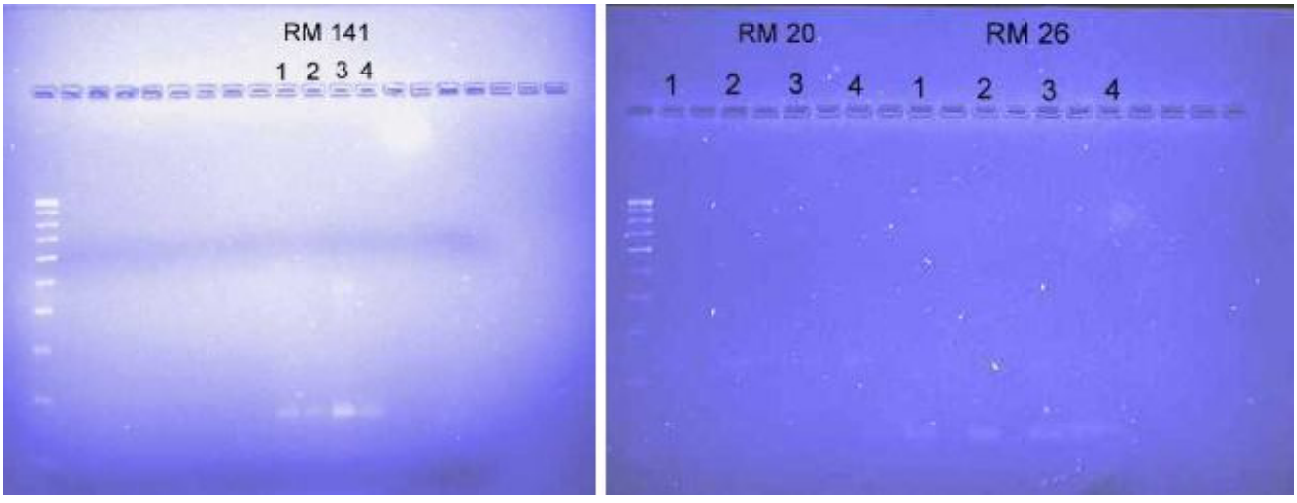


Figure 18: SSR polymorphism in rice varieties

JNKV, Jabalpur

Experimental material: The rice varieties NPT 29, NPT 65, JR 81, MTU 1010, JR 201, JR 503, Kranti, Mahamaya, Improved Jeera shankar and Improved Chinnor were used in the study.

Table 3: List of hybrids, their parental lines and contaminant variety

Hybrid	A line	R line	B line	Contamination variety
JRH 5	IR 68897 A	NPT 65	IR 68897 B	Kranti
JRH 8	IR 68897 A	NPT 29	IR 68897 B	Kranti
JRH 19	IR 58056 A	NPT 13-01	IR 58056 B	Kranti

Table 4: List of primers used in hybrid purity testing

Primers	Reverse sequence	Forward sequence	AT (°C)
RM 237	5'-TGGGAAGAGAGCACTACAGC-3'	5'-CAAATCCCGACTGCTGTCC-3'	55
RM 16	5'-AAC ACA GCA GGT ACG CGC-3'	5'-CGC TAG GGC AGCATCTAA A-3'	55
RM 190	5'-TTGCAGATGTTCTTCCTGATG-3'	5'-CTTTGTCTATCTCAAGACAC-3'	52
RM 205	5'-CTGGCCCTTCACGTTTCAGTG-3'	5'-CTGGTTCTGTATGGGAGCAG-3'	55
RM 235	5'-TCACCTGGTCAGCCTCTTTC-3'	5'-AGAAGCTAGGGCTAACGAAC-3'	55
RM 228	5?- GCTTGCGGCTCTGCTTAC-3?	5?- CTGGCCATTAGTCCTTGG-3?	52
RM 234	5'-ACAGTATCCAAGGCCCTGG-3'	5'-CACGTGAGACAAAGACGGAG-3'	52
RM 251	5'- GAATGGCAATGGCGCTAG-3'	5'- ATGCGGTTCAAGATTCGATC-3'	55
RM 256	5'-GTTGATTTCGCCAAGGGC-3'	5'-GACAGGGAGTGATTGAAGGC-3'	55
RM 276	5'-TCCTCCATCGAGCAGTAT-3'	5'-CTCAACGTTGACACCTCGTG-3'	55
RM 279	5'-GGCTAGGAGTTAACCTCGCG-3'	5'-GCGGGAGAGGGATCTCCT-3'	52
RM 84	5?- TTGCAAATGCAGCTAGAGTAC-3?	5?-TAAGGGTCCATCCACAAGATG-3?	52
RM 502	5-CTGGCCCTTCACGTTTCAGTG-3'	5'-CTGGTTCTGTATGGGAGCAG-3'	55
RM 217	5'- GGGTGTGAACAAAGACAC- 3'	5'- ATCGCAGCAATGCCTCGT – 3'	55
RM 510	5?-AACCGGATTAGTTTCTCGCC-3?	5?-AACCGGATTAGTTTCTCGCC-3?	55
RM 4653	5'-AACCGATGCAGATCAGAG-3'	5'-CTCGGACAAGCATGATCT-3'	55
RM 5	5'-GCATCCGATCTTGATGGG-3'	5'-TGCAACTTCTAGCTGCTCGA-3'	55
RM 475	5'-ACGGTGGGATTAGACTGTGC-3'	5'-CCTCACGATTTTCCTCCAAC-3'	55
RM 118	5'-CACATCCTCCAGCGACGCCGA G-3'	5'-CCAATCGGAGCCACCGGAGAG C-3'	55
RM 137	5'-CGGGTCGTCCCCGAGGATCTTG-3'	5'-GACATCGCCACCAGCCCACCA C-3'	55
RM 152	5'-GAAACCACCACACCTCACCG-3'	5'-CCGTAGACCTTCTTGAAGTAG-3'	55
RM 171	5'-AACGCGAGGACACGTACTTAC-3'	5'-ACGAGATACGTACGCCTTTG-3'	55
RM 233	5'- GCATTGCAGACAGCTATTGA- 3'	5'- CCAAATGAACCTACATGTTG-3'	55
RM 154	5'-CTCCTCCTCCTGCGACCGCTCC C-3'	5'-ACCCTCTCCGCCTCGCCTCCTC-3'	55
RM 205	5'-CTGGCCCTTCACGTTTCAGTG-3'	5'-CTGGTTCTGTATGGGAGCAG-3'	55
RM 438	5'-CTCTCTGCCACCGATCCTAC-3'	5'-CTTATCCCCCCGTCTCTCTC-3'	55
RM 488	5'- CAGCTAGGGTTTTGAGGCTG-3'	5'- TAGCAACAACCAGCGTATGC-3'	55
RM 212	5'-CACCCATTTGTCTCTCATTATG-3'	5'-CCACTTTCAGCTACTACCAG-3'	55
RM 539	5'- AGTAGGGTATCACGCATCCG- 3'	5'- GAGCGTCCTTGTTAAAACCG -3'	55

Result:

Identification of Hybrid Specific SSR Markers

Determining the genetic purity of hybrid seed is an essential requirement for its commercial use, since there is always a chance of contamination in the hybrid seed production plot because of pollen shedders, out-crossing and physical mixtures during the subsequent handling of the harvested material.

Table 5: The summarized result of testing of genetic purity of all three hybrids

Hybrid	Markers identified for testing the genetic purity	Identified specific markers
JRH 5	RM 237, RM 16, RM 190, RM 205, RM 235, RM 228, RM 234, RM 251, RM 256, RM 276, RM 279, RM 84, RM 502, RM 217	RM 237, RM 16, RM 84
JRH 8	RM 190, RM 228, RM 234, RM 251, RM 256, RM 276, RM 279, RM 510, RM 502, RM 5, RM 217, RM 4653	RM 5
JRH 19	RM 190, RM 205, RM 235, RM 228, RM 234, RM 251, RM 276, RM 279, RM 510, RM 502, , RM 217, RM 4653	-

RM 237, RM 16 and RM 84 markers are found to be specific for JRH 5, while RM 5 specific for JRH 8. These markers are also specific to find any potential contaminant for other hybrids and Kranti.

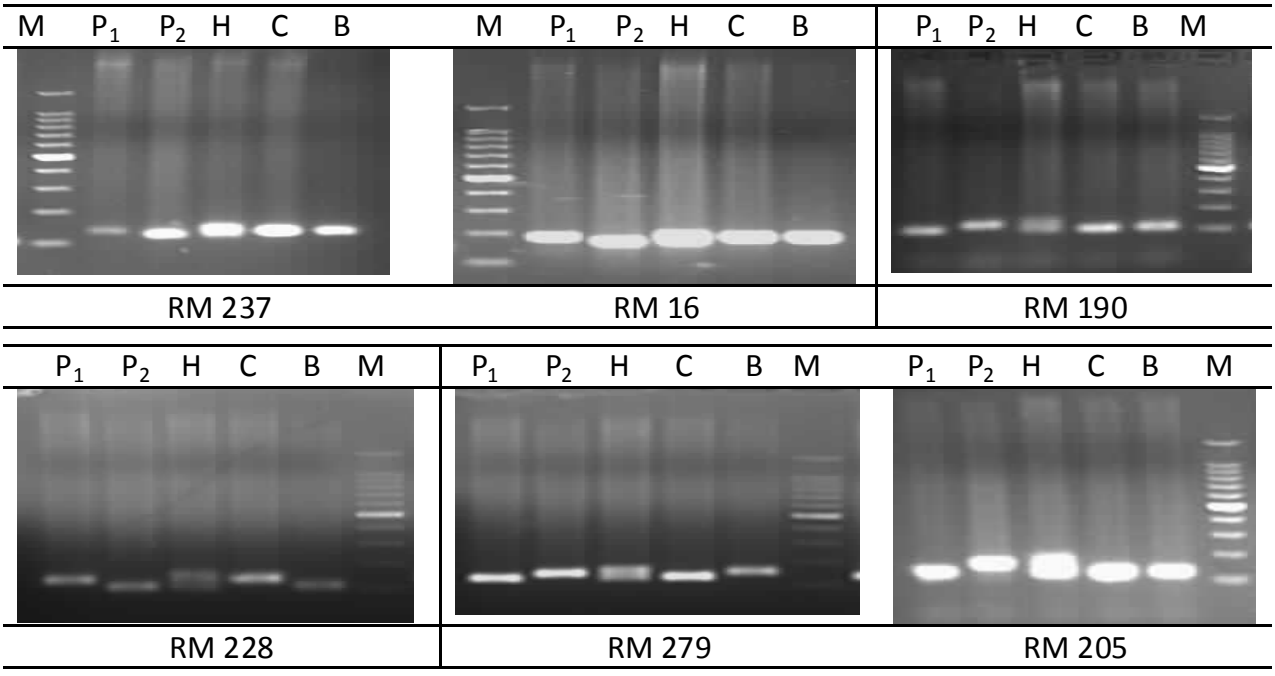


Figure 19: Fingerprinting of rice hybrid JRH 5 using different SSR markers (M: 100 bp marker, P_1: A line, P_2: B line, H: Hybrid, C: Contaminator variety, B: B line)

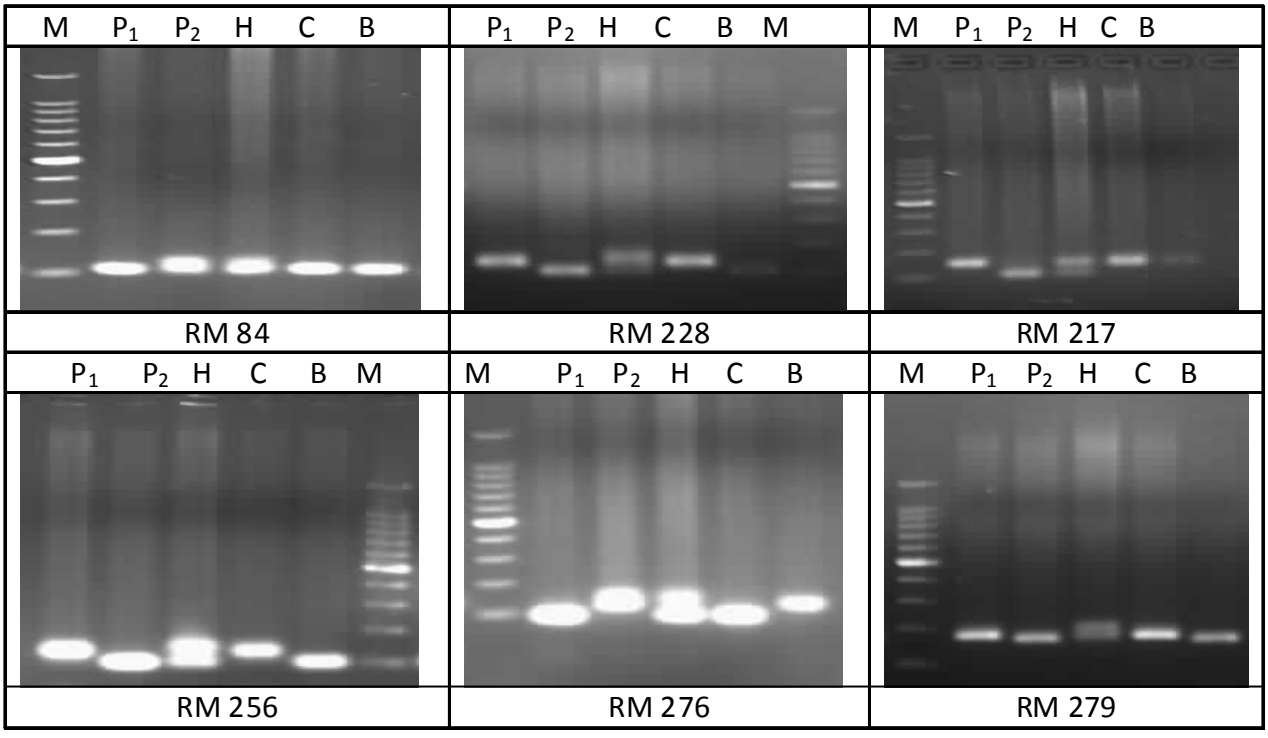


Figure 20: Fingerprinting of rice hybrid JRH 8 using different SSR markers (M: 100 bp marker, P_1: A line, P_2: B line, H: Hybrid, C: Contaminator variety, B: B line)

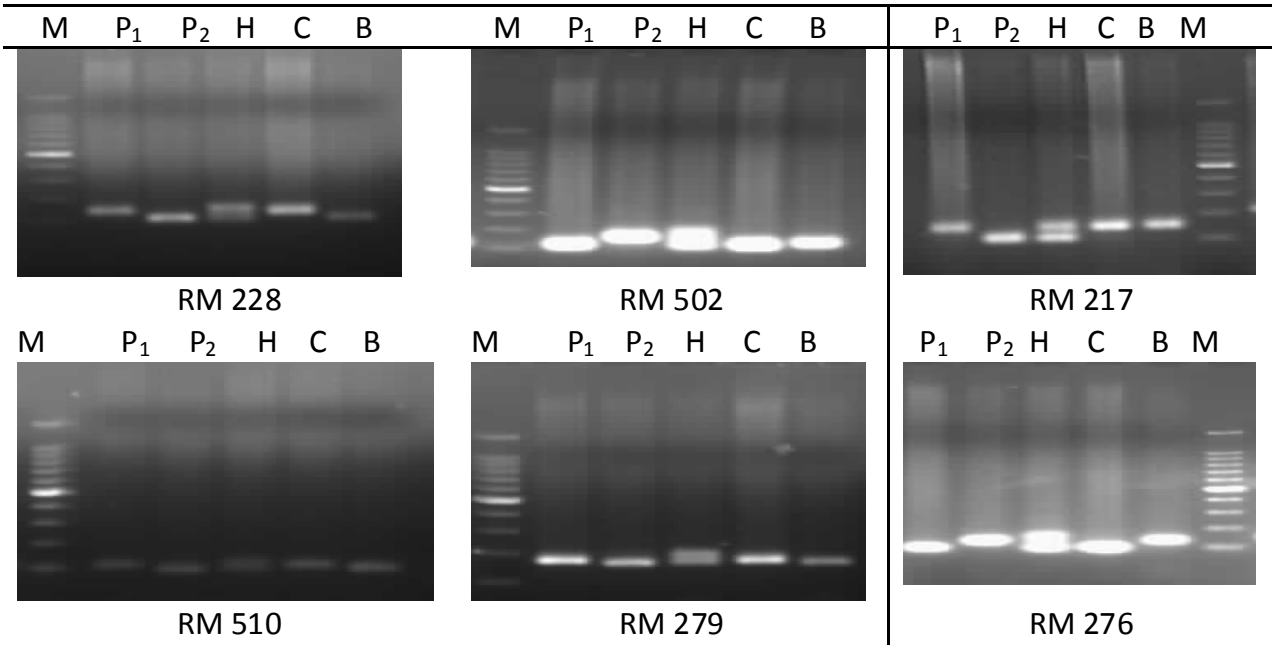


Figure 21: Fingerprinting of rice hybrid JRH 19 using different SSR markers (M: 100 bp marker, P_1: A line, P_2: B line, H: Hybrid, C: Contaminator variety, B: B line)

Identification of variety specific SSR marker: To verify the extent of contamination with other varieties grown nearby or threshed in the same threshing floor and processed in the same processing plant, the present experiment was undertaken with ten rice varieties. A total of 37 markers showed polymorphism. Out of that, nineteen unique SSR markers were indentified for nine varieties.

Table 6: The summarized result of identifying the variety specific SSR markers

Variety	Unique marker	Size (bp)
NPT 29	RM 152	169
	RM 171	292
NPT 65	RM 137	219
	RM 279	132
	RM 502	157
	RM 510	118
JR 81	RM 256	141
JR 201	RM 16	176
	RM 212	124
JR 503	RM 234	159
Kranti	RM 475	209
	RM 118	162
	RM 235	142
	RM 438	309
Mahamaya	RM 488	200
	RM 539	292
Improved Jeera shanakar	RM 233	172
	RM 154	200
Improved Chinnor	RM 205	282

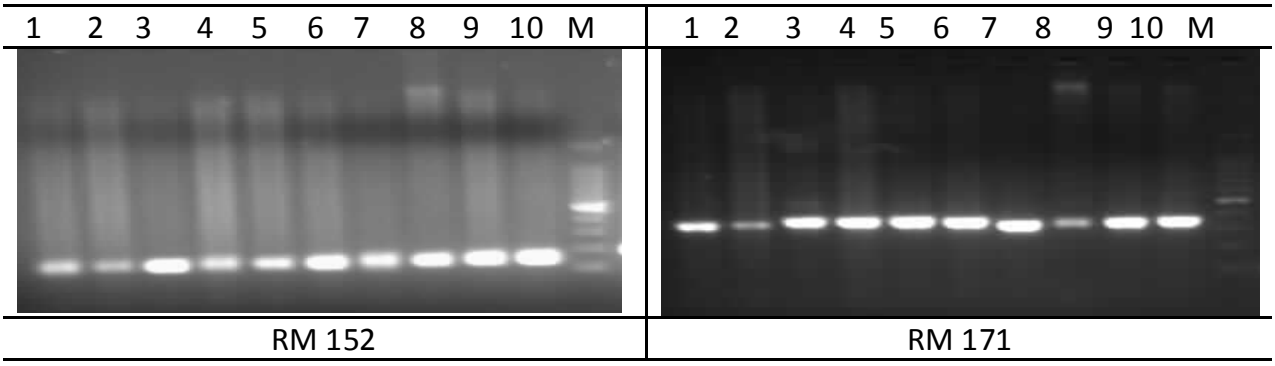


Figure 22: Fingerprinting of rice Variety NPT 29 using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeera shankar, 10: Improved Chinnor)

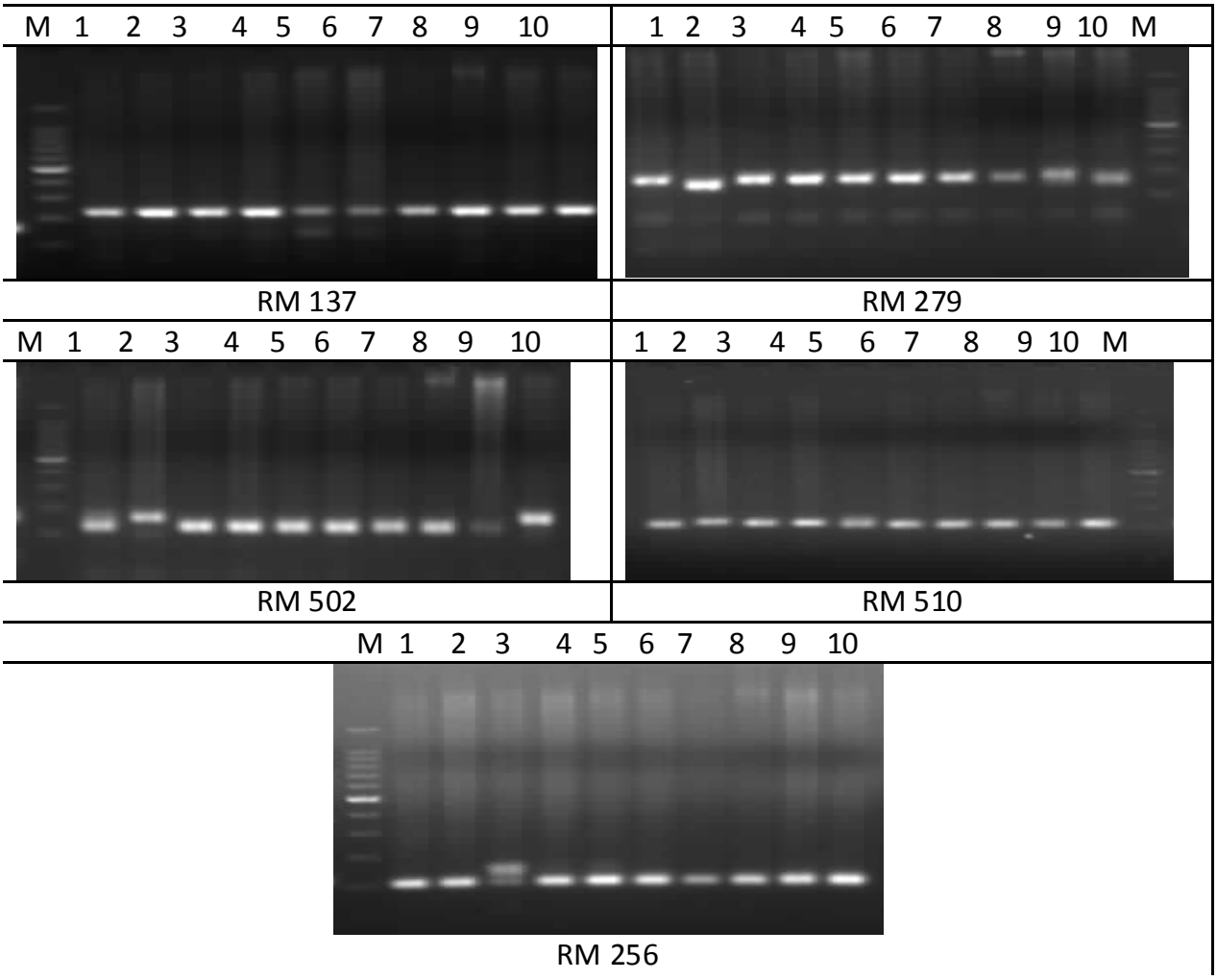


Figure 23: Fingerprinting of rice Variety NPT 65 using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeera shankar, 10: Improved Chinnor)

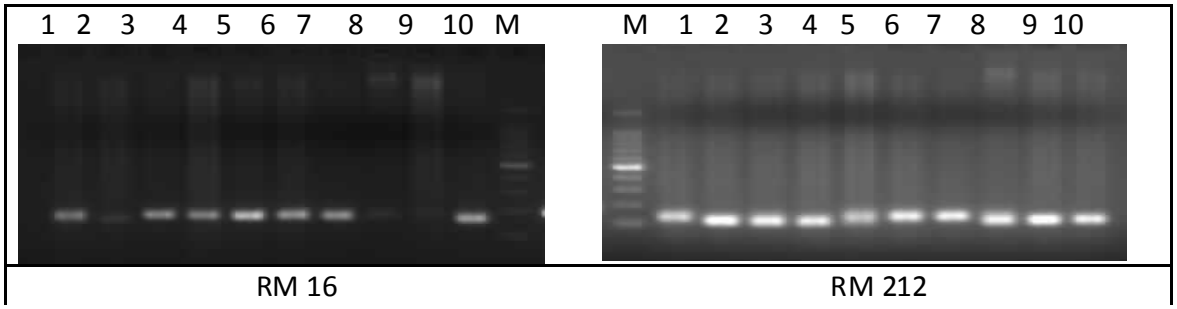


Figure 24: Fingerprinting of rice Variety JR 81 using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeera shankar, 10: Improved Chinnor).

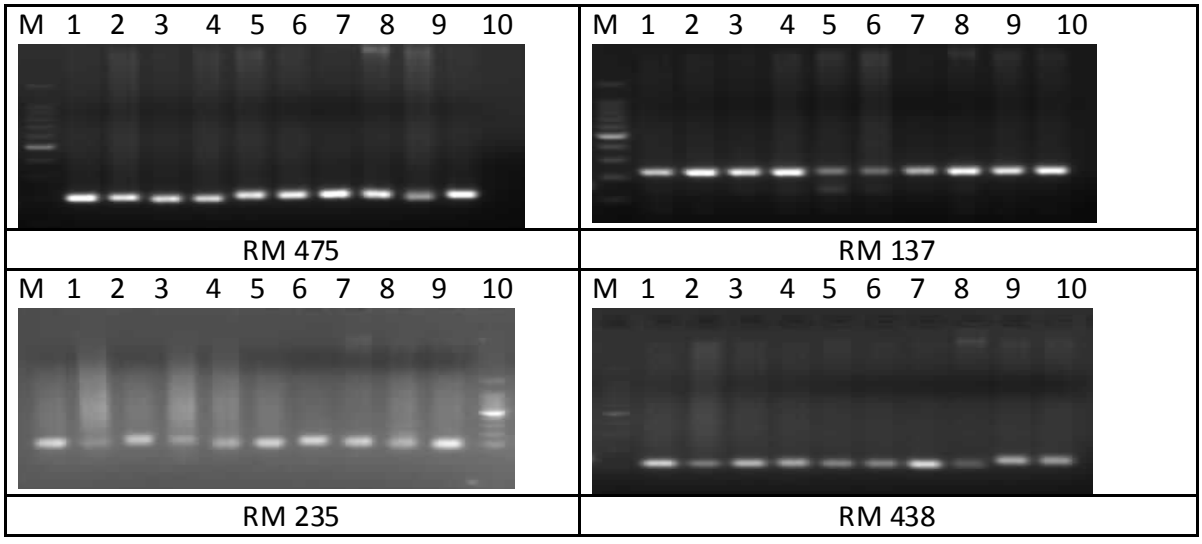


Figure 25: Fingerprinting of rice Variety JR 201 using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeera shankar, 10: Improved Chinnor).

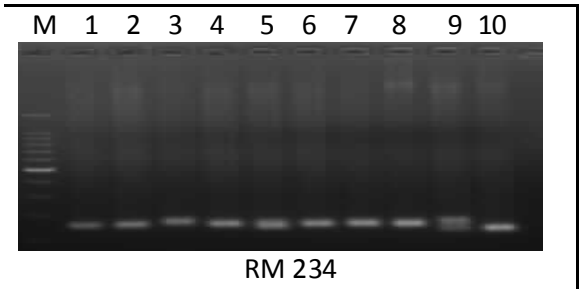


Figure 26: Fingerprinting of rice Variety JR 503 using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeerashankar, 10: Improved Chinnor).

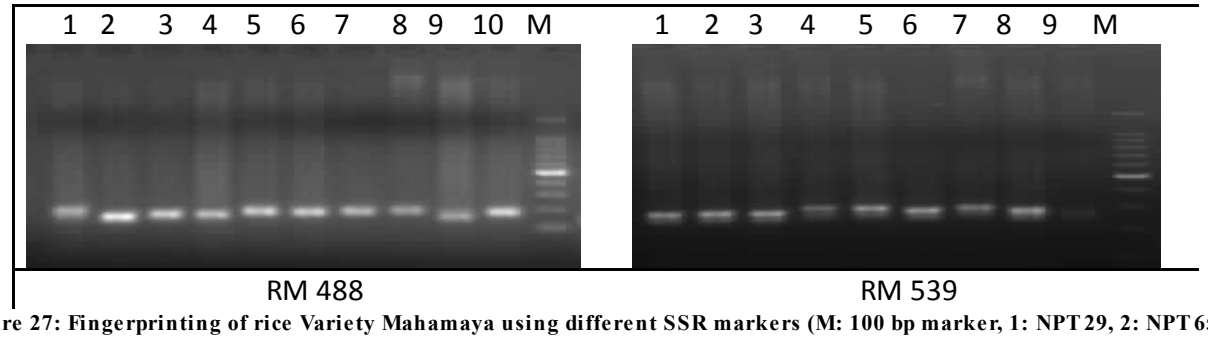


Figure 27: Fingerprinting of rice Variety Mahamaya using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeerashankar, 10: Improved Chinnor)

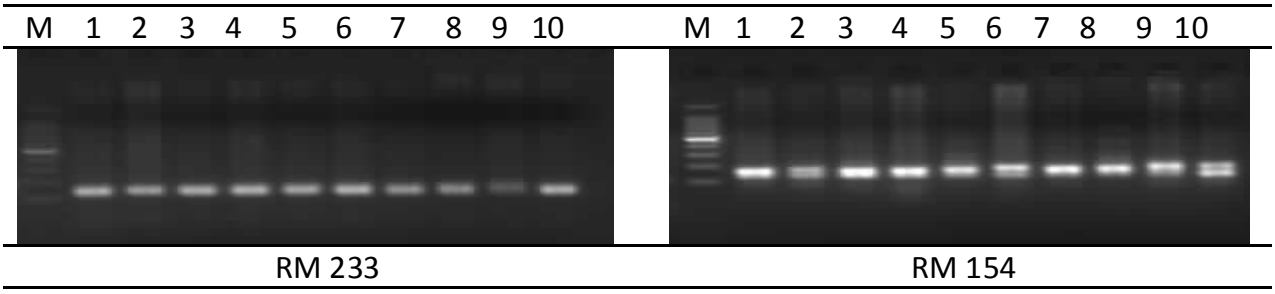


Figure 28: Fingerprinting of rice Variety Improved Jeera shankar using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeera shankar, 10: Improved Chinnor)

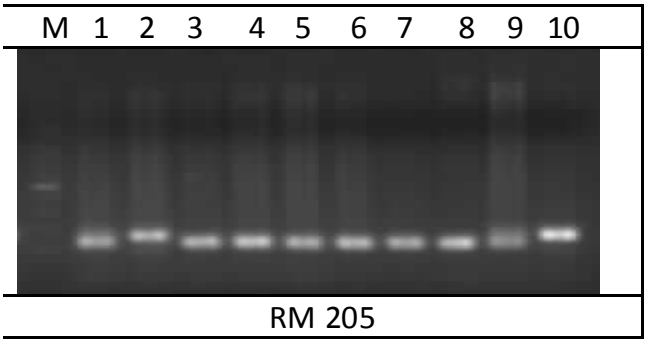


Figure 29: Fingerprinting of rice Variety Improved Chinnor using different SSR markers (M: 100 bp marker, 1: NPT 29, 2: NPT 65, 3: JR 81, 4: MTU 1010, 5: JR 201, 6: JR 503, 7: Kranti, 8. Mahamaya, 9: Improved Jeerashankar, 10: Improved Chinnor)

AAU Jorhat

Varieties: Nine rice varieties (HYV) existing in seed chain were selected for the present study.

Primers used: A panel of 15 SSR primers previously reported to be polymorphic in distinguishing rice varieties were used in the present study

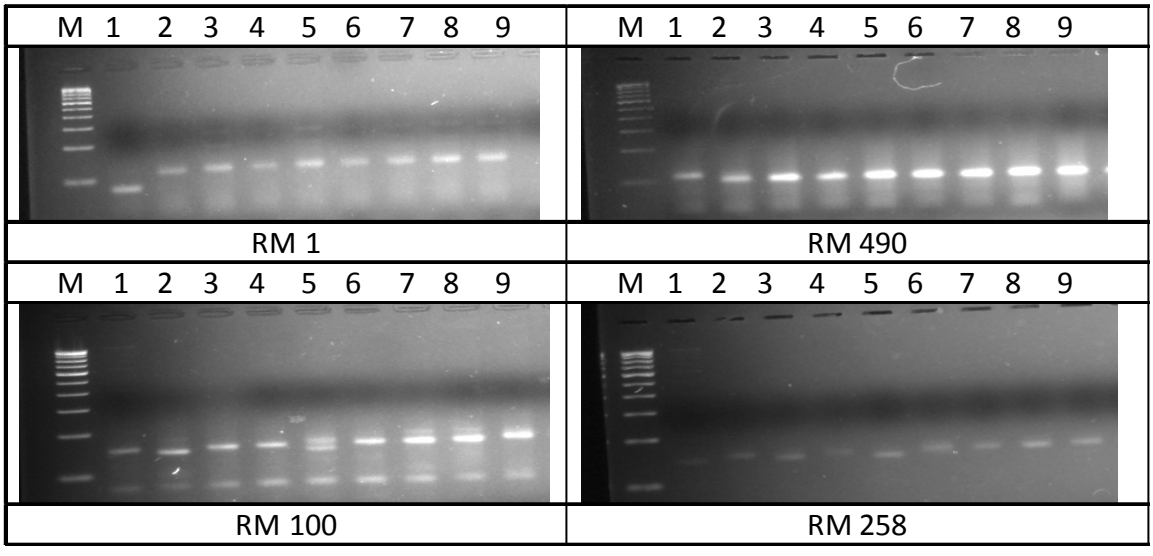


Fig. 30: Fingerprinting of rice using different SSR markers (M: 100 bp marker, 1: Gitesh, 2: Aghuni bora, 3: Ketekijoha, 4: Luit, 5: Manoharsali, 6: Ranjit, 7: Lachit, 8. Mashuri, 9: Bahadur)

PAJANCOA & RI, Karaikal

Experimental details: Genomic DNA from fresh leaves was isolated from young seedlings of four rice varieties *viz.,* ADT 37, ADT 43, ADT (R) 45 and Improved White Ponni using CTAB procedure. Out of 35 primers, 33 were showing amplification in different temperature and 2 primers were not amplified as listed below (Table 7). Out of 35 primers tested for amplification, 20 SSR primers showed amplification at 55°C, 3 SSR primers showed amplification at 54°C, 4 SSR primers showed amplification at 56°C, 6 SSR primers showed amplification at 58°C.

Table 7 : List of primers used in variety purity testing at PAJANCOA & RI, Karaikal

Primer code	Reverse sequence (5'to 3')	Forward sequence (5'to 3')	Tm (°C)
RM 21	ACAGTATTCCGTAGGCACGG	GCTCCATGAGGGTGGTAGAG	-
RM 216	GCATGGCCGATGGTAAAG	TGTATAAAACCACACGGCCA	55
RM 171	AACGCGAGGACACGTACTTAC	ACGAGATACGTACGCCTTTG	55
RM 286	GGCTTCATCTTTGGC GAC	CCGGATTCACGAGATAAACTC	58
RM 536	TCTCTCCTCTTGTTTGG CTC	ACACACCAACACGACCACAC	54
RM 206	CCCATGCGTTTAACTAT TCT	CGTTCCATCGATCCGTATGG	55
RM 19	CAAAAACAGAGCAGATGAC	CTCAAGATGGACGCCAAGA	55
RM 20	ATCTTGTCCCTGCAGGTCAT	GAAACAGAGGCACATTTCATTG	55
RM 167	GATCCAGCGTGAGGAA CACGT	AGTCCGACCACAAGGTGCGTTGTC	55
RM 333	GTACGACTACGAGTGTCACCAA	GTCTTCGCGATCACRCGC	55
RM 264	GTTGCGTCCTACTGCTACTTC	GATCCGTGTCGATGATTAGC	55
RM 125	ATCAGCAGCCATGGCAGCGACC	AGGGGATCATGTGCCGAAGGCC	55
RM 566	ACCCAACTACGATCAGCTCG	CTCCAGGAACACGCTCTTTC	55
RM 320	CAACGTGATCGAGGATAGATC	GGATTTGCTTACCACAGCTC	55
RM 247	T A G T G C C GATCGATGTAACG	CATATGGTTTTGACAAAGCG	55
RM 544	TGT GA G C C TGAGCAATAACG	GAAGCGTGTGATATCGCATG	56
RM 346	CGAGAGAGCCCATAACTACG	ACAAGACGACGAGGAGGGAC	55
RM 547	TAGGTTGGCAGACCTTTTCG	GTCAAGATCATTCTCGTAGCG	56
RM 10	TTGTCAAGAGGAGGCATCG	CAGAATGGGAAATGGGTCC	55
RM 519	AGAGAGCCCCTAAATTTCCG	AGGTACGCTCACCTGTGGAC	58
RM 149	GCTGACCAACGAACCTAGGCCG	GTTGGAAGCCTTTCCTCGTAACACG	58
RM 210	T C A C A T T C GGTGGCATTG	CGAGGATGGTTGTTCACTTG	-
RM 346	C G A G A GAGCCCATAACTACG	ACAAGACGACGAGGAGGGAC	58
RM 144	TGCCCTGG C G CAAATTTGATCC	GCTAGAGGAGATCAGATGGTAGTG	58
RM 561	GAGCTGTTTTGGACTACGGC	GAGTAGCTTTCTCCCACCCC	54
RM 47	ACTCCACTCCACTCCCCAC	GTCAGCAGGTCGGACGTC	56
RM 222	CTTAAATGGGCCACATGCG	CAAAGCTTCCGGCCAAAAG	55
RM 116	TCACGCACAGCGTGCCGTTCTC	CAAGATCAAGCCATGAAAGGAGGG	56
RM118	CCAATCGGAGCCACCGGAGAGC	CACATCCTCCAGCGACGCCGAG	54
RM119	CATCCCCCTGCTGCTGCTGCTG	CGCCGGATGTGTGGGACTAGCG	55
RM121	ACCGTCGCCTTCCACTTTCCCC	TTCGGGGTTGCCGGTGATGTTG	55
RM122	GAGTCGATGTAATGTCATCAGT	GAAGGAGGTATCGCTTTGTTGGAC	55
RM124	ATCGTCTGCGTTGCGGCTGCTG	CATGGATCACCGAGCTCCCCCC	55
RM125	ATCAGCAGCCATGGCAGCGACC	AGGGGATCATGTGCCGAAGGCC	55

Testing for purity: When SSR markers were used to amplify the DNA of true to type CR1009 and suspected off-types collected from BSP plot of rice cv. CR 1009, SSR marker, RM122 showed variation in the band size (Fig 32). Further confirmation of this marker for identification of off-type in CR 1009 is needed.

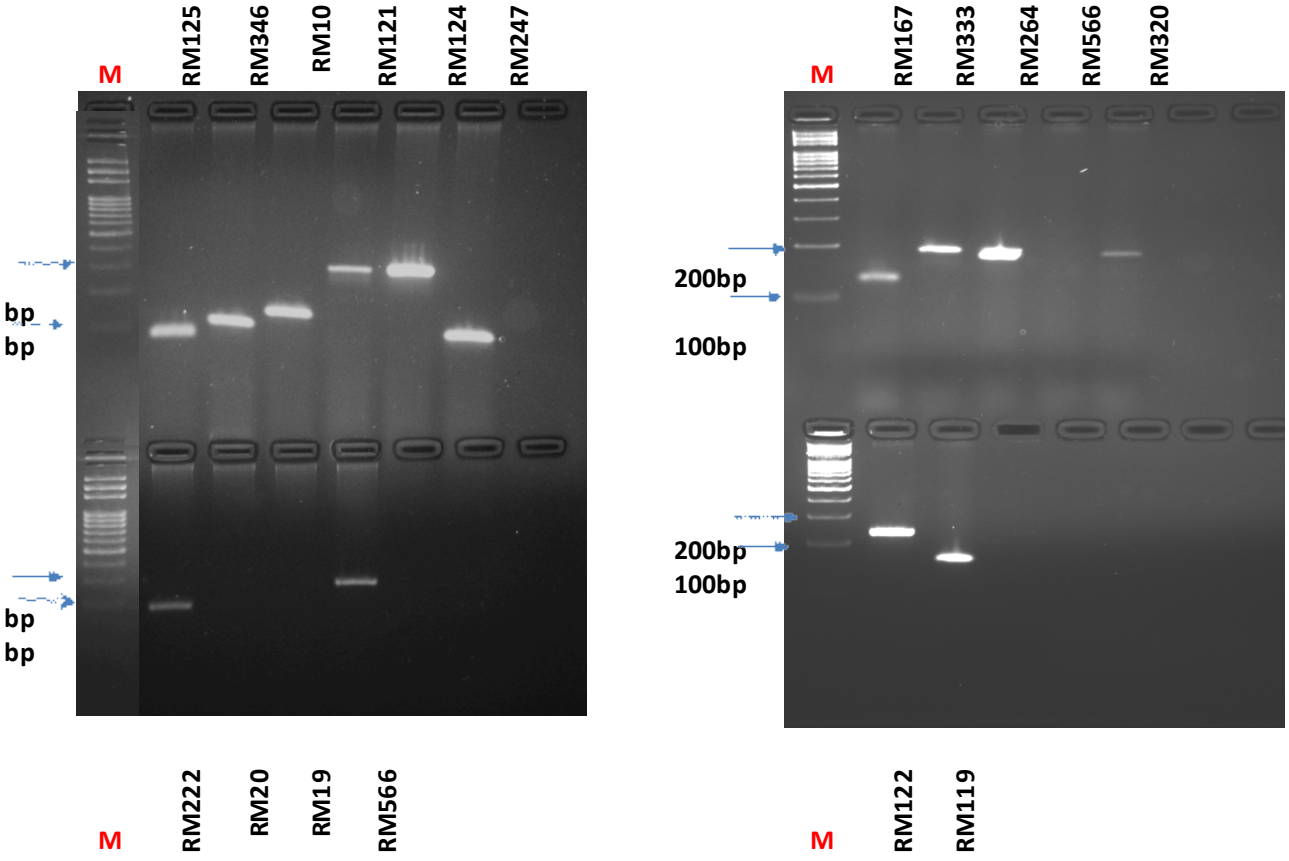


Figure 32: Gel profile showing the amplification of SSR primers RM320, RM122 and RM119 in CR1009 at 55p C

Conclusion (Crop Paddy): The respective Centres are generating data on SSR markers for varietal identification to maintain genetic purity however this is ongoing activity for the Centres to perform on varieties/hybrids involved in seed production system.

ICAR-IISS, Mau

Experimental details: Major rice hybrids such as DRRH-3, PSD-1, PSD-3, PRH-10 and NDRH-2, which are released and recommended for cultivation in Uttar Pradesh, were chosen for identification of hybrid specific SSR makers in Paddy. Moreover, molecular characterization of major cultivated varieties of paddy in the country and in Uttar Pradesh state were also selected for identification of variety specific SSR makers in Paddy.

Table 8: List of rice hybrids recommended for Uttar Pradesh

S. No	Hybrids	A line	R line
1	DRRH3	APMS-6A	RPHR1005R
2	PSD 1	UPRI 95-17A	UPARI93-133R
3	PSD 3	UPRI 95-17A	UPRI 93-287R
4	PRH10	Pusa 6A	PRR78R
5	NDRH2	IR58025A	NDR3026-3-1-R

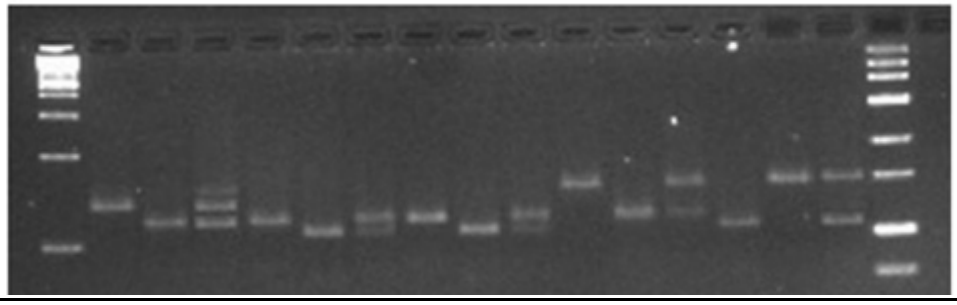
Table 9: Primers used for molecular characterization of rice parental lines

SSR markers	Forward Primer	Reverse Primer
RM 228	CTGGCCATTAGTCCTTGG	GCTTGCGGCTCTGCTTAC
RM 258	TGC TGT ATG TAG CTC GCA CC	TGG CCT TTA AAG CTG TCG C
RM 505	AGAGTTATGAGCCGGGTGTG	GATTTGGCGATCTTAGCAGC
RM 519	AGAGAGCCCCTAAATTTCCG	AGGTACGCTCACCTGTGGAC
RM-565	AGTAACGAGCATAGCAGGCG	GCAAAGCCTTCAGGAATCAG

All the above primers were retrieved from (Gramene: http:// archive. gramene.org / markers /microsat/ ssr.html)

Results

Molecular Characterization of rice parental lines and hybrids using SSR markers: In the study, RM-228 molecular marker is able to amplify different alleles of 5 hybrids and their parental lines (Fig. 33) These rice varieties are predominantly cultivated in Uttar Pradesh (Table 8).

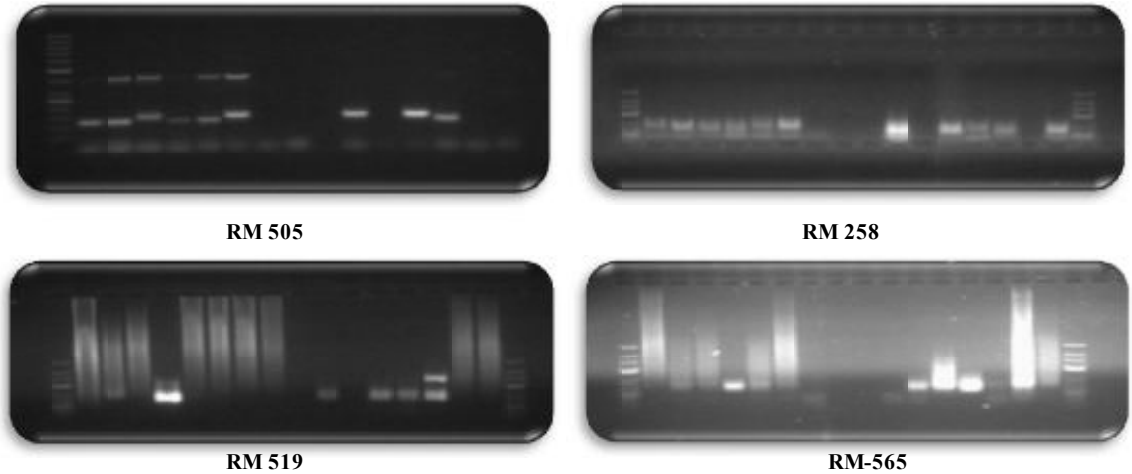


(Lane-wise 1. Ladder, 1,2 & 3 DRRH-3 A,R lines & H; 4,5 & 6 PSD-1 A,R lines & H, 7,8, & 9 PSD-3 ; A,R lines & H, 10, 11 & 12 PRH-10; and 13, 14 & 15 NDRH-2 A,R lines & H)

Fig 33: Molecular characterization of rice cultivars using SSR marker RM-228.

Several markers have been tested for genetic purity test (Table 9). Among SSR markers, RM 228 marker is found to be the unique marker for DRRH3 rice hybrid and to find any potential contaminant from PSD1, PSD3, PRH10, NDRH2 and thirty two varieties cultivated at IISS, Mau.

Molecular characterization of rice varieties



RM 505 **RM 258**

RM 519 **RM-565**

Fig. 34: Lane-wise (1) LR-50bp (2) HUR -105 (3) Rajendra Sweta (4) Rajendra Bhagwati (5) HUR -917 (6) MTU-7029 (7) PB -1509 (8) Swarna Sub-1 (9) Sumbha Sub-1 (10) PB- 1121 (11) Pusha 1612 (12) BPT -5204 b/s (13) PS 5 (14) SHIATS-1 (15)-pb-1 (16) BPT-5204 (17) CO- 51 (18) LR 50bp

For the study, 45 SSR markers were chosen to amplify the regions encompassing 12 chromosomes of rice genome (Fig. 34). From the results, it was observed that 05 markers were able to amplify a total of 31 different alleles. In which, some of the bands are monomorphic in nature, which substantiates the homogeneity in rice genome. However, RM-228 marker has showed polymorphism with an average of 1.66 allelic variants per SSR locus. Since these markers have showed a unique pattern of identification of different varieties, these markers could be used for further validation. Hybrids recommended in the Uttar Pradesh region were indentified with RM-228 and has showed its potential as unique marker. It could be included not only to identify the hybrids and but also to determine the seed lot purity.

Crop: Maize

PAU Ludhiana

Experimental details: Marker analysis using SSR for Hybrid (PMH1) and its parents (LM 13 and LM14) was conducted. Total 86 markers were tested, 51 markers showed amplification at 55/65^{0}C out of which polymorphism was observed in 24 markers as follows

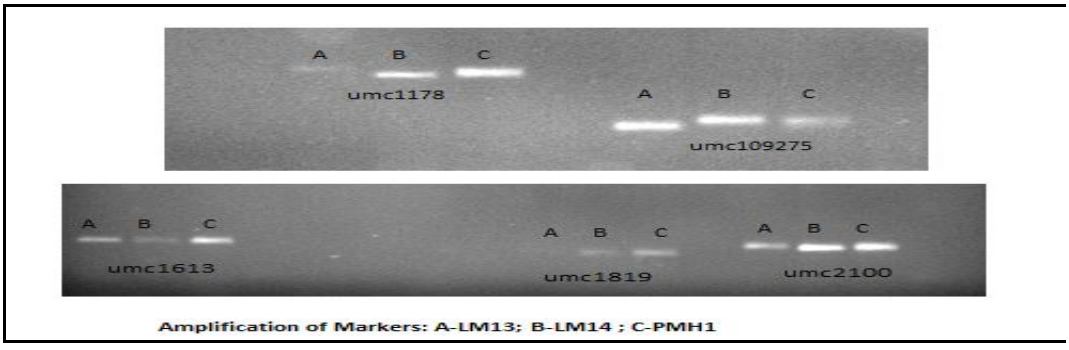
Table 10: Details of markers showing polymorphism in Maize

	Polymorphic markers (No)	Markers Name	Monomorphic markers (No)
PMH1	8	umc238, umc1798, umc1227, umc1412, umc 2516, pA1/A2i448880, umc1974 and umc 2358	43
LM13	19	umc 1178, umc109275, umc2100, umc1338, umc1704, umc1227, umc1940, umc1798, umc1183, umc1695, umc1597, umc238, umc1154, umc1371, umc1929, umc1785, umc2336, umc2358 and umc2004	32
LM14	18	umc 1178, umc109275, umc2100, umc1338, umc1704, umc1227, umc1940, umc1798, umc1695, umc1597, umc238, umc1154, umc1371, Umc2516, umc1974, umc2358, umc2016 and umc2004	33

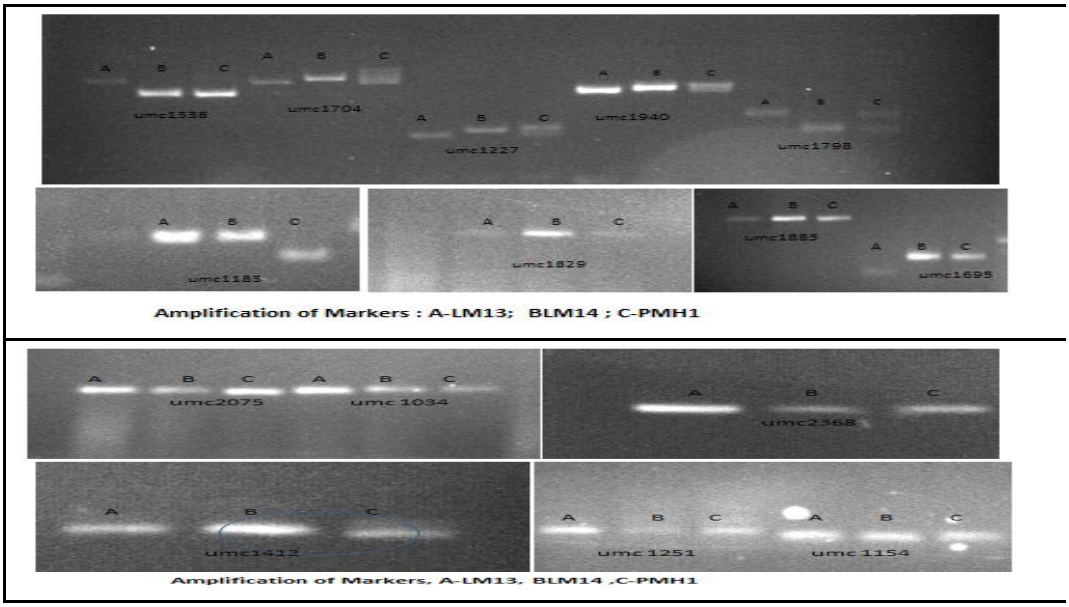
Table 11: Multiple Allelic expression of Maize using SSR markers in Hybrid (PMH1) and its parents (LM 13 and LM14) Primers at sr no. 1-19 were being worked out during 2015-16 and 20-51 during 2016-17.

S. no.	Marker	Chr. No	No. of Allele	LM13	LM14	PHM1
1.	umc 1178	1	A1 ~100, A2~150	A1	A2	A2
2.	umc109275	1	A1~150, A2~130	A1	A2	A2
3.	umc1613	1	A1~150	A1	A1	A1
4.	umc1819	1	A1~120	A1	A1	A1
5.	umc2100	1	A1~150, A2~170	A1	A2	A2
6.	umc1338	2	A1~130, A2~190	A1	A2	A2
7.	umc1704	2	A1~130, A2~150	A1	A2	A1
8.	umc1227	2	A1~150, A2~130	A1	A2	A1/A2
9.	umc1940	2	A1~190, A2~170	A1	A2	A2
10.	umc1798	2	A1~120, A2~150	A1	A2	A1/A2
11.	umc1183	3	A1~170, A2~190	A1	A1	A2
12.	umc1225	5	A1~150	A1	A1	A1
13.	umc1829	5	A1~150	A1	A1	A1
14.	umc1885	5	A1~130	A1	A1	A1
15.	umc1695	5	A1~120, A2~170	A1	A2	A2

S. no.	Marker	Chr. No	No. of Allele	LM13	LM14	PHM1
16.	umc1597	6	A1~190, A2~210	A1	A2	A2
17.	umc238	6	A1~180, A2~200	A1	A2	A1/A2
18.	umc1154	6	A1~180, A2~200	A1	A2	A1
19.	umc1371	6	A1~120, A2~170	A1/A2	A2	A2
20.	umc 2368	7	A1~150	A1	A1	A1
21.	umc1251	7	A1~100	A1	A1	A1
22.	umc1154	7	A1~170	A1	A1	A1
23.	umc1412	7	A1~170, A2~120	A1	A1	A2
24.	umc1456	7	A1~100	A1	A1	A1
25.	umc1929	7	A1~170, A2~120	A2	A1	A1
26.	umc1139	8	A1~150	A1	A1	A1
27.	umc2075	8	A1~200	A1	A1	A1
28.	umc1034	8	A1~190	A1	A1	A1
29.	umc1357	9	A1~100	A1	A1	A1
30.	umc2219	9	A1~120	A1	A1	A1
31.	umc1785	10	A1~250, A2~170	A2	A1	A1
32.	umc2516	10	A1~120, A2~190	A1	A2	A2
33.	bnlg434	7	A1~190	A1	A1	A1
34.	bnlg2132	7	A1~120	A1	A1	A1
35.	bnlg1270a	9	A1~120	A1	A1	A1
36.	umc1828	8	A1~120	A1	A1	A1
37.	umc1530	8	A1~170	A1	A1	A1
38.	bnlg1091	9	A1~100	A1	A1	A1
39.	pA1/A2i448880	9	A1~100, A2~150	A1	A1	A2
40.	bnlg1716	10	A1~100	A1	A1	A1
41.	1762a	10	A1~90	A1	A1	A1
42.	bnlg2037	8	A1~150	A1	A1	A1
43.	umc1974	8	A1~120, A2~190	A1	A1/A2	A1/A2/A3
44.	umc2336	9	A1~100, A2~170	A2	A1	A1
45.	umc2358	9	A1~100, A2~150	A1/A2	A1/A2	A1/A2
46.	bnlg236	10	A1~100	A1	A1	A1
47.	umc2016	10	A1~120, A2~170	A1	A2	A1
48.	umc2004	8	A1~200, A2~150	A2	A2	A1
49.	umc1657	9	A1~120	A1	A1	A1
50.	bnlg2249	6	A1~120	A1	A1	A1
51.	umc1863	10	A1~100	A1	A1	A1



Figures 35: Marker analysis conducted during 2015-16



Figures 36: Marker analysis conducted during 2016-17

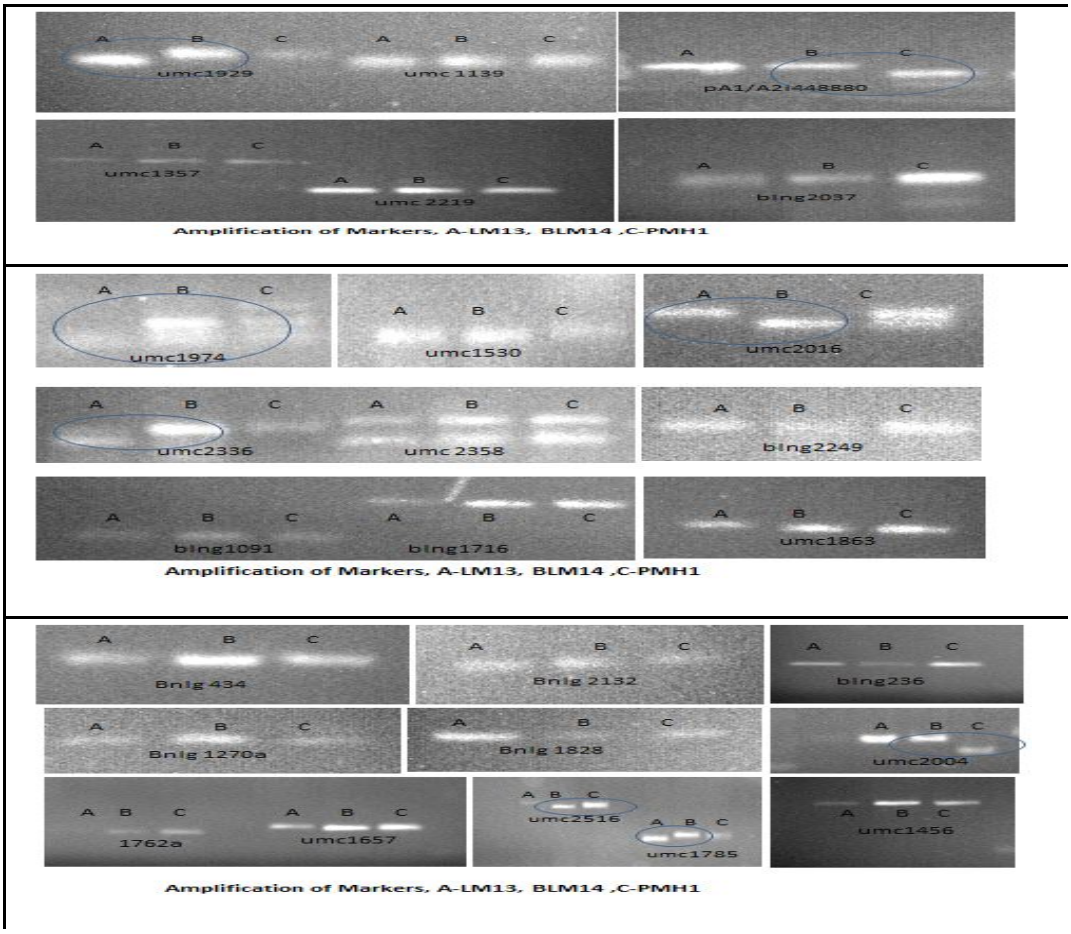


Figure 37: Amplification of markers LM 13, LM 14, and PMH 1

Conclusion (Crop Maize): The respective Centres are generating data on SSR markers for varietal identification to maintain genetic purity however this is ongoing activity for the Centres to perform on varieties/hybrids involved in seed production chain.

Crop: Pearl millet

SKNAU, Durgapura

Methodology: Seeds of five bajra hybrids along with their parents were collected from AICRP- pearl millet, Rajasthan Agricultural Research Institute, Durgapura-Jaipur (Table 12). In total, 15 SSR markers were used in this study to screen pearl millet hybrids (Table 13). Among these, few SSR markers showed polymorphism between the varieties used in this study (Fig. 38). Study with some more SSR markers is in progress.

Table 12: Bajra hybrids and their parents taken for study of polymorphism

Hybrid	Female Parent	Male Parent
RMS6AX98-109	RMS6A	Inbred 98-109
ICMA 843-22 X 58-64	ICMA 843-22	Inbred 58-64
ICMA 843-22X 65-74	ICMA 843-22	Inbred 65-74
ICMA 843-22 X 75-85	ICMA 843-22	Inbred 75/85
ICMA 97111 A X 1-7	ICMA 977111	Inbred 1-7

Table 13: List of SSR markers along with their nucleotide sequences used to study the polymorphism in pearl millet

SSR marker	F/R	Primer sequence (5'-3')	T_m(^{0}C)
PSMP2069	F	CCCATCTGAAATCTGGCTGAGAA	60.6
	R	CCGTGTTCGTACAAGGTTTTGC	60.3
PSMP2090	F	AGCAGCCCAGTAATACCTCAGCTC	64.4
	R	AGCCCTAGCGCACAACACAAACTC	64.4
PSMP2246	F	CGGATGCTAAATTAACCGAAGC	58.4
	R	CCAGCTTGCTTCTGTTGCGTTC	62.1
PSMP2273	F	AACCCCACCAGTAAGTTGTGCTGC	64.4
	R	GATGACGACAAGACCTTCTCTCC	62.4
PSMP2088	F	AAGAAGCCACCAGCACAAAA	55.3
	R	TGCATGAAAGTAGAGGATGGTAAA	57.6
PSMP2089	F	TTCGCCGCTGCTACATACTT	57.3
	R	TGTGCATGTTGCTGGTCATT	55.3
PSMP2206	F	AGAAGAAGAGGGGGTAAGAAGGAG	62.7
	R	AGCAACATCCGTAGAGGTAGAAG	60.6
PSMP2237	F	TGGCCTTGGCCTTTCCACGCTT	64.0
	R	CAATCAGTCCGTAGTCCACACCCCA	66.3
PSMP2056	F	ACCTGTAGCTTCAAAATTCAAAAA	54.2
	R	AATTCAGTGTGATTTCGATGTTGC	57.6
PSMP2251	F	TCAAACATAGATATGCCGTGCCTCC	63.0
	R	CAGCAAGTCGTGAGGTTCGGATA	62.4
	R	GGTTAGTTTGTTTGAGGCAAATGC	53.9
PSMP2086	F	CGCTTGTTTTCCTTTCTTGCTGTT	59.3
	R	CCTTCTCAGATCCTGTGCTTTCTT	61.0
PSMP2001	F	CATGAAGCCAATTAGGTCTC	55.3
	R	ACCATCTGACTTGTTCTTATCC	56.5
PSMP2248	F	TCTGTTTIGTTTGGGTCAGGTCCTTC	63.2
	R	CGAATACGTATGGAGAACTGCGCATC	64.8
PSMP2224	F	GGCGAATTGGAATTCAGATTG	55.9
	R	CGTAATCGTAGCGTCTCGTCTAA	60.6
PSMP2263	F	AAAGTGAATACGATACAGGAGCTGAG	61.6
	R	CATTTCAGCCGTTAAGTGAGACAA	59.3

Plate 2.2 Gel Analysis of PCR products using Primer 3

Plate 2.3: Gel Analysis of PCR products using Primer8

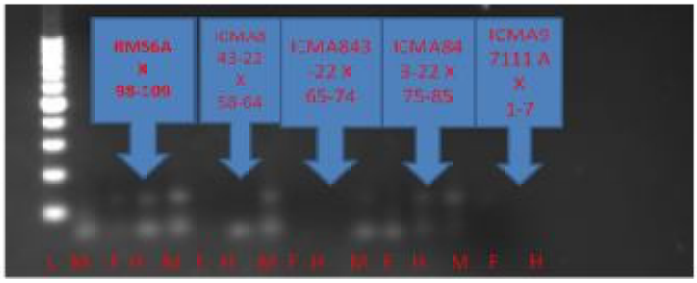


Figure 38: Gel analysis of PCR products using primers.

Conclusion (Crop: Pearl millet): The respective Centres are generating data on SSR markers for varietal identification to maintain genetic purity however this is ongoing activity for the Centres to perform on varieties/ hybrids involved in seed production chain.

Crop: Soybean

VNMKV, Parbani

Treatments Details : 18 soybean varieties with 20 SSR markers

Results: In this study, till date we have screened 20 SSR primers to identify selected 18 soybean varieties which are in the seed production chain and released under VNMKV, Parbhani (Table 14). The different soybean MAUS released varieties along with JS 335, JS 93-05 and sterile lines were selected and DNA was isolated for screening of these varieties and identification of polymorphic markers to find an unique marker for each variety. From 20 SSR markers, we found eight markers as polymorphic markers and two markers amplified a specific allele among 18 soybean genotype (Fig. 39).

Table 14: List of Soybean varieties used in this study

VNMKV, Varieties	Other varieties
MAUS 01	JS 335
MAUS 02	IS 93-05
MAUS 32	Cat 3458
MAUS 47	Cat 2115 B
MAUS 61	Cat 3459
MAUS 61-02	Cat 3468
MAUS 71	Cat 872 B
MAUS 81	
MAUS 158	
MAUS 162	
MAUS 612	

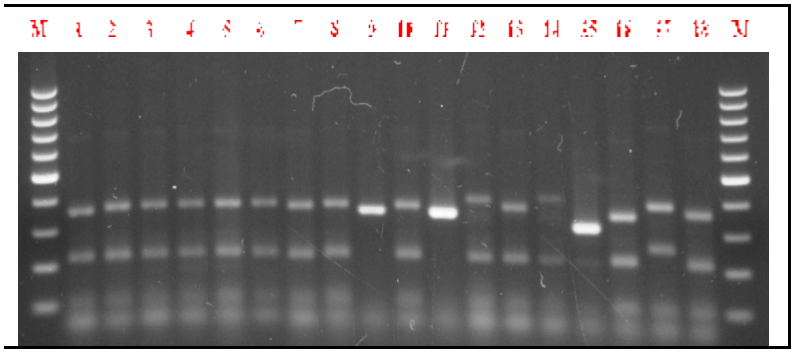


Figure 39: FAD2-20 SSR marker shows the polymeric banding pattern among 18 genotypes of soybean, Lane M: DNA Ladder 100bp, Lane 1-18.

Conclusion (Crop Soybean): The respective Centres are generating data on SSR markers for varietal identification to maintain genetic purity however this is ongoing activity for the Centres to perform on varieties/ hybrids involved in seed production chain.

Crop: Groundnut and Mungbean

UAS, Dharwad

Mungbean varieties DGG-1 and DGGV-2, groundnut varieties, DH-101, DH-86, TAG-24 and TMV-2 were used in this study.

Result

Out of total 20 primers tried in the PCR amplification, only one primer showed polymorphic amplification while rest of the primers gave monomorphic amplification, and in several reactions tried produced very faint or fuzzy lanes. Primer MBSSRG13 gave polymorphic band of 800bp in DGG-1 variety and the same is absent in DGGV-2 variety at 56°C annealing temperature.

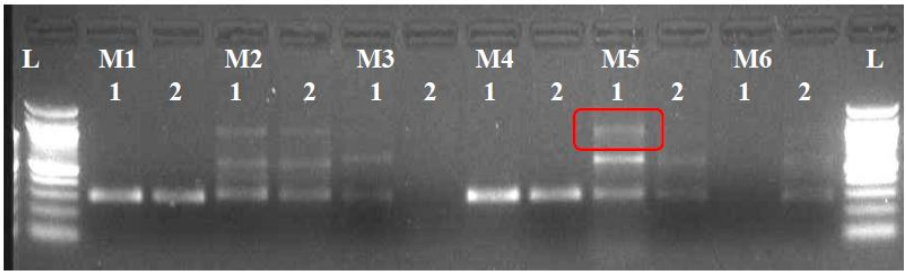


Figure 40: DNA fingerprinting of mungbean varieties with SSR markers

L: 100 bp ladder; 1: DGG1; 2: DGGV2
M1: MBSSRG1 M4: MBSSRG11
M2: MBSSRG2 M5: MBSSRG13
M3: MBSSRG10 M6 MBSSRG12

PCR reaction was carried out for 25 AhTE markers in groundnut out of which 9 markers showed polymorphism viz., AhTE908, AhTE190, AhTE181, AhTE313, AhTE202, AhTE248, AhTE205, AhTE359, and AhTE478. Marker AhTE-205 and AhTE202exhibited 300bp amplicon in newly released variety DH-101, indicating the polymorphism with the reference varieties. Marker AhTE181 showed amplification of 350bp amplicon in DH-101 variety where as in other reference varieties that amplicon is absent indicating the polymorphism between the varieties. Variety DH-101 showed amplification of 200bp amplicon with AhTE908 whereas the same was absent in other reference varieties.

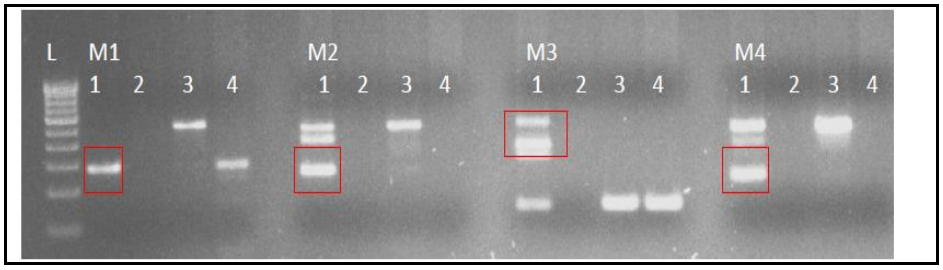


Figure 41: DNA fingerprinting of groundnut varieties with *Arachis hypogaea* transposable element markers.
L: 100 bp ladder; 1: DH101, 2: DH 86, 3: TAG 24, 4:TMV 2
M1: AhTE205 **M3: AhTE181**
M2: AhTE202 **M4: AhTE908**

Conclusion (Overall): Few unique SSR markers reported for varietal identification in rice need to be revalidated and this experiment is ongoing until each centre gets the molecular markers for the respective crop in seed chain.

Experiment 3: To prolong groundnut seed (off-shell or kernel) longevity by storing in polyethylene bag (700 gauge)

Background: Groundnut seed loses germinability during storage and is cultivated in *summer*, *Rabi* and *Kharif* seasons in different parts of the Country. In general, seed may be stored for upcoming season safely for 8-10 months however in coastal areas and parts of Orissa, West Bengal and Tamil Nadu, seed stored in-shell loses germinability quickly and become unsuitable for the sowing in the ensuing season. The situation sometimes become worse and seed need to be transported from neighboring states for timely sowing. Under such situation a huge quantity of seed (in-shell) need to be transported from one place to another. Keeping this in background experiment was conducted to store groundnut seed (off-shell) in suitable environment to prolong seed germinability and vigour at the following centres.

Objective: 1. To store and transport groundnut seed (off-shell) in the form of kernel
2. To know the storage potential of groundnut seed as kernel (off-shell)

Date of start : April 2014
Centres : ANGRAU, Hyderabad; OUA&T Bhubaneswar; TNAU, Coimbatore; PDKV, Akola; MPKV, Rahuri; UAS, Raichur; RARI, Durgapura; KKV, Dapoli; ICAR-RC NEH, Manipur.

PJTSAU, Hyderabad

Experimental details: Two groundnut varieties K-6 (Non dormant) and K-9 (Dormant) varieties were procured from ARS, Kadiri, Ananathapur and TSSDC, Wanaparthy, Mahabubnagar respectively. Fresh seed was procured during the month of November, 2016 and Pods and kernels were stored in polythene bags and data are being recorded as per the technical programme.

Results: Up to the first three months germination is good in pods and kernels in both varieties and after three months kernels germination was observed to be decreasing in the both varieties.

Table 1: Various seed vigour parameters recorded in two ground nut varieties at 14 days

Variety	K-6				K-9			
	Pods		Kernels		Pods		Kernels	
Months of storage	0	3 M	0	3 M	0	3 M	0	3 M
Germination (%)	98	98	96	93	96	95	96	92
Root length (cm)	14.0	13.8	13.6	13.6	13.8	14.0	13.8	14.0
Shoot length (cm)	6.6	6.5	6.5	6.4	4.8	5.0	5.0	4.6
Seedling length (cm)	20.6	20.3	20.1	20	18.6	19	18.8	18.6
Seedling Vigour Index I	2018	1989	1930	1860	1786	1805	1805	1711

OUA&T, Bhubaneswar

Experimental details:

Varieties : Two (Devi and TG-38B)
Design : Completely Randomized Design
Replication : 4
Treatment : T_1 – Control i.e. Pod as such (in-shell) - Farmers conventional method
T_2 – Kernel (off-shell) - Unconventional method
Status : Ongoing

TNAU, Coimbatore

Experimental details: Variety, TMV 13 and CO 6, Pods and kernels were packed in 700 gauge polyethylene bag and cloth bags separately. One set consist of each one pack of pods packed in polyethylene 700 gauge bag and cloth bag and kernels packed in polyethylene 700 gauge bag and cloth bag. They were placed in ambient storage environment. Initial evaluation on seed quality parameters was conducted. Thereafter once in 30 days all the seed quality parameters were analyzed. The results are tabulated as below.

Figure 1: Storage of groundnut seed in polyethylene bags as pod (in-shell) and kernel (off-shell).

Table 2: Effect of storage containers, storage chambers and pod/kernel storage on groundnut seed germination (%) in TMV 13 and CO 6 varieties

Germination (%)	TMV 13						CO6						
	Pod				Kernel		Pod				Kernel		
	Poly pouch		Gunny bag		Poly pouch	Gunny bag	Poly pouch		Gunny bag		Poly pouch	Gunny bag	Mean
Initial	94		94		94	94	94		94		94	94	94
30 days	94		94		94	94	94		94		94	94	94
60 days	91		88		89	86	94		93		91	87	90
90 days	85		91		83	78	88		82		83	79	84
120days	80		81		70	68	84		78		74	68	75
150days	77		73		64	59	79		68		68	62	69
180days	70		62		60	52	76		64		63	54	63
Mean	84		83		79	76	87		82		81	77	
	T	S	D	TXS	TXD	SXD	T	S	D	TXS	TXD	SXD	
SEd	0.53	0.32	0.84	0.76	0.82	0.31	0.62	0.38	0.72	0.49	0.51	0.55	
CD (P = 0.05)	1.08	0.65	1.68	1.52	1.64	0.63	1.34	0.76	1.44	0.98	1.04	1.10	

Table 3: Effect of storage containers, storage chambers and pod / kernel storage on shoot length (cm) of groundnut seed germination in TMV 13 and CO 6 varieties

Shoot length (cm)	TMV 13						CO6						
	Pod				Kernel		Pod				Kernel		
	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Mean
Initial	13.6		13.6		13.6	13.6	15.1		15.1		15.1	15.1	14.4
30 days	13.6		13.3		13.4	13.1	14.8		14.6		14.6	14.9	14.0
60 days	13.2		12.6		13.2	12.6	14.8		14.5		14.5	14.5	13.7
90 days	13.2		12.2		13	11.5	14.1		13.4		13.7	13.4	13.2
120 days	12.3		11.1		12.1	10.1	12.4		11.2		12.1	12.3	11.9
150 days	12.1		10.5		11.4	9.6	11.7		10.8		11.2	11.2	11.1
180 days	10.6		10.1		9.6	8.7	11.3		8.6		10.8	10.1	9.9
Mean	12.7		11.9		12.3	11.3	13.2		12.4		13.1	13.9	
	T	S	D	TXS	TXD	SXD	T	S	D	TXS	TXD	SXD	
SEd	0.43	0.38	0.31	0.28	0.59	0.64	0.3	0.34	0.25	0.33	0.41	0.34	
CD (P = 0.05)	0.88	0.8	0.64	0.6	1.18	1.3	0.58	0.68	0.5	0.66	0.82	0.68	

Table 4: Effect of storage containers, storage chambers and pod / kernel storage on root length (cm) of groundnut seed germination in TMV 13 and CO 6 varieties

Root length (cm)	TMV 13						CO6						
	Pod				Kernel		Pod				Kernel		
	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Mean
Initial	10.8		10.8		10.8	10.8	11.4		11.4		11.4	11.4	11.1
30 days	10.8		10.5		10.6	10.3	11.1		10.9		10.9	10.9	10.8
60 days	10.4		9.8		10.4	9.8	11.1		10.8		10.8	10.2	10.4
90 days	10.4		9.4		10.2	8.7	10.4		9.7		10	9.2	9.8
120 days	9.5		8.3		9.3	7.3	8.7		7.5		8.4	6.4	8.2
150 days	9.3		7.7		8.6	6.8	8		5.7		7.5	5.3	7.4
180 days	7.6		6.2		6.4	6.7	5.5		4.9		7.1	4.4	6.1
Mean	9.8		9.0		9.5	8.6	9.5		8.7		9.4	8.3	
	T	S	D	TXS	TXD	SXD	T	S	D	TXS	TXD	SXD	
SEd	0.51	0.28	0.64	0.4	0.5	0.45	0.31	0.35	0.52	0.49	0.43	0.48	
CD (P = 0.05)	1.12	0.58	1.30	0.68	1.4	0.94	0.64	0.65	1.04	0.98	0.86	0.96	

Table 5: Effect of storage containers, storage chambers and pod/kernel storage on seedling dry matter production (mg/ seedling) in TMV 13 and CO 6 varieties

Seedling dry weight (g)	TMV 13						CO6						
	Pod				Kernel		Pod				Kernel		
	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Mean
Initial	282		282		282	282	282		282		282	282	282
30 days	282		282		282	282	282		282		282	282	282
60 days	273		264		267	258	273		264		267	258	266
90 days	255		273		234	249	255		273		234	249	253
120 days	240		243		210	237	240		243		210	237	233
150 days	231		219		192	201	231		219		192	201	211
180 days	210		204		180	180	210		204		180	180	194
Mean	253		252		235	241	253		252		235	241	
	T	S	D	TXS	TXD	SXD	T	S	D	TXS	TXD	SXD	
SEd	33	20	34	21	30	16	17	25	11	23	32	30	
CD (P = 0.05)	68	42	70	44	62	34	38	52	24	48	66	62	

Table 6: Effect of storage containers, storage chambers and pod/kernel storage on seedling vigour index in TMV 13 and CO 6 varieties

Vigour index I	TMV 13						CO6						
	Pod				Kernel		Pod				Kernel		
	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Ploy pouch		Gunny bag		Ploy pouch	Gunny bag	Mean
Initial	2294		2294		2491	2491	2281		2281		2478	2478	2386
30 days	2294		2294		2397	2397	2281		2281		2384	2384	2339
60 days	2148		2218		2252	2073	2135		2205		2239	2060	2166
90 days	2006		2083		1849	1834	1993		2070		1836	1821	1937
120 days	1744		1717		1435	1304	1731		1704		1422	1291	1544
150 days	1648		1544		1197	958	1635		1531		1184	945	1330
180 days	1574		1472		1074	750	1561		1459		1061	737	1161
Mean	1944		1946		1814	1687	1902		1933		1801	1674	
	T	S	D	TXS	TXD	SXD	T	S	D	TXS	TXD	SXD	
SEd	41	28	42	29	38	24	25	33	19	31	40	38	
CD (P = 0.05)	84	60	82	62	82	52	54	68	38	64	82	78	

Result: Groundnut pods of TMV 13 packed in polypouch and stored in ambient recorded the highest germination of 70% after the storage period of 6 months, followed by the pods packed in gunny bags (62%). Kernels packed in gunny bag and stored in ambient recorded the lowest germination of 52% after 6 months of storage in TMV 13. In CO6 variety, groundnut pods packed in polypouch and stored in ambient recorded the highest germination of 76 % after the storage period of 6 months, followed by the pods packed in gunny bags (64%), kernels packed in gunny bag and stored in ambient recorded the lowest germination of 54 % after 6 months of storage in CO 6. Similar trend was observed in seedling growth (shoot length, root length, epicotyl and hypocotyl elongation) and dry matter production in both varieties.

TMV 13 groundnut pods packed in polypouch recorded the vigour index of 1574 of after the storage period of 6 months, followed by the pods packed in gunny bags (1472), kernels packed in gunny bag recorded the

lowest vigour index of 750 after 6 months of storage. In the variety CO6 groundnut, pods packed in polypouch recorded the highest vigour index of 1561 after the storage period of 6 months, followed by the pods packed in gunny bags 1469, kernels packed in gunny and stored in ambient recorded the lowest vigour index of 737 after 6 months of storage. In TMV 13 pods can be stored in ambient upto 5 months with the germination of 77%, in gunny bag (73%) and kernels can be stored in polypouch upto 4 months with the germination of 70 per cent. In CO 6 Pod can be stored in polypouch upto 6 months with 76% germination and in gunny bag upto 4 months with 78% germination , kernels can be packed in polypouch and stored for 4 months with 74% germination under ambient condition.

PDKV, Akola

Experimental details: Groundnut (Var. TAG-24) T_{1-} in-shell. T_{2-}off-shell, Packaging material, P1- Cloth bag, P2- Gunny bag, P3- 700 gauge Polyethylene bag, P4 Air tight containers.

Results: The data on seed quality parameters i.e. seed moisture (9.1 %) and seed germination (86 %), seedling length (20.60 cm), seedling dry weight (0.15 cm) and vigour index (12.9) were recorded before storage. The storage study is in progress.

MPKV, Rahuri

Experimental Details : T_1 : Pods in Cloth bags

T_2 : Pods in Polyethylene bags

T_3 : Kernels in Cloth bags

T_4 : Kenels in Polyethylene Bags

Date of initiation : 01.05.2016

Results: The data on effect of different forms of groundnut seed and container on longevity of groundnut during storage are presented in the Table. 7&8. From the data it is revealed that the storage of groundnut seed in the form of pod and kernel and container had significant effect on storability of groundnut seed. Groundnut in the form of pods stored in polyethylene bags (700 guage) recorded significantly higher germination than the other form of groundnut seed storage. The germination of 89.38 and 82.79 % was observed at 90 and 180 days of storage, respectively. Where as the storage of groundnut in the form of kernels stored in the polyethylene bags (700 guage) recorded germination of 85.94 and 80.12 % at 90 and 180 days of storage, respectively. Thus it is concluded that, the storage of pods in polyethylene bags (700 guage) is superior method of storage than the storage of groundnut kernels in cloth bags.

Table 7: Effect of Storage containers on germination, moisture and seedling dry weight of groundnut

Treatments	Germination (%)		Moisture (%)		Seedling Dry Weight (gm)	
	90 DAS	180 DAS	90 DAS	180 DAS	90 DAS	180 DAS
Pods in Cloth Bags	80.36	76.06	10.02	9.95	1.85	1.72
Pods in Polyethylene Bags	89.38	82.79	9.61	8.69	1.90	1.89
Kernels in Cloth Bags	78.21	75.01	10.12	9.98	1.79	1.71
Kernels in Polyethylene Bags	85.94	80.12	9.65	9.50	1.86	1.84
SE ±	2.37	0.99	0.43	0.39	0.05	0.02
CD at 5 %	7.17	2.99	NS	1.19	NS	0.07

Table 8: Effect of Storage containers on vigour index and membrane stability of groundnut

Treatments	Root Shoot Length (cm)		Seed Vigour I		Seed Vigour II		Electrical Conductivity (dsm^{-1})	
	90 DAS	180 DAS	90 DAS	180 DAS	90 DAS	180 DAS	90 DAS	180 DAS
Pods in Cloth Bags	17.92	17.90	1539.01	1358.89	158.89	131.34	0.23	0.27
Pods in Polyethylene Bags	19.54	19.02	1639.62	1522.46	168.04	156.71	0.19	0.23
Kernels in Cloth Bags	16.49	16.10	1458.11	1283.95	149.07	128.24	0.29	0.32
Kernels in Polyethylene Bags	18.55	18.34	1621.36	1468.17	163.06	148.01	0.21	0.26
SE ±	0.59	0.59	6.46	46.76	4.85	2.84	0.01	0.01
CD at 5 %	1.79	1.80	NS	141.40	NS	8.59	0.05	0.04

UAS, Raichur

Experimental details: Department of seed science and technology,Agriculture College, Bhimarayngudi, Variety: K-9, S_1: Kernel (off-shell), S_2: Pod as such (in-shell), P_1: Super grain bag, P_2: PICS bag, P_3: Polylined gunny bag.

Treatment combinations:

S_1P_1: Kernel (off-shell) with Supergrain bag

S_1P_2: Kernel (off-shell) with PICS bag

S_1P_3: Kernel (off-shell) with Polylinedgunny bag

S_2P_1: Pod as such (in-shell) with Supergrain bag

S_2P_2: Pod as such (in-shell) with PICS bag

S_2P_3: Pod as such (in-shell) with Polylinedgunny bag

Fig 2: General view of Experiment

Table 9: Effect of kernel and pods on seed quality parameters of groundnut *cv.* K-9 during storage

Treatments	Germination (%)			Shoot Length (cm)			Root Length (cm)			SVI I			SVI II		
	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS
S_1 (Kernel)	89.92	86.92	82.98	6.04	4.87	3.88	18.09	16.86	13.84	2170	1866	1480	410	314	238
S_2 (Pod)	90.25	86.75	82.50	5.97	4.90	3.75	18.38	17.12	13.83	2197	1908	1451	423	317	252
S.Em±	3.42	2.64	2.47	40.06	75.26	78.80	9.53	14.14	21.62	7.13	10.46	16.43	39.71	89.63	80.44
CD (0.01)	2.41	2.01	1.86	0.54	0.61	0.49	0.81	0.91	0.92	83	87	85	38	43	31

Table 10: Effect of packaging material on seed quality parameters of groundnut *cv.* K-9 during storage

Treatments	Germination (%)			Shoot Length (cm)			Root Length (cm)			SVI I			SVI II		
Packaging Material	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS
P_1 (Supergrain)	90.00	87.00	82.88	6.18	5.01	3.61	17.825	16.69	13.96	2160	1866	1461	415	310	245
P_2 (PICS)	90.38	86.75	82.50	5.88	4.81	3.83	18.138	17.01	13.88	2171	1882	1472	429	318	256
P_3 (PLGB)	89.88	86.75	82.75	5.95	4.83	4.01	18.750	17.28	13.66	2220	1913	1463	407	319	234
S.Em±	2.79	2.15	2.01	32.70	61.44	64.34	7.78	11.54	17.65	5.82	8.54	13.41	32.42	73.18	65.67
CD (0.01)	2.947	2.47	2.28	0.67	0.74	0.59	0.97	1.12	1.12	102	106	104	45	52	38

Table 11: Interaction Effect kernel and pods with different packaging material on seed quality parameters of groundnut *cv.* K-9 during storage

Treatment combinations	Germination (%)			Shoot Length (cm)			Root Length (cm)			SVI I			SVI II		
	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS	0MAS	3MAS	6MAS
S_1P_1	90.00	87.00	83.00	6.25	4.93	3.65	17.75	16.63	14.13	2160	1831	1484	411	313	227
S_1P_2	90.25	87.00	83.00	5.98	5.00	3.75	18.00	16.75	13.73	2164	1870	1471	409	305	243
S_1P_3	89.50	86.75	82.75	5.90	4.68	4.25	18.53	17.20	13.68	2186	1896	1484	412	323	244
S_2P_1	90.00	87.00	82.75	6.10	5.10	3.58	17.90	16.75	13.80	2160	1901	1438	419	307	263
S_2P_2	90.500	86.50	82.00	5.80	4.63	3.90	18.28	17.28	14.05	2177	1895	1472	448	331	269
S_2P_3	90.25	86.75	82.75	6.00	4.98	3.78	18.98	17.35	13.65	2253	1929	1442	402	314	223
S.Em±	1.71	1.32	1.23	20.03	37.63	39.40	4.76	7.07	10.81	3.56	5.23	8.22	19.85	44.82	10.22
CD (0.01)	4.17	3.49	3.22	0.94	0.15	0.84	1.39	1.58	1.55	144	151	147	65	74	54

SKNAU, Durgapura

Experimental details: Two groundnut varieties i.e RG 510 and RG 525 (both Virginia type) were harvested on 10-11-2016 and pods were dried with vine under shade for 7 days followed by drying of pods on floor for 3 days. The moisture content was around 8% at this stage. The total produce of both the varieties was then divided into two sets i.e. in shell (pods) and kernels. Both pod and kernels were stored separately in polythene bags (700 gauge), air tight and stored in safe storage conditions. There are three replications for each treatment and sufficient numbers of bags are stored to take observations at 3, 6, 9 and 12 months storage. Experiment is under progress.

Table 12: Seed moisture content and germination percentage in groundnut at initial stage

Variety	Moisture content	Germination percentage (initial)
RG 510	11.23	80%
RG 525	11.80	76%

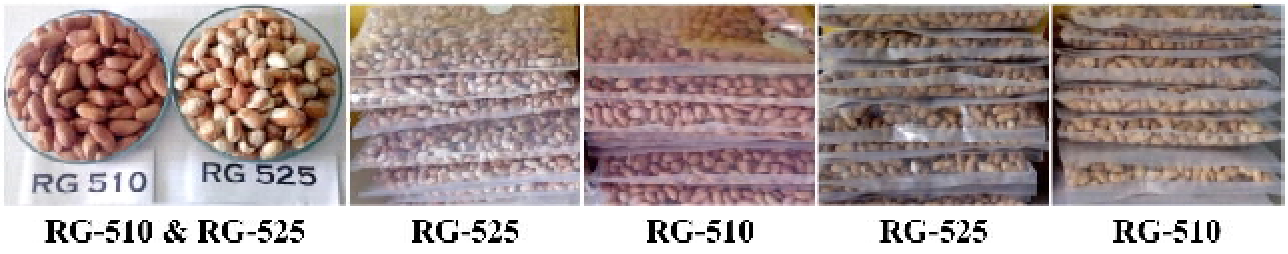


Figure 3: Seeds of groundnut varieties taken for study

Figure 4: Germination in groundnut seeds at initial stage

UAS, Dharwad

Cultivars: GPBD-4 (Dormant) and TMV-2 (Non dormant)

Conclusion: Storage of ground nut pods maintained germination (%), vigour for long time compare to storage as kernel. Storage of ground nut pods in high density polythene bags (HDPE) was significantly superior and on par with 700 gauge polythene bags as compare to gunny and cotton cloth bags.

Table 13: Initial seed quality parameters

Treatments	Initial Germination (%)		Initial seed moisture (%)	
	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1: Pods stored in HDPE bag	8.00	8.48	80.00	81.84
T_2: Pods stored in 700 Gauge polythene bag	8.26	8.24	81.33	84.50
T_3: Pods stored in gunny bag	8.63	8.61	81.90	88.28
T_4: Pods stored in cotton bag	8.28	8.25	80.00	84.65
T_5: Kernels stored in HDPE bag	8.25	8.22	82.96	84.40
T_6: Kernels stored in 700 Gauge polythene bag	7.87	7.83	79.18	80.51
T_7: Kernels stored in gunny bag	8.44	8.42	81.33	86.34
T_8: Kernels stored in cotton bag	8.29	8.26	80.67	84.76
SEm±	0.19	0.22	1.28	1.95
CD @ 5 %	NS	NS	NS	NS

Table 14: Effect of different packaging material on seed germination percentage during storage

Treatments	2 month		4 month		6 month		8 month		10 month	
	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1	77.40	79.71	73.53	75.72	69.12	71.18	60.13	61.92	49.91	51.40
T_2	77.91	80.63	74.01	76.60	69.57	72.01	60.53	62.64	50.24	52.00
T_3	73.67	76.25	69.98	72.43	65.78	68.09	57.23	59.24	47.50	49.17
T_4	73.00	75.56	69.35	71.78	65.19	67.47	56.71	58.70	47.07	48.72
T_5	74.30	76.90	69.85	72.29	65.66	67.95	57.12	59.12	47.41	49.07
T_6	74.79	77.41	70.30	72.76	66.08	68.40	57.49	59.51	47.72	49.39
T_7	70.72	73.20	66.48	68.80	62.49	64.68	54.36	56.27	45.12	46.70
T_8	70.08	72.53	65.88	68.18	61.92	64.09	53.87	55.76	44.71	46.28
SEm±	0.41	0.45	0.39	0.43	0.37	0.40	0.32	0.35	0.27	0.29
CD @ 5%	1.26	1.38	1.19	1.30	1.12	1.22	0.97	1.06	0.81	0.88

Table 15: Effect of different packaging material on seedling root length (cm) during storage

Treatments	2 month		4 month		6 month		8 month		10 month	
	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1	14.71	15.14	13.97	14.39	13.13	13.52	11.43	11.77	9.48	9.77
T_2	14.80	15.32	14.06	14.55	13.22	13.68	11.50	11.90	9.55	9.88
T_3	14.00	14.49	13.30	13.76	12.50	12.94	10.87	11.25	9.03	9.34
T_4	13.87	14.36	13.18	13.64	12.39	12.82	10.78	11.15	8.94	9.26
T_5	14.12	14.61	13.27	13.74	12.47	12.91	10.85	11.23	9.01	9.32
T_6	14.21	14.71	13.36	13.83	12.56	13.00	10.92	11.31	9.07	9.38
T_7	13.44	13.91	12.63	13.07	11.87	12.29	10.33	10.69	8.57	8.87
T_8	13.32	13.78	12.52	12.95	11.77	12.18	10.24	10.59	8.50	8.79
SEm±	0.08	0.09	0.07	0.08	0.07	0.08	0.06	0.07	0.05	0.06
CD @ 5%	0.24	0.26	0.25	0.25	0.21	0.23	0.18	0.20	0.15	0.17

T_1: Pods stored in HDPE bag, T_2: Pods stored in 700 Gauge polythene bag, T_3: Pods stored in gunny bag, T_4: Pods stored in cotton bag, T_5: Kernels stored in HDPE bag, T_6: Kernels stored in 700 Gauge polythene bag, T_7: Kernels stored in gunny bag, T_8: Kernels stored in cotton bag.

Table 16: Effect of different packaging material on seedling shoot length (cm) during storage

Treatments	2 month		4 month		6 month		8 month		10 month	
	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1	14.71	15.14	13.97	14.39	13.13	13.52	11.43	11.77	9.48	9.77
T_2	14.80	15.32	14.06	14.55	13.22	13.68	11.50	11.90	9.55	9.88
T_3	14.00	14.49	13.30	13.76	12.50	12.94	10.87	11.25	9.03	9.34
T_4	13.87	14.36	13.18	13.64	12.39	12.82	10.78	11.15	8.94	9.26
T_5	14.12	14.61	13.27	13.74	12.47	12.91	10.85	11.23	9.01	9.32
T_6	14.21	14.71	13.36	13.83	12.56	13.00	10.92	11.31	9.07	9.38
T_7	13.44	13.91	12.63	13.07	11.87	12.29	10.33	10.69	8.57	8.87
T_8	13.32	13.78	12.52	12.95	11.77	12.18	10.24	10.59	8.50	8.79
SEm±	0.08	0.09	0.07	0.08	0.07	0.08	0.06	0.07	0.05	0.06
CD @ 5%	0.24	0.26	0.25	0.25	0.21	0.23	0.18	0.20	0.15	0.17

T_1: Pods stored in HDPE bag, T_2: Pods stored in 700 Gauge polythene bag, T_3: Pods stored in gunny bag, T_4: Pods stored in cotton bag, T_5: Kernels stored in HDPE bag, T_6: Kernels stored in 700 Gauge polythene bag, T_7: Kernels stored in gunny bag, T_8: Kernels stored in cotton bag.

Table 17: Effect of different packaging material on seedling vigour index-I

Treatments	2 month		4 month		6 month		8 month		10 month	
	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1	2029	2152	1831	1942	1618	1716	1225	1298.79	844	895
T_2	2056	2202	1855	1987	1639	1756	1241	1329.12	855	916
T_3	1838	1969	1659	1777	1466	1571	1110	1188.72	764	819
T_4	1805	1934	1629	1745	1439	1542	1090	1167.11	751	804
T_5	1870	2003	1652	1770	1460	1564	1105	1183.85	761	816
T_6	1894	2029	1674	1793	1479	1584	1120	1199.27	771	826
T_7	1694	1815	1497	1604	1323	1417	1001	1072.58	690	739
T_8	1664	1782	1470	1575	1299	1391	983	1053.09	677	725
SEm±	20.27	22.95	18.14	20.51	16.02	18.12	12.13	13.72	8.36	9.45
CD @ 5%	61.50	69.60	55.01	62.21	48.60	54.97	36.79	41.60	25.34	28.66

T_1: Pods stored in HDPE bag, T_2: Pods stored in 700 Gauge polythene bag, T_3: Pods stored in gunny bag, T_4: Pods stored in cotton bag, T_5: Kernels stored in HDPE bag, T_6: Kernels stored in 700 Gauge polythene bag, T_7: Kernels stored in gunny bag, T_8: Kernels stored in cotton bag

Table 18: Effect of different packaging material on field emergence (%)

Treatments	2 month		4 month		6 month		8 month		10 month	
	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2	GPBD-4	TMV-2
T_1	75.08	77.32	71.32	73.45	67.04	69.04	58.33	60.07	48.41	49.86
T_2	75.57	78.21	71.79	74.30	67.48	69.85	58.71	60.77	48.73	50.44
T_3	71.46	73.96	67.88	70.26	63.81	66.04	55.52	57.46	46.08	47.69
T_4	70.81	73.29	67.27	69.62	63.23	65.45	55.01	56.94	45.66	47.26
T_5	72.07	74.60	67.75	70.12	63.69	65.91	55.41	57.35	45.99	47.60
T_6	72.55	75.09	68.19	70.58	64.10	66.35	55.77	57.72	46.29	47.91
T_7	68.60	71.00	64.48	66.74	60.61	62.74	52.73	54.58	43.77	45.30
T_8	67.98	70.36	63.90	66.14	60.07	62.17	52.26	54.09	43.37	44.89
SEm±	0.40	0.44	0.38	0.42	0.36	0.39	0.31	0.34	0.26	0.28
CD @ 5%	1.22	1.34	1.15	1.26	1.08	1.19	0.94	1.03	0.78	0.86

T_1: Pods stored in HDPE bag, T_2: Pods stored in 700 Gauge polythene bag, T_3: Pods stored in gunny bag, T_4: Pods stored in cotton bag, T_5: Kernels stored in HDPE bag, T_6: Kernels stored in 700 Gauge polythene bag, T_7: Kernels stored in gunny bag, T_8: Kernels stored in cotton bag

KKV, Dapoli

Methodology :

Crop : Groundnut,
Variety : 1) Konkan Tapora,
2) Konkan Gaurav
Experimental Details : Design : FCRD
Replication : 3
Treatment Details :
1. Control : Pod as such (in shell)
2. T_2 : Kernel (off-shell)

Results: Seed in-shell and off-shell of two varieties of groundnut i.e. Konkan Tapora and Konkan Gaurav was stored in polyethylene bags (700 guage) and gunny bag as mentioned below. T_1-Kernel stored in polyethylene bag T_2-Pods stored in polyethylene bag and T_3-Control (Pods stored in gunny bag). The germinability and related parameters were studied at initial, 3 and 6 months interval. The experimental results are presented in Table 19-21. Result showed that germinability decreased in all the treatments and varieties after 6 months of

storage and remained between 48.33 to 87.66%, whereas field emergence ranged between 30.00 to 78.00%, root length 13.00 to 19.66 cm, shoot length 5.33 to 8.83 cm, epicotyl length 2.50 to 2.60 cm, hypocotyl length 4.53 to 8.83 cm, seedling dry weight 0.40 to 0.51 gm, chlorophyll content at 30 days old seedling 1.12 to 1.22 mg/g. Similarly SVI I and SVI II also decreased in all the treatments after 6 months of storage. So at 6 month of storage kernel and pod stored in polyethylene bags (700 gauge) maintained the germination above the minimum seed certification standard prescribed for groundnut as compared to gunny bag.

Table 19: Effect of packaging material at initial stage of storage

Treatment	Germination (%)	Moisture (%)	Root length (cm)	Shoot length (cm)	Epicotyl length (cm)	Hypocotyl length (cm)	Field emergence (%)
Konkan Tapora (V_1)	96.44 (79.33)	9.94 (18.37)	22.72	11.88	4.80	8.45	91.88 (73.47)
Konkan Gaurav (V_2)	95.22 (77.36)	9.92 (18.35)	22.16	11.44	4.31	7.31	91.33 (72.93)
SE (m)	0.471	0.006	0.171	0.248	0.074	0.121	0.556
CD (5%)	NS	NS	0.533	NS	0.230	0.377	NS
Polyethylene bag Kernel	95.50 (77.95)	9.93 (18.36)	21.91	11.16	4.33	8.05	91.66 (73.23)
Polyethylene bag pod	96.16 (78.87)	9.93 (18.36)	23.00	12.50	4.95	8.11	92.16 (73.82)
Control (gunny bag pod)	95.83 (78.23)	9.94 (18.36)	22.41	11.33	4.38	7.48	91.00 (72.54)
SE (m)	0.577	0.007	0.210	0.304	0.090	0.148	0.680
CD (5%)	NS	NS	0.653	0.948	0.281	0.462	NS
Kernel ko. tapora	96.00 (78.82)	9.94 (18.37)	22.33	11.33	4.66	8.60	91.66 (73.23)
Pod ko. tapora	97.00 (80.24)	9.94 (18.37)	23.33	12.66	4.96	8.76	92.33 (73.94)
Control ko. tapora	96.33 (78.95)	9.94 (18.37)	22.50	11.66	4.76	8.00	91.66 (73.23)
Kernel ko. gaurav	95.00 (77.09)	9.93 (18.36)	21.50	11.00	4.00	7.50	91.66 (73.23)
Pod ko. gaurav	95.33 (77.50)	9.92 (18.35)	22.66	12.33	4.93	7.46	92.00 (73.69)
Control ko. gaurav	95.33 (77.50)	9.93 (18.35)	22.33	11.00	4.00	6.96	90.33 (71.86)
SE (m)	0.816	0.010	0.297	0.430	0.128	0.209	0.962
CD (5%)	NS	NS	NS	NS	0.398	NS	NS

Table 20: Effect of packaging material at initial stage of storage

Treatment	Seedling dry weight (gm)	Chlorophyll content at 30 days old seedlings (mg/g)	Vigour Index I	Vigour Index II
Konkan Tapora (V_1)	0.624	1.17	3330.38	60.14
Konkan Gaurav (V_2)	0.535	1.33	3008.50	50.91
SE (m)	0.003	0.005	35.21	0.503
CD (5%)	0.009	0.017	109.71	1.568
Polyethylene bag Kernel	0.582	1.250	3160.08	55.62
Polyethylene bag pod	0.578	1.248	3291.50	55.61
Control (gunny bag pod)	0.577	1.253	3056.75	55.35
SE (m)	0.003	0.007	43.12	0.616
CD (5%)	NS	NS	134.36	NS
Kernel ko. tapora	0.629	1.17	3288.00	60.35
Pod ko. tapora	0.621	1.16	3456.66	60.28
Control ko. tapora	0.621	1.18	3246.50	59.79
Kernel ko. gaurav	0.536	1.33	3032.16	50.89
Pod ko. gaurav	0.534	1.33	3126.33	50.94
Control ko. gaurav	0.534	1.32	2867.00	50.90
SE (m)	0.005	0.009	60.99	0.872
CD (5%)	NS	NS	NS	NS

Table 21: Effect of packaging material at 3 months of storage

Treatment	Germination (%)	Moisture (%)	Root length (cm)	Shoot length (cm)	Epicotyl length (cm)	Hypocotyl length (cm)	Field emergence (%)
Konkan Tapora (V_1)	85.22 (67.63)	9.78 (18.22)	20.27	10.61	3.97	6.56	86.77 (68.69)
Konkan Gaurav (V_2)	83.55 (66.30)	9.79 (18.23)	17.44	8.33	3.30	5.66	83.77 (66.23)
SE (m)	0.42	NS	0.40	0.51	0.07	0.20	0.49
CD (5%)	87.00 (68.84)	9.74 (18.18)	18.91	8.91	3.36	5.56	85.16 (67.34)
Polyethylene bag Kernel	89.00 (70.62)	9.82 (18.25)	19.75	12.16	4.43	6.76	87.00 (68.89)
Polyethylene bag pod	77.16 (61.43)	9.81 (18.24)	17.91	7.33	3.11	6.01	83.66 (66.14)
Control (gunny bag pod)	0.51	NS	0.49	0.63	0.09	0.24	0.60
SE (m)	87.33 (69.12)	9.71 (18.15)	20.33	10.33	3.73	5.80	86.66 (68.55)
CD (5%)	90.00 (71.53)	9.83 (18.26)	21.50	12.83	4.90	7.16	89.00 (70.60)
Kernel ko. tapora	78.33 (62.23)	9.80 (18.23)	19.00	8.66	3.30	6.73	84.66 (66.92)
Pod ko. tapora	86.66 (68.55)	9.77 (18.21)	17.50	7.50	3.00	5.33	83.66 (66.13)
Control ko. tapora	88.00 (69.70)	9.80 (18.23)	18.00	11.50	3.96	6.36	85.00 (67.18)
Kernel ko. gaurav	76.00 (60.64)	9.82 (18.25)	16.83	6.00	2.93	5.30	82.66 (65.37)
Pod ko. gaurav	0.73	NS	0.70	0.89	0.12	0.34	0.84

Table 22: Seedling vigour traits and packaging material (3 months storage)

Treatment	Seedling dry weight (gm)	Chlorophyll content at 30 days old seedlings (mg/g)	Vigour Index I	Vigour Index II
Konkan Tapora (V_1)	0.54	1.18	2645.22	47.36
Konkan Gaurav (V_2)	0.47	1.24	2166.11	39.24
SE (m)	0.004	0.005	23.59	0.376
CD (5%)	0.013	0.017	73.51	1.172
Treatments				
Polyethylene bag kernel	0.52	1.16	2422.83	45.85
Polyethylene bag pod	0.54	1.24	2843.00	48.63
CONTROL (Gunny bag Pod)	0.45	1.23	1951.16	35.41
SE (m)	0.005	0.007	28.90	0.461
CD (5%)	0.016	0.020	90.03	1.435
Interaction (VXP)				
Kernel ko. tapora	0.56	1.14	2678.66	50.38
Pod ko. tapora	0.60	1.16	3090.00	55.13
Control ko. tapora	0.46	1.25	2167.00	36.56
Kernel ko. gaurav	0.47	1.18	2167.00	41.32
Pod ko. gaurav	0.48	1.32	2596.00	42.14
Control ko. gaurav	0.45	1.22	1735.33	34.26
SE (m)	0.007	0.009	40.87	0.652
CD (5%)	0.022	0.029	NS	2.030

Table 23: Seed germination and seedling vigour traits with different packaging material (6 months storage)

Treatment	Germination %	Moisture (%)	Root length (cm)	Shoot length (cm)	Epicotyl length (cm)	Hypocotyl length (cm)	Field emergence
Konkan Tapora (V_1)	76.56 (61.92)	9.62 (18.06)	16.72	7.22	3.08	5.98	62.33 (52.52)
Konkan Gaurav (V_2)	71.11 (58.18)	9.61 (18.05)	15.05	6.11	2.81	5.06	58.66 (50.18)
SE (m)	0.369	0.050	0.157	0.142	0.035	0.048	0.208
CD (5%)	1.148	NS	0.490	0.441	0.109	0.151	0.648
Treatments							
Polyethylene bag Kernel	83.33 (65.93)	9.67 (18.11)	16	6.58	2.91	4.98	73.66 (58.35)
Polyethylene bag Pod	85.83 (67.91)	9.70 (18.14)	18.33	7.91	3.35	6.08	78.00 (60.88)
Control (Gunny bag Pod)	52.33 (46.32)	9.46 (17.91)	13.33	5.50	2.58	5.51	32.66 (34.82)
SE (m)	0.451	0.061	0.192	0.173	0.043	0.059	0.255
CD (5%)	1.406	0.189	0.600	0.540	0.134	0.185	0.793
Interaction (VXP)							
Kernel ko. Tapora	85.66 (67.72)	9.65 (18.09)	16.83	7.16	3.00	5.13	73.66 (59.10)
Pod ko. Tapora	87.66 (69.43)	9.69 (18.13)	19.66	8.83	3.60	6.33	78.00 (62.00)
Control ko. Tapora	56.33 (48.62)	9.50 (17.95)	13.66	5.66	2.66	6.50	35.33 (36.45)
Kernel ko. Gaurav	81.00 (64.13)	9.70 (18.13)	15.16	6.00	2.83	8.83	71.33 (57.60)
Pod ko. Gaurav	84.00 (66.40)	9.72 (18.15)	17.00	7.00	3.10	5.83	74.66 (59.75)
Control ko. Gaurav	48.33 (44.02)	9.42 (17.86)	13.00	5.33	2.50	4.53	30.00 (33.19)
SE (m)	0.638	0.086	0.272	0.245	0.061	0.084	0.360
CD (5%)	1.989	NS	0.848	0.764	0.190	0.261	1.122

Table 24: Seed germination and seedling vigour traits with different packaging material (6 months storage)

Treatment	Seedling dry weight (gm)	Chlorophyll content at 30 days old seedlings (mg/g)	Vigour Index I	Vigour Index II
Varieties				
Konkan Tapora (V_1)	0.47	1.17	1881.16	36.52
Konkan Gaurav (V_2)	0.42	1.16	1539.00	30.50
SE (m)	0.007	0.006	16.50	0.489
CD (5%)	0.022	NS	51.40	1.524
Treatments				
Polyethylene bag Kernel	0.46	1.15	1885.00	38.36
Polyethylene bag Pod	0.47	1.14	2257.08	41.00
Control (Gunny bag Pod)	0.40	1.21	987.83	21.17
SE (m)	0.009	0.007	20.21	0.599
CD (5%)	0.027	0.022	62.96	1.866
Interaction (VXP)				
Kernel ko. Tapora	0.48	1.13	2056.00	44.46
Pod ko. Tapora	0.51	1.15	2498.16	45.35
Control ko. Tapora	0.40	1.22	1089.33	22.76
Kernel ko. Gaurav	0.43	1.16	1714.66	35.26
Pod ko. Gaurav	0.44	1.12	2016.00	36.66
Control ko. Gaurav	0.40	1.19	886.33	19.57
SE (m)	0.012	0.010	28.58	0.847
CD (5%)	0.038	0.032	89.04	2.640

Conclusion (Overall): Data collected by the Coimbatore Centre indicated that packaging of groundnut seed in polyethylene bags as kernel (off-shell) is possible up to six months however other Centre need to repeated the experiment and record data meticulously to draw meaningful conclusion. In addition, experiment conducted in the Division of Seed Science and Technology on seeds collected from DGR Junagadh, indicated that groundnut

seed (off-shell) could be stored safely for 8-10 months in air tight plastic box at ambient conditions with seed desiccant beads @ 100 g for 10 kg seed (off-shell). Storage of ground nut pods in high density polythene bags (HDPE) was significantly superior and on par with 700 gauge polythene bags as compare to gunny and cotton cloth bags as reported by UAS Dharwad.

Experiment 4: Storage of soybean and groundnut seeds with desiccant i.e. silica gel and/or calcium chloride ($CaCl_2$, Anhydrous)

Background: Use of desiccant in seed storage is often recommended for the coastal and high rainfall areas, and this can best be used with the help of polyethylene bags which may prevent the free entry of moisture from storage environment to the seed. If it is not prevented, seed moisture may reach to its saturation point much early than the required period following frequent interaction with atmospheric RH. Silica gel, $CaCl_2$ are cheaper desiccants where Zeolite is expensive technique to store large volume seeds but at the same time it is highly effective to maintain seed germinability for a longer period, if seeds are stored in airtight container. The experiment was designed with the following objective.

Objective:

To maintain storability in soybean and groundnut seeds employing desiccants in high humidity regions

Date of start	:	Summer 2016
Crop		**Centres**
Soybean	:	GBPUAT, Pantnagar; UAS, Bengaluru; PAJANCOA&RI, Karaikal
Groundnut	:	ICAR-RC NEH, Tripura and Manipur

Crop: Soybean

GBPUAT, Pantnagar

Variety: Variety: PS 1225

Treatments:

T_1=Cloth bag without silica gel

T_2=Cloth bag with silica gel

T_3=Polythene bag (250 gauge) with silica gel

T_4=Polythene bag (250 gauge) + Cloth bag with silica gel.

Observation recorded: The following parameters were recorded.

(i) Germination percentage (initial, 3, 6, 9 &12 months after storage)

(ii) Seed moisture content (%)

(iii) Seedling length (cm/seedling)

(iv) Seedling dry weight (mg/seedling)

(v) Vigour Index I (Germination (%) x seedling length (cm/seedling)

(vi) Vigour index II (Germination (%) x seedling dry weight (mg/seedling))

(vii) Field emergence (%)

Results: The soybean variety PS 1225 was used for storage purpose with silica gel. Initial values for seed moisture content, germination percentage, seedling length, seedling dry weight and vigour index I and SVI-II were 8%, 90%, 26.1 cm/seedling, 31.97 mg/seedling, 2344 and 2866 respectively. After 3 months of storage all the containers showed germination above minimum seed certification standard i.e. above 70 %. After 6 months of storage period, per cent germination, seedling length, seedling dry weight and seedling vigour index-I and seedling vigour index -II declined in all the containers. Treatment T_4 (Polythene bag +cloth bag with silica gel) showed significantly highest germination percentage, which differ significantly from the rest of the containers. The germination per cent was above the minimum seed certification standard in T_4 and T_3 containers (Polythene bag 250 of gauge with silica Gel). The lowest germination per cent was recorded with T_1 treatment (cloth bag without silica gel). Seedling length, seedling dry weight, seedling vigour index –I and seedling vigour index-II also showed the similar trend as germination.

Table 1: Effect of silica gel on seed germination and seedling vigour parameters of soybean seed (variety PS1225)

Treatments	Seed moisture content (%)			Germination (%)		
	Storage period (months)			Storage period (months)		
	Initial	3 months	6 months	Initial	3 months	6 months
T_1	7.8	11.0	12.6	89.7	76.3	63.7
T_2	7.8	9.0	9.7	89.7	78.0	69.0
T_3	7.8	6.2	7.6	89.7	80.6	73.7
T_4	7.8	6.0	7.0	89.7	81.0	76.3
Mean	7.8	8.0	9.2	89.7	79.0	70.7
S.Em±		0.02	0.02		0.7	0.8
C.D.(5 %)		0.12	0.11		2.4	2.9
Treatments	**Seedling length (cm/seedling)**			**Seedling vigour index-I**		
	storage period (months)			**storage period (months)**		
	Initial	**3 months**	**6 months**	**Initial**	**3 months**	**6 months**
T_1	26.1	18.80	17.80	2344	1438	1038
T_2	26.1	20.00	19.00	2344	1560	1212
T_3	26.1	21.10	20.23	2344	1700	1378
T_4	26.1	21.80	20.56	2344	1767	1474
Mean	26.1	20.43	19.40	2344	1616	1275
S.Em±		0.06	0.04		14	17
C.D. (5 %)		0.20	0.16		47	57
Treatments	**Seedling dry weight (mg/seedling)**			**Seedling vigour index-II**		
	storage period (months)			**storage period (months)**		
	Initial	**3 months**	**6 months**	**Initial**	**3 months**	**6 months**
T_1	31.97	24.60	23.40	2866	1881	1360
T_2	31.97	25.60	24.43	2866	1997	1564
T_3	31.97	26.73	25.53	2866	2157	1751
T_4	31.97	27.80	25.66	2866	2252	1858
Mean	31.97	26.18	24.76	2866	2072	1633
S.Em±		0.06	0.06		20	20
C.D. (5 %)		0.21	0.22		71	70

PAJANCOA&RI, Karaikal

Treatments:

T_1 = Vitavax treated seeds with $Cacl_2$ (1:0.25) in Super grain bag

T_2 = Vitavax treated seeds with Silica gel (1:0.30) in Super grain bag

T_3 = Vitavax treated seeds with drying beads (Zeolites) (1:0.35)in Super grain bag

T_4 = Vitavax treated seeds in Super grain bag

T_5 = Vitavax treated seeds with $Cacl_2$ (1:0.25) in Cloth bag

T_6 = Vitavax treated seeds with Silica gel (1:0.30) in cloth bag

T_7 = Vitavax treated seeds with drying beads (Zeolites) (1:0.35) in Super grain bag

T_8 = Vitavax treated seeds in Cloth bag

Results

The results on effect of desiccants and containers on seed storability of six months stored soybean under coastal environment of Karaikal district are presented in Table 2-5. The results revealed that between two containers, a significant increase in seed moisture content was observed in seeds stored in cloth bags (8.4 to 11.45%) as compared to Super grain bags over a period of six months of storage. Among the three desiccants used, drying beads recorded significantly lower moisture content (7.37%) followed by $Cacl_2$ (7.9%), irrespective of containers and period of storage. Seed germination is concerned; more than 85 per cent germination was recorded in all the treatments even after six months of storage, irrespective of containers and desiccants used, probably due to seed treatment with Vitavax as followed in all treatments. Similar observation was also found in seedling vigour and vigour indices. However, significant differences in field emergence was observed and seeds stored in super grain bags (66.2%) with or without desiccants registered nearly 11 per cent higher field emergence than seeds stored in cloth bags (54.8%).

Conclusion: Based on the above observations, it could be concluded that the soybean seeds could be safely stored in Super grain bags with or without desiccants. The performance of desiccants was effective only in Super grain bags and not in cloth bags.

Table 2: Effect of desiccants on seed moisture content (%) and germination (%) during of soybean seeds under coastal environment of Karaikal district

Treatments	Seed moisture content (%)				Seed germination (%)			
	0	3	6	Mean	0	3	6	Mean
T_1	8.2	7.4	8.1	7.90	83	91	86	86.7
T_2	8.3	8.2	8.4	8.30	84	88	88	86.7
T_3	7.5	7.2	7.4	7.37	83	91	92	88.7
T_4	7.8	7.8	8.0	7.87	83	92	93	89.3
T_5	8.6	9.2	11.5	9.77	88	89	86	87.7
T_6	8.7	9.5	11.3	9.83	84	89	93	88.7
T_7	7.6	9.3	11.7	9.53	83	87	89	86.3
T_8	8.7	9.4	11.3	9.80	83	84	85	84.0
Mean	8.18	8.50	9.71		83.9	88.9	89.0	
	T	P	TxP		T	P	TxP	
SEd.	0.08	0.05	0.13		1.17	0.72	2.03	
CD (P=0.05)	0.16	0.09	0.27		2.34	1.43	4.05	

Table 3: Effect of desiccants on shoot and root length of seedlings (cm) during storage of soybean seeds under coastal environment of Karaikal district

Treatments	Shoot length (cm)				Root length (cm)			
	0	3	6	Mean	0	3	6	Mean
T_1	21.92	20.44	19.17	20.51	24.98	24.68	26.46	25.37
T_2	20.87	20.43	20.23	20.51	25.31	23.73	27.14	25.39
T_3	22.14	20.91	21.02	21.36	26.25	24.40	27.43	26.03
T_4	20.41	20.18	20.61	20.40	24.33	22.26	25.93	24.17
T_5	21.49	20.20	20.21	20.63	26.17	23.29	25.00	24.82
T_6	21.70	20.27	20.32	20.76	26.55	23.73	26.57	25.62
T_7	21.91	20.56	20.21	20.89	26.27	24.26	24.92	25.15
T_8	21.05	20.78	19.50	20.44	26.81	22.89	25.23	24.98
Mean	21.44	20.47	20.16		25.83	23.66	26.09	
	T	P	TxP		T	P	TxP	
SEd.	0.34	0.21	0.59		0.38	0.23	0.65	
CD (P=0.05)	0.68	0.41	1.17		0.75	0.46	1.30	

Table 4: Effect of desiccants on Dry weight of seedlings (g/10 seedlings) and Vigour index I during storage of soybean seeds under coastal environment of Karaikal district.

Treatments	Dry weight of seedlings (g/ 10 seedlings)				Vigour index I			
	0	3	6	Mean	0	3	6	Mean
T_1	0.303	0.325	0.283	0.304	3891	3467	3924	3760.7
T_2	0.309	0.304	0.291	0.301	3856	3250	4169	3758.3
T_3	0.356	0.316	0.289	0.320	3992	3465	4457	3971.3
T_4	0.341	0.295	0.299	0.312	3721	3260	4328	3769.7
T_5	0.315	0.332	0.285	0.311	4172	3248	3888	3769.3
T_6	0.345	0.322	0.292	0.320	4022	3294	4361	3892.3
T_7	0.342	0.308	0.275	0.308	4002	3290	4017	3769.7
T_8	0.328	0.310	0.279	0.306	3973	3083	3802	3619.3
Mean	0.330	0.314	0.287		3953.6	3294.6	4118.3	
	T	P	TxP		T	P	TxP	
SEd.	NS	0.005	NS		73.9	45.2	128.0	
CD (P=0.05)		0.010			147.3	92.2	255.1	

Table 5: Effect of desiccants on Vigour index II and field emergence (%) during storage of soybean seeds under coastal environment of Karaikal district

Treatments	Vigour index II				Field emergence (%)			
	0	3	6	Mean	0	3	6	Mean
T_1	25.08	29.55	24.34	26.32	69	71	51	63.7
T_2	25.73	26.60	25.61	25.98	77	65	54	65.3
T_3	29.32	28.60	26.59	28.17	75	72	57	68.0
T_4	28.24	27.15	27.81	27.73	76	70	57	67.7
T_5	27.61	29.51	24.51	27.21	81	56	43	60.0
T_6	28.82	28.65	27.16	28.21	89	42	38	56.3
T_7	28.36	26.75	24.48	26.53	81	42	26	49.7
T_8	27.19	26.07	23.72	25.66	70	51	39	53.3
Mean	27.54	27.86	25.53		77.3	58.6	45.6	
	T	P	TxP		T	P	TxP	
SEd.	0.78	0.48	NS		3.49	2.14	6.04	
CD at 5%	1.56	0.96			6.95	4.26	12.04	

Figure 1: Developed seedlings after three months of storage

Figure 2: Developed seedlings after six months of storage

Figure 3: Initial Field emergence

UAS, Bengaluru

Variety: JS-335

Treatment details:

Containers	Desiccants
C_1: Cloth Bag	D_1: Control
C_2: Super grain bag	D_2: Silica gel @ 0.30 K/ 1.5 K seed
C_3: Polythene bag (700 gauge)	D_3: Zeolite beads @ 0.15 K/ 1.5 K seed

Results: Among the treatments, super grain bag with zeolite beads and silica gel exhibited on par results Germination (81% & 79%), Field emergence (79% & 75%), Seedling length (26.40 & 25.10cm), Seedling dry weight (43.30 & 36.40 mg/seedling), Vigour index-I (2151 & 1996) and Vigour index-II (3529 & 2894) in all the seed quality parameters followed by polythene bag with silica gel. The germination percentage of seeds stored in polythene and super grain bag was above the MSCS and the experiment is in progress.

Table 6: Effect of storage containers and desiccants on seed germination of soybean seeds during storage

Treatments	Germination (%)								
	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	94	83	77	72	70	70	54	37	70
SB	94	86	81	88	88	83	76	79	84
PB	94	85	87	83	78	75	75	72	81
Mean	94	85	82	81	79	76	68	63	
Desiccant									
C	94	84	81	83	75	71	61	59	76
SG	94	84	83	81	81	80	73	64	80
ZB	95	85	81	80	80	76	71	65	79
Mean	94	84	82	81	79	76	68	63	
Packaging materials× desiccants									
CBC	85	81	58	78	68	68	46	34	65
CBSG	89	82	56	73	72	74	60	37	68
CBZB	89	82	53	66	70	69	56	42	66
SBC	89	84	75	90	85	79	69	78	81
SBSG	92	85	83	85	86	84	78	79	84
SBZB	91	85	77	91	94	86	80	81	86
PBC	89	84	84	81	72	68	69	67	77
PBSG	91	85	76	86	86	84	80	78	83
PBZB	90	85	57	83	75	75	76	72	77
Mean	89	84	69	81	79	76	68	63	
SEm±									
PM	0.45	0.48	2.432	0.64	0.58	1.15	0.83	0.87	
D	0.56	0.53	2.162	0.58	0.46	1.28	0.79	0.75	
PM×D	0.97	0.92	4.213	1.00	1.02	2.10	1.44	1.50	
CD (@5 %)									
PM	1.3	1.42	7.782	1.9	1.7	3.4	2.5	2.6	
D	1.66	1.57	7.782	1.7	1.4	3.8	2.3	2.2	
PM×D	2.88	2.73	13.478	3.0	3.0	6.2	4.3	4.5	
CV (%)	1.45	1.56	7.311	1.74	1.80	3.71	2.98	3.37	

CB: Cloth bag; SB: Super grain bag; PB: Polythene bag; C: Control;
ZB: Zeolite beads; SG: Silica gel PM: Packaging material; D: Desiccant

Table 7: Effect of storage containers and desiccants on field emergence of soybean seeds during storage

Treatments	Field emergence (%)								
	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	88	81	55	66	71	67	56	40	66
SB	91	84	78	75	72	69	76	76	78
PB	90	84	72	71	66	67	76	70	75
Mean	90	83	68	71	70	68	69	62	
Desiccants									
C	88	83	72	71	68	65	64	60	71
SG	91	84	71	67	70	69	73	62	73
ZB	90	84	62	73	71	70	72	63	73
Mean	90	84	68	70	70	68	70	62	
Packaging materials × Desiccants									
CBC	85	81	58	68	69	64	49	41	64
CBSG	89	82	56	66	72	69	61	37	67
CBZB	89	82	53	64	74	70	58	42	67
SBC	89	84	75	81	72	68	69	74	77
SBSG	92	85	83	69	70	70	78	75	78
SBZB	91	85	77	75	74	71	80	79	79
PBC	89	84	84	66	64	65	72	65	74
PBSG	91	85	76	68	68	68	79	75	76
PBZB	90	85	57	80	67	69	76	70	74
Mean	89	84	69	71	70	68	69	62	
SEm±									
PM	0.83	0.28	2.49	0.57	0.57	1.29	1.36	1.22	
D	0.55	0.15	2.26	0.48	0.48	1.08	1.29	1.08	
PM×D	0.95	0.50	4.327	1.00	1.13	2.14	2.36	2.11	
CD (@5 %)									
PM	2.46	0.83	7.992	1.7	1.7	3.8	4.0	3.6	
D	1.63	0.63	7.782	1.4	1.4	3.2	3.8	3.2	
PM×D	2.82	1.48	13.843	3.0	3.4	6.4	7.0	6.3	
CV (%)	1.52	0.85	8.940	2.02	2.00	4.15	4.84	4.82	

CB: Cloth bag; SB: Super grain bag; PB: Polythene bag; C: Control; ZB: Zeolite beads; SG: Silica gel PM: Packaging material; D: Desiccant

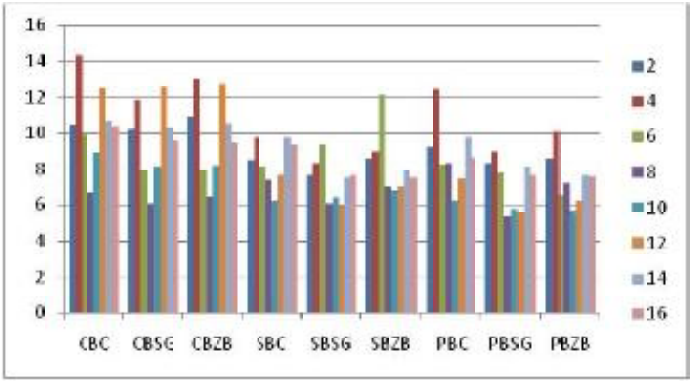


Figure 4: Effect of storage containers and desiccants on seed moisture content of soybean seeds during storage

CB: Cloth bag; SB: Supergrain bag; PB: Polythene bag; C: Control; ZB: Zeolite beads; SG: Silica gel PM: Packaging material; D: Desiccant

Table 8: Effect of storage containers and desiccants on seedling length of soybean seeds during storage

Seedling length (cm)									
Treatments	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	27.3	25.9	28.4	27.16	28.60	25.96	25.30	25.96	26.82
SB	24.9	25.5	27.3	30.40	26.60	24.96	25.18	24.9	26.22
PB	26.5	24	28.3	29.96	27.96	25.60	23.48	25.60	26.43
Mean	26.23	25.13	28.00	29.17	27.72	25.51	24.65	25.49	
Desiccants									
C	24.8	25.1	27.7	26.90	27.10	23.90	24.46	23.90	25.48
SG	26.5	23.6	28.1	28.50	27.26	26.10	24.86	26.10	26.38
ZB	27.4	26.7	28.2	32.13	28.80	26.53	24.63	26.53	27.62
Mean	26.23	25.13	28.00	29.18	27.72	25.51	24.65	25.51	
Packaging materials × Desiccants									
CBC	26.3	26.0	29.6	27.20	29.30	25.20	25.10	25.20	26.74
CBSG	26.4	24.2	28.6	29.30	28.60	27.30	24.75	27.30	27.06
CBZB	25.0	26.4	27.1	25.00	27.90	25.40	26.05	25.40	26.03
SBC	22.6	25.4	24.1	27.90	25.60	23.40	25.00	23.40	24.68
SBSG	27.2	24.8	27.7	26.30	24.80	25.10	23.85	25.10	25.61
SBZB	29.1	27.6	30.0	37.00	29.40	26.40	26.70	26.40	29.08
PBC	25.5	24.1	29.5	25.60	26.40	23.10	23.30	23.10	25.08
PBSG	28.0	26.1	27.9	29.90	28.40	25.90	26.00	25.90	27.26
PBZB	26.0	21.9	27.5	34.40	29.10	27.80	21.15	27.80	26.96
Mean	26.23	25.17	28.00	29.18	27.72	25.51	24.66	25.51	
SEm±									
PM	1.64	1.27	0.93	0.57	0.57	0.48	0.39	0.57	
D	0.76	1.19	0.76	0.48	0.49	0.56	0.42	0.48	
PM×D	1.33	2.21	1.62	1.00	1.21	1.16	0.69	1.00	
CD (@5 %)									
PM	4.87	3.77	2.99	1.7	1.7	1.4	1.2	1.7	
D	2.25	3.77	2.85	1.4	1.5	1.7	1.2	1.4	
PM×D	3.95	6.56	5.188	3.0	3.6	3.4	2.0	3.0	
CV (%)	7.18	12.42	8.19	4.85	5.10	5.54	3.97	5.54	

CB: Cloth bag; SB: Supergrain bag; PB: Polythene bag; C: Control;
ZB: Zeolite beads; SG: Silica gel; PM: Packaging material; D: Desiccant

Table 9: Effect of storage containers and desiccants on seedling dry weight of soybean seeds during storage

Seedling dry weight (mg/seedling)									
Treatments	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	42.8	46.1	38.7	34.23	33.93	30.13	44.45	38.18	38.57
SB	45.5	46.7	38.6	35.50	38.06	36.20	48.13	38.60	40.91
PB	46.5	43.6	37.9	39.90	35.10	32.66	43.45	35.66	39.35
Mean	44.93	45.47	38.40	36.54	35.70	33.00	45.34	37.48	
Desiccants									
C	44.9	43.6	41.7	34.06	34.43	33.00	44.58	34.23	38.81
SG	46.9	44.2	37.5	36.96	35.23	31.40	45.70	38.30	39.52
ZB	43.0	48.8	35.9	38.60	37.42	34.60	45.75	39.91	40.50
Mean	44.93	45.53	38.37	36.54	35.69	33.00	45.34	37.48	
Packaging materials × Desiccants									
CBC	44.7	43.4	42.4	28.80	32.40	29.40	43.40	35.20	37.46
CBSG	41.1	44.9	37.5	39.70	34.60	28.60	43.20	39.10	38.59
CBZB	42.6	50.1	36.2	34.20	34.80	32.40	46.75	40.25	39.66
SBC	46.1	46.9	40.9	32.20	36.40	38.20	47.20	36.10	40.50
SBSG	42.5	47.5	37.2	36.60	38.40	34.40	48.20	36.40	40.15
SBZB	44.1	48.9	37.6	37.70	39.40	36.20	49.00	43.30	42.03
PBC	44.0	40.4	41.8	41.20	34.50	31.40	43.15	31.40	38.48
PBSG	48.1	45.7	37.9	34.60	32.70	31.40	45.70	39.40	39.44
PBZB	51.6	41.5	34.0	43.90	38.10	35.20	41.50	36.20	40.25
Mean	44.98	45.48	38.39	36.54	35.70	33.02	45.34	37.48	
SEm±									
PM	1.99	1.50	1.17	0.48	0.49	1.19	0.90	0.19	
D	1.51	1.37	1.29	0.57	0.54	1.34	0.84	0.05	
PM×D	2.62	2.37	2.026	1.00	0.98	2.21	1.57	0.33	
CD (@5 %)									
PM	5.91	4.45	3.74	1.4	1.5	3.5	2.7	0.6	
D	4.48	4.06	3.67	1.7	1.6	4.0	2.5	0.1	
PM×D	7.78	7.03	6.482	3.0	2.9	6.6	4.7	1.0	
CV (%)	8.26	7.38	7.467	3.87	3.96	9.48	4.91	1.27	

CB: Cloth bag; SB: Supergrain bag; PB:Polythene bag; C: Control;
ZB: Zeolite beads; SG: Silica gel PM: Packaging material; D: Desiccant

Table 10: Effect of storage containers and desiccants on seedling vigour index-Iof soybean seeds during storage

Seedling vigour index-I									
Treatments	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	2570	2147	2181	1970	2001	1830	1378	974	1881
SB	2323	2195	2206	2674	2345	2077	1916	1994	2216
PB	2513	2035	2455	2500	2166	1945	1773	1864	2156
Mean	2469	2126	2281	2381	2171	1951	1689	1611	
Desiccant									
C	2319	2104	2242	2235	2023	1713	1504	1413	1944
SG	2509	2021	2334	2358	2268	2103	1817	1676	2136
ZB	2579	2251	2266	2550	2221	2038	1747	1743	2174
Mean	2469	2125	2281	2381	2171	1951	1689	1611	
Packaging materials × Desiccants									
CBC	2458	2138	2249	2122	1992	1715	1166	842	1835
CBSG	2500	2024	2153	2139	2059	2022	1496	1013	1926
CBZB	2325	2264	2140	1650	1953	1754	1472	1067	1828
SBC	2076	2171	1999	2511	2176	1850	1737	1837	2045
SBSG	2570	2151	2410	2366	2331	2110	1862	1996	2225
SBZB	2753	2280	2208	3145	2528	2272	2150	2151	2436
PBC	2423	2002	2477	2074	1901	1573	1608	1561	1952
PBSG	2659	2214	2438	2571	2414	2177	2093	2020	2323
PBZB	2457	1888	2450	2855	2183	2087	1619	2013	2194
Mean	2469	2126	2280	2381	2171	1951	1689	1611	
SEm±									
PM	141.5	107.3	124.0	56.21	56.34	73.54	42.56	44.60	
D	73.9	113.2	118.0	49.17	58.19	68.25	40.85	35.26	
PM×D	128.0	196.1	214.8	97.24	100.0	127.5	73.72	77.25	
CD (@5 %)									
PM	420.2	318.6	396.8	166.9	167.3	218.4	126.4	132.5	
D	219.4	336.2	367.8	146.0	172.8	202.7	121.3	104.7	
PM×D	380.1	582.4	687..3	288.8	297.0	378.7	218.9	229.4	
CV(%)	7.33	13.05	13.3	5.78	6.51	9.24	6.17	6.78	

CB: Cloth bag; SB: Supergrain bag; PB:Polythene bag; C: Control;
ZB: Zeolite beads; SG: Silica gel PM: Packaging material; D: Desiccant.

Table 11: Effect of storage containers and desiccants on seedling vigour index-IIof soybean seeds during storage

Seedling vigour index-II									
Treatments	Storage period (in months)								
	2	4	6	8	10	12	14	16	Mean
Packaging materials									
CB	4030	3816	2962	2467	2376	2119	2427	1438	2704
SB	4246	3977	3126	3147	3355	3003	3661	3085	3450
PB	4408	3647	3283	3319	2874	2476	3276	2605	3236
Mean	4228	3813	3124	2978	2868	2533	3121	2376	
Desiccant									
C	4200	3645	3366	2830	2760	2385	2757	2043	2998
SG	4437	3751	3120	3068	2960	2547	3351	2471	3213
ZB	4046	4040	2885	3035	2885	2665	3255	2614	3178
Mean	4228	3812	3124	2978	2868	2532	3121	2376	
Packaging materials× desiccants									
CBC	4180	3564	3229	2246	2203	2001	2018	1177	2577
CBSG	3885	3750	2806	2898	2491	2118	2616	1446	2751
CBZB	4025	4133	2852	2257	2436	2237	2646	1690	2785
SBC	4236	4014	3366	2907	3094	3019	3280	2834	3344
SBSG	3952	3976	3237	3331	3610	2874	3758	2894	3454
SBZB	4550	3932	2776	3205	3363	3115	3944	3529	3552
PBC	4186	3357	3504	3337	2984	2137	2974	2119	3075
PBSG	4163	4013	3318	2976	2780	2649	3678	3073	3331
PBZB	4876	3570	3027	3644	2858	2642	3175	2624	3302
Mean	4228	3812	3124	2978	2869	2532	3121	2376	
SEm±									
PM	173.9	89.8	136.3	57.68	123.6	133.7	70.88	30.91	
D	149.4	136.3	115.3	62.14	128.9	118.6	68.15	24.65	
PM×D	258.9	236.1	236.0	100.0	222.5	231.6	122.7	53.51	
CD (@5 %)									
PM	516.4	266.7	436.0	171.3	367.1	397.1	210.5	91.8	
D	443.7	404.8	415.0	184.6	382.8	352.2	202.4	73.2	
PM×D	768.9	701.2	755.3	297.0	660.8	687.9	364.4	158.9	
CV(%)	8.66	8.76	10.689	4.75	10.97	12.93	5.56	3.19	

CB: Cloth bag ; SB: Supergrain bag ; PB: Polythene bag ; C: Control;
ZB: Zeolite beads; SG: Silica gel; PM: Packaging material; D: Desiccant

Conclusions (Overall): Initial observations suggest soybean seeds stored in Polythene bag 250 of gauge with silica Gel maintain higher seed quality parameters (germination, seedling length, seedling dry weight, seedling vigour index –I and seedling vigour index-II). The experiment need to be conducted with uniform design at all the locations including use of desiccants/drying beads and packaging material.

Experiment 5: Storage of groundnut seed in modified environment with CO_2 gas

Objective: To maintain storability of groundnut seeds with the help of modified environment

Date of start : 2016
Centre : TNAU, Coimbatore

TNAU, Coimbatore

Twenty-five kg of pods and kernels of groundnut variety were stored in two separate containers, and modified with the 40 % (v/v) CO_2 concentration. Initial seed quality evaluation was carried and continued once in 30 days. The CO_2 concentration was monitored once in a week and maintained. The seeds were dried to 7 % moisture content while placing into the containers.

Figure 1: Groundnut pods and kernels stored in modified environment containers

Table 1: Effect of storage of groundnut seeds *var* TMV 13 in modified environment with CO_2

	Germination (%)		Shoot length (cm)		Root length (cm)		Epicotyl length (cm)		Hypocotyl length (cm)	
	Pod	Kernel	Pod	Kernel	Pod	Kernel	Pod	Kernel	Pod	Kernel
Initial	94	94	13.8	13.8	11.0	11.0	3.3	3.3	3.7	3.7
30 days	94	94	13.8	13.8	11.0	11.0	3.3	3.3	3.7	3.7
60 days	93	92	13.5	13.1	10.6	10.2	3.0	2.6	3.4	3.0
90 days	90	89	13.1	12.7	10.4	9.8	2.6	2.2	3.0	2.6
120 days	87	84	12.8	12.0	10.1	9.5	2.3	1.9	2.7	2.3
150 days	85	81	12.4	11.7	9.5	8.9	2.1	1.7	2.5	2.1
180 days	81	75	12.1	11.1	8.9	8.4	1.9	1.5	2.3	1.9
Mean	89	87	13.1	12.6	10.2	9.8	2.6	2.4	3.0	2.8
	T	TXD	T	TXD	T	TXD	T	TXD	T	TXD
SEd	0.58	0.46	0.21	0.18	0.27	0.22	0.31	0.29	0.16	0.23
CD (P = 0.05)	1.18	9.8	0.42	0.36	0.54	0.44	0.61	0.58	0.32	0.46

Table 1 (Continued): Effect of storage of groundnut seeds var TMV 13 in modified environment with CO_2.

	Dry matter production (mg/ seedling)		Vigour index		Field emergence (%)		Chlorophyll content (mg/ g of leaf)	
	Pod	Kernel	Pod	Kernel	Pod	Kernel	Pod	Kernel
Initial	285	285	2331	2331	87	87	36.9	36.9
30 days	284	281	2331	2331	87	87	36.9	36.9
60 days	281	273	2241	2144	86	85	35.8	35.6
90 days	274	267	2115	2003	83	82	34.7	33.9
120 days	262	254	1992	1806	80	77	32.9	31.6
150 days	256	243	1862	1669	78	74	31.6	29.9
180 days	247	231	1701	1463	74	68	30.8	27.8
Mean	270	262	2082	1964	82	80	34.2	33.2
	T	TXD	T	TXD	T	TXD	T	TXD
SEd	4.5	3.6	21	14	2.78	3.24	0.43	0.58
CD (P = 0.05)	9.2	7.4	42	28	5.56	6.48	0.86	1.16

Results: Groundnut pods and kernels stored in modified environment of 40% CO_2 have significant difference in storage on seed viability as well as seed quality parameters. The pods recorded higher germination of 89 per cent after 180 days of storage compare to kernels, which recorded 75%. The pods storage recorded the higher shoot length and root length (12.1 and 8.9 cm) and kernels recorded 11.1 and 8.4, respectively after 6 months of storage. The pods recorded 74 per cent field emergence after 180 days of storage and kernels recorded 68%. The pods recorded the higher vigour index of 1701 after 180 days of storage compare to 1463 recorded by the kernels. This study showed that seed as pods (in-shell) may be better option than storage as kernels (off-shell), however off-shell seed could be stored for 4 months and this time could be used in transport of seed from one place to another for the sowing in immediate ensuing season.

Conclusion: The seed quality parameters of kernels are on par with that of pods upto 120 days under modified environment of 40% (v/v) CO_2.This finding may be recommended to different seed agencies for utilization in transport of seed material (off-shell) to reduce the bulkiness of being transported as pods.

Experiment 6: Basic studies for developing priming technology in crop plants

Background: Seed priming is important to establish uniform crop stand, especially under sub-optimal conditions, however, the technique needs to be standardized for various locations and crops in the country. Field crops in which priming technology needed are soybean, groundnut, rice, wheat, pigeonpea, chickpea and various vegetable or low volume crops i.e. onion and carrot. In the major crops including wheat, rice and millets it is being demonstrated in on farm trials, but in case of pulses and oilseeds, it still need to be understood for its practical application. The basic requirement of seed priming is to stop germination activity just before the radical emergence, followed by slow dehydration. In this process seed water potential just before radical emergence need to be worked out and care is needed to take in dehydration process also because dehydration is happening second time after detachment of seed from mother plant (after acquiring desiccation tolerance). Soaking of seeds for different hours followed by unregulated dehydration may be just a hit and trial method for invigorating seeds. In addition, seed germination is the function of time and temperature which also need to be addressed adequately in the priming process. Thus soaking of seed could be used in on farm demonstration where dehydration is not involved, and certainly not in seed which require dry state for its storage, immediately after priming/invigoration treatments.

Objective	:	To improve crop establishment under sub optimal conditions in different field crops
Year of Start	:	2016
Centre	:	**Pigeon pea:** IARI, New Delhi; UAS, Bengaluru **Chickpea:** GBPUAT, Pantnagar **Rice:** AAU, Jorhat and, ICAR- RC NEH, Manipur

Crop: Pigeonpea

ICAR-IARI, New Delhi

Varieties: Pusa 991, Pusa 992, Pusa 2001 and Pusa 2002

Methodology: Four replications of 50 seeds each were put for germination test at 25^{0}C. Ten normal seedlings from each replication were randomly taken for measuring shoot and root lengths, subsequently, these were dried overnight in an oven at 90^{0}C and the dry weight of these seedlings was measured. Seedling vigour was calculated;

Vigour index I = germination (%) x seedling length (root + shoot).

Vigour index II = germination (%) x seedling dry weight (root + shoot)

[Same procedure was adopted to assess the effect of seed quality enhancement treatments (hydro-priming/ thermo-priming)].

The test weight, moisture content, imbibitions pattern and seed coat to cotyledon ratio were also assessed. The weight of 1000 seeds was taken in grams up to two decimals. The germination percent and moisture content was assessed using ISTA, 2015 method. For studying the imbibitions pattern 100 seeds in four replicates were soaked in 100ml water at 25^{0}C. The weight gain was measured from 1hr after soaking to 36 hours of soaking. The seed coat was removed from the seeds after 10 hrs of soaking. The cotyledons and seed coats were dried overnight in an oven at 90^{0}C and weighed after 30 minutes of cooling to calculate their ratios.

Priming: 400 seeds of each variety were weighed and soaked in water volumes; half of the weight, equal of the weight and double the weight. The soaking in volume of water equal to weight of seeds was found sufficient.

The germination and other vigour parameters were assessed after 1 hr of soaking to 30 hrs of soaking. Similarly for thermo priming, the seeds were exposed to 25^{0}C, 30^{0}C and 40^{0}C for 1 to 24hrs and germination percent at 25^{0}C following ISTA (2015) method and other vigour parameters were assessed.

Results: The data on initial seed quality status of four varieties; Pusa-991, Pusa-992, Pusa-2001 and Pusa-2002 of Pigeonpea produced in different years has been presented in table 1. The test weight of variety Pusa 2001 was highest (85.24g) while it was lowest (73.34g) in Variety Pusa 992. The varieties Pusa 991 and Pusa 992 had slightly more moisture than the recommended (9.0%) moisture content where as the varieties Pusa 2001 and Pusa 2002 had the optimum moisture content. The highest germination (96.5%) was maintained in 2011 produced variety of Pusa 2002, however it was lowest (78.0%) in Pusa 992 produced in same year. But, all the varieties maintained germination above the Indian Minimum Seed Certification Standards (75.0%)

Table 1: Status of seed quality of four varieties of Pigeon pea produced in different years

Varieties	Year of produce	Test Wt. (g)	Moisture content (%)	Germination (%)
Pusa-991	2011	75.45	9.76	87.5
Pusa-992	2011	73.34	9.42	78.0
Pusa-2002	2011	83.43	9.02	96.5
Pusa-2001	2013	85.24	9.01	83.0
Mean		79.37	9.30	86.25
SEM		5.85	0.36	7.86

The data on initial seed vigour status of four varieties of Pigeonpea has been presented in table 2. The first count and germination of varieties; Pusa-991, Pusa-992 and Pusa-2001 was at par, however, these parameters were significantly high in variety, Pusa-2002. This was mainly attributed due to number of abnormal seedlings in these varieties.

Table 2: Status of Initial seed vigour of four varieties of Pigeon pea

Varieties	FC(TR)	GER (%)	ABN (%)	VI-I	VI-II
Pusa-991	85.0 (67.25a)	87.5 (69.37a)	8.5 (16.94a)	2504ab	18.55
Pusa-992	75.5 (60.79a)	78.0 (62.68a)	7.5 (13.55a)	2035a	16.94
Pusa-2002	94.5 (76.48b)	96.5 (80.20b)	1.0 (4.70b)	2878b	21.21
Pusa-2001	80.5 (63.95a)	83.0 (65.89a)	5.0 (14.57a)	2502ab	20.34
Mean	83.9	86.3	5.5	2478	19.26
SEM	1.99	2.35	3.02	188.5	1.13

* Figures in parentheses are arcsine transformed values

Vigour index I of Varieties; Pusa-991 and Pusa-2001 was at par and it was significantly less in case of Variety Pusa 992. The Vigour index I and Vigour index II were highest in variety, Pusa 2002. It could be deduced from the above that the seed quality of Pusa-992 was significantly poor than Pusa-2002, even though both were harvested from the same year.

The perusal of mean values of Seed Coat to Cotyledon ratio in Pigeonpea Varieties given in table 3 revealed that the variety Pusa 2001 had the highest seed coat weight while the weight of cotyledons was maximum in variety Pusa 2002. Seed Coat to Cotyledon ratio was also highest in variety Pusa 2002. This could have an impact on water uptake pattern of different varieties.

Table 3: Seed Coat to Cotyledon ratio in Pigeonpea Varieties

Varieties	Seed Coat Wt./s (g)	Cotyledon Wt./s (g)	SC/Coty (Ratio)
Pusa-991	0.129	0.626	0.206
Pusa-992	0.134	0.601	0.223
Pusa-2002	0.131	0.704	0.186
Pusa-2001	0.163	0.688	0.237
Mean	0.139	0.655	0.213
SED	0.016	0.049	0.022

Imbibition pattern for 36 hrs duration in four Pigeonpea Varieties; Pusa-991, Pusa-992, Pusa-2001 and Pusa-2002 have been shown in Figure 1. It was observed that all the varieties imbibed water in different patterns, however there were genotypic differences. It took maximum of 30 hrs to start the radicle protrusion at 25^{0}C. No relation with Seed Coat to Cotyledon ratio could be established.

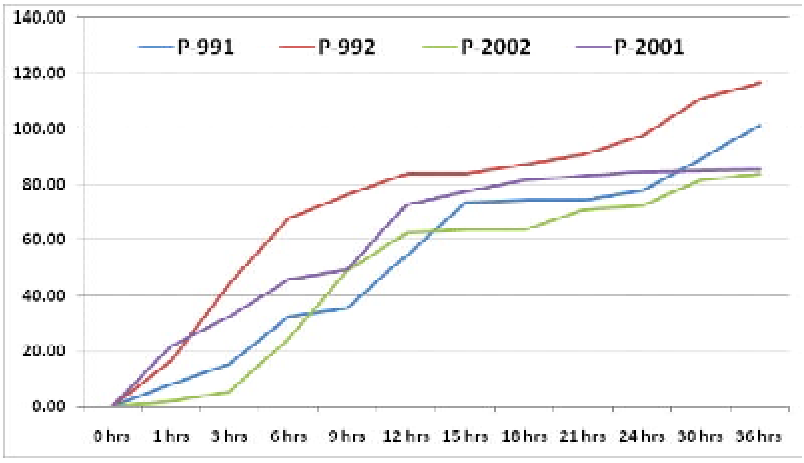


Fig. 1: Imbibition Pattern in Pigeonpea Varieties

For standardization of priming duration in pigeonpea, data was recorded on first count (%), normal seedlings (germination %), abnormal seedlings, dead, hard seeds, shoot and root lengths, vigour index I and vigour index II from 1 hr to 30 hours priming. The glance of data on first count (%), germination, vigour index II (figure 2) and vigour index I (figure3) of pigeonpea Variety Pusa 992 after different periods of priming revealed that maximum values of all these parameters were noticed after 10hrs of priming in wt./vol of water at 25^{0}C.

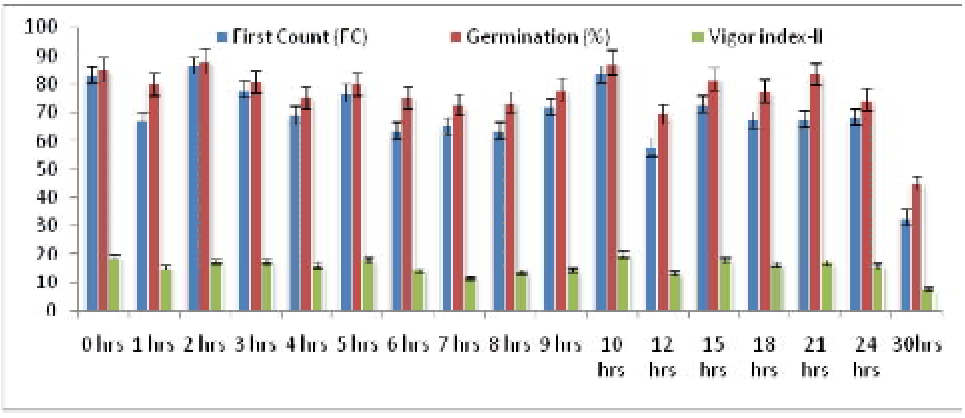


Fig. 2: First count, germination and vigour Index II of pigeonpea variety Pusa 992 after different periods of priming

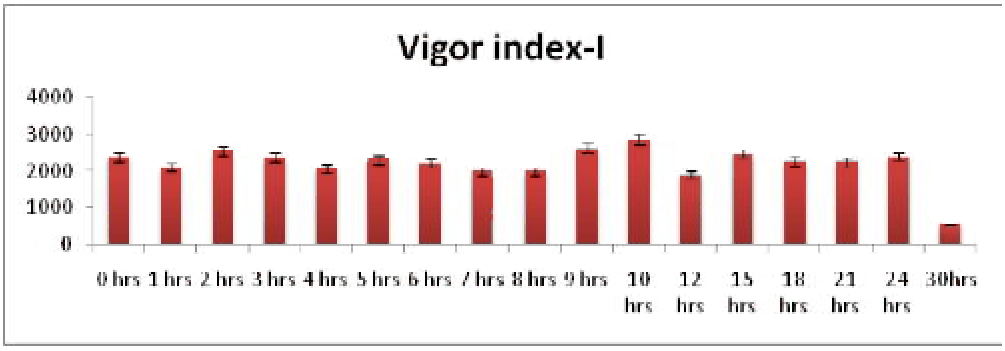


Fig. 3: Vigour index I of pigeonpea variety Pusa 992 after different periods of priming

For standardization of thermo-priming temperature in pigeonpea, data was recorded on first count (%), normal seedlings (germination %), abnormal seedlings, dead, hard seeds, shoot and root lengths, vigour index I and vigour index II after exposure to 25^{0}C, 30^{0}C and 40^{0}C for 1 hr to 30 hours. The perusal of pooled data for all durations on First count (figure 4), germination (figure 5), vigour index II (figure 6) and vigour index I (figure 7) of pigeonpea varieties after exposing to different thermo-priming temperatures revealed variable responses among the varieties and parameters. In general, the values of seed quality parameters of variety Pusa 992 showed poor results as compared to other varieties.

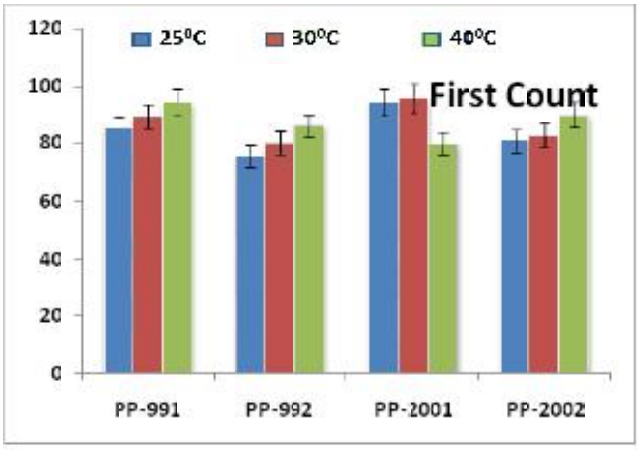


Fig. 4: Pooled Germination (%) after exposure to 25^{0}C, 30^{0}C and 40^{0}C for 1 hr to 30 hours

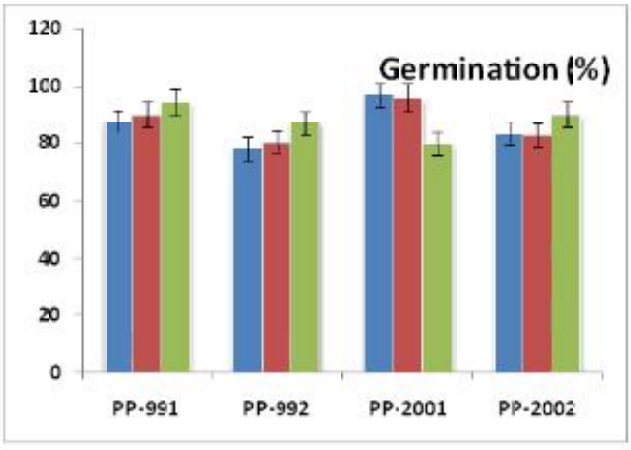


Fig. 5: Pooled Germination (%) after exposure to 25^{0}C, 30^{0}C and 40^{0}C for 1 hr to 30 hours

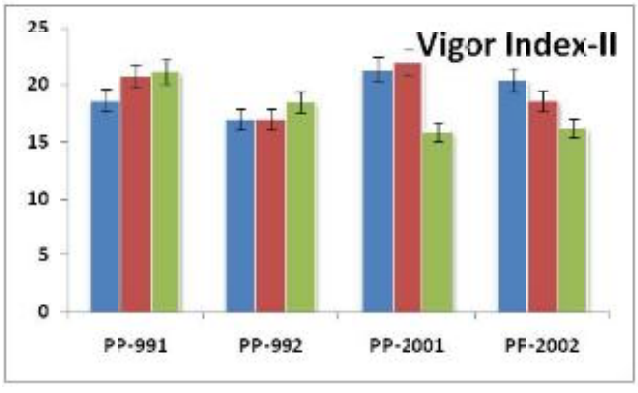


Fig. 6: Pooled Vigour index II after exposure to 25^{0}C, 30^{0}C and 40^{0}C for 1 hr to 30 hours

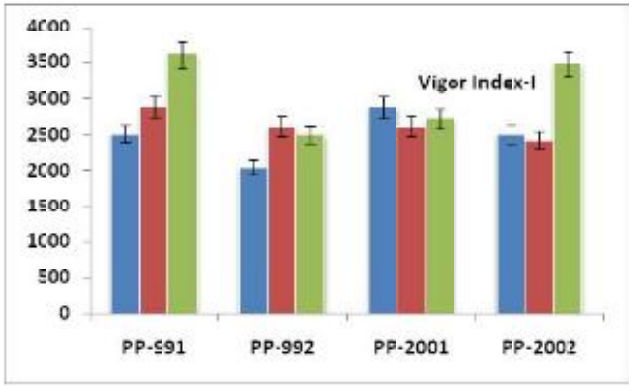


Fig. 7: Pooled Vigour index I after exposure to 25^{0}C, 30^{0}C and 40^{0}C for 1 hr to 30 hours

This could be because of the relative sensitivity of variety Pusa 992, which was relatively poor initially, to temperature. The increasing exposure of varieties; Pusa-991, Pusa-992 and Pusa-2002 to temperature from 25^{0}C to 40^{0}C showed improvement in first count (%) and germination (%), while in case of Pusa-2001, first count (%) increased slightly and germination (%) deceased slightly after exposure to 30^{0}C, while exposure to 40^{0}C resulted in significant decrease of both these parameters. The vigour index I in varieties; Pusa-991 and Pusa-2002 increased significantly after exposure to 40^{0}C. Significant increase in vigour index I of variety Pusa 992 was observed after exposure to increased temperatures while it decreased in variety Pusa 2001. The vigour index II of the varieties; Pusa 991 and Pusa 992 increased, while it decreased in other two varieties with exposure to 40^{0}C. It can thus be deduced that and exposure to 40^{0}C would result in more improvement of seed quality traits of relatively poorer seed lots.

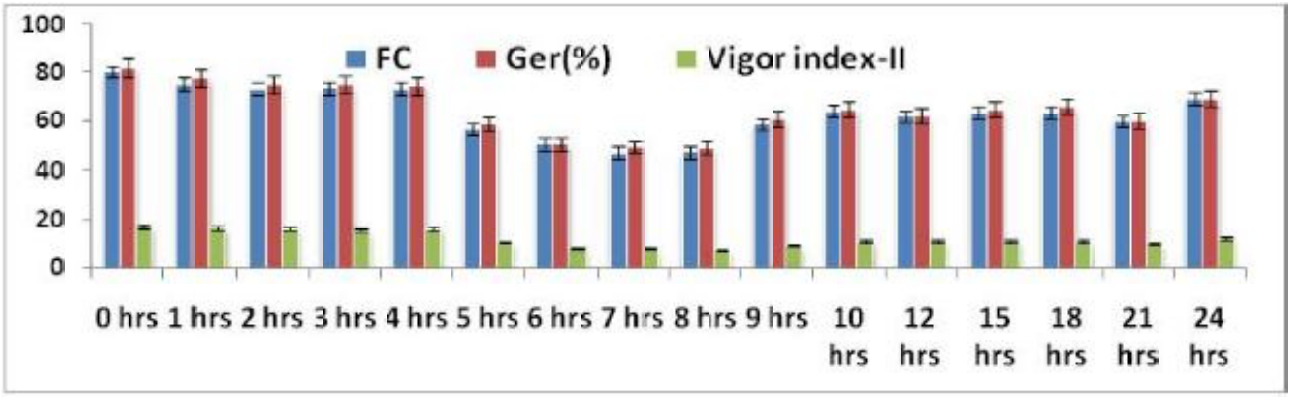


Fig. 8: First count, Germination and Vigour Index II of Pigeon pea Variety Pusa 992 after different periods of thermo-priming

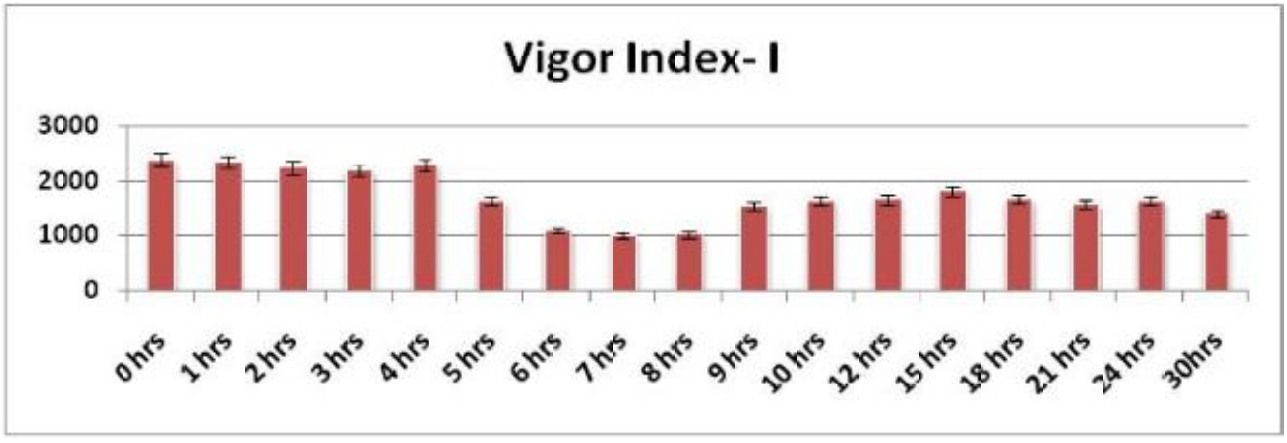


Fig. 9: Vigour Index I of Pigeon pea Variety Pusa 992 after different periods of thermo-priming

For standardization of thermo-priming duration in Pigeonpea, data was recorded on First count (%), normal seedlings (germination %), abnormal seedlings, dead, hard seeds, shoot and root lengths, Vigour index I and Vigour index II from 1 hr to 30 hours of exposure to 40^{0}C. The perusal of data on first count (%), germination, vigour index II (figure 8) and vigour Index I (figure 9) of pigeonpea variety Pusa 992 after different periods of thermo-priming revealed that maximum values of all these parameters were noticed after 1hr of exposure at 40^{0}C.

Table 4: Comparison of Standardized Priming

Std. Pri. Method	FC (%)	Ger (%)	Vigor index-II	Vigor index-I
Control	83.25	85.50	19.14	2369.2
Imbibition for 10 h at 25ºC	83.50	87.75	20.06	2870.0
For 1h at 30ºC	80.25	82.50	17.36	2388.9
For 1 h at 40ºC	90.00	94.00	18.33	2809.9

Summary:

1. There were genotypic differences in imbibition pattern
2. It takes 30 hrs at 25^0C in most of the pigeon pea varieties for the radicle to protrude
3. Correlation with Seed Coat to Cotyledon ratio could not be established
4. Imbibition in amount of water equal to seed weight at 25^0C for 10 hrs was judged as optimal for hydro priming in pigeon pea
5. There were genotypic differences for relative sensitive to higher temperature exposure
6. The optimum exposure temperature for thermo-priming could be 40^0C and
7. One hour exposure was found to be the optimum time for enhancement of seed quality in pigeon pea.

UAS, Bengaluru

Experimental details

Variety: Redgram cv. BRG-2

Plot size: 3m x 3m

Date of Start: 12.08.16

Spacing: 60cm x 20cm.

Treatment

T_1: Control

T_2: Thiram @0.25% (Fungicide)

T_3: Hydropriming

T_4: Hydro priming + thiram @0.25 %

T_5: Bio-priming (*Trichoderma viridae*) @ 10g/kg seed (bio-fungicide)

T_6: Ascorbic acid @ 1000 ppm

T_7: Halo-priming (KNO_3@0.4%)

T_8: Turmeric extract @ 1% (antioxidant compound for diseases)

The red gram (BRG-2) seeds were procured from NSP, GKVK and initial seed quality parameters were recorded. After that seeds were treated with above treatments were dried under shade to bring back its original

moisture content. The seed quality and biochemical parameters were recorded for treated seeds. The biochemical tests were carried out as per protocol given by Sadasivam and Manickam (2008) except for catalase activity (Goth, 1991).

Table 5: Initial seed quality parameters of red gram (BRG-2)

Seed quality parameters	
Moisture content (%)	8.59
Germination (%)	76.0
Seedling length (cm)	25.3
Dry weight (mg/seedling)	26.0
Seedling Vigour Index-I	1924
Seedling Vigour Index-II	1984

Table 6: Effect of priming treatments on seed quality parameters of red gram (BRG-2)

Treatments	Germination (%)	Field emergence (%)	Seedling length (cm)	Dry weight (mg/seedling)	Seedling Vigour Index-I	Seedling Vigour Index-II
C	76	72	20.8	23.1	1584	1759
Ti	74	69	20.5	22.5	1517	1668
Hyp	65	48	19.6	21.5	1282	1401
Hyp+Ti	69	69	20.8	26.3	1432	1822
Bip	77	74	20.2	22.6	1567	1747
Asa	70	66	22.2	21.8	1548	1520
Hap	66	65	19.6	23.5	1295	1546
Tue	64	61	21.2	24.8	1361	1598
Mean	70	65	20.63	23.27	1448	1632
S.Em±	1.752	0.553	0.385	1.507	50.307	125.43
CD (@5%)	5.252	1.657	1.155	4.519	150.819	376.04
CV (%)	4.325	1.460	3.234	11.22	6.016	13.308

C: Control, Ti:Thiram, Hyp: Hydropriming, Hyp+Ti: Hydropriming + thiram,
Bip: Biopriming, Asa: Ascorbic acid, Hap: Halopriming, Tue: Turmeric extract

Table 7: Effect of priming on EC, protein content, TDH, amylase activity, catalase and peroxidase activities

Treatments	EC (µS/cm)	TDH activity (OD480nm)	Amylase activity (mg maltose liberated/h/mg of protein)	Protein content (mg/0.1 g of sample)	Catalase activity (mMol H_2O_2 degraded/min)	Peroxidase activity (ΔA_{436}/min/ g of seed)
C	150.00	0.49	0.15	0.17	41.50	136.00
Ti	162.00	0.68	0.14	0.15	36.50	115.00
Hyp	160.50	0.73	0.10	0.12	36.00	125.50
Hyp+Ti	149.50	0.68	0.12	0.14	35.50	107.00
Bip	139.50	0.81	0.24	0.17	42.00	133.50
Asa	149.50	0.79	0.16	0.14	39.00	123.00
Hap	165.50	0.72	0.64	0.21	39.00	115.00
Tue	181.00	0.57	0.11	0.10	36.00	115.50
Mean	157.19	0.63	0.2075	0.15	38.19	121.31
S.Em±	6.59	0.03	0.21	0.15	1.311	3.40
CD(@5%)	21.51	0.113	0.016	0.034	4.27	11.10
CV (%)	5.93	7.71	11.18	13.15	4.85	3.96

C: Control, Ti:Thiram, Hyp: Hydropriming, Hyp+Ti: Hydropriming + thiram,
Bip: Biopriming, Asa: Ascorbic acid, Hap: Halopriming, Tue: Turmeric extract

Conclusion: Among the treatments biopriming (*Trichoderma viridae*) @ 10g/kg seed treated seeds exhibited slight improvement in quality parameters (Germination: 77%, Field emergence: 74%, Seedling length: 20.2cm, Dry weight: 22.6 mg/seedling, Seedling Vigour index I and II 1567 and 1747 respectively, TDH activity: 0.81 OD 480nm, Amylase activity: 0.64 mg maltose liberated per h/mg of protein, Protein content: 0.21 mg/0.1g of seed sample, Catalase activity: 42.00 mMol H_2O_2 degraded/min, Peroxidase activity: 133.00 ΔA_{436}/min/g of seed) compared to other treatments. There is no much improvement with seed priming when compare to control.

Crop: Chickpea

GBPUAT, Pantnagar

Experimental details: Chickpea variety: Pant G 186. Laboratory study was conducted to standardize effective concentration of KCl and priming duration to improve germination and seedling vigour of chickpea under sub optimal conditions. The treatments comprising of halopriming at five levels i.e., 1.0, 1.5, 2.0, 2.5 and 3.0 % KCl concentration and three priming durations (8, 12 and 16 hours). There were 18 treatment combinations replicated three times in a completely randomized design.

Results: Among different priming treatment the highest germination percentage (95.6%) recorded with the seeds primed with 1.5% KCl which was at par with 1% KCl and halopriming. The minimum germination percentage was recorded with 3% KCl. Among different seed priming durations , 8 hours showed significantly highest value of germination percentage (93.1%) which was at par with 12 hours (89.5%) duration. The lowest germination percentage (88.3%) was recorded with 16 hours duration.The higher value of seedling length and dry weight resulted in increased seedling vigour indices (SVI-I & SVI-II) in primed seeds as seed germination and seedling length (cm/seedling) reflects seedling vigour index-I whereas seed germination and seedling dry weight (mg/seedling) reflects seedling vigour index-II. Significantly highest value of SVI-I and SVI-II (1054 and 1207 respectively) was recorded with 1.5% KCl concentration followed by 1% KCl concentration. The lowest value was observed with 3% KCl concentration. Seed priming for 8 hours showed significantly highest value of seedling length (10.5 cm). The lowest value (9.5 cm) was observed with 16 hours which was at par with 12 hours priming duration (9.8 cm). The maximum seedling dry weight (10.8 mg) was also observed in 8 hours duration of seed priming, value which was at par with 12 hours duration (10.4 mg). The lowest seedling dry weight (10.1 mg) was observed in 16 hours priming duration. Vigour index –I &vigour index II also showed similar trend as seedling dry weight. On the basis of above study it may be concluded that chick pea seed priming with KCl @1.5 % for 8 hours is beneficial for improving seed germination and seedling vigour indices.

Table 8: Effect of different concentration of KCl and priming duration on seed germination and seedling vigour of chickpea

Treatments	Germination (%)	Seedling Length (cm/seedling)	SVI-I	Seedling dry weight (mg/seedling)	SVI-II
KCl Concentrations					
Hydropriming	92.0	9.3	863	10.1	935
1.0%	92.8	10.4	976	11.0	1032
1.5%	95.6	11.0	1054	12.6	1207
2.0%	90.4	10.2	932	10.4	949
2.5%	87.3	9.6	843	9.7	847
3.0%	83.6	9.1	769	8.7	729
Mean	90.3	9.9	906	10.4	950
SEm±	1.5	0.3	31	0.38	39
CD (5%)	4.4	0.75	89	1.1	111

Treatments	Germination (%)	Seedling Length (cm/seedling)	SVI-I	Seedling dry weight (mg/seedling)	SVI-II
Priming duration (hours)					
8	93.1	10.5	982	10.8	1005
12	89.5	9.8	886	10.4	936
16	88.3	9.5	850	10.1	909
Mean	90.3	9.9	906	10.4	950
SEm±	1.1	0.2	22	0.3	27
CD (5%)	3.1	0.5	63	0.8	78

Crop: Rice

AAU, Jorhat

The upland direct seeded rice faces serious challenge and damage due different biotic and abiotic factors like drought and weeds. It has been observed from previous experiences that the early vigour increases the competitive ability of the crop. Thus, an experiment was planned to enhance the early growth of the upland direct seeded rice by seed priming with microbial cultures developed and sustaining the advantage to the crop with the help of appropriate weed management practice. The experiment was done in collaboration with AICRP on weed science, Jorhat centre. Microbial cultures were taken from Agricultural Biotechnology department.

Technical programme: The experiment was laid out in a 2 factor randomized block design with 3 replications. The treatments comprised of 3 microbial cultures and 3 weed management practices including a weedy check. The seeds of the variety '*Ronkhang'* were sown on 30.04.16 and the crop was harvested on 12.08.16, thus maturing in about 104 days. The normal recommended fertilizer dose of 40:20:20; N:P_2O_5:K_2O was applied.

Treatments: Seed priming with *Trichoderma harzianum,* Seed Priming with bacterial strain (ABTJ11), Seed Priming with consortium, Seed Hydration for 8 hrs (Control).

Table 9: Crop growth parameters as affected by treatments

Treatment	Field emergence (%)	No of Tiller/m^2	Plant height (cm)	No of Panicle/m^2	Panicle length (cm)
Trichoderma	88.02	17.48	81.69	15.37	14.37
ABT microbial culture	88.12	16.54	79.46	14.52	14.59
Consortium	88.50	18.00	82.81	15.78	15.81
Hydration	87.56	16.48	80.14	13.78	14.03
C.D. (p=0.05)	NS	NS	NS	0.76	1.18

Table 10: Yield attributes, grain and straw yield of rice as affected by treatments

Treatment	No of filled grain/panicle	No of false grain/panicle	Grain Yield (kg/ha)	Straw Yield (kg/ha)
Trichoderma	68.89	26.67	1311.33	2714.67
ABT microbial culture	68.56	27.67	1329.78	2703.89
Consortium	72.33	24.22	1381.89	2793.00
Hydration	64.89	27.44	1257.67	2483.00
C.D. (p=0.05)	2.16	NS	30.56	47.17

Table 11: Weed density and dry weight at various stages as affected by treatments

Treatment	Weed density* (no./50cm^2)			Weed dry weight* (g/50cm^2)		
	30DAS	60DAS	Harvest	30DAS	60DAS	Harvest
Trichoderma	4.13 (22.89)	7.27 (53.44)	4.77 (59.00)	1.96 (4.22)	4.48 (20.00)	4.77 (22.78)
ABT microbial culture	4.17 (23.56)	6.95 (49.11)	4.96 (61.33)	1.99 (4.44)	4.55 (20.89)	4.96 (24.67)
Consortium	3.88 (20.33)	7.30 (54.00)	4.57 (51.00)	1.75 (3.33)	4.25 (18.11)	4.57 (20.89)
Hydration	4.25 (24.33)	7.07 (50.44)	5.06 (57.00)	1.95 (4.22)	4.63 (21.56)	5.06 (25.67)
C.D. (p=0.05)	NS	NS	0.18	NS	0.23	0.18

Results: We are including the results related to seed vigour and yield parameters omitting the weed management practices.Growth, yield attributes, yields of the crop: Data on field germination percentage, number of tiller, plant height, number of panicle and panicle length presented in Table 9 revealed a significant effect of microbial cultures on number of panicle and panicle length. The treatment with consortium resulted the highest values of these parameters followed by *Trichoderma* and ABT microbial culture (Table 9). The results presented in Table 10 showed a significant increase in the number of filled grains with corresponding decrease in the number of false grain due to consortium culture followed by *Trichoderma* and ABT microbial culture. The trend was reflected on the grain and straw yield of rice and the highest values were given by this treatment. It was significantly better than rest of the treatments (Table 10). Data on weed density presented in Table 11 showed a significant variation among the microbial cultures only at harvest. The lowest value was recorded with consortium followed by *Trichoderma*. However, both of these treatments were significantly superior to ABT microbial culture and Hydration in decreasing weed density at harvest. The weed dry weight was significantly affected by treatments with microbial cultures at 60 DAS and harvest. The lowest values were recorded with consortium followed by *Trichoderma* and ABT microbial culture.

Experiment 7 : **Use of nanotechnology for enhancing seed quality**
Objective : To demonstrate seed priming in the field of nano-technology
Date of start : 2016
Center : TNAU, Coimbatore; UAS, Bengaluru; UAS, Dharwad

Crop: Rice

TNAU, Coimbatore

Experimental details: Variety included in study CO (R) 51. Fresh and medium vigour seed lots were taken for this study. Both the lots were subjected to nanopriming treatments with titanium oxide (plan 1) and Zinc oxide (plan 2).

Treatments, T_1–Control, T_2–Hydropriming, T_3 - TiO_2 100 ppm, T_4 - TiO_2 200 ppm, T_5 - TiO_2 300 ppm, T_6 - TiO_2 400 ppm, T_7 - TiO_2 500 ppm, T_8 - TiO_2 600 ppm, T_9 - TiO_2 700 ppm.

Results (Plan 1): Titanium Oxide with 400 ppm recorded the maximum germination (95 %) over the control (91 %). Any increase in the concentration over the 400 ppm reduced the effect of nanopriming. Hence upto 400 ppm of Titanium oxide can be used for nanopriming of rice seeds. The same treatment recorded the maximum

seedling growth parameters and vigour index (2720) compared to control 2596 (Table1). The nanopriming increased the germination, seedling growth and vigour index in the low vigour seed lot. The maximum germination recorded in 400 ppm and 500 ppm of titanium oxide nanopriming. It increased the germination potential from 68 % to 86 % and vigour index from 1992 to 2872.

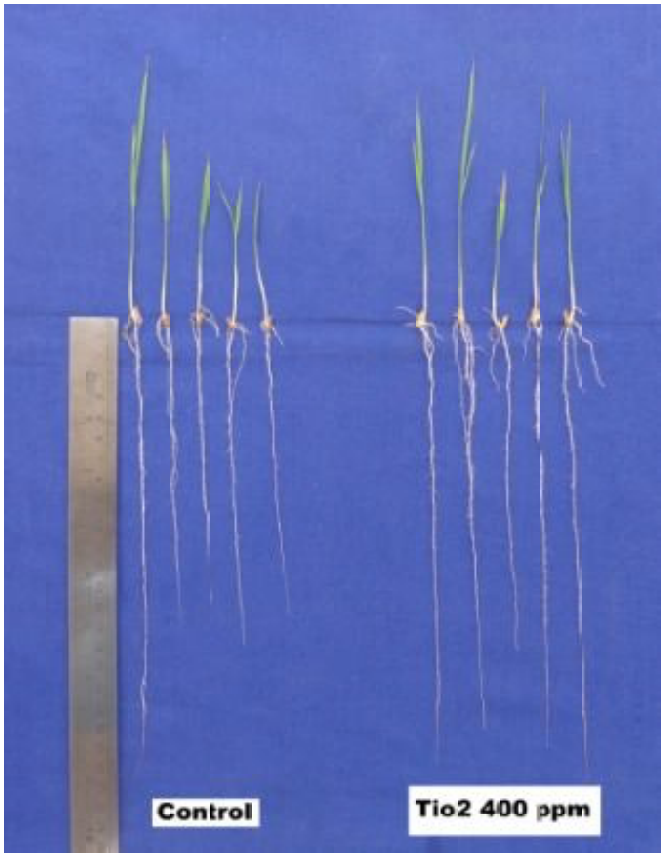


Figure 1: Rice seedlings with or without nanoparticle treatments (priming)

Table 1: Effect of nanopriming of Titanium Oxide on high vigour seed lot rice variety CO (R) 51

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	DMP	Vigour index I
Control	91	9.4	19.1	60.7	2596
Hydropriming	93	9.8	19.5	57.7	2719
TiO_2 100 ppm	93	9.4	19.2	56.1	2614
TiO_2 200 ppm	93	10.1	17.9	58.5	2599
TiO_2 300 ppm	94	9.5	18.7	59.2	2579
TiO_2 400 ppm	95	9.5	19.1	57.3	2720
TiO_2 500 ppm	92	10.5	19.0	59.8	2706
TiO_2 600 ppm	93	9.5	10.6	57.5	1879
TiO_2 700 ppm	90	9.2	16.0	57.5	2257
Mean	93	9.7	16.2	58.3	2397
SEd	0.58	0.24	0.41	1.12	22
CD (P = 0.05)	1.18	0.48	0.84	2.25	46

Table 2: Effect of nanopriming of Titanium Oxide on low vigour seed lot rice varietyCO (R) 51

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	DMP	Vigour index I
Control	68	9.6	19.7	61.4	1992
Hydropriming	72	9.6	19.9	62.4	2124
TiO_2 100 ppm	82	9.8	22.4	62.8	2640
TiO_2 200 ppm	85	10.4	21.2	64.1	2690
TiO_2 300 ppm	85	9.9	21.8	62.4	2663
TiO_2 400 ppm	86	10.4	23.0	63.9	2872
TiO_2 500 ppm	84	9.8	21.6	62.8	2638
TiO_2 600 ppm	80	9.7	20.4	61.5	2408
TiO_2 700 ppm	80	9.7	20.2	60.8	2392
Mean	80	9.9	21.4	62.5	2513
SEd	0.66	0.48	0.27	1.58	18
CD (P = 0.05)	1.88	0.96	0.54	3.18	36

Plan 2: Fresh and medium vigour seed lots were taken for this study. Both the lots were subjected to the nanopriming treatments with Zinc oxide.

Treatments: T_1–Control, T_2–Hydropriming, T_3 - ZnO 100 ppm, T_4 - ZnO 200 ppm, T_5 - ZnO 300 ppm, T_6 - ZnO 400 ppm, T_7 - ZnO 500 ppm, T_8 - ZnO 600 ppm, T_9 - ZnO 700 ppm.

Table 3: Effect of nanopriming of Zinc Oxide on high vigour seed lot rice variety CO (R) 51

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	DMP	Vigour index I
Control	96	9.5	18.5	57.3	2687
Hydropriming	93	8.9	9.8	50.5	1741
ZnO 100 ppm	95	10.4	18.8	56.2	2775
ZnO 200 ppm	97	11.7	19.2	58.6	2995
ZnO 300 ppm	95	10.3	15.5	54.9	2470
ZnO 400 ppm	91	10.3	18.6	56.8	2628
ZnO 500 ppm	94	10.0	18.8	55.1	2713
ZnO 600 ppm	96	9.5	14.1	57.0	2255
ZnO 700 ppm	94	10.3	19.1	57.0	2759
Mean	95	10.1	16.9	55.9	2558
SEd	0.12	0.15	0.22	0.52	4.7
CD (P=0.05)	0.22	0.30	0.44	1.04	9.4

Table 4: Effect of nanopriming of Zinc Oxide on low vigour seed lot rice variety CO (R) 51

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	DMP	Vigour index I
Control	62	8.4	16.2	50.1	1525
Hydropriming	59	7.8	7.5	43.3	903
ZnO 100 ppm	61	9.3	16.5	49	1574
ZnO 200 ppm	63	10.6	16.9	51.4	1733
ZnO 300 ppm	61	9.2	13.2	47.7	1366
ZnO 400 ppm	57	9.2	16.3	49.6	1454
ZnO 500 ppm	60	8.9	16.5	47.9	1524
ZnO 600 ppm	62	8.4	11.8	49.8	1252
ZnO 700 ppm	60	9.2	16.8	49.8	1560
Mean	61	9.0	14.6	48.73	1432
SEd	0.11	0.17	0.27	0.33	2.27
CD (P=0.05)	0.22	0.34	0.54	0.66	4.54

Result: Nanopriming with Zinc oxide has no significant role in enhancing seed quality in both the lots of high and vigour. Hence, Zinc oxide may not be useful for nanopriming of rice seed quality enhancement.

UAS, Bengaluru

Crop : Red gram

Variety: BRG-2

Experimental details: Freshly harvested seeds of pigeonpea cv.BRG-2 were dried to safer and uniform moisture level(8 to 9 %). Initial seed quality parameters were recorded and then treated with different nanoparticles (Zinc oxide, Silver, Silicon dioxide) with different concentrations (100 ppm, 250 ppm, 500 ppm, 750 ppm and 1000 ppm). The seed quality and biochemical parameters were being carried out for treated seeds.

Treatment details:

T_1	: Zinc oxide NP 100 ppm	T_9	: Silver NP 750 ppm
T_2	: Zinc oxide NP 250 ppm	T_{10}	: Silver NP 1000 ppm
T_3	: Zinc oxide NP 500 ppm	T_{11}	: Silicon NP 100 ppm
T_4	: Zinc oxide NP 750 ppm	T_{12}	: Silicon NP 250 ppm
T_5	: Zinc oxide NP 1000 ppm	T_{13}	: Silicon NP 100 ppm
T_6	: Silver NP 100 ppm	T_{14}	: Silicon NP 750 ppm
T_7	: Silver NP 250 ppm	T_{15}	: Silicon NP 1000 ppm
T_8	: Silver NP 500 ppm	T_{16}	: Control

Table 5: Initial seed quality parameters of red gram (BRG-2)

Replication	Moisture content (%)	Germination (%)	Seedling length (cm)	Dry weight (mg/seedling)	Seedling Vigour Index-I	Seedling Vigour Index-II
R_1	9.1	88	19.47	17.62	1850	1674
R_2	8.9	90	18.36	16.23	1707	1509
R_3	8.9	86	20.45	18.25	1922	1716
R_4	8.8	88	19.29	17.26	1813	1622
Mean	8.9	88	19.39	17.34	1630	1823

Crop: Maize

Hybrid: Hema

Treatments: Silver (1250ppm/kg seed), Zinc oxide (1500ppm/kg seed), Copper oxide (1500ppm/kg seed) & Iron oxide (1250ppm/kg seed), Design: FCRD, Replications: Three

Results: Seed quality parameters differed significantly between control and nanoparticles treatment. Germination was highest in silver and iron oxide (91%) nanoparticles whereas lowest was recorded in control (79%). Seedling length was higher in iron oxide nanoparticles (38.31cm) followed by silver nanoparticles (35.95cm) compared to control (25.65cm). Seedling dry weight was higher in copper (7.07 mg/seedling) and iron oxide nanoparticles (7.03mg/seedling) compared to control (4.57mg/seedling). Similar trend was observed in seedling vigour index I and II, it was highest in iron oxide (3600 and 660, respectively) and lowest in control (2018 and 359, respectively) (Table 6).

Biochemical changes due to nanoparticles were also differed significantly. Electrical conductivity was highest in untreated seeds (110.20 µS/cm) and it was lowest in all nanoparticles treated seeds. Further, dehydrogenase activity was highest in nanoparticles treated seeds and lowest in control. Protein content was highest in Ag NP's and FeO NP's (132.67 µg/g seed), highest total soluble sugars was observed in ZnO NP's (321.3 µg/ml seed leachate); carbohydrate content recorded highest in Ag NP's (349 µg/g seed) and amylase activity was recorded highest in CuO NP's (1440 mg maltose liberated/h/mg of protein) whereas, lowest was recorded in control and water soaked seeds (Table 7). Activated water and nutrient uptake could be responsible for increased biochemical activity.

Table 6: Seed quality parameters as influenced by nanoparticles treatment in maize hybrid Hema

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	Seedling length (cm)	Seedling dry weight (mg/seedling)	SVI-I	SVI-II
T_1	79	10.69	14.97	25.65	4.57	2018	359
T_2	84	13.45	16.59	30.03	5.47	2520	459
T_3	91	15.58	20.37	35.95	6.60	3390	623
T_4	91	17.10	21.21	38.31	7.03	3600	661
T_5	89	15.73	19.48	35.20	6.67	3167	601
T_6	90	15.76	19.10	34.86	7.07	3203	650
Mean	87	14.72	18.62	33.34	6.23	2983	559
S.Em±	0.86	0.95	0.77	1.32	0.21	101.4	21.06
CD(@5%)	2.65	2.93	2.37	4.07	0.65	312.7	64.91
CV(%)	1.71	11.18	7.16	6.86	5.85	5.89	6.53

SVI: Seedling vigour index, T_1: Control, T_2: Water, T_3: Silver NP's,
T_4: Iron oxide NP's, T_5: Zinc oxide NP's , T_6: Copper oxide NP's

Table 7: Influence of biochemical parameters due to nanoparticles treatments in maize hybrid Hema

Treatments	EC (µS/cm)	TDH (OD480 nm)	Protein (µg/g seed)	TSS (µg/ml seed leachate)	CHO (µg/g seed)	Amylase (mg maltose liberated/h/mg of protein)
T_1	110.20	0.951	107.33	292.3	232.7	673.3
T_2	95.69	1.140	123.67	302.7	246.3	780.0
T_3	83.71	1.643	132.67	305.0	349.0	826.7
T_4	84.96	1.627	132.33	306.7	259.3	823.3
T_5	90.11	1.346	128.67	321.3	264.7	893.3
T_6	92.44	1.221	122.67	318.3	258.0	1440.0
Mean	92.85	1.321	124.56	307.72	268.33	906.1
S.Em±	3.49	0.11	1.39	11.16	7.97	6.15
CD(@5%)	10.75	0.34	4.23	34.33	24.56	18.96
CV (%)	6.51	14.34	1.94	6.28	5.14	11.76

Conclusion: Among the different nanoparticles studied, the iron oxide registered higher seed quality parameters followed by silver nanoparticles compared to untreated control. Nanoparticles, probably enhance the abilities of absorbing and utilizing water and fertilizer, stimulate antioxidant system and apparently hasten its germination and plant growth.

Conclusion (Overall): The enhancement in germination, seedling growth and vigour index in the low vigour rice seed lot upon nanopriming with 400 ppm of Titanium oxide has shown the potential application of nanotechnology

for improving the seed quality parameters. Further studies on the physiological and biochemical changes associated with the treatment of nanoparticles will delineate the mechanism involved in the observed response. Data reported from TNAU, Coimbatore and UAS, Bengaluru are encouraging and promise that nanotechnology could be the best option to condition seed for adverse conditions such as water-deficit, nutrient deficiency and anti-fungal and insecticide activities.

Demonstration of technology: On farm demonstration of seed priming technology

Background: This experiment was designed for on farm demonstration of seed priming technology developed by the respective Centre. This technology is mainly focused to enhance seed vigour under sub-optimal conditions such water scarcity during rainy season, lower and higher soil temperatures during winter and summer seasons, respectively, and soil salinity. In addition, hydropriming technology is well established to obtain rapid and uniform germination, optimum plant stand and high yield especially under rain-fed conditions by soaking the seed overnight in water and then drying back.So far, each Centre is demonstrating this technology for at least for 3-4 years which now needs to be concluded and transformed into farmer's friendly technology.

Objective: To demonstrate seed priming technology in the farmers field for easy adoption

Year of Start : 2008-09

Crop		Centre
Wheat	:	NDUA &T, Faizabad; RPCAU, Dholi; PAU, Ludhiana; GBPUA &T, Pantnagar; HPKVV, Palampur; CCS HAU, Hisar; CSAU&T, Kanpur
Pearl millet	:	SKNAU, Durgapura; CCS HAU, Hisar
Sorghum	:	ANGRAU, Hyderabad; UAS, Dharwad; MPKV, Rahuri, ICAR-RC NEH, Manipur; VNMKV, Parbhani
Chickpea	:	JNKVV, Jabalpur

Crop: Wheat

PAU, Ludhiana

Variety: PBW 658 (Late sown wheat variety)

Name of the farmer: Sh. Raj Singh, Village- Gorsian Haakam Rai, Ludhiana.

Methodology:

Plot size: 0.4 ha/ treatment/ Date of sowing: Dec. 10, 2015

Treatments: T_0: Control (Unprimed)

T_1: Hydro-priming (12h) followed by shade drying

Observations: Though there was no significance difference in the yield, but the plant stand was uniform in treated seed plots.

Table 1: Effect of priming on seed quality of wheat variety PBW 658 sown during 2015-16

Treatment	Germination (%)	Speed of germination	Tillers/plant (No's)	Seed Yield (q ha^{-1})
T0 (Unprimed)	88.0	16.8	13.8	43.0
T1 (Hydro-priming)	98.6	20.8	18.6	46.2

GBPUA & T, Pantnagar

Experimental details: Varieties- DBW16 and UP 2565. Seeds were primed with water for 12 hours as per technical programme. The primed and unprimed seed of wheat variety were supplied to the farmers. Primed seeds of both the varieties showed higher plant population (m^{-2}). The crop was harvested in first week of May, 2016. The primed seeds of both the variety showed higher yields and seed weight. The primed seeds of variety DBW16 and UP 2565 produced 37.9 q/ha and 36.3 q/ha whereas non primed seeds produced 35.6 q/ha and 34.4 q/ha respectively. The difference between primed and unprimed seed yield of variety DBW16 and UP 2565 were 2.3 q/ha and 1.9 q/ha respectively. During 2016-17, hydroprimed seeds of two late sown varieties have been supplied to the farmers as per technical programme.

Table 2: Demonstration of priming technology through farmer's participation

Farmers	Preceding crop	Plant population/m2		1000 seed weight (g)		Seed yield (kg)/m2		Seed yield(q/ha)	
		UP	PR	UP	PR	UP	PR	UP	PR
Variety DBW16									
F_1	Tomato	182	189	33.9	35.1	0.361	0.378	36.1	38.0
F_2	Tomato	186	193	33.9	35.7	0.369	0.382	36.8	38.2
F_3	Potato	189	198	34.0	36.0	0.357	0.379	35.8	37.9
F_3	Lahi	189	190	34.1	35.8	0.338	0.374	33.8	37.5
F_4	potato	188	196	34.1	36.2	0.349	0.369	34.9	36.9
F_5	Tomato	199	202	34.4	36.4	0.364	0.392	36.4	39.2
Mean		189	195	34.1	35.9	0.356	0.379	35.6	37.9
Variety UP 2565									
F_1	Tomato	151	159	34.1	36.1	0.325	0.375	32.5	37.5
F_2	Tomato	161	167	34.9	36.8	0.348	0.361	34.8	36.1
F_3	Lahi	155	159	35.6	37.2	0.369	0.355	36.9	35.5
F_4	Tomato	162	163	33.5	35.6	0.335	0.359	33.5	35.9
Mean		157	162	34.5	36.4	0.344	0.363	34.4	36.3

UP= unprimed, PR=primed.

HPKVV, Palampur

Experimental detail: Six demonstrations were conducted on wheat using seed of HPW 155 variety at six farmer's field at different locations of the state. The soaking and drying of seeds to original moisture content was done in the departmental laboratory in the presence of farmers. Seeds were soaked in water overnight (17 hrs) and then the seeds were subjected for drying under shade for 72 hrs. The dried seeds along with control (40 kg seed: 20 kg hydroprimed and 20 kg unprimed seeds) were provided to the six farmers for sowing by each farmer in 0.40 hectare area using farmer cultural practice. The observations were recorded on final plant stand in and seed yield in 1 m^2 in hydroprimed as well as unprimed treatments.

Results: In all the farmers field, the final plant stand in 1 m^2 and seed yield (q/ha) were observed to be little high in case of hydroprimed seed. The maximum plants recorded in 1 m^2 hydroprimed plots were 256.7 while in case of unprimed these were 252.6. Further, the maximum seed yield of 32.66 q/ha was observed for hydroprimed seed as compared to 31.67 q/ha for unprimed seed. The average increase in final plant stand and seed yield in primed seed was 2.49 % and 2.43 %, respectively. During 2016-17, the demonstrations are being conducted at 5 farmer's field using seed of HPW155 wheat variety at different locations of the state with 0.40 ha area each.

CSAUA & T, Kanpur

Variety: Shatabadi (K-307)

Details: The seeds were treated with three treatments (Control/Unprimed):

T_1, Water: T_2 and 2.5% KNO_3: T3. Seeds were primed in wet gunny bags, with the water and 2.5% solution of KNO_3 for 12 hrs in ratio (w/v) at 1:1. Dehydration of seeds was done under shaded condition to maintain the moisture content between 10-15%. Dressing of 2.5 g/kg seed with thiram was done after dehydration. Seed lot not primed served as control (T_1). Each treatment was sown in plot of 10x10 m^2 area in three replications for rain fed conditions during 2015-16.

Results: Seeds of wheat crop Shatabdi (K-307) were sown at 4 locations on farmer's field under rainfed condition. Seeds primed with KNO_3 (2.5%) was found effective for all the locations under rainfed condition for getting yield of 35.27, 31.47, 30.98 and 28.47 q/ha with average 31.54 q/ha over control 28.24 q/ha with an increase of 10.46%. Highest final plant stand, harvest index, no. of effective tillers/plant was also recorded in 2.5 % KNO_3 treatments in all the four locations.

Table 3: Seed priming treatments on wheat var. Shatabadi (K-307) at farmer's field under rainfed conditions (2015-16)

Date of sowing	Field mc (%)	Treat.	Seed mc (%)	Day to 50% crop stand	Days to 50% anthesis	Days to maturity	Final plant stand (m^2)	HI	No. of effective tillers/ plant	Spike Length (cm)	Seed yield/ plot (kg)	Seed yield (q/ha)
1 /12/15	14.6	T_1	12.8	14	86	123	71	55	14	7.3	29	29
		T_2	14.3	13	84	123	78	35	15	8.36	32	32
		T_3	12.8	12	83	120	84	36	17	9.58	35	35
2/ 12/15	13.8	T_1	13.0	14	86	123	84	33	15	7.41	20	28
		T_2	14.3	13	84	123	83	34	15	8.39	294	29
		T_3	12.8	12	83	120	86	55	18	9.55	30	30
3/12/15	13.6	T_1	12.6	17	87	125	73	34	15	6.98	28	28
		T_2	13.8	15	85	125	78	34	17	8.15	29	29
		T_3	12.8	15	84	124	82	35	18	9.34	31	31
4/12/15	12.8	T_1	12.6	17	87	125	44	35	13	5.6	26	26
		T_2	13.6	15	85	125	45	31	14	6.00	27	27
		T_3	12.8	15	84	124	53	38	15	7.32	28	28

C.D.= 0.53, 0.38, 1.16, 4.05, 1.32, 0.87, 0.28, 0.94, 1.00, T_1 =Untreated, T_2 =Taps water, $T_{3=}$ 2.5% KNO_3.

Crop: Pearlmillet

SKNAU, Durgapura

Methodology: The priming technology has proved better over normal sowing in different crops. Therefore, this experiment was allotted to our centre to demonstrate the seed priming technology in pearl millet on farmer's field for easy adoption.

Results: These demonstrations were conducted in Kharif 2016 on farmer's field at Jobner and Dausa areas. In total 6 demonstrations were conducted. Seeds of pearl millet variety RHB 173 and RHB 177 were procured from our AICRP on Pearl Millet Improvement project. The seeds were primed with KNO_3 for 6 hours and shade dried. Control seeds did not have any treatment. The experiments were maintained under rainfed conditions. The fields were visited time to time and shared the experience of farmers. It was observed that there was 6-8% increase in the yield of pearl millet if priming technology was followed.

Table 4: Effect of priming technology on growth and yield of pearl millet var. RHB 173 at Dausa, Rajasthan

Observations	Unprimed	Primed	% increase
(%) content at the time of sowing	10.2	13.4	13.33
Days to 50 % flowering	46	47	02.22
Final plant stand /m^2	10.5	13.0	14.28
Plant height (cm)	162.12	171.40	4.23
Seed yield (g/plant)	7.88	8.92	10.14
1000 seed weight (g)	9.10	9.35	1.29
Average ear length (cm)	29.8	32.3	5.53
Seed yield (q/ha)	10.40	12.70	11.96
Fodder yield (q/ha)	42.29	46.65	6.97
Harvest Index	24.16	26.45	4.43

Table 5: Effect of priming technology on growth and yield of pearl millet var. RHB 177 at Jobner, Rajasthan

Observations	Primed	Unprimed	Average
(%) content at the time of sowing	10.2	13.9	13.00
Days to 50 % flowering	45	46	02.22
Final plant stand /m^2	11	13.5	13.63
Plant height (cm)	158.60	167.10	7.78
Seed yield (g/plant)	8.40	9.35	9.87
1000 seed weight (g)	9.05	9.29	1.20
Average ear length (cm)	28.40	29.30	-
Seed yield (q/ha)	9.30	11.85	4.59
Fodder yield (q/ha)	40.76	44.34	6.86
Harvest Index	23.65	25.86	6.69

CCS HAU, Hisar

Crops: Wheat and Pearlmillet

Treatment Details: Seed priming in wheat was followed by soaking for 12 hours and drying under shade. Seed priming in pearlmillet was performed by soaking in 2.5% KNO_3 solution for 6h and drying under shade. The demonstrations were conducted under rain dependent condition.

Plot size: 0.5 acre, with three replications

Results:

Crop 1: Wheat- There was 6.46% increase in final plant stand and 7.12% increase in seed yield over control was observed (Table 6).

Table 6: Effect of hydropriming on plant stands and grain yield in wheat

Locations	Final plant stand/m^2		Grain yield (q/ha)	
	Unprimed	Primed	Unprimed	Primed
1	279	294	52.5	56.5
2	260	280	51.0	54.0
3	268	285	51.5	55.0
4	238	255	48.0	52.0
5	255	270	50.0	53.0
Mean	260	276.8	50.6	54.2
% increase over control	-	6.46	-	7.12

Crop 2: Pearlmillet- There was 4.92% increase in final plant stand and 5.55% increase in seed yield in pearl millet over control (Table 7).

Table 7: Effect of hydropriming on plant stands and grain yield in pearl millet

Locations	Final plant stand/m^2		Grain yield (q/ha)	
	Unprimed	Primed	Unprimed	Primed
1	12	12	14.0	15.0
2	14	15	16.0	16.5
3	10	11	12.5	13.5
4	12	12	14.5	15.0
5	13	14	15.0	16.0
Mean	12.2	12.8	14.4	15.2
% increase over control	-	4.92	-	5.55

Crop: Sorghum

PJTSAU, Hyderabad

Treatments: Primed seed in tap water (Priming treatment control) and Primed seed with KNO_3 solution.

Results: Crop was sown in the farmer's fields of Mahubunagar district of Telanagana state and crop is at grain maturity stage. There is no significant difference in the treated with KNO_3 and control for the root parameters and 4 days difference was observed in the days to 50% flowering.

MPKV, Rahuri

Results: The programme on demonstration technology on Sorghum and Chickpea was organised during the year 2015-16 on the university farm at four location for each crop. The crop was not harvested at the time of submisstion of data. Hence the data on yield obtained from demonstrations during the year 2015-16 are given in Table 8 and 9. However, hydropriming demonstrations on Sorghum and Chick Pea was organised at Tambere Tal. Rahuri Dist. Ahmednagar during Rabi 2016-17.

Table 8: Effect of Priming Technology on yield of Sorghum

Location	Date of Sowing	Field Emergence (%)		Yield (q/ha)		
		Primed	Unprimed	Primed	Unprimed	Percent Increase
B Block of BSP Farm	21.09.2015	21	16	18.90	17.50	7.41
C Block of BSP Farm	26.09.2015	22	17	21.43	19.80	7.61
D Block of BSP Farm	20.09.2015	19	14	24.18	22.50	6.95
Central Nursery Block of BSP Farm	17.09.2015	20	17	21.69	20.10	7.33

Table 9: Effect of Priming Technology on yield of Chickpea

Location	Date of Sowing	Field Emergence (%)		Yield (q/ha)		
		Primed	Unprimed	Primed	Unprimed	Percent Increase
B Block of BSP Farm	21.10.2015	30	27	18.50	17.00	8.11
C Block of BSP Farm	19.10.2015	31	28	21.00	19.00	9.52
D Block of BSP Farm	20.10.2015	33	29	24.00	21.50	10.42
Central Nursery Block of BSP Farm	25.10.2015	29	26	19.00	17.50	7.89

Crop: Chickpea

JNKVV, Jabalpur

Methodology:

Design	RBD
Variety	JG 16
Replication	3
Plot size	10 x 10 m^2
Row to row spacing	30 cm
Replication to replication distance	1.5 m
Date of Sowing	12.11.2016

Treatment detail

T_1 : Control (Non-primed seed)
T_2 : Primed seed in tap water (Priming treatment control)
T_3 : Primed seed with 2.5% KNO_3 Solution

Results: Seed of Chickpea variety JG 16 was primed for 7 h. in gunny bag with tap water and 2.5% KNO_3 solution. The seed were dehydrated under shade to bring the seed moisture content up to 11%. The primed seeds along with control (non-primed) were sown on 12.11.2016 in three replication after seed treatment with fungicide (Carbendazim 2.5 kg/ha) and Rhizobium culture during Rabi 2015 for demonstration at village Kajri, Tehsil Panagar in the farmers field. The observation on seed moisture percent, days to 75% plant stand and plant population /m^2 showed significant differences.

The remaining observations will be recorded on 75% anthesis plant height (cm), No. of branches / plant, No. of pods / plants, 100 seed weight days to harvest maturity, final plant stand / m^2, total biomass (g)/plant and per plot, yield (g) / plant and kg/ha and harvest index.

Table 10: Effect of priming treatments on seed moisture content (*mc*), days to emergence and crop stand

Treatment	Moisture content (%)	Days to field emergence	Plant stand /m^2
Control (Non-primed seed)	9.99	8.50	39.33
Primed seed in tap water (Priming treatment control)	10.09	9.23	56.67
Primed seed with 2.5% KNO_3 Solution	10.19	12.10	66.33
SEm+	0.02	0.44	1.60
CD 5%	0.065	1.51	5.52

PDKV Akola

Crop : Pigeon pea (Var. PKV Tara)

Experiment details : T_0-Control (non-primed seed)

T_1-Primed seed in tap water

T_2-Primed seed with 2.5 % KNO_3

T_3-Primed seed in wetted gunny bag

Results: The seed priming technology was demonstrated on the farmer's field. After priming the primed seeds were dried back under shade to their initial seed moisture content and analyzed for different seed quality parameter (table 11) it was observed that the seed primed with 2.5% KNO_3 exhibited higher seed germination (94.66%), seedling length (29.33 cm) seedling dry weight (0.65g) and vigour index (61.54). the treatment and untreated seed were sown in field in July 2016. The same primed seed was distributed among the farmers for sowing. The crop is still in field and relevant observation on seed yield parameters will be recorded.

Table 11: Effect of seed priming on seed quality parameters before sowing and plant stand of pigeon pea.

Treat.	Germination (%)	Seedling length (cm)	Seedling dry wt. (g)	VI-I	VI-II	Days to 75% crop stand	Days to anthesis (75%)	Plant stand/ m^2
T_0	82.66	25.06	0.56	2072	46	6.66	117.33	7.07
T_1	91.00	27.33	0.57	2524	52	2.33	116.33	7.37
T_2	94.66	29.33	0.65	2776	61	4.33	115.33	7.77
T_3	88.00	28.23	0.59	2485	52	3.66	117.00	7.25
S.E(m±)	0.63	0.49	0.01	49.59	1.35	6.66	117.33	7.07
CD at 5%	2.18	1.72	0.04	171.7	4.69	2.33	116.33	7.37

Experiment (previous year): High Yielding Technology (HYT) on enhancing seed yield in crop plants

Objective: To study the effect of seed treatment using high yielding technology on seedling establishment and seed yield

Crop: Wheat

JAU, Jamnagar

Experimental details:

Crop	:	Wheat	Season	:	Rabi-2015-16
Variety	:	Raj-4079	Design	:	RBD
No. of treatments	:	2 (Two)	Replications	:	13
Spacing: Between two rows	:	20 cm	Row length	:	5.00 m
No. of rows sown/plot	:	20	Plot size	:	5.00m x 4.00m
Fertilizer dose: (NPK kg/ha)	:	120 : 60 : 00	No. of irrigation	:	10
Date of sowing	:	19 -11–2015,	Date of harvesting	:	07-03-2016

Treatments: (i) T_1 =Control (Untreated); (ii) T_2 = Treated HYT "D" @ 3 ml/kg seed (Seed coating with 5-7 ml water).

Results: Wheat cv. Raj-4079 treated (coating polymer HYT"D" @3ml/kg seed) and untreated seeds were supplied by SKNAU, Jaipur. The results on the effect of seeds treated with HYT "D" on different parameters are given in Table 1. The results revealed that the effect of HYT "D" on dry weight of seedling, vigour index II, plant height at flowering & at maturity, root bio-mass at flowering & at maturity, days to 50 % flowering and number of productive tillers per hill was found significant; whereas, the remaining traits under studied was found non-significant. The effect on important characters viz., dry weight of seedling, vigour index II, plant height at flowering & at maturity, root bio-mass at flowering & at maturity and number of productive tillers per hill were significantly higher in treated seeds.

Table 1: Effect of high yielding technology (HYT) on different parameters in wheat

Parameters	Untreated	Treated	Mean	S Em±	CD (P=0.05)	CV%
Seed germination (%)	97.23	97.08	97.15	0.49	NS	1.80
Seedling length (cm)	13.80	14.29	14.04	0.54	NS	13.79
Dry weight of seedling (g/10 seedling)	0.345	0.380	0.363	0.01	0.02	6.69
Vigour index-I	1342	1388	1365	54.95	NS	14.52
Vigour index-II	3.36	3.69	3.52	0.07	0.22	7.31
Plant height at flowering (cm)	46.14	50.58	48.36	0.75	2.32	5.62
Root bio-mass at flowering (g)	0.666	0.933	0.799	0.04	0.12	17.19
Days to 50 % flowering	59.15	58.39	58.77	0.23	0.70	1.40
Number of productive tillers/hill	5.06	7.31	6.19	0.09	0.29	5.46
Plant height (cm)	70.39	74.12	72.25	0.65	2.02	3.27
Root biomass (g)	0.599	0.735	0.667	0.02	0.05	8.87
1000-seed weight (g)	43.37	46.21	44.79	1.00	NS	8.06
Seed yield/hill (g)	26.37	27.66	27.01	1.72	NS	23.02
Seed yield (kg/ha)	5769	6154	5962	171.96	NS	10.40

Crop: Soybean

MPKV, Rahuri

Year of start : 2015 -2016
Crop : Soybean
Variety : Phule Agrani
Treatment Details : T_1 : Control (Untreated)
: T_2 : Seed Treatment with HYT "D" @ 3 ml/kg seed
Date of Sowing : 18.07.2016.

Results : The data on effect on HYT "D" on yield , yield contributing parameters and seed quality presented in the Table. 2. The data revealed that, the HYT "D" had significant effect on seed yield , yield contributing parameters and seed quality of soybean. The Soybean seed (Phule Agrani) recorded significantly higher germination (87.15 %) due to HYT "D" treatment. Other seed quality parameters *viz.* Root Shoot length (28.11 cm), Seedling dry weight (0.47 gm), Vigour Index I (2449.69) and II (41.47) was also significantly higher than the untreated seed. It was observed that all the yield contributing parameters were significantly higher than the untreated seed. Plant height of Soybean was significantly higher (52.84 cm) while 50 % flowering was recorded four days earlier due to HYT "D" treatment. The yield (2215.37 kg/ha), No. of pods/plant (95.87), pod weight/plant(14.95 g), 100 seed weight (12.37 g), seed yield / plant (6.20 g) have recorded significantly higher values due to HYT "D" treatment over untreated control.

Table 2: Effect of High Yielding Technology (HYT) "D" on Growth, Yield and Yield contributing characters of Soybean var. Phule Agrani

Treatment	Plant Height (cm)	Days to 50 % Flowering	No of Pods / Plant	No of Seeds / Pod	Pod Weight / Plant (g)	100- Seed Weight (g)	Seed Yield / Plant (g)	Seed Yield / Plot (kg)	Yield / ha (kg)
Untreated (T_1)	49.28	47.03	73.66	2.69	12.91	11.23	4.90	2.32	1939.0
Treated (T_2)	52.84	43.27	95.87	2.72	14.95	12.37	6.20	2.65	2215.3
SE ±	0.71	0.33	2.51	0.04	0.36	0.24	0.17	0.07	60.44
CD at 5 %	2.22	1.04	7.82	NS	1.14	0.76	0.53	0.22	188.31

Table3: Effect of High Yielding Technology (HYT) "D" on seed quality parameters of Soybean

Treatment	Germination (%)	Root / Shoot Length (cm)	Seedling Dry Weight (g)	Vigour I	Vigour II
Untreated (T1)	83.68	26.97	0.42	2257.01	35.46
Treated (T2)	87.15	28.11	0.47	2449.69	41.47
SE ±	0.52	0.33	0.01	27.86	0.62
CD at 5%	1.64	1.04	0.02	86.81	1.94

JNKVV, Jabalpur

Experimental details:

Design	:	RBD
Replication	:	13
Plot size	:	5m x 4m
Row to row distance	:	45 cm
Replication to replication distance	:	1.5m
Treatments	:	Two
T_1	:	Treated with HYT "D" @ 3ml/kg of seed (Seed coating with 5-7ml water)
T_2	:	Control (Untreated)
Crop	:	Soybean (JS 20-29)
Seed rate	:	100 kg/ha
Fertilizer dose	:	As per recommended package of practices
Date of Sowing	:	11.07.2016

Results: Seeds treated with HYT "D" @ 3ml/kg exhibited significantly superior traits viz. seed germination (%) seedling length (cm), dry weight of seedling (g), VI-I, VI-II, plant height (cm), root biomass (g) at flowering, No. of pods, No. of seeds / plant, pod weight (g) / plant, 100 seed weight (g), biomass (kg/ha), yield (kg/ha), seed yield (g)/m^2 and harvest index (%). Soybean variety JS 20-29 treated with HYT 'D' @ 3 ml/kg of seed improved the seed quality, yield and yield attributing traits as compared to untreated control.

Table 4: Effect of High Yielding Technology (HYT) on enhancing Seed Yield in Soybean Variety JS-20-29

Seed Quality Parameters	Control	Treated	SEm±	CD 5%
Seed germination %	71.75	85.00	0.62	1.92
Seedling length (cm)	23.37	29.75	0.22	0.68
Dry wt. of seedlings (g)/10 seedlings	0.42	0.61	0.00	0.01
VI-I	1661.65	2527.90	23.63	72.83
V-II	30.49	53.05	0.54	1.66
Plant height (cm)	57.51	58.56	0.67	2.09
Root biomass (g) at flowering	1.21	1.61	0.05	0.15
Days to 50% flowering	46.00	44.92	44.94	135.48
No. of Pods / Plant	25.67	27.52	1.22	37.75
No. of Seeds / Pod	1.96	2.01	2.01	6.06
No. of Seeds/Plant	103.53	110.37	110.57	333.30
Pod Weight(g) / Plant	28.71	31.26	31.21	94.08
1000 seed weight (g)	12.09	12.70	0.20	0.62
Biomass (kg/ha)	2017.20	2410.00	31.12	95.89
Seed yield (kg/ha)	864.00	1062.27	10.63	32.76
Seed yield (g)/plant	4.46	5.77	0.18	0.563
Seed yield (g/m^2)	132.52	142.97	2.24	6.91
HI (%)	43.00	44.12	0.79	2.44

Crop: Rice

PAJANCOA & RI, Karaikal

Variety	Paddy cv. CO (R) 50
Commencement	04.08.2016

Seed germination test

Field Trial

Figure 1: Demonstration of HYT in Rice

Table 5: Effect of high yielding technology (HYT) on seedling vigour in rice cv. CO (R) 50

Parameters	Untreated	Treated	Mean	S Ed.	CD (P=0.05)
Seed germination (%)	84.00	86.00	85.00	NS	
Shoot length (cm)	9.96	10.35	10.16	0.15	0.31
Root length (cm)	23.01	23.04	23.02	NS	
Dry weight of seedlings (g/10 seedlings)	0.13	0.13	0.13	NS	
Vigour index-I	2764	2873	2819	42.50	87.72
Vigour index-II	11.26	11.51	11.40	NS	
Days to 50% flowering	92.60	92.90	92.80	NS	
Plant height at flowering (cm)	118.33	122.22	120.26	NS	
Root biomass at flowering (g)	4.23	4.53	4.38	NS	
Shoot biomass at flowering (g)	35.56	37.56	36.57	NS	
Root : shoot ratio at flowering	0.12	0.12	0.12	NS	
No. of tillers / hill	11.66	12.79	12.23	0.44	0.97
No. of productive tillers / hill	10.77	11.49	11.14	NS	
100 seed weight (g)	2.39	2.44	2.41	NS	
Seed yield per plant (g)	22.85	25.89	24.37	1.07	2.33
Seed yield per plot (kg)	6.57	6.84	6.71	0.12	0.25

Results: The results on effect of seed treatment with HYT 'D' on seed yield and yield components in paddy cv. CO (R) 50 are presented in Table 5. The results revealed that the effect of HYT 'D' was pronounced only in seed vigour in terms of shoot length and vigour index. Seeds treated with HYT 'D' had produced longer shoots (10.35 cm) than untreated seeds (9.95 cm). Thus, higher vigour index was recorded in HYT 'D' treated seeds (2873) as compared to untreated (2764). Under field conditions, the effect of HYT 'D' was significant in number of tillers per hill and seed yield. Nearly 13 per cent higher seed yield per plant was recorded in seeds treated with HYT 'D' (25.89 g) than untreated seeds (22.85 g).

OUAT, Bhubaneswar

Experimental details: The experiment was conducted during *Kharif* 2016. The effect of seed coating with HYT 'D' @ 3 ml/kg seed (diluted with 5-7 ml water) on plant growth, seed yield and quality was studied in direct seeded rice cv. Siddhanta.

Date of sowing	:	18.07.2016
Treatments	:	T_1 – Control (Untreated)
		T_2 – Treated with HYT'D' @ 3 ml/kg seed (with 5-7 ml water)
Design of experiment	:	Randomized Block Design
No. of replications	:	13
Plot size	:	10 x 1.8 m
Status	:	Completed

Results: The results of the experiment have been presented in Table 6. The HYT 'D' treatment was found superior to the control with respect to plant growth, seed yield and yield attributing characters. Days to 50% flowering was significantly lower for crop raised from treated seed (62.77 days) as compared to the crop raised from untreated seed (63.85 days). The crop raised from treated seed recorded significantly higher number of productive tillers per hill, plant height at maturity, plant biomass at maturity, seed yield per hill, seed yield per plot and seed yield per hectare. The seed yield per hectare recorded in the crop raised from treated seed was 28.09q, as against 27.16q in the untreated control. The 1000-seed weight was significantly higher in the seed produced from the treated seed (19.62 g) in comparison to the untreated control (18.71 g). No significant difference was observed between the seed produced from treated and untreated seeds with regards to seed quality parameters, viz. seed germinability, seedling length, seedling dry weight, SVI-I and SVI-II.The results of the experiment revealed that rice seed coated with HYT 'D' @ 3 ml/kg seed (diluted with 5-7 ml water) was found superior to the untreated control in respect of plant growth and seed yield parameters. However, the seed coating treatment had no significant effect on the quality of seed produced.

Table 6: Effect of High Yielding Technology (HYT) on plant growth, seed yield and quality in direct seeded rice cv. Siddhanta

Parameter	T_1	T_2	Mean	S.E.m (±)	C.D (0.05)
Days to 50% flowering	63.85	62.77	63.31	0.204	0.627
No. of productive tillers / hill	5.80	6.18	5.99	0.079	0.244
Plant height at maturity (cm)	89.78	92.32	91.05	0.821	2.531
Plant biomass at maturity (g)	8.92	9.58	9.25	0.115	0.355
Seed yield per hill (g)	7.30	7.54	7.42	0.040	0.122
Seed yield per plot (kg)	4.889	5.056	4.972	0.0261	0.0805
Seed yield per ha (q)	27.16	28.09	27.62	0.145	0.447
1000-seed weight (g)	18.71	19.62	19.17	0.053	0.163
Seed germination (%)	89.08	87.85	88.46	0.084	NS
Seedling length (cm)	33.80	33.39	33.60	0.354	NS
Dry weight of 10 seedlings (g)	0.072	0.073	0.072	0.0008	NS
Seed Vigour Index – I	3011.29	2929.43	2970.36	54.814	NS
Seed Vigour Index – II	0.642	0.638	0.640	0.0145	NS

Seed Pathology

C. Seed Pathology

S.No.	Experiment	Title
01	Experiment 1A.	Monitoring and detection of rice bunt, false smut and bacterial leaf blight in processed, unprocessed and farmer's seed samples
02	Experiment 02.	Monitoring of emerging new diseases of seed-borne nature
03	Experiment 03.	Studies on seed health status of farmers-own-saved seed
	Experiment 3A.	Studies on seed health status of farmers-own-saved seed (wheat)
	Experiment 3B.	Studies on seed health status of farmers-own-saved seed (Soybean)
	Experiment 3C.	Studies on seed health status of farmers-own-saved seed (Rice)
	Experiment 3D.	Studies on seed health status of farmers-own-saved seed (Groundnut)
	Experiment 3E.	Studies on seed health status of farmers-own-saved seed (Chick pea)
04	Experiment 04.	Standardization of detection methods for seed-borne pathogens of significance
05	Experiment 05.	Correlation of various levels of seed infection by important seed-borne fungi on seed germination and disease incidence in crops
06	Experiment 06.	Management of seed-borne infection of *Colletotrichum capsici* in chilli, *Alternaria solani* in tomato by way of biological agents obtained from different locations
07	Experiment 07.	Management of seed associated *Fusarium oxysporum* f.sp. *ciceris* and *Macrophomina phaseolina* in chickpea through seed bio priming and soil application of *Trichoderma harzianum* strains obtained from different locations
08	Experiment 08.	Management of pod diseases of soybean through fungicide application
09	Experiment 09.	Management of cumin blight through fungicide application
10	Experiment 10.	Establishment of seed certification standards for chilli anthracnose
11	Experiment 11.	Non chemical management of seed-borne infection of bean anthracnose
12	Experiment 12.	Detection and molecular characterization of BCMV of mungbean
13	Experiment 13.	Monitoring of seed-borne viruses in vegetables, pulses and soybean and standardization of methods for detection through biological, serological and molecular techniques
14	Experiment 14.	Standardization of bio priming technique for management of *Fusarium* wilt of safflower
15	Experiment 15.	Standardization of bio priming technique for management of *Alternaria helianthi* associated with sunflower seeds
16	Experiment 16.	Management of Alternaria solani through seed treatment and foliar application of new fungicides
17	Experiment 17.	Impact of different storage conditions and longevity on seed associated mycoflora of green gram
18	Experiment 18.	Detection, location and transmission of seed-borne *Macrophomina phaseolina* in sesame
19	Experiment 19.	Management of purple blotch / Stemphylium blight of onion through fungicide and plant based products
20	Experiment 20.	Efficacy of biologically synthesized metal oxide nano –particles on mycoflora associated with green gram seeds and impact on seed quality parameter
21	Experiment 21.	Detection, location and transmission of seed-borne *Alternaria sesami* in sesame

Seed Pathology (2016-17)

Recommendations

- Effective prevention of the transmission of pathogens including *Colletotrichum dematium* from plant to seed and management of pod blight complex disease of soybean may be achieved through two applications of Carbendazim + Mancozeb (0.30%) first at pod formation (R3) and second at pre-harvest stage (R5).It resulted in 80.32% disease control over check under conditions of Maharashtra and Madhya Pradesh. Basic seed treatment with same combination, prior to sowing results in higher seed germination and enhanced yield over control.
- Effective management of cumin blight (*Alternaria burnsii*) may be achieved by three applications of Azoxystrobin (0.025%) at 10 day interval after appearance of blight disease along with the basic seed treatment with Thiram@ 0.3% per Kg seed, prior to sowing. The treatment enhances the seed yield and provides freedom from the post association of the pathogen under conditions of Gujarat and Rajasthan.
- Bio priming of safflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each is effective against seedborne *Fusarium carthamii* responsible for wilt disease. Treatment results in enhanced seed germination, emergence and reduced wilt incidence with seed yield enhancement under conditions of Maharashtra.
- Bio priming of sunflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each is effective against seedborne *Alternaria helianthi* responsible for leaf blight disease. Treatment results in enhanced seed germination, emergence and reduced incidence of blight with seed yield enhancement under conditions of Maharashtra.
- Effective management of seed rot, seedling blight, die-back and fruit rot of chilli caused by *Colletotrichum capsici* and *Alternaria alternata* may be achieved through seed dressing with *Trichoderma harzianum* @10g or *Trichoderma viride* @ 05g + *Pseudomonas fluorescens* @ 05g /kg seed. Use of biopesticides also results in higher seed germination and vigour.
- Chilli seed associated three anthracnose fungi can be detected by Polymer Chain Reaction based technique using the specific primers with known sequence, developed by earlier workers. The fungi and primers are *Colletotrichum truncatum* (Ccap F; Ccap R.); *Colletotrichum gloeosporioides* (Cboncoll F; Cboncoll R.); *Colletotrichum coccodes* (Cco 1NF1; Cco2NR1).
- Cumin Seed Wash Examination technique is identified as a relatively quick method for the detection of surface adhered spores of *Alternaria burnsii*, the causal agent of devastating blight.

Significant observations

- To prevent the transmission of pathogens from plant to seed and for the management of pod blight complex disease of soybean, two applications of Carbendazim + Mancozeb (0.30%) first at pod formation (R3) and second at pre-harvest stage(R5) resulted in 80.32% disease control over check under conditions of Maharashtra and Madhya Pradesh. *Colletotrichum dematium* was predominantly associated with pod blight complex along with *Alternaria alternata, Fusarium oxysporum, Curvularia lunata, Aspergillus flavus, Aspergillus niger.* Seed treatment with same combination increased seed emergence by 16.4% over control.

- Under conditions of Gujarat and Rajasthan, for the effective management of cumin blight (*Alternaria burnsii*) three applications of Azoxystrobin (0.025%) at 10 day interval resulted in minimum disease intensity (18.01%) with highest seed yield (592Kg/ha) and consequently minimum post association (3.95) of *Alternaria burnsii* in harvested cumin seeds as compared to control with disease intensity (57.04%) and seed yield (178kg /ha) and 62.25 % post association of the fungus.
- Bio-priming of safflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each resulted in least association (11.0%) of *Fusarium carthamii* with enhanced seed germination (94.0%), emergence(89.0%) and reduced wilt incidence (11.0%) and disease control over check (76.60%) as compared to 39.0% association , 78.0% germination , 75.0% emergence and 47.0% wilt incidence in control. Yield enhancement of 16.77% over check is recorded.
- Bio-priming of sunflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each resulted in least association (11.0%) of *Alternaria helianthi* with enhanced seed germination (81.33%), emergence (75.0%) and reduced incidence of blight (39.0%) and disease control over check (50.0%) as compared to 45.33% association, 68.33% germination, 65.0% emergence and 78.0% incidence of blight. Yield enhancement of 22.42% over check is recorded.
- As per the Indian Seed Act, bunt caused by *Tilletia barclayana* is the designated objectionable seedborne pathogen in rice seed production programme with certification standards 0.10 & 0.50 % in Foundation & Certified, respectively. Continued monitoring in 15 States covering 89 districts and after testing 3686 seed samples of different varieties, 37.14 % samples have been found infected with rice bunt pathogen. Maximum 87.6 % samples infected are recorded from Punjab, with highest incidence and association of 6.25% in seed sample from Patiala .Rice bunt has not been reported from Tamil Nadu, Assam, New Delhi, Gujarat and Maharashtra (except few parts of coastal region of Dapoli).
- Rice bunt is continued to be the major widespread problem in seed samples from northern part of India, especially in Punjab, Haryana, Uttarakhand, Uttar Pradesh and Himachal Pradesh.
- Investigations on analysis of seed health status of farmers-saved-seeds re-indicated the alarming association of Karnal bunt of wheat (*Tilletia indica*) in Punjab, Haryana, Himachal Pradesh and Uttarakhand, Ear cockle has not been reported from any center.
- Association of *Macrophomina phaseolina*, *Fusarium oxysporum* and *Colletotrichum dematium* with soybean seeds is wide spread in Madhya Pradesh, Maharashtra, Telangana and Rajasthan.
- Rice seed discoloration due to infection of a number of mycoflora is a nationwide problem. Dominant association of *Aspergillus flavus* in groundnut seeds has been recorded as a widespread problem in Telangana, Madhya Pradesh, Maharashtra, Gujarat, Odisha state. Wide spread infection of *Fusarium oxysporum* with chick pea seeds has been observed while no association of *Ascochyta rabiei* is reported.
- Seed health tests of tomato crop and hybrids, purchased by the farmers from different private sector companies, revealed the association of a bacterial pathogen, *Clavibacter michiganense* pv. *michiganense*. The bacterial pathogen has also been noticed and isolated from the infected fruits from the badly infected farmers' field crop grown in Bhabhar region of Uttarakhand State.
- Cumin Seed Wash Examination technique is identified as a relatively quick method for the detection of surface adhered spores of *Alternaria burnsii*, the causal agent of devastating blight of cumin.

- Need based innovative modifications in Standard blotter method (wetting of blotters with NaOH solution 0.6%) has been found superior for the detection of Moong bean and Uridbean seed associated *Macrophomina phaseolina, Fusarium oxysporum* and *Alternaria alternata.*
- Re-confirmation of the superiority of Standard Blotter method has been established for the detection of *Macrophomina phaseolina, Fusarium oxysporum Colletotrichum dematium* (*Colletotrichum truncatum*) associated with soybean, sesame seeds.
- PCR based detection technique using the specific primers with known sequence, developed by earlier workers were used and validated for the detection of chilli seed associated anthracnose fungus, *Colletotrichum truncatum* (Ccap F; Ccap R.) ; *Colletotrichum gloeosporioides* (Cboncoll F; Cboncoll R.); *Colletotrichum coccodes* (Cco 1NF1; Cco2NR1) at HPKV , Palampur .
- PCR based protocol for the detection of Pepper Mild Mottle Virus (PMMoV) from seeds through RT-PCR using the viral Coat Protein (CP) specific primers. The seeds were harvested from the virus infected plants which were indexed through DAS-ELISA for the presence of the virus. The cDNA was amplified using the viral coat protein specific primers (F5'CCAATGGCTGACAGATTACG-3' and R5'CAACGACAACCCTTCGATTT-3') with initial denaturation of 94°C for 4 min followed by 35 cycles of 94°C for 15 sec, 48°C for 40 sec and 72°C for 1 min and final extension of 7 min at 72°C to confirm the presence of PMMoV. The PCR product was checked on 1.2% agarose gel along with a negative control (water used as template) and positive control (plasmid isolated from clone having CP gene used as template). The amplification of ~740 bp product was observed in both the seed sample and positive control; while no band was observed in negative control, however, further validation of the protocol is needed.
- Transmission of pathogens from seed to plant and plant to seed was determined in 12 crops and 17 pathogens. Greater the development of disease in the form of seed and seedling mortality was noticed as higher degree of seed infection & surface area covered. Degree of seed germination decreased with increase in seed infection area.
- More than 50% seed surface area discolored due to infection of *Helminthosporium oryzae* , species of *Drechslera, Fusarium , Curvularia , Alternaria* in rice resulted in drastic reduction of seed germination, below to MSCS;
- In chilli seedling mortality due to *Colletotrichum capsici* increased in seeds those with more than 50 % area discolored.
- Higher the degree of seed infection, greater the reduction in seed germination was recorded in cumin blight (*Alternaria burnsii*) and bean anthracnose (*Colletotrichum dematium*).
- For effective ecofriendly management of the most wide spread disease chilli die back and fruit rot caused by *Colletotrichum capsici* and *Alternaria alternata* seed dressing with bioagent is a promising option. Under conditions of north India, seed treatment with *Trichoderma harzianum* @10g or *Trichoderma viride* @ 05g + *Pseudomonas fluorescens* @ 05g/kg seed resulted in maximum seed germination (79.0%) & vigour index (718.9) with least disease (2.0%) as compared to untreated control with seed germination (63%) & vigour index (472.5) with maximum disease (20%) .
- Under conditions of Jammu & Kashmir, efficacy of seed treatment with *Trichoderma harzianum* @ 5g + *Pseudomonas fluorescens* @ 5g resulted in maximum (96.33%) seed germination with least seed rot and fruit rot (6.33%) of tomato caused by *Alternaria solani.*

- Investigation at PAU, Ludhiana & MPKV Rahuri indicated the effective management of seed associated *Fusarium oxysporum* f.sp. *ciceris* and *Macrophomina phaseolina* in chickpea through seed bio priming and soil application of bio agents. *Trichoderma harzianum* @10g/Kg seed, prior to sowing followed by soil application @ 10 kg/ha was effective as compared to check (more than 83% wilt disease control). Seed bio priming alone (75.67% disease control) and soil application alone (74.34% disease control) resulted in higher incidence of wilt caused by *Fusarium oxysporum* f.sp. *ciceris*. Similar trend was noticed with 66.34 % control of root rot (*Macrophomina phaseolina*) over check.

Experiment 1A	:	**Monitoring and detection of rice bunt, false smut and bacterial leaf blight in processed, unprocessed and farmer's seed samples**
Objective	:	To determine the status of pathogen in seed samples from farmers and processing plants
	:	To prepare the distribution map in different locations
Year of start	:	2002 (concluded up to 2013-14)
Status	:	Continued 2016-17
Centre	:	All Centres (AAU, Anand; AAU, Jorhat; NDUAT, Faizabad; GBPUAT, Pant Nagar; OUAT, Bhubaneswar; PJTSAU, Hyderabad; PAU, Ludhiana; CCSHAU, Hissar; HPKV, Palampur; TNAU, Coimbatore; JNKVV, Jabalpur; MPKV, Rahuri; MAU, Parbhani ; SKUAST, Srinagar)
Crop/Pathogen	:	Rice- Bunt (*Tilletia barclayana*); False smut (*Ustilaginoidea virens*); BLB

Results

Detection Technique : Standard NaOH seed soak method for rice bunt (*Tilletia barclayana*)
: Visual inspection of seeds on Diaphanoscope

Analysis of Rice bunt (*Tilletia barclayana*)

Seed Category	District/ Location/Fields	Samples tested	Samples Infected	% infected samples	% range of infection	Varieties tested
PJTSAU, Hyderabad						
Farmer	8 64	312	127	40.71	0.05-0.92	15
Seed Processing Plant	05	135	39	28.89	0.05-0.72	03
	Highest infected samples (58.67%)observed in Warangal, least 6.6% from Adilabad					
CCSHAU, Hissar						
Farmer	08	385	134	34.80	0.05-0.50	09
Seed Processing Plant	03	111	30	27.02	0.05-0.10	03
GBPUAT, Pant Nagar						
Farmer	02	132	19	32.50	0.05-0.30	28
Seed Processing Plant	02	39	08	36.84	0.05-0.25	08
	Maximum (42.85%) samples from Bajpur were infected. Dehradun and Haridwar regions are observed as Hot Spots					
HPKV, Palampur						
Farmer	05	171	32		0.1-0.4	-
Seed Processing Plant	-	-	-	-	-	-
	Incidence of rice bunt is increasing					
MPKV, Rahuri						
Farmer	03 55	514	0	0	0	18
Seed Processing Plant	04	65	10	15.38	0.1-0.3	22
	Bunt has been intercepted in samples from Ratnagiri, Dapoli region					
MAU, Parbhani						
Farmer	-	-	-	-	-	-
Seed Processing Plant	02	04	0	0	0	03

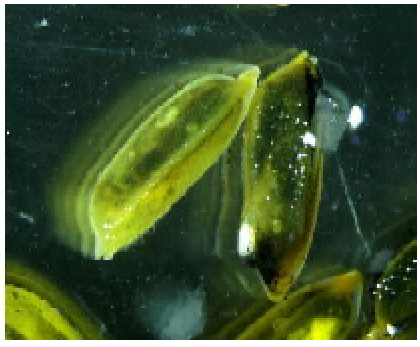
NDUAT, Faizabad						
Farmer	08 16	97	17	17.52	0.0015-0.25	16
Seed Processing Plant	01 STL	80	05		0.0-0.20	20
OUAT, Bhubaneswar						
Farmer	10	340	24	42.75	0.0-1.0	13
Seed Processing Plant	02 STL	125	04		0.0-1.0	13
PAU, Ludhiana						
Farmer	12	1000	876	87.6	0.0-6.25	22
Seed Processing Plant	-	-	-	-	-	-
	Highest infection (6.25%)in seed sample from Patiala dist., 102 samples (11.6%) were below MSCS; Pusa 44 most susceptible variety observed					
JNKVV, Jabalpur						
Farmer	11	130	09		0.01-0.02	13
Seed Processing Plant	05	50	02		0.01-0.02	06
AAU, Anand						
Farmer	7	233	07		0.0-0.5	56
Seed Processing Plant	03	290	01		0.0-0.5	28
SKUAST, Srinagar						
Farmer	02	185	0	0	0	05
Seed Processing Plant	02	80	0	0	0	04
AAU, Jorhat						
Farmer	01	83	0	0	0	21
Seed Processing Plant	SP Fields	88	0	0	0	13
TNAU, Coimbatore						
Farmer	03	44	0	0	0	13
Seed Processing Plant + Seed Company	19+10	140	0	0	0	11
ICAR- IARI New Delhi						
Farmer	3 14	60	0	0	0	06
Seed Processing Plant	-	-	-	-	-	-

Summary	
Total geographical area covered in India	15 States
Total districts covered	89 districts
Number of rice varieties tested	369 in 15 states
Number of samples tested (Farmers)	3686
Infected	1369
Percentage	37.14% (87.6% samples from farmers infected in Punjab)
Number of samples tested (Processing Plants)	1207
Infected	99
Percentage	8.20
Range of bunt infection in rice seeds	0.015-6.25 (Highest infection (6.25%) in farmers sample obtained from Patiala (Punjab)

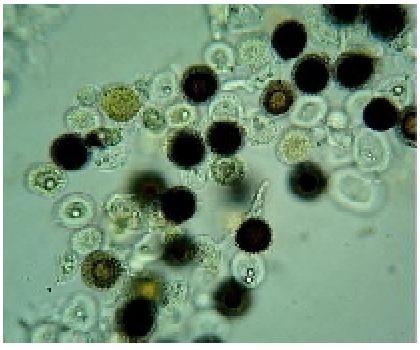
Results: The analysis of 3686 rice seed samples collected from farmers and 1207 seed samples from processing plants covering 89 districts of 15 States of India revealed the presence of rice bunt disease in the range of 0.015 to 6.25%. In all, 37.14% seed samples from farmers were infected while only 8.2% samples collected from processing plants exhibited the infection of bunt (*Tilletia barclayana)*.Highest infection (6.25%) was recorded in the sample from Patiala. In Punjab maximum (87.6%) seed samples were found infected as confirmed by standard NaOH seeds soak method.

Infected rice seeds

Healthy rice seeds

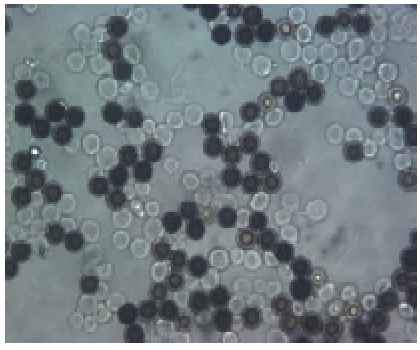


Bunt affected rice seed



Teliospores of *Tilletia barclayana*

Bunt affected seed



Teliospores of *Tilletia barclayana*

Analysis of False smut (*Ustilaginoidea virens*)

Field category	District/ Location/Tehsils	Field visited	Percent field infected	Percent infection	Scale Rating
MPKV , Rahuri					
Farmer Field	03 56	327		1.0-9.0	0-3
Seed Production Plots	02 03	07	0	0	0
AAU, Jorhat					
Farmer Field	-	57	-	-	0-3
Seed Production Plots	04	118	-	-	0
OUAT, Bhubaneswar					
Farmer Field	01	110	25.5	-	1-2.5
Seed Production Plots	21 varieties	100	-	-	0-2

PJTSAU, Hyderabad					
Farmer Field	07 49	227	-	1.0	0-1
Seed Production Plots	07	13	-	0	0
PAU, Ludhiana					
Farmer Field	12 35	80	-	-	0-3
Seed Production Plots	-	-	-	-	-
TNAU, Coimbatore					
Farmer Field	05	50	-	23-30.0	0-1
Seed Production Plots	04	50	-	35-40.0	0-1
CCSHAU, Hissar					
Farmer Field	8	54	-	1.0-20.0	0-5
Seed Production Plots	31	31	-	1.0-18.0	0-1
JNKVV, Jabalpur					
Farmer Field	10	60	-	1.0-29.0	1-4
Seed Production Plots		42	-	1.0-14.0	1-3
AAU , Anand					
Farmer Field	06	233/66 var	-	-	-
Seed Production Plots	10	106 plots/ 23 var	-	-	-
NDUAT, Faizabad					
Farmer Field	-	-	-	-	-
Seed Production Plots	05 08	5	-	-	3-5
SKUAT, Srinagar					
Farmer Field	02	149	4.69	0.4	0-1
Seed Production Plots	04	24	0	0	0
Research Farm	02	09	0	0	0
ICAR- IARI, New Delhi					
Farmer Field	03	14	-	2-3	0-3
Seed Production Plots	14	05	-	0	0
Research Farm	-	-	-	-	-
VNMKV, Parbhani					
Farmer Field	-	-	-	-	-
Seed Production Plots	02	04	0	0	0

Results: Monitoring of false smut disease made in 1361 fields of farmers in 57 districts spread over 11 States of India indicated that except in Gujarat, all most all the places the disease was present in varying degree of infection under scale of 1-3.Incidence of false smut was quite low in seed production plots due to prophylactic measures adopted therein.

False smut *(Ustilaginoidea virens)*

Experiment 2	:	**Monitoring of emerging new diseases of seed-borne nature**
Objective	:	To keep a vigilant eye on the occurrence and development of diseases of seed-borne nature
Year of start	:	2013-14
Status	:	Continued in 2016-17
Centre	:	All Centres

Results

Kharif, 2012	**Panicle blight of rice** caused by a bacterium, ***Burkholderia glumae*** was reported by Dr. Karuna Vishunavat. The seed associated disease initially came into the notice during a joint field visit with scientists from Japan at GBPUAT, Pantnagar while observing discolored grains of PR-113 and PR-16 variety during Kharif 2012.
Kharif, 2013	During 2013, a new observation on the occurrence of **False Head Smut** caused by fungus, ***Ustilaginoidea virens*** (Cooke) Takashi was recorded on maize (*Zea mays* L.) in the tribal region of Panchmahal and Dahod district during Kharif 2013 by Dr. RN Pandey, Gohel and Parmar, AAU, Anand, Gujarat.
Kharif , 2014	**Mosaic disease** in mungbean caused by **Bean Common Mosaic Virus** was reported at Farmers field in Surendra Nagar, Mehsana, Patan and Banaskantha district with a incidence in the range of 15-46 % in 21 fields out of 70 fields by Dr. RN Pandey, Gohel and Parmar, AAU, Anand, Gujarat. Incidence has again observed in Kharif 2015 at Vadodara, Anand, Vijapur, SK Nagar, and Jagudan.
Kharif , 2014	Varying degree of incidence of **Backnae or Foolish Disease** caused by a seed associated fungus, ***Fusarium fujikuroi*** was observed by Dr. Aflaq Hamid, SKUAST, Kashmir in Anantnag and Kulgam district of Kashmir valley affecting the rice crop.

Kharif, 2015	Seed health tests of tomato crop and hybrids, purchased by the farmers from different private sector companies, revealed the association of a **bacterial pathogen.** The bacterial pathogen has also been noticed and isolated from the infected fruits from the badly infected farmers' field crop grown in Bhabhar region of Uttarakhand State. Identification of the bacteria and standardization of detection technique is in progress.
Rabi , 2015	Incidence of **Septoria blotch of wheat** caused by ***Septoria nodorum*** was found affecting the wheat crop at Khudwanir, Anantnag (14.6%), Srinagar, Shalimar (16.5%), Sopore, and Baramula (11.3%) during 2014-15 by Dr. Zahoor Bhatt, SKUAST, Kashmir. *Septoria tritici* and *Septoria nodorum* of wheat have been reported elsewhere in the world, however, with the preliminary identification as *Septoria nodorum* the pathogen is reported and final identification and confirmation of species is under process. Typical lens shaped lesions with yellow green border surrounding the dead tissues and association of pycnidial bodies were observed on leaf and sheath.
Kharif, 2015	**Rice bunt** caused by ***Tilletia barclayana*** has been recorded to the level of 0.2% in the variety (Co 50) collected from farmers saved seeds from Thanjavur district, Tamil Nadu, by Dr. Indira, Seed Centre, Tamil Nadu Agricultural University , Coimbatore (TN) .The disease has not been recorded so far from Tamil Nadu.
Kharif 2016	**Rice bunt** caused by ***Tilletia barclayana*** has been recorded first time at Karim Nagar, Telangana State by STR Centre, PJTSAU, Hyderabad
	Backnae disease of rice *(Fusarium* spp.) in ADT 38 at farmers field of Sirumgai & Kodumudi , Erode Distt (Tamil Nadu) in the range of 10-15% bt STR Centre, Coimbatore (Tamil Nadu)
Rabi 2016	**Rice Udbatta disease** (*Ephelis oryzae*) in ADT(R) 49 and CR 1009 during Rabi 2016 at Karaikal Distt , Puducheri(UT) as reported by PAJANCOA &RI , Karaikal
	False Smut of Rice in BPT5204, CR1009 and White Poni at Karaikal Distt , Puducheri (UT) as reported by PAJANCOA &RI , Karaikal

Panicle blight of rice (*Burkholderia glumae*)

Udbatta disease (*Ephelis oryzae*)

Experiment 3 : **Studies on seed health status of farmers-own-saved seed**
Objective : To determine the health status of seed samples from the farmers own saved seeds
Year of start : 2000
Status : Continued 2016-17
Crop : Wheat, Rice, Soybean, Groundnut, Chickpea
Centre : All centres for 5 crops

Experiment 3A : **Studies on seed health status of farmers-own-saved seed**
Crop : Wheat
Detection technique : Standard NaOH seed soak for Karnal bunt (*Neovossia indica= Tilletia indica*); Seed soak in water & visual inspection for Ear cockle (*Anguina tritici*) ; Visual inspection of plants for loose smut (*Ustilago segatum* var. *tritici*)
Year of start : 2000
Status : Continued 2016-17
Centre : PAU, Ludhiana; CCSHAU, Hissar; GBPUAT, Pant Nagar; HPKV, Palampur; SKNAU, Durgapura

Results

Centre	District/ Location/ Fields	Sample	Variety	Per cent range of pathogen association			Other crop seed
				Loose smut	Karnal Bunt	Ear cockle	
PAU, Ludhiana	11	500	15	-	0.0-2.0	0.0	Nil
Remarks	4.4% samples had germination below IMSCS;						
	70.8% samples were infected with Karnal bunt (146 out of 500);						
	The disease is wide spread and prevalent in 11 districts under study; 200 samples were found infected in the range of 0.1-2.0%						
	4% samples were not accepted due to the Karnal bunt disease association (more than 0.25% assocition)						
	Highest disease association (0.23%) was noticed in seed samples from Ropad district while least from Sangrur (0.03%);						
	Ear cockle was not observed; Data on Loose smut will be taken on crop maturity.						
	Lowest number (35.5%) of Karnal Bunt affected seed samples were from Faridkote.						
CCSHAU, Hissar	06	117	44	0.0-0.0	0.05-0.70 (av .073%)	0.0	Nil
Remarks	All samples fulfilled the germination standard, 90.0-98.0% observed.						
	No loose smut is reported. Absence of the disease is attributed due to use and sale of Tebuconazole fungicide treated seeds.						
	74.35% samples found infected with Karnal bunt pathogen in the range of 0.05 -0.70% (above the prescribed limit that is 0.25%) that resulted in rejection of 3.41% seed samples						
	PBW 343, PBW 373, HD 2687, UP 2338 and HD 2329 had maximum infection;						
	Yamuna Nagar is identified as Hot Spot having maximum infection of Karnal Bunt.						
	Ear cockle was not observed.						
GBPUAT, Pantnagar	04	2543	17	-	0.0 -4.0	-	Nil
Remarks	2.55% samples from 4 districts were infected with Karnal bunt (65 out of 2543);						
	Out of 65 infected samples, 12 samples had infection above prescribed limit (0.25%)						
	98% samples maintained germination above IMSCS						
HPKV, Palampur	08	336	-	0.0-0.4% Loose smut	-	-	Nil
	6.25% seed samples had infection of loose smut (21 out of 336) in the range of 0.0-0.4% collected from 8 districts; Maximum loose smut disease was noticed in region of Balad (Kangra Dist.)and Rori (Solan)						
	07	340	-	-	0.1-8.1% Karnal Bunt	-	-
	Highest incidence of Karnal bunt (8.1%) was in samples from Lakhroon (Una Dist.)						
	7.05% seed samples had infection more than prescribed limit						
	13.5% seed samples were infected with the Karnal bunt						

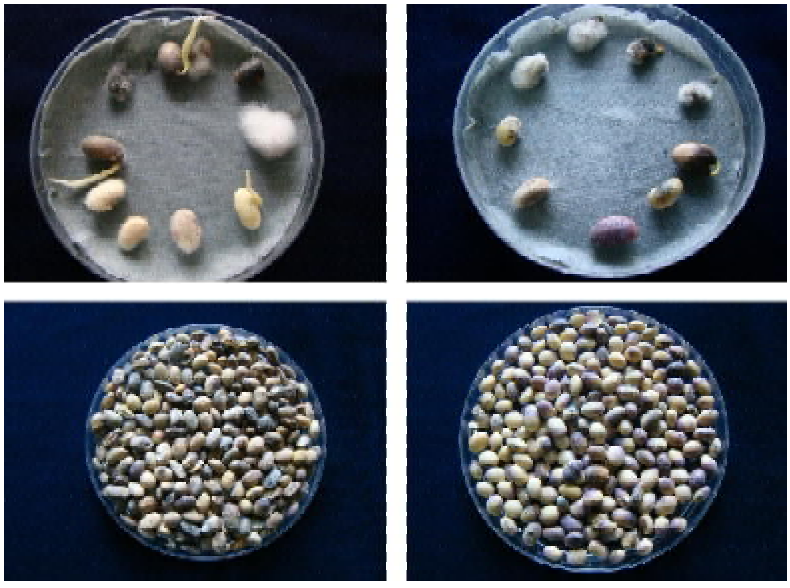
SKNAU, Durgapura	03 05	215	05	0.0-0.05 (13 fields)	0.0-0.2 (8 samples)	0.0	Nil
Remarks	88.37 % samples exhibited seed germination above IMSCS(11.62% below standards);						
	6.04 % fields had infection of loose smut;						
	3.72 % seed samples had infection of Karnal bunt in the range up to 0.20% from Sahpur, Bassi and Sangod locations						
	Ear cockle was not observed, however, in previous years it was recorded from Laxamgargh and Padampur in var.Raj3765.						
CSAUT Kanpur	04	120	-	0.0	0.03-5.43%	0.0	Nil
	32.5% seed samples were infected with Karnal bunt infection in the range of 0.03-5.42%						
	Maximum infection (5.42%) was recorded in the seed samples from Farrukhabad						

Summary: Farmers saved seed samples: wheat

06 States	36 districts	4171 samples tested	0.0-8.1 % range	% Samples infected	
				PAU, Ludhiana	70.80
				CCSHAU, Hissar	74.35
				GBPUAT, Pant Nagar	02.50
				HPKV, Palampur	13.50
				SKNAU, Durgapura	03.70
				CSAUT, Kanpur	32.50

Loose smut (*Ustilago segatum* var. *tritici*)

Experiment 3B : **Studies on seed health status of farmers-own-saved seed**
Crop : Soybean
Methodology : Standard Blotter method (ISTA,1996)
Year of start : 2000
Status : Continued 2016-17
Centre : MPKV, Rahuri; SKNAU, Durgapura; JNKVV, Jabalpur ; MAU, Parbhani



Results

Centre	Districts/ Tehsils	Samples	Varieties	Percent range of association of mycoflora				
				MP	CD	FO	CK	AF
MPKV, Rahuri	07	419	02	1.0-6.1	1.0-3.4	3.3-7.4	1.0-2.8	--
Remarks	Out of 419 seed sample collected from 7 districts (Ahmad Nagar, Sangli, Satar, Pune Kolhapur, Nasik, Sholapur) 58 samples (13.84) have exhibited germination below MSCS (70%). The seed germination ranged between 59.0-88.0%.							
	Association of *Alternaria alternata* (2.0-5.8%), *Phoma medicaginis* (1.2-3.7%), soybean mosaic virus (SMV) (1.0-2.1%) and Fusarium *moniliformae* (1.1-5.8%) was also recorded.							
SKNAU, Durgapura	02	135	03	2.0-11.0	0.0-4.0	-	0.0-2.5	-
Remarks	Out of 135 seed samples from 3 districts (Jhalawar,Kota and Chhitorgarh) and 3 locations of 3 varieties (JS 335, NRC37 and Pratap Soya) 115 (87.14%) samples have shown germination above MSCS.							
	9.62% seed samples had shown the association of *Macrophomina phaseolina*.							
	5.92% seed samples have shown the association of *Colletotrichum* sp.							
JNKVV, Jabalpur	18	190	02	2.0-16.0	3.0-11.0	5.0-15.0	0-19.0	0-14.0
Remarks	Out of 190 seed samples obtained from 18 major soybean growing districts of the State, germination ranged between 67-82 percent. Due to rains at pod filing stage reduction in seed germination was recorded; About 21.5% seed samples were below MSCS.							
	Association of *Macrophomina phaseolina* ranged from 2.0-16%; *Colletotrichum dematium* from 3-11% and purple seed stain up to 19% was recorded.							
VNMKV, Parbhani	04 14	125	02	1.6- 4.4	1.0-2.8	1.0-4.4	1.0-2.8	-
Remarks	Out of 125 seed samples collected from Parbhani, Hingoli, Nanded, Osmanabad and Beed districts, 9.0% samples had germination below MSCS(70%).							
	Other mycoflora such as *Fusarium moniliformae*, *Phoma medicaginis*, *Alternaria alternata* and SMV were also recorded.							

PJTSAU Hyderabad	04	182	01	-	0.2-28.3	0.5-33.2	-	-
Remarks	32.65 % sample had germination above IMSCS;							
	Improper filling and discoloration of seed observed that is attributed to untimely rains, coincided at pod filling stage.							
UAS Dharwad	Observation from 6 month stored 100 seed samples from different places on moisture content, insect infestation, germination and vigour indicate variability. Data needs to be presented in the prescribed format.							

06 States 37 districts 1021 samples	**% samples below MSCS germination**		**% Maximum infection**		
	MPKV , Rahuri	13.84	*Macrophomina phaseolina*	11.0	SKNAU
	SKNAU, Durgapura	14.12	*Colletotrichum dematium*	28.0	PJTSAU
	JNKVV, Jabalpur	21.50	*Fusarium oxysporum*	33.0	PJTSAU
	VNMKV , Parbhani	04.0	*Cercospora kikuchii*	28.0	MPKV
	PJTSAU, Hyderabad	32.65			

Soybean seed mycoflora

Experiment 3C : **Studies on seed health status of farmers-own-saved seed**
Crop : Rice
Year of start : 2000
Status : Continued 2016-17
Centre : OUAT, Bhubaneswar; AAU, Jorhat; SKUAT, Srinagar; TNAU, Coimbatore; HPKV, Palampur; NDUAT, Faizabad
Detection technique : Standard NaOH seed soak for bunt (*Neovossia horrida = Tilletia barclayana*); Standard Blotter method (ISTA, 1996); Visual inspection of seeds

Results

Centre	Districts	Samples	Varieties	% infection Bunt	Seed Discoloration
OUAT, Bhubaneswar	04	275	10	0.0-1.0	Observed 5 fungal flora
Remarks	Germination of seeds ranged from 39-98%,				
	Rice bunt recorded in 10 varieties in a range 0.0-1.0%;				
	Trichoconis padwiciki, Curvularia sp., *Fusarium* sp., *Helminthosporium oryzae*, *Aspergillus* spp. were predominant				
AAU, Jorhat	01 02	83	20	0.0	Observed 5 fungal flora
Remarks	83 seed samples of rice were collected from farmers of 2 sub division of Bongaigaon district, North Salmara & Bongaigaon, located in the lower Brahmaputra valley;				
	Seeds were stored in jute bags and *Duli* a local structure made of bamboo, and at some places treated with powder of neem leaves; with a seed moisture ranged 12.0-14.0%				
	68.67% samples exhibited germination above MSCS (57 out of 83)				
	No association of but pathogen was recorded; Species of *Aspergillus, Rhizopus, Penicillium, Drechslera,* and *Fusarium* was noticed.				
SKUAT, Srinagar	02	345	04	0.0	Observed 4 fungal flora
Remark	In all , 345 seed samples of rice from two districts(Ganderbal and Srinagar) comprising 04 varieties exhibited seed germination in the range of 80-85%				
	Association of *Bipolaris oryzae, Alternaria* spp., *Pyricularia oryzae* and *Fusarium* spp. was noticed				
TNAU, Coimbatore	03	43	20	0.0-0.0	Observed 9 fungal flora
Remarks	The seed germination and moisture of the collected samples from Thanjavur, Thiruvarur and Nagapatinam districts of Cauvery delta zone was above MSCS; most of the farmers used gunny bags for storage of seeds				
	Bunt infection was not recorded ; however it was noticed in 2015-16 from Thanjavur district in one sample				
	Helminthosporium oryzae, Fusarium moniliformae, Aspergillus flavus, Curvularia lunata , Pyricularia oryzae, Chaetomium globosum, Trichoconis padwiciki and *Penicillium* were found associated with discolored seeds				
NDUAT, Faizabad	08	61	16	0.0-0.20%	Observed 8 fungal flora
Remarks	28.57 % samples (11 out of 49) showed the germination below MSCS				
	5 samples exhibited the association of rice bunt in the range of 0.0-0.20%				
	Pyricularia oryzae ,Trichoconis padwiciki, Fusarium moniliformae, Aspergillus flavus, Chaetomium globosum, Helminthosporium oryzae, *Curvularia lunata* and *Penicillium* were found associated with discolored seeds				

ICAR-IARI, New Delhi	03	60	-	0	Observed 7 fungal flora
Remark	Seed samples collected from 03 districts (Noida, Baraut and Gurugram) exhibited germination in the range of 80-92%				
	None of the sample showed the association of bunt disease				
	Bipolaris oryzae, Phoma, Fusarium moniliformae, Aspergillus flavus, Curvularia lunata, Aspergillus niger and *Alternaria alternata* were found associated with discolored seeds				
PAU, Ludhiana	12	1000	22	0.0-6.25%	
Remark	Rice bunt was highest (6.25%) in Pusa 44 from Patiala followed by 5.16% in PR124 from Faridkote district				
	87.6% samples were infected with bunt disease				
	Seed discoloration is a major problem; 16.48% samples were affected ; highest number (64%samples) from Jalandhar; maximum in PR124				
MPKV , Rahuri	04	257	-	0	Observed 7 fungal flora
Remark	All the samples had seed germination above certification standard;				
	No bunt infection observed				
	Fusarium moniliformae (4.0-6.2%), *Alternaria alternata* (4.1-11.4%), *Drechslera oryzae* (0.0-7.9%), *Phoma* spp. (0.0-4.8%), *Aspergillus niger* (2.8-5.2%), *Aspergillus niger* (1.3-2.5%)				
HPKV, Palampur	05	171	-	0.1-0.4%	Observed 9 fungal flora
Remark	The observations made on occurrence of diseases on hybrid rice and some improved varieties showed wide distribution of false smut (3-5 on 0-9 point scale); Hybrid PAC 807 showed high incidence of neck blast in some of the locations which used to be almost resistant previously and severity of neck blast in the ranged (10 - 50 per cent)				

Seed mycoflora of rice

Summary table Farmers saved seed: Rice

	% samples below IMSCS		% rice bunt	Number of Mycoflora with discolored seeds
09 States 42 Districts 2295 Samples tested	OUAT	7.30	0.0-1.0	5 (up to 38% samples discolored)
	AAU, Jorhat	31.33	0.0	5 (up to 77% samples discolored)
	SKUAT	None	0.0	4 (29-43% samples discolored)
	TNAU	40.0	0.0	9 (60-80 % samples discolored)
	NDUAT	28.50	0.0-2.0	8
	ICAR-IARI	None	0.0	7
	PAU	-	0.0-6.25	5 (16.40% average discolored)
	MPKV	None	0.0	7 (20-35% samples discolored)
	HPKV	-	0.0	4 (no discoloration on hybrids)
Mycoflora observed at places with discolored seeds	*Bipolaris (Helminthosporium) oryzae, Phoma, Fusarium moniliformae, Pyricularia oryzae , Trichoconis padwiciki, Aspergillus flavus, Chaetomium globosum , Curvularia lunata, Aspergillus niger, Alternaria alternata*			

Experiment 3D : **Studies on seed health status of farmers-own-saved seed**
Crop : Groundnut
Methodology Standard Blotter method (ISTA,1996)
Year of start : 2000
Status : Continued 2016-17
Centre : AAU, Anand; PJTSAU, Hyderabad; SKNAU, Durgapura; JNKVV, Jabalpur

Results

Centre	Districts	Samples	Varieties	% range of infection	
				Aspergillus flavus	*Aspergillus niger*
AAU, Anand	04	117	17	2.0-14.0	-
Remarks	All the samples from Amreli, Junagarh, Rajkot, and Jamnagar exhibited the seed germination above MSCS.				
	None of the sample was free from infection of *Aspergillus flavus.*				
	Seed sample of Certified variety GG 20 resulted in maximum germination (80.0-84.0%) with less association of the fungus (2-3%).				
SKNAU, Durgapura	02	110	04	-	06.5-11.51
Remarks	Out of 120 samples collected from Jaipur and Sikar 15.45% exhibited the germination below MSCS				
	24% samples were found infected with *Aspergillus niger*				
JNKVV, Jabalpur	04	89	02	2.0-13.0	2.0-10.0
Remarks	Out of 89 samples from Sauasar, Pandhurna, Chhindwara and Seoni analyzed, 83(93.25%) had germination above MSCS in the range of 83-94%				
	35 samples were found infected with *Aspergillus flavus* and *Aspergillus niger*				
	Farmers seed sample that were stored for more than 150 days had higher association of *Aspergillus flavus* (up to 90 associations) indicate the improper handling, storage and threshing mechanism.				
MPKV, Rahuri	06	102	04	5.0-18.0	4.0-15.0
Remarks	Seed collected from 4 major districts exhibited germination in the range of 65-86%				
	11 seed samples exhibited germination below the certification standards				

Farmers saved seed samples Groundnut

	% samples below MSCS germination		*Aspergillus flavus*	*Aspergillus niger*
04 States 16 districts 418 samples	SKUAN , Durgapura	15.45	00.00	6.5-11.5
	JNKVV, Jabalpur	15.45	2.0-13.0	2.0-10.0
	MPKV, Rahuri	10.78	5.0-18.0	4.0-15.0
	AAU, Anand	00.0	2.0-14.0	0.0

Aspergillus flavus

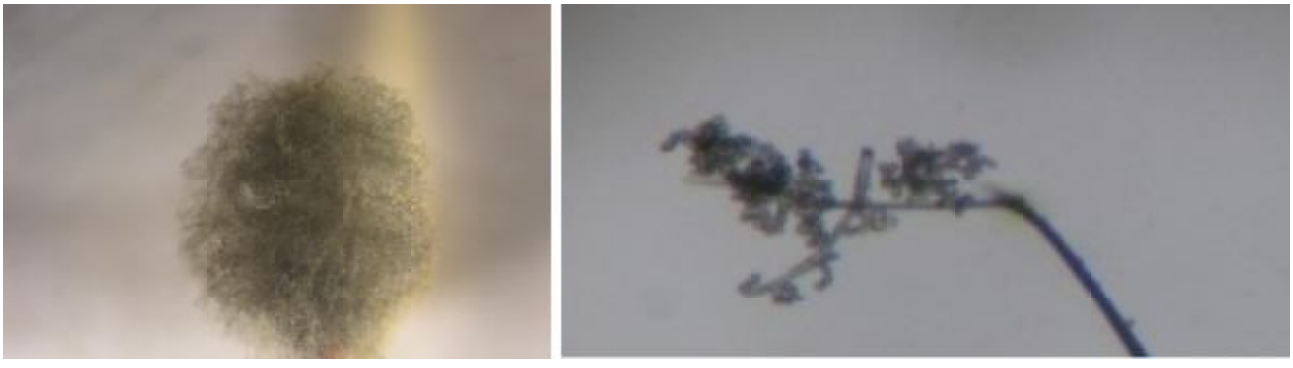
Aspergillus niger

Experiment 3E : Studies on seed health status of farmers-own-saved seed
Crop : Chick pea
Methodology Standard Blotter method (ISTA,1996)
Year of start : 2000
Status : Continued 2016-17
Centre : MPKV, Rahuri; SKNAU, Durgapura; PJTSAU, Hyderabad

Results

Centre	Districts	Samples	Varieties	% range of infection		
				Botrytis cinerea	***Ascochyta rabiei***	***Fusarium oxysporum***
MPKV, Rahuri	04 18	294	-	2.0-8.0	0.0	2.0-8.0
Remarks	Out of 334 samples collected from Ahmad Nagar, Nasik, Sholapur and Pune districts 2.04% (6 samples) had germination below IMSCS. The seed germination ranged from 77.0-96.0%.					
	Association of *Botrytis cinerea* ranged from 2.0-8.0% & *Fusarium oxysporum* 2.0-8.0%.Seedborne *Ascochyta rabiei* was not recorded.					
PJTSAU, Hyderabad	02 04	160	06	0.0	0.0	1.2-11.67
Remarks	Investigation of 160 seed samples of chick pea collected from 2 districts revealed the association of *Fusarium oxysporum* in40 samples (25%) in the range of 1.2-11.67%.					
SKNAU , Durgapura	02	100	03	0.0	0.0	0.5-4.0
Remarks	12% seed samples exhibited seed germination below the certification standards					
	Association of *Botrytis cinerea* & *Ascochyta rabiei* was not recorded in any sample.					

Association of *Fusarium oxysporum* with chickpea seeds



Association of *Botrytis cinerea* with chickpea seeds

Farmers saved seed samples Chickpea

	% samples below MSCS germination		*Fusarium oxysporum*	*Ascochyta rabiei*
03 States 08 districts 554 samples	SKUAN , Durgapura	12.00	0.5-4.0	0.0
	PJTSAU, Hyderabad	None	1.25-11.67	0.0
	MPKV, Rahuri	2.04	2.0-7.0	0.0

Experiment 4 : **Standardization of detection methods for seedborne pathogens of significance**

Objective : To work out the efficacy of different techniques for the detection of seedborne pathogens of significance prevalent in a particular region

Year of start : 2008

Status : Continued 2016-17

Target crops : Rice, wheat, soybean, sesame, mungbean, Urdbean, tomato, onion, chilli, lentil , cumin

Target pathogens : *Drechslera oryzae, Helminthosporium oryzae, Bipolaris oryzae, Alternaria alternata, Alternaria solani, Alternaria porri, Alternaria burnsii, Macrophomina phaseolina, Colletotrichum dematium (Colletotrichum truncatum), Colletotrichum capsici,, Fusarium oxysporum ,Bipolaris oryzae*

Centre : AAU, Anand; AAU, Jorhat; NDUAT, Faizabad; GBPUAT, Pant Nagar; OUAT, Bhubaneswar; ANGRAU, Hyderabad; PAU, Ludhiana; CCSHAU, Hissar; HPKV, Palampur; TNAU, Coimbatore; JNKVV, Jabalpur; MPKV, Rahuri; MAU, Parbhani; SKUAST, Srinagar; SKAU, Durgapura

Results

Centre	Crop	Target pathogen & disease	Identification of suitable method
AAU, Anand			
	Cumin	*Alternaria burnsii* (Blight of cumin)	**Seed Wash Examination Technique** Relatively quick technique found effective, however, suitable for surface adhered spores (externally seed-borne)
			Seed wash was examined under compound microscope for inoculum load and transfer was watched on Potato dextrose agar medium for subsequent growth to verify the viable spores
		Detailed stepwise protocol is ready for submission	
NDUAT, Faizabad			
	Chickpea	*Ascochyta rabiei*	**Direct seed observation under Diaphanoscope** Infected seed can be identified based upon the seed morphology and subsequently by Standard Agar plate method
			Seeded plates were incubated at 22-24ºC under alternate cycles of light and dark periods for 24 h
			Working sample 400 seeds with two replications; incubated seeds observed on 6th day.
		Detailed stepwise protocol is ready for submission	
	Rice	*Bipolaris oryzae* (Brown spot)	**Standard Agar Plate Method (Modified)** By the incorporation of Guaicol (0.2ml/L), using agar-agar (5g/L) and streptomycin sulphate (0.5g/L) after sterilization of culture media in an autoclave and before pouring in to the plate
			Seeded plated were incubated at 22ºC under alternate cycles of light and dark periods for 24 h
			Working sample 400 seeds with two replications; incubated seeds observed on 6th day.
		Detailed stepwise protocol is ready for submission	

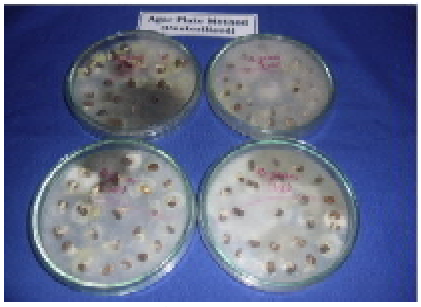
OUAT, Bhubaneswar			
	Rice	*Sarocladium oryzae*	**Standard Agar Plate Method (Modified)** Agar was replaced by malt extract, surface sterilized seeds were incubated at 22ºC under alternate cycles of light and dark periods; working sample 400 seed with two-replication were used, 71.2% seeds exhibited infection
AAU, Jorhat			
	Rice	*Drechslera oryzae*	**Standard Agar Plate Method** Other methods used (I) Standard Blotter method (II) 2,4-D method (III) deep fridge method (IV) Test Tube Water Agar Seedling Symptom Test
GBPUAT, Pant Nagar			
	Tomato	*Clavibacter michiganense* pv. *michiganense*	**Selective media SCM & D2ANX** recorded maximum recovery Seeds were procured from naturally infected plants from epidemic fields from Bhabhar region, Uttarakhand
PJTSAU, Hyderabad			
	Moong bean and Urd bean	*Macrophomina phaseolina* *Fusarium oxysporum* *Alternaria alternata*	**Standard Blotter Method (Modified)** Instead of wetting (soaking) the blotters in sterile water, the method was modified by using NaOH (0.6%), that resulted in maximum recovery of the target fungi as compared to method where the water was used.
			Other methods used (I) standard agar plate method was modified by incorporation and substituted with seed extract and (II) seed impregnation
		Detailed stepwise protocol is ready for submission	
PAU , Ludhiana			
	Chickpea	*Ascochyta rabiei*	**Standard Agar Plate Method (Modified)** Modified with incorporation of Streptomycin sulphate (2000ppm) in the agar-agar prior to pouring in the plates
SKUAST, Srinagar			
	Chilli	*Colletotrichum capsici*	**Standard Water Agar Plate Method** (Modified) Direct placements of unsterilized capsicum seeds from infected fruits were placed and more than 85% recovery of the fungus recorded.
		Detailed stepwise protocol is ready for submission	
TNAU, Coimbatore			
	Black gram	*Fusarium oxysporum* , *Macrophomina phaseolina*	**Standard Blotter Method** (Modified) The alkali blotter soaking with solution of NaOH 0.4% and KOH 0.2% performed the best method for the detection of seedborne *Fusarium oxysporum* and *Macrophomina phaseolina* in black gram in both surface sterilized and unsterilized conditions, respectively.
JNKVV, Jabalpur			
	Soybean	*Macrophomina phaseolina* *Fusarium oxysporum* *Colletotrichum dematium*	**Standard Blotter method & Test Tube Water Agar Seedling Symptom Test**, out of seven methods tried
	Moong bean; Urid bean	*Macrophomina phaseolina* *Fusarium oxysporum* *Colletotrichum dematium*	**Standard Blotter method & Test Tube Water Agar Seedling Symptom Test**, out of seven methods tried
	Sesame	*Macrophomina phaseolina*	**Standard Blotter method**, out of seven methods tried
		Detailed stepwise protocol is ready for submission	

MAU, Parbhani			
	Soybean	*Macrophomina phaseolina* *Fusarium oxysporum* *Colletotrichum dematium*	**Standard Blotter method**, out of five methods tried
MPKV, Rahuri			
	Soybean	*Macrophomina phaseolina* *Fusarium oxysporum* *Colletotrichum dematium*	**Standard Blotter method**, out of six methods tried
SKAU, Durgapura			
	Sesame	*Macrophomina phaseolina* (Stem & root rot)	**Standard Blotter method** , out of six methods tried
HPKV, Palampur			
	Chilli	*Colletotrichum truncatum* (= *C. capsici*); *C. gloeosporioides;* *C. coccodes* (Anthracnose)	PCR based detection technique using the specific primers with known sequence, developed by earlier workers were used and validated for the detection of chilli seed associated anthracnose fungus.
			Colletotrichum truncatum: Ccap F; Ccap R.
			Colletotrichum gloeosporioides: Cboncoll F; Cboncoll R.
			Colletotrichum coccodes: Cco 1NF1; Cco 2NR1.
		Detailed stepwise protocol is ready for submission	
	Chilli	Pepper Mild Mottle Virus (PMMoV)	PCR based protocol for the detection of PMMoV from seeds through RT-PCR using the viral Coat Protein (CP) specific primers.
		The seeds were harvested from the virus infected plants which were indexed through DAS-ELISA for the presence of the virus. The cDNA was amplified using the viral coat protein specific primers (F5'CCAATGGCTGACAGATTACG-3' and R5'CAACGACAACCCTTCGATTT-3') with initial denaturation of 94°C for 4 min followed by 35 cycles of 94°C for 15 sec, 48°C for 40 sec and 72°C for 1 min and final extension of 7 min at 72°C to confirm the presence of PMMoV. The PCR product was checked on 1.2% agarose gel along with a negative control (water used as template) and positive control (plasmid isolated from clone having CP gene used as template). The amplification of ~740 bp product was observed in both the seed sample and positive control while no band was observed in negative control, however, further validation of the protocol is needed.	

Growth of tomato seed associated *Clavibacter michiganense* pv. *michiganense*

Blotter

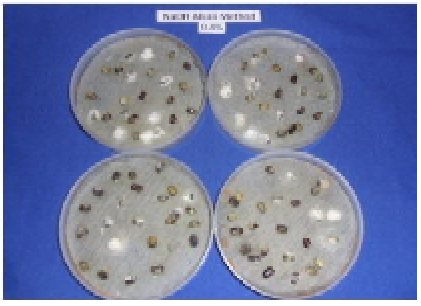
2,4-D



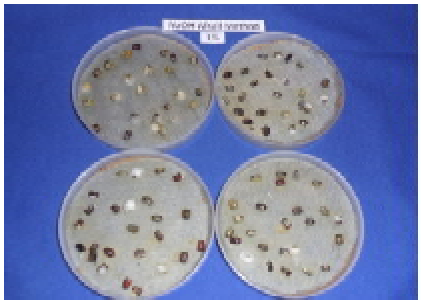
Agar plate

Deep freeze

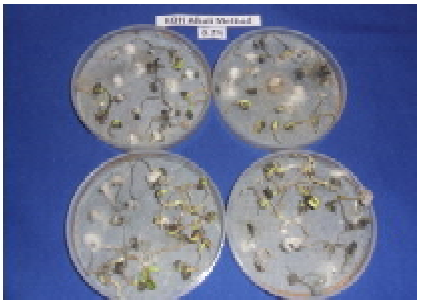
NaOH 0.4%



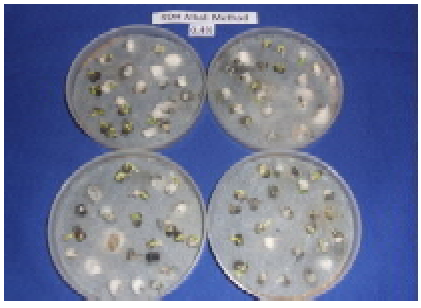
NaOH 0.8%



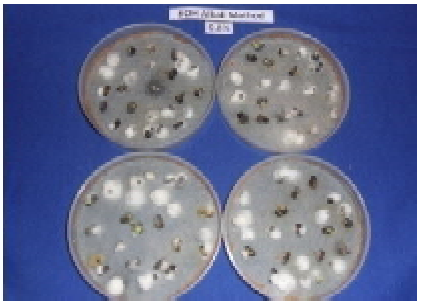
NaOH 1%



KOH 0.2%

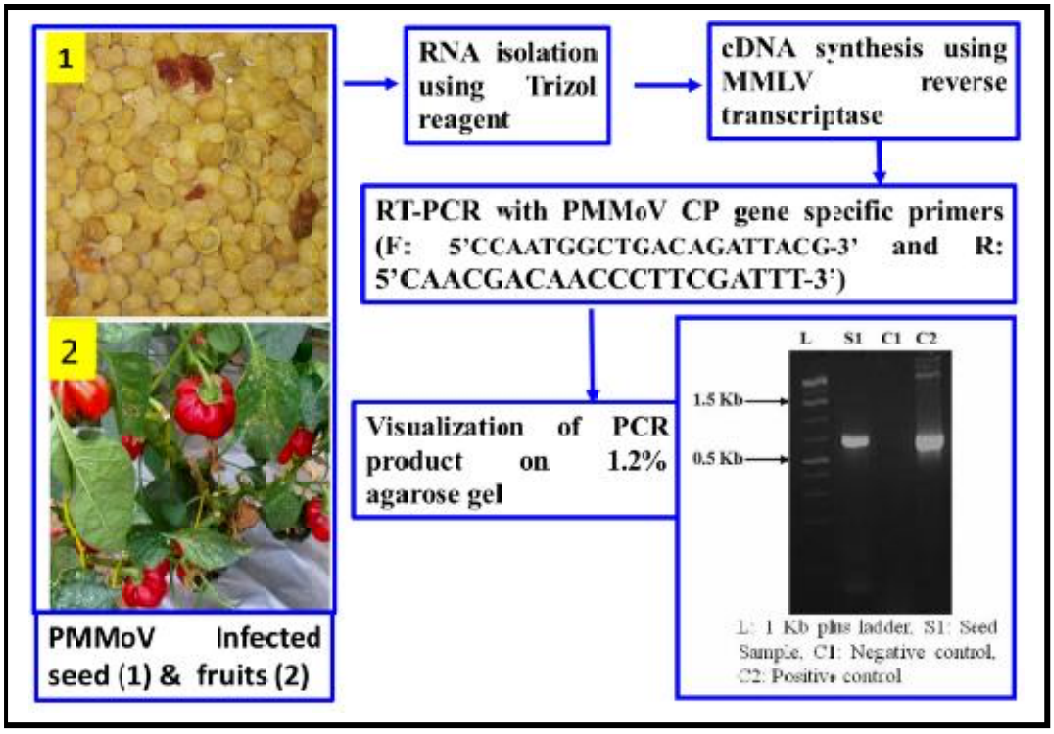


KOH 0.4%



KOH 0.8%

Methods of detection of seedborne pathogens in black gram in unsterilized condition



PCR based protocol for the detection of *Pepper mild mottle virus* (PMMoV) from chili seeds

Experiment 5 : Correlation of various levels of seed infection by important seedborne fungi on seed germination and disease incidence in crops

Objective : To determine the influence of disease/pathogen association on seed germination

Year of start : 2013-14

Methodology : Varied degree of disease incidence was recorded under field conditions; seeds were harvested from those categories of infection and tested for association of pathogen and impact on seed germination was assessed.

Status : Continued 2016-17

Crop : All crops

Centre : All Centres

Results

Centre	Crop & Pathogen	Observations
GBPUAT, Pant Nagar	Chilli (***Colletotrichum capsici***)	Grater the development of disease in the form of seed and seedling mortality was noticed as higher degree of seed infection & surface area covered
	05 categories of seed used (Chilli seeds with 0, 25, 50, 75 and more than 75% surface area infected were used in the investigation); Impact on seed germination and mortality measured	Degree of seed germination decreased with increase in seed infection area; Seed germination reduced from 58 to 7% in different categories as compared to healthy 72% seed germination with no disease; Seedling mortality increased from 4 to 70% in categories with 25-75% area covered as compared to no disease in healthy seeds
	Seeds collected from anthracnose affected fruits, having an infected area of 0 -25%, leads to 58.0 % seed germination which is below certification standards (60.0%). Therefore suggested that for seed production, chilli seed should be collected from only clean healthy disease free fruits.	

NDUAT, Faizabad	Barley leaf blotch (***Bipolaris sorokiniana***) 13 seed lots with varying degree of seed infection used	Conspicuous effect of seed infection on sowing seed quality traits (germination, viability, test weight; vigour) exhibited the influence of infection.
	No direct correlation between seed infection of *Bipolaris sorokiniana* and its subsequent effect on seed germination could be established	
CCSHAU, Hissar	Bacterial leaf blight (***Xanthomonas campestris* pv. *cyamopsidis***)	Five categories based upon the seed discoloration were made: (i) Healthy (ii) 0-15 % (iii) 16-50 % (iv) 51-100 % discolored (v) Shriveled Seed germination reduced from 56.33% in healthy seeds(i) to 7.66% in shriveled seeds (v); Seed germination was 49(ii), 38.66(iii) and 26% in (iv) different categories.
	Degree of seed germination decreased with increase in discolored seed surface area	
AAU, Jorhat	Rice (***Drechslera oryzae***)	Brown spot of rice severity was 75% in field, thereafter 58% association recorded in seed; Seed germination was 74%
TNAU, Coimbatore	Rice seed discoloration Based upon the levels of seed infection five categories were made (i) 0 (apparently healthy) (ii) 1-25 (iii) 26-50 (iv) 50 -75 (v) > 75 % seed area covered	The apparently healthy looking seeds with 0 per cent seed discoloration (i) recorded significantly higher germination (84%) and seedling vigour (2508.3) with least ungerminated seeds (5.0%). The seeds with more than 75 per cent seed discoloration (v) recorded least germination (26.2%) and seedling vigour (633.6) with maximum ungerminated seeds (55.0%).
	The increase in the levels of discoloration on rice seeds decreases the germination, seedling vigour and increases the ungerminated seeds.	
OUAT, Bhubaneswar	Sesame ***Alternaria sesami*** ***Macrophomina phaseolina*** ***Xanthomonas*** sp.	Reduction in seed germination observed in category (iii, iv, v) below the certification standards; 05 categories of plant & capsule infection (i)Trace: 0-5%, (ii)Mild: 6-25%, (iii) Modorate:26-50%, (iv) Medium: 51-75%,(v) Severe: 76-100%) made and seeds were extracted analyzed for germination; Seed germination ranged from 38-75% in these three categories
	Trace and mild infection did not affect the seed germination whereas moderate, medium and severe infection reduced the germination below the certification standard of the sesame seeds.	
	Rice discoloration 05 categories of infected seeds prepared (i) 0 (ii) 25 (iii) 50 (iv) 75 (vi) and (v) more than 76% area discolored	
PAU, Ludhiana	Drastic reduction in rice germination (46%) with category (iv & v) discolored seed samples was observed	Seeds with no discoloration exhibited 86.3% germination while it gradually reduced; Drastic reduction in germination (46%) with 75% and above discolored seed samples ; Infection in field was more than 75% and subsequently plant to seed infection observed up 30%
	Rice brown spot (***Bipolaris oryzae***) Investigation made on 05 categories of seed (i) 0-5 (ii) 6-25 (iii) 26-50 (iv) 51-75 (v) more than 76% seed infection	

SKUAST, Srinagar	As the degree of infection increased in seed the germination also reduced	Incidence of diseases in the field was 27.3%; plant to seed infection increased (33%); Severity in field was 12.6% and infection in harvested seeds was 17.5%
		83% seed germination in (i)category ; 52.65% in (iii) and 20.3% in seeds with more than 76%(v) infection category was observed
	Sunflower (***Alternaria helianthi***) Five categories of seed infection (i) 0-5 (ii) 6-25 (iii)26-50 (iv)51-75 (v) more than 76	
MPKV, Rahuri	Higher the degree of seed infection, grater the reduction in seed germination observed	Infected seed were collected from infected plants from 27 locations of 03 districts; Mild infection (up to 25 % area covered) did not affect the seed germination while moderate (26-50%), medium (51-75%) and severe (more than 75 % area covered) affected seed, reduced seed germination below MSCS level i.e. 70%; Seed germination up to 59% recorded in seeds having infection more than 75%; Apparently healthy seeds resulted in 82% seed germination
	Safflower (***Alternaria carthamii***) 6 seed infection level based on discoloration (i) 0(ii) 0-25% (iii) 26-50% (iv) 51-75% (v) more than 75% (vi) 100% were used.	
PJTSAU, Hyderabad	Lower levels of infection from (i, ii, iii) resulted in germination in the range of 89-92 % germination, respectively. Hence infection level up to category (iii) acceptable as germination and vigour was above MSCS Across the different levels of seed infection tested, there was significantly negative correlation of -0.930 between seed infection and germination and of -0.919 was observed between seed infection and vigour of safflower.	As the infection level increased the seed germination and vigour index decreased ; (A) Least germination (15.4%) was recorded in seeds with 100% infection(vi) ; low level of infection (ii, iii and iv) resulted in 89-92.9% germination ; (B) Vigour index ranged from 14.0 to 1955 in (vi) to (i) category. Negative correlation between seed infection and seed germination was observed.
	Cumin (***Alternaria burnsii***) 05 categories of cumin seed infection were prepared	
AAU, Anand	With the increase in seed infection (seed surface area covered) the decrease in seed germination was recorded	10.08% seed infection resulted in 76% germination while80.03 % infection resulted in 42% seed germination

Mycoflora associated with discolored rice seeds

Experiment 6 : **Management of seed-borne infection of *Colletotrichum capsici* in chilli, *Alternaria solani* in tomato by way of biological agents**

Objective : To work out the safe treatment for the management of seedborne nature

Year of start : 2012 (modified in 2013)

Status : Continued 2016-17

Centre : GBPUAT, Pantnagar; HPKVV, Palampur; SKUAST, Srinagar

Crop/Pathogen : Chilli - Dieback & fruit rot (*Colletotrichum capsici*)
Tomato - Blight & frit rot (*Alternaria solani*)

Methodology : Seed treatment with bio agents & subsequent observations on the target disease

Results

Crop /Pathogen/ Disease	Seed treatment dosage in grams per kg of seed	Progress
GBPUAT, Pantnagar		
Chilli - Dieback & fruit rot (*Colletotrichum capsici*)	T1: *Trichoderma viride* @10g T2:*Trichoderma harzianum* @10g T3:*Pseudomonas fluorescens* @10g T4:*Trichoderma viride* @05g plus *Pseudomonas fluorescens* @05g T5: *Trichoderma harzianum* @05g + *Pseudomonas fluorescens* @05g T6: Untreated seed control	Seed treatment with (T2) *Trichoderma harzianum* @10g resulted in maximum seed germination (70.0%) & vigour index (680) with least disease (2.0%) as compared to untreated control -seed germination (63%) & vigour index (472) with maximum disease (20%)incidence
Tomato -Blight & fruit rot (*Alternaria solani*)		Results not available
HPKVV, Palampur		
Chilli - Dieback & fruit rot (*Colletotrichum capsici*) (Experiment was conducted in Plug tray method under green house conditions)		Seed treatment with (T4) *Trichoderma viride* @ 05g + *Pseudomonas fluorescens* @ 05g resulted in maximum seed germination (88.3%) with least seed rot (13%) and seedling rot (1.2%) as compared to untreated control -seed germination (65.6%) with maximum seed rot disease (37%)and seedling rot (18.91%) incidence
Tomato -Blight & fruit rot (*Alternaria solani*)		Results not available
SKUAST, Srinagar		
Chilli - Fruit rot (*Colletotrichum capsici*)		Results not available
Tomato -Blight & fruit rot (*Alternaria solani*)		Seed treatment with (T5) *Trichoderma harzianum* @05g + *Pseudomonas fluorescens* @05g resulted in maximum seed germination (96.33%) & vigour index (1098) with least disease (6.33%) as compared to untreated control -seed germination (79%) & vigour index (704) and with max disease (25%) incidence

Blight & fruit rot (*Alternaria solani*) **Dieback & fruit rot (*Colletotrichum capsici*)**

Experiment 7 : **Management of seed associated *Fusarium oxysporum* f.sp. *ciceris* and *Macrophomina phaseolina* in chickpea through seed bio priming and soil application of *Trichoderma harzianum* strains obtained from different locations**

Objective : To determine the efficacy of biological agents and influence of priming on the seed associated *Fusarium oxysporum* f.sp. *ciceris* and *Macrophomina phaseolina*

Year of start : 2011-12

Status : Continued 2016-17

Crop/Pathogen : Chickpea – Vascular wilt pathogen (*Fusarium oxysporum* f.sp. *ciceris*) and dry root rot pathogen (*Macrophomina phaseolina*)

Source of bio agent : AAU, Anand; PAU , Ludhiana; TNAU, Coimbatore, Local isolate

Methodology : Seed priming & soil application with *Trichoderma harzianum* strains

Centre : PJTSAU, Hyderabad ; MPKV, Rahuri ; PAU , Ludhiana; HPKV, Palampur

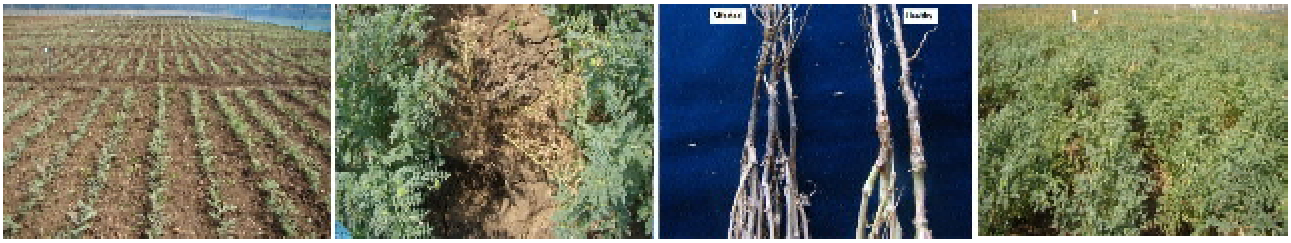
Treatment details

	Application of *Trichoderma harzianum*	Dose	Source
T:01	Seed bio priming	@10 g/kg seed	AAU, Anand
T:02	Seed bio priming	@10 g/kg seed	PAU, Ludhiana
T:03	Seed bio priming	@10 g/kg seed	TNAU, Coimbatore
T:04	Seed bio priming	@10 g/kg seed	MPKV, Rahuri
T:05	Soil application	@10 kg/ha	AAU, Anand
T:06	Soil application	@10 kg/ha	PAU, Ludhiana
T:07	Soil application	@10 kg/ha	TNAU, Coimbatore
T:08	Soil application	@10 kg/ha	MPKV, Rahuri
T:09	Seed bio priming + Soil application	@10 g/kg seed+@10 kg/ha	AAU, Anand
T:10	Seed bio priming + Soil application	@10 g/kg seed+@10 kg/ha	PAU, Ludhiana
T:11	Seed bio priming + Soil application	@10 g/kg seed+@10 kg/ha	TNAU, Coimbatore
T:12	Seed bio priming + Soil application	@10 g/kg seed+@10 kg/ha	MPKV, Rahuri
T:13	Control	-	-

Results

Centre	Observations
MPKV, Rahuri	Incidence of chick pea wilt (T:12) in JG 62 was minimum (16.33%) when the seed bio priming with MPKV, Rahuri isolate of *Trichoderma harzianum* @10g/Kg seed, prior to sowing followed by soil application @ 10 kg/ha was done as compared to check (more than 95% wilt). Seed bio priming alone (24.33 % wilt) and soil application alone (25.66% wilt) resulted in higher incidence of wilt caused by (*Fusarium oxysporum* f.sp. *ciceris*). T:12 resulted in 83.67% control over check.
	Similar trend was noticed in T: 12 where 79.0% control of root rot (*Macrophomina phaseolina*) was noticed.
	PAU, Ludhiana isolate of *Trichoderma harzianum* was also promising at Rahuri.
PAU, Ludhiana	Seed bio priming @10g/kg seed with PAU, Ludhiana isolate of *Trichoderma harzianum* applied with FYM resulted in minimum wilt (8.23%) as compared to untreated check (12.9%). Similar trend for root rot diseases (9.16%) as compared to check (18.1%) has been noticed, with corresponding higher yield. Native local isolate of bio agents performed better as compared to others.
HPKV, Palampur	Experiment is in progress. It has been laid out at Research Sub Station, Una (HP).
PJTAU, Hyderabad	Maximum disease was recorded in FoC & Mp inoculated control (50.46%) and minimum with untreated control (16.68%). Among *Trichoderma strains* applied treatments, the treatment with seed bio-priming and soil application of *Trichoderma viride* of TNAU was effective (24.08%) followed by application of AAU isolate.

AAU , Anand	Maximum vigour index (7624) with minimum disease incidence (14.7%) having highest yield (1360 kg/ha) was observed in treatment seed bio-priming for 10 hr with suspension of solid talc based formulation ($2x10^8$ cfu/g) of *Trichoderma harzianum* AAU isolates @ 50 g in 250 ml of water/kg of seed + soil application of *T. harzianum* enriched FYM (10 g *T. harzianum* / kg FYM) @ 100 g /m^2 of soil/furrow, and untreated check (4799 VI, 18.67% DI and grain yield of 994 kg/ha)



Wilt and Root rot of Chickpea

Experiment 8 : **Management of pod diseases of soybean through fungicide application**
Objective : To investigate the associated mycoflora affecting soybean pods
: To determine the influence of fungicide application
Year of start : 2014-15
Status : Continued 2016-17
Centre : MPKV , Rahuri ; JNKVV, Jabalpur ; MAU Parbhani
Crop/Disease : Soybean pod blight complex
Methodology : Foliar application of fungicides – 02; First at pod formation and second at pre-harvest plant growth stage; Fungicides : 7+1 , Replication :3; Plot size 5X1 m; Design RBD; Basic seed treatment with Thiram + Carbendazim each @0.15% prior to sowing

Results

Centre	Fungicide Treatments	Observations
MPKV, Rahuri	T_1: Carbendazim (0.25%) T_2: Mancozeb (0.25%) T_3: Tebuconazole (0.20%) T_4: Hexaconazole (0.20%) T_5: Propiconazole (0.10%) T_6: Azoxystrobin (0.15%) T_7: Carbendazim + Mancozeb (0.30%) T_8: Control	(i)Two application of Carbendazim (0.25%) (T1) first at pod formation and second at pre-harvest stage resulted in 80.32 **%** disease control over check; Mean PDI in T1 was 12.66% where as in control (T8)-40.66% (ii) *Colletotrichum truncatum* (*C. dematium*) was predominantly was associated with pod blight ; (iii)Other mycoflora isolated on potato dextrose agar medium were *Alternaria alternata, Fusarium oxysporum, Curvularia lunata* and spp. *Aspergillus*
JNKVV, Jabalpur		(i)Two application of Carbendazim + Mancozeb (T7)(0.30%) first at pod formation and second at pre- harvest stage resulted in 76.3% disease control over check; (ii) *Colletotrichum dematium* was predominantly associated with pod blight complex, (iii)Other mycoflora isolated on potato dextrose agar medium were *Alternaria alternata, Fusarium oxysporum, Curvularia lunata, Aspergillus flavus, Aspergillus niger.*
MAU, Parbhani		(i)Two application of Carbendazim + Mancozeb (T7)(0.30%) first at pod formation and second at pre- harvest stage resulted in 80.32% disease control over check;

Pod blight of soybean

Experiment 9	:	**Management of cumin blight through fungicide application**
Objective	:	To investigate the associated mycoflora affecting cumin seeds quality
	:	To determine the influence of fungicide application
Year of start	:	2014-15
Status	:	Continued 2016-17
Centre	:	AAU , Anand ; SKNAU, Durgapura
Crop/Disease	:	Cumin - Alternaria blight (*Alternaria burnsii*)
Methodology	:	i Seed treatment with Thiram (0.3%) ii. Subsequent three application of fungicides after initiation of disease incidence at 10 day interval

Results

Centre	Fungicide Treatments & Dosages	Results
AAU , Anand	T_1: Carbendazim (0.01%) T_2: Mancozeb (0.20%) T_3: Propiconazole (0.10%) T_4: Azoxystrobin (0.25%) T_5: Propineb (0.15%) T_6: Hexaconazole (0.05%) T_7: Carbendazim + Mancozeb (0.25%) T_8: Control	(i)Three application of Azoxystrobin (0.25%) at 10 day interval resulted in minimum disease intensity (18.01%) with highest seed yield (592kg / ha) and minimum association (3.95)of *Alternaria burnsii* in harvested cumin seeds as compared to Control where disease intensity was (57.04%) and seed yield (178kg /ha) and 62.25 % post association of the fungus. (ii) Application of Carbendazim + Mancozeb (0.25%) was also promising, and recorded 21.98% diseases incidence , with corresponding post association of the fungus 4.55% and yield of 521Kg /ha.
SKNAU, Durgapura		In previous years, similar trend was recorded with superiority of 3 applications of Azoxystrobin (0.25%) at 10 day interval.

Grades of infected cumin seeds

Pure culture of *Alternaria burnsii*

Experiment 10 : **Establishment of seed certification standards for chilli anthracnose**
Objective : To fix the seed certification limits
Year of start : 2015-16
Status : Continued 2016-17
Crop : Chilli
Pathogen : *Colletotrichum truncatum*
Centre : HPKV, Palampur; PAU, Ludhiana; MAU , Parbhani

Results

Centre	Treatments	Progress
Study.10.(a). Selection of seeds with different levels of infection of *Colletotrichum truncatum* and determination of disease development in nursery & field		
PAU, Ludhiana	Categories with level of infection as per the area coverage of the seeds : (i) No symptoms (ii) 00-10%: Brown spot (iii) 11-25%: Brown spots (iv) 26-50%: Brown streaks (v) 51-76% & more: Seeds with sunken lesions & numerous acervuli	The categories were prepared. The seed germination was recorded in decreasing trend as the infection level increased. Lower the infection level, higher the germination was observed 78% in (i) to 15% in (v) category. Seedling mortality 23% in (i) to 11% in (v), was recorded with increase in infection level.
HPKV, Palampur		The categories are prepared, and similar trend has been recorded.
Study.10.(b). Further investigation in relation to transmission of the pathogen under controlled and fields conditions will conducted in the current season for establishment of inoculum load.		

Experiment 11 : **Non-chemical management of seed-borne infection of bean anthracnose**
Objective : To manage seed-borne infection and seed health through bio-agents and organic inputs
Year of start : 2015-16
Status : Continued 2016-17
Crop : Bean (*Phaseolus* spp.)
Pathogen : *Colletotrichum lindemuthianum*
Centre : HPKV, Palampur; SKUAST, Srinagar

Results

Under non chemical management approach for seedborne infection by *Colletotrichum* sp. in bean (*Phaseolus* sp.) maximum disease control (38.4%) with least disease incidence (53.3%) and maximum seed germination (83.3%) was recorded with optimum seedling vigour (2499) as compared to untreated control where infected seeds were used that exhibited minimum seed germination (33.03%), maximum disease incidence (86.6%) and least seedling vigour (693). Seeds treated with fungicide, Carbendazim have resulted in maximum seed germination (86.6%), maximum disease control (46.2%) and seedling vigour (2771).

Table: Influence of seed treatments with organic inputs and bio-agents on the incidence of bean anthracnose

Centre	Treatments	Progress
SKUAST, Srinagar	T_1: *Trichoderma harzianum* @10g T_2: *Trichoderma viride* @10g T_3: *Pseudomonas fluorescens* @10g T_4: *Trichoderma harzianum* @10g+*Trichoderma viride* @10g T_5: *Trichoderma harzianum* @10g+*Pseudomonas fluorescens* @10g T_6: *Trichoderma viride* @10g+ *Pseudomonas fluorescens* @10g T_7: Panchgabya (alone) T_8: Panchgabya+ *Trichoderma harzianum* @10g T_9: Panchgabya + *Trichoderma viride* @10g T_{10}: Panchgabya + *Pseudomonas fluorescens*@10g T_{11}: Carbendazim 50WP@0.1% T_{12}: Healthy seed (alone) T_{13}: Infected seed (alone)	Among the non-chemical treatment seed dressed with Panchgabya with *Trichoderma viride* (T_9) exhibited promising results with 80% seed germination, 1408 seedling vigour, 21.67 % disease incidence resulting in 66.67% disease control over check as compared (T_{13}) where infected seeds were used. In untreated control seed germination 46.67%, 539 seedling vigour, disease incidence was 65%. Among chemicals seed treatment with Carbendazim 50WP @0.1% (T_{11}) was the most effective.
HPKV, Palampur		Among the non chemical treatment, combination of Panchgabya + *Trichoderma viride* (T_9) exhibited promising results with 96.67% seed germination, 2.75% seed infection as compared to control 66.67% seed germination ,2% seed infection. Seed dressing with *Trichoderma viride* @10g + *Pseudomonas fluorescens* @10g (T_6) was also promising with 97.33 seed germination and 4.79% seed infection. Seed treatment with Carbendazim (T_{11}) completely eliminated the infection of *Colletotrichum lindemuthianum*.

Bean anthracnose

Experiment 12 : **Detection and molecular characterization of BCMV of mungbean**
Objective : To determine the location of virus in parts of the seed
: To characterize the pathogen using molecular techniques
Year of start : 2015-16
Status : Continued 2016-17
Centre : AAU , Anand (as a Lead Centre)
Crop/Disease : Mungbean – Bean Common Mosaic Virus

Results

DAS-ELISA technique was employed for the detection of the virus present in the different parts of mungbean. The presence of BCMV was detected in complete seed as well as seed coat, cotyledons and embryo parts of the seed with BCMV antisera under ELISA. The infected tissues exhibited positive reaction as compared to negative control (0.126) wherein O.D. value of 3.362, 3.045, 2.593 and 2.391 were obtained in seeds, seed coat, cotyledons and embryo, respectively as given in below table.

Table : Detection of Bean Common Mosaic Virus in different parts of mungbean

Seed parts & control	O.D. value at 405 nm	Reaction
Positive Control	1.797	+
Negative Control	0.126	-
Seed	3.362	+++
Seed coat	3.045	+++
Cotyledons	2.593	+
Embryo	2.391	+
Buffer	0.844	-

+++ = Strongly positive, ++ = mildly positive, + = week reaction, - = Negative reaction

Experiment 13 : **Monitoring of seedborne viruses in vegetables , pulses and soybean and standardization of methods for detection through biological, serological and molecular techniques**

Objective : To identify the seed associated viruses in the samples obtained from various parts of the country

: To develop and standardize the nucleic acid based techniques for detection of seed associated viruses

Year of start : 2009

Status : Continued 2016-17

Centre : AAU , Anand (as a Lead Centre)

Crop/Disease : Pulses and soybean

Bean Common Mosaic Virus

Urdbean Leaf Crinkle Virus

Results

District and location	Varieties observed	Field visited	Field Infected	% Incidence of virus	Remark
Cluster bean (Bean Common Mosaic Virus)					
Farmers Field (03 districts)	01	29	12 (41.37%)	11.20-38.5	Maximum infection in Pusa Navbahar
Cowpea (Cowpea Aphid borne Mosaic Virus)					
Farmers Field (03 districts)	06	27	06 (22.22%)	5.5-9.30	Maxi infection -Pusa Phalguni
Mungbean (Urdbean Leaf Crinkle Virus)					
Farmers Field (03 districts)	05	49	01 (2.04%)	Up to 0.1	No infection in -Meha, K 851, GM3
Seed Production (04 districts)	04	07	00	00	No infection in Meha, K 851, GM3,4
Soybean (Soybean Mosaic Virus)					
Farmers Field (03 districts)	05	14	03 (21.42%)	2.35 -4.0	No infection in – JS 335, GS2
Seed Production (02 districts)	02	03	00	00	No infection in -plots - NRC 37

Cowpea Bean mosaic virus (CpBCMV) in Cowpea					
Farmers Field (01 districts)	06	-	-	0.07 -01.7	Max. GC 5
Cowpea Golden mosaic virus (CpGMV) in Cowpea					
Farmers Field (01 districts)	06	-	-	0.07 -01.7	No infection in -AVCP1, GDVC2, GC3
Yellow Mosaic Virus in Black gram					
Farmers Field (01 districts)	02	-	-	2.10 -3.8	Max infection in- T9 & GU1

Experiment 14 : **Standardization of bio priming technique for management of Fusarium wilt of safflower**
Objective : To standardize the technique for effective economical technique of bio priming
Year of start : 2015-16
Status : Continued 2016-17
Centre : MPKV Rahuri (as Lead Centre)
Crop/Disease : Safflower - Wilt (*Fusarium carthamii*)
Methodology : Bio priming biological agents and subsequent testing for germination , emergence and disease incidence in field

Results

Bio priming of safflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each resulted in least association (11.0%) of *Fusarium carthamii* with enhanced seed germination (94.0%), emergence (89.60%) and reduced wilt incidence (11.0%), disease control over check (76.60%) and yield (14.45q/ha) as compared to 39.0% association, 78.0% germination, 75.0% emergence, 47.0% wilt incidence and yield (12.38q/ ha).

Fusarium wilt of safflower

Table: Influence of bio priming on association of seedborne *Fusarium carthamii* and subsequently incidence of wilt of safflower under conditions of Rahuri, Maharashtra (2016-17)

Bio priming with per kg of seed	*Fusarium carthamii* Association*	Percent seed Germination	Percent field Emergence	Percent Wilt Incidence	Percent disease control	Yield q/ha
Trichoderma viride @10g	20.0 (26.56)**	86.0 (68.07)**	82.0 (65.38)**	20.0 (25.78)**	57.45	13.39
Trichoderma harzianum @10g	18.0 (25.10)	87.0 (68.88)	83.0 (65.67)	19.0 (25.88)	59.57	13.56
Pseudomonas fluorescens @10g	20.0 (26.55)	85.0 (67.57)	82.0 (64.94)	22.0 (27.92)	53.19	12.97
Bacillus subtilis @10g	23.0 (28.65)	85.0 (67.24)	80.0 (63.45)	23.0 (28.65)	51.06	12.76
Trichoderma viride + *Pseudomonas fluorescens* @ 05 g each	13.0 (21.10)	92.0 (73.59)	87.0 (68.99)	14.0 (21.96)	70.21	14.19
Trichoderma harzianum + *Pseudomonas fluorescens* @ 05 g each	11.0 (19.36)	94.0 (75.85)	89.0 (70.68)	11.0 (19.36)	76.60	14.45
Trichoderma viride + *Bacillus subtilis* @05 g each	16.0 (23.57)	90.0 (71.66)	84.0 (66.45)	17.0 (24.33)	63.83	14.17
Trichoderma harzianum + *Bacillus subtilis* @ 05 g each	14.0 (21.94)	91.0 (72.56)	86.0 (68.08)	16.0 (23.53)	65.96	13.63
Untreated control	39.0 (38.64)	78.0 (62.08)	75.0 (60.01)	47.0 (43.28)	--	12.38
SE±	0.70	1.39	1.67	1.94	--	0.43
CD at 5%	2.07	4.13	5.02	5.81	--	1.30
CV %	4.70	3.46	14.40	12.55	--	15.56

*Association of the fungus was determined with standard Blotter method (ISTA, 1996)
**Figures in parenthesis is arc sin value

Experiment 15 : **Standardization of bio priming technique for management of *Alternaria helianthi* associated with sunflower seeds**
Objective : To standardize the technique for effective economical technique of bio priming
Year of start : 2015-16
Status : Continued 2015-16
Centre : MPKV Rahuri (as Lead Centre)
Crop/Disease : Sunflower- Leaf blight (*Alternaria helianthi*)
Methodology : Bio priming biological agents and subsequent testing for germination, emergence and disease incidence in field

Sunflower- Leaf blight (*Alternaria helianthi*)

Results

Bio priming of sunflower seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 05 g each resulted in least association (11.0%) of *Alternaria helianthi* with enhanced seed germination (81.33%), field emergence (75.0%) and reduced incidence of blight (39.0%), disease control over check (50 %)and yield (21.84q/ha) as compared to 45.33% association, 68.33% germination, 65.0% emergence, 78.0% incidence of blight and yield (17.84q/ha).

Table: Influence of bio priming on association of seedborne *Alternaria helianthi* and subsequently incidence of blight of sunflower under conditions of Rahuri (2016-17)

Bio priming with per kg of seed	*Alternaria helianthi* Association*	Percent seed Germination	Percent field Emergence	Percent blight Incidence	Percent disease control	Yield q/ha
Trichoderma viride @10g	18.0 (25.10)**	74.67 (59.81)**	71.0 (57.43)**	54.0 (47.61)**	30.77	19.80
Trichoderma harzianum @10g	17.67 (24.85)	75.0 (60.01)	71.33 (57.66)	52.0 (46.17)	33.33	20.38
Pseudomonas fluorescens @10g	22.0 (27.97)	74.0 (59.35)	70.66 (57.21)	55.0 (47.87)	29.49	18.62
Bacillus subtilis @10g	22.66 (28.43)	73.66 (59.13)	70.33 (57.00)	57.0 (49.03)	26.92	18.40
Trichoderma viride + *Pseudomonas fluorescens* @ 05 g each	13.0 (21.13)	79.0 (62.74)	73.67 (59.13)	42.0 (40.40)	46.15	21.31
Trichoderma harzianum + *Pseudomonas fluorescens* @ 05 g each	11.0 (19.36)	81.33 (64.41)	75.0 (60.01)	39.0 (38.64)	50.00	21.84
Trichoderma viride + *Bacillus subtilis* @ 05 g each	17.33 (24.58)	77.0 (61.35)	72.0 (58.05)	47.0 (43.27)	39.74	21.04
Trichoderma harzianum + *Bacillus subtilis* @ 05 g each	16.0 (23.57)	78.0 (62.04)	72.33 (58.27)	46.0 (42.70)	41.03	20.82
Untreated control	45.33 (42.32)	68.33 (55.76)	65.0 (53.74)	78.0 (62.06)	-	17.84

*Association of the fungus was determined with standard Blotter method (ISTA, 1996)

**Figures in parenthesis is arc sin value

Experiment 16	:	**Management of *Alternaria solani* through seed treatment and foliar application of new fungicides**
Objective	:	(i) To determine the influence of fungicide application of the quality of harvested seeds and fruits (ii) To determine the transmission of pathogen from seed to plant
Year of start	:	2016
Status	:	Continued 2016-17
Centre	:	AAU , Anand
Crop/Disease	:	Tomato- *Alternaria solani*
Methodology	:	Basic seed treatment with Thiram @0.25% and later subsequent 2/3 foliar application of fungicides after first appearance of disease. Fungicide : 9+1, replication :3 and design : RBD

Results

To determine the influence of fungicide application on the development of disease of tomato, experiment has been laid out and observations are under progress. Results will be submitted later.

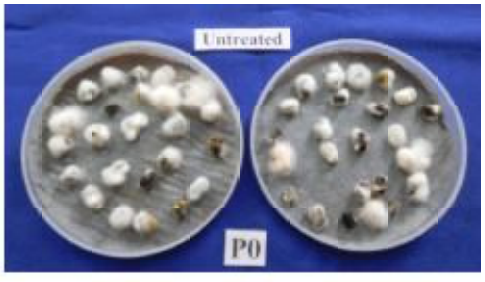
Experiment 17	:	**Impact of different storage conditions and longevity on seed associated mycoflora of green gram / black gram**
Objective	:	To determine the extent of association of mycoflora with freshly harvested seeds
	:	To determine the influence of fungicide treatment on development of mycoflora and its impact on seed quality parameters under different storage conditions and periods
Year of start	:	2016
Status	:	Continued 2016-17
Centre	:	TNAU , Coimbatore ; PAJANCOA, Karaikal
Crop/Disease	:	Black gram – species of *Macrophomina , Colletotrichum , Fusarium , Aspergillus* and *Cercospora*

Methodology

Seeds of black gram (COBG 10-06) were tested for seed moisture, germination, seedling vigour and associated *Fusarium* sp. and *Macrophomina* sp. One portion of seed lot was treated (T) with Carboxin+ Thiram @0.25% and other part was untreated (UT). Treated and untreated seeds were stored in cloth bags (CB), gunny bags (GB) and polylined gunny bags (PGB) and tested up to 150day of storage at 30day interval.

Results

Seeds from cloth bags



Freshly harvested seeds of black gram

Seeds from Gunny bag

Seeds from Polylined bags

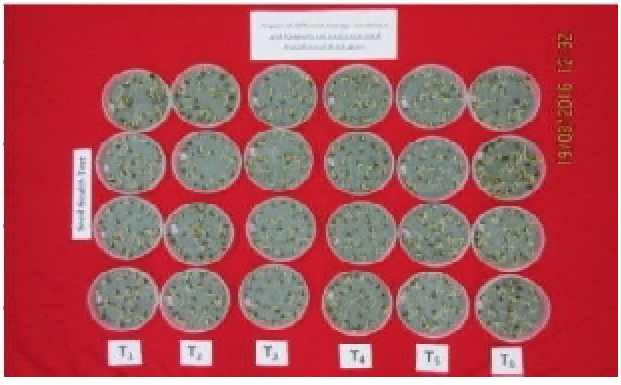
Table: Impact of seed dressing with fungicide and containers

Parameter	Range up to 150day of storage	Remark
	PGB storage was superior over CB & GB	
Seed moisture	8.9 to 10.7%	No difference in T & UT
Seed germination	91 to 85%	91.3-89% Treated in PGB
		91.3-88% Untreated in PGB
Seedling emergence	94-79%	89.32% Treated in PGB
		88.60% Untreated in PGB
Vigour Index	3531.9-2496.0	2804.6 Treated in PGB
		2687.4 Untreated in PGB

Experimental materials

Field emergence

Seed germination test



Seed health test

Table: Impact of seed dressing with fungicide

Treated and untreated seeds stored in cloth bags (CB), gunny bags (GB) and polylined gunny bags (PGB) and tested up to 150day of storage at 30day	
Seed treatment with Carboxin+ Thiram @0.25%	
Association of *Macrophomina*	10.2-2.0% in UT up to 60 day , later no infection
	No infection in Treated seeds till 150 day of storage
Association of *Fusarium*	No infection up to 60day in treated seeds ,later infection up to 3.3% in cloth bags , then increased upto30% in CB at 150 day
	No infection in PGB up to 150day
PAJANCOA & RI, Karaikal	
The effect of seed treatment was significant on seed germination, seed infection and seedling vigour in terms of dry weight of seedlings and vigour index I and II. The influence of container was significant on seed infection only. However, all the seed quality attributes were affected by the period of storage. Between treatments, seeds treated with Vitavax 200 @ 2g/kg of seeds had maintained significantly higher germination, vigour indices with reduced seed infection after four months of storage under ambient condition of coastal environment at Karaikal, the coastal district located in the Bay of Bengal. The influence of seed treatment was highly significant on seed infection as observed in terms of 2.1 per cent in treated seeds as against 36.9 per cent in untreated seeds. Among the containers, Polylined gunny bag registered the least seed infection (15.1%) followed by Cloth bag (17.7%).	

Experiment 18 : **Detection ,location and transmission of seedborne *Macrophomina phaseolina* in sesame**
Objective : To determine the transmission of seedborne target pathogen
Year of start : 2016
Status : Continued 2016-17
Centre : TNAU , Coimbatore
Crop/Disease : Sesame- *Macrophomina phaseolina*

Results

Detection of *Macrophomina phaseolina*

Out of three methods employed, Standard Blotter method was the most suitable .Out of seed samples of ten sesame varieties tested , VRI 1 exhibited maximum (8.0%)association.

Table . Association of *Macrophomina phaseolina* as detected by three methods

Method	Range of infection of	Maximum infection	No infection
Standard Blotter	1.0-8.0	VRI 1	TMV 5, TMV6,TMV 7, Paiyur 1
Standard agar plate	3.0-6.0	VRI 1	
Test tube water agar	2.0-3.5	VRI 1	

Location of *Macrophomina phaseolina*

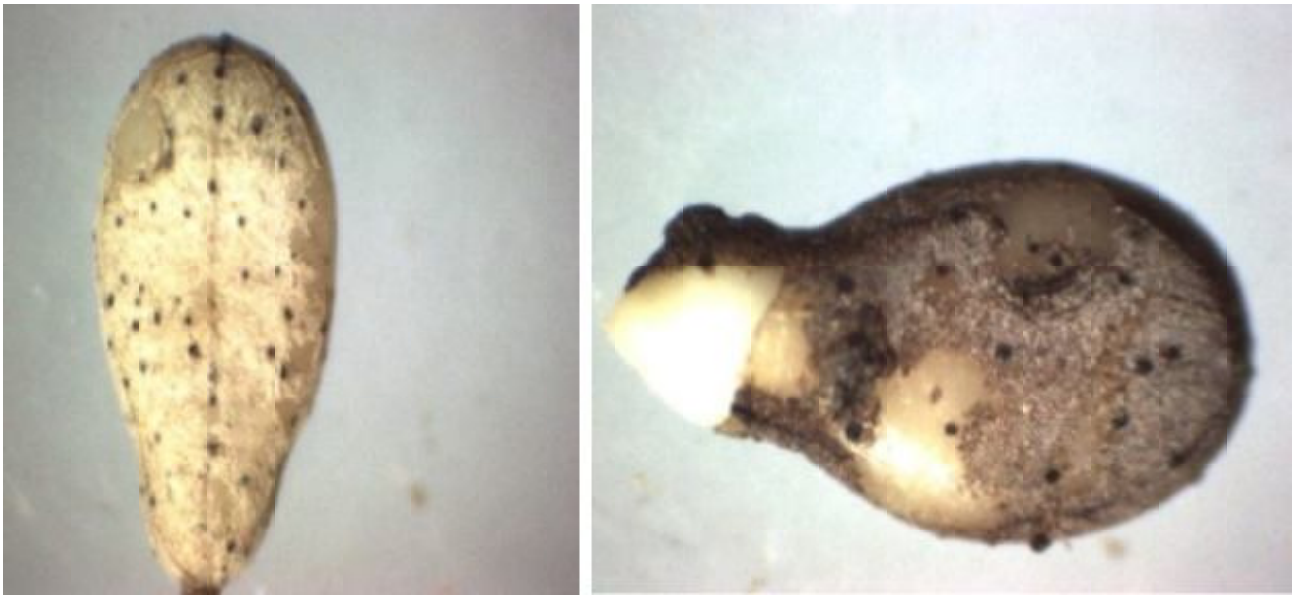
Seed component technique indicated the presence of the fungus in seed coat, cotyledon and embryo. Internally and externally seedborne nature is established, during the present investigation.

Transmission - seed to plant

Seed to plant transmission of the pathogen was established through sowing of the infected seeds in sterile soil and subsequent isolation of the fungus from young infected plants

Transmission -plant to seed

Transmission was confirmed by artificial inoculation of the developing capsules and examination, later recovery of the pathogen from the extracted seeds.



Scattered pycnidia of *Macrophomina phaseolina* on sesame seed surface

Experiment 19	:	**Management of purple blotch/ Stemphylium blight of onion through fungicide and plant based products**
Objective	:	To determine the influence of fungicide application on the quality of harvested seed and development of diseases
Year of start	:	2016
Status	:	Continued 2016-17
Centre	:	PAU, Ludhiana
Crop/Disease	:	Onion – *Alternaria porri*
Methodology	:	Basic seed treatment with Captan + Thiram and subsequent 2/3 foliar application of with 9+1 treatment using RBD with 3 replications

Results

To determine the influence of fungicide application on the development of disease of onion, experiment has been laid out and observations are under progress. Results will be submitted later.

Experiment 20	:	**Efficacy of biologically synthesized metal oxide nano –particles on mycoflora associated with green gram seeds and impact on seed quality parameter**
Objective	:	To study the effect of biologically synthesized nano-particle on seed associated mycoflora; impact on seed quality characters.
Year of start	:	2016
Status	:	Continued 2016-17
Centre	:	PJSTAU, Hyderabad
Crop/Disease	:	Green gram - *Macrophomina phaseolina, Fusarium oxysporum, Colletotrichum dematium, Cercospora* spp., *Aspergillus* spp.
Methodology	:	Basic seed treatment with biologically synthesized nano-particles of ZnO, MgO and AgO @ 2,3 and 4 ppm

Results

Zinc oxide (ZnO) and magnesium oxide (MgO) nano-particles @ 4ppm were superior in reducing seed infection and maintained seedling vigour and seed germination over control and other treatments. Silver oxide (HgO) nano-particles were not effective at 2 and 4ppm, however, were effective at 3ppm, up to 6 months period of storage after treatment.

Table: Effect of biologically synthesized metal oxide nano-particles on mycoflora associated with green gram seeds and impact on seed quality parameters

Treatments	Germination (%)		Seed ling vigor index		Seed infection (%)	
Treatments	3 MAT	6MAT	3 MAT	6MAT	3 MAT	6MAT
ZnO @2ppm	99.0 (83.0)	96.7 (79.6)	2275	2233	7.0 (15.2)	8.03 (16.2)
ZnO @3 ppm	99.0 (83.0)	94.7 (76.7)	2303	2509	2.79 (9.4)	5.72 (13.6)
ZnO @4 ppm	100 (85.9)	98.0 (82.0)	2300	2624	1.92 (7.92)	2.22 (8.44)
MgO @2ppm	90.0 (71.6)	92.7 (74.3)	2408	2439	1.09 (6.24)	6.28 (14.4)
MgO @3 ppm	89.0(70.3)	96.0 (79.1)	2425	2499	0.00 (4.05)	3.05 (10.4)
MgO @4ppm	99.0(83.0)	98.7 (83.2)	2625	2667	0.00 (4.05)	1.39 (6.85)
Ag @ 2 ppm	83.0 (65.5)	79.3 (62.9)	1393	776	5.00(12.8)	8.86 (17.2)
Ag @ 3 ppm	100 (85.9)	96.7 (79.6)	2663	2659	2.50 (9.00)	1.94 (7.89)
Ag @ 4 ppm	88.0 (68.6)	73.3 (58.9)	2121	1269	3.34 (10.5)	18.3 (25.2)
Control	88.0 (70.2)	86.7 (68.6)	2270	1618	10.6 (18.9)	12.7 (20.9)
CV (%)	3.47	3.29	4.09	5.42	15.1	15.9
CD at 5% level	4.55	4.18	157	196	2.87	3.30

Experiment 21 : **Detection , location and transmission of seedborne *Alternaria sesami* in sesame**
Objective : To determine distribution , methods of detection and transmission of the pathogen
Year of start : 2016
Status : Continued 2016-17
Centre : PJSTAU, Hyderabad
Crop/Disease : Sesame - *Alternaria sesami*

Results

Association with seeds

Out of 32 seed samples, collected from farmer's field (26), experimental field (5) and seed production plots (1), 18 samples (56%) were infected with *Alternaria sesami* as detected by standard blotter method. Seed germination was above MSCS in all the samples

Table: Association of *Alternaria sesami* with seed samples from different sources

Source / field	Sample tested	Sample infected	Range of infection (400 seeds)		Percent seed germination
			Minimum	Maximum	
Farmer	26	14	0.25	5.5	86
Research	05	03	0.50	4.0	89
Seed production	01	01	0.00	0.0	87

Efficacy of detection methods

Results: Out of three methods used, Standard agar plate method resulted in maximum recovery of the fungus (28%) as compared to standard blotter method (16.25%) and Test tube water agar method (13.25%). The presence of the fungus was confirmed in all the seed parts except embryo. Association with seed coat (24%), pericarp (16%) and endosperm (9%) was noticed employing the seed component plating technique.

Transmission seed to plant

Results: Seed to plant transmission was confirmed, using seeds from naturally infected capsules by employing standard paper towel method (36% infection) and sowing of seeds in sterile soil (20%). Seedling infection by *Alternaria sesame* was noticed and Koch's postulate was established for testing of virulence of the isolated fungus.

Transmission plant to seed

Results: Under field conditions, developing sesame capsules were inoculated with spore suspension of *Alternaria* (5X10 spores /ml). Typical symptoms of blight appeared on 8th day of inoculation, which progressed with maturity. The seeds from infected capsules were analyzed and association of the target fungus was confirmed indicating the transmission of the fungus from plant to seed.

Seedling infection (*Alternaria sesame*)

Capsule infection

Pure culture

Spores of *Alternaria sesame*

Seed Entomology

भाकृअनुप
ICAR

D. Seed Entomology

Experiment 1 : Studies on the effect of insecticidal seed treatment on seed viability during storage under ambient condition.

Objectives:

1. To evaluate newer molecules against major storage insect-pests damaging seeds.
2. Study of the storability of treated seeds.

Year of start/ modification: 2012/ 2013

Crop	Centre
Wheat	SKNAU, Durgapura; IISS, Mau
Maize	TNAU, Coimbatore; UAS, Bangalore
Pearl millet	JAU, Jamnagar; MPKV, Rahuri
Paddy	OUAT, Bhubaneswar; AAU, Jorhat; PJTSAU, Hyderabad
Pigeon pea	NDUAT, Faizabad; UAS, Raichur; PDKV, Akola
Cowpea	UAS, Bangalore
Mungbean	SKNAU, Durgapura; OUA&T, Bhubaneswar; MPKV, Rahuri
Chickpea	PJTSAU, Hyderabad; JAU, Jamnagar;
Black gram	TNAU, Coimbatore
Field pea	CSAUAT, Kanpur

Treatment:

A. Chemical

1. Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)
2. Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)
3. Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)
4. Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)
5. Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)
6. Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)
7. Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed)
8. Deltamethrin 2. 8 EC @ 1.0 ppm (0.04 ml/kg seed)
9. Untreated control

B. Packaging Material: Gunny bag-lets of 2 kg capacity

Replications: 3 **Design:** CRD

Results

A. Wheat: (Tables 1.1 to 1.6)

SKNAU, Durgapura

All the treatments except rynaxypyr maintained seed germination above IMSCS (Indian Minimum Seed Certification Standards-85%) after six months of storage, but emamectin benzoate, novaluron and deltamethrin were highly effective providing complete protection{ID (insect damage)-nil} against storage insects. All other newer insecticides recorded 1.7-11.7% insect damage, while untreated control recorded 77% seed germination and 17.7% insect damage after six months of storage.

Although seed germination was maintained above IMSCS up to nine months of storage in case of seed treatment with emamectin benzoate, spinosad and deltamethrin but insect damage (1.7-8.0%) was beyond permissible limit. However, emamectin benzoate and deltamethrin seed treatment recorded 1.7% and 2.3% insect damage respectively after nine months of storage while control recorded 41% insect damage. Emamectin benzoate and deltamethrin treatment maintained very high seed germination (91-94%) up to 12 months of storage and recorded very low insect damage (2.3-3.7%) compared to other seed treatments.

IISS, Mau

All the treatments maintained seed germination above IMSCS up to six months of storage but emamectn benzoate, spinosad, indoxacarb and chlorfenapyr restricted insect damage (0.2-0.4%) within permissible limit. After nine months of storage emamectin benzoate and spinosad maintained seed germination above IMSCS (85-87%) but only emamectin benzoate restricted insect damage within permissible limit (ID 0.30%). Other insecticides recorded 0.9-4.1% insect damage whereas control recorded 48.2% insect damage and 71% seed germination after nine months of storage.

Cumulative mortality of *R. dominica* adults was 90-93% within 7 days of release in emamectn benzoate, spinosad, indoxacarb and deltamethrin treated seed stored for nine months whereas cumulative mortality was 100% within 15 days of release in emamectn benzoate, spinosad, indoxacarb, Chlorfenapyr and deltamethrin treated seed stored for nine months.

B. Maize

TNAU, Coimbatore

All the treatments restricted insect damage (ID 0.0-0.01%) within permissible limit and maintained required seed germination standard under IMSCS (90%) after six months of storage. Control recorded 90.7% seed germination and 2.0% insect damage after six months of storage. After nine months of storage all the insecticidal treatments (ID 0.24-0.60%) were significantly superior to the control (ID 3.73%) but failed to maintain seed germination above IMSCS (G 84-85%).

UAS, Bangalore

After six months of storage all the treatments including control maintained seed germination (90.7-97.7%) above IMSCS but only emamectin benzoate and spinosad restricted insect damage within permissible limit (ID

0.50-0.67%). After nine months of storage all the insecticidal treatments except novaluron maintained seed germination (95.3%) above IMSCS but only spinosad restricted insect damage (0.75) within permissible limit. Control recorded 88% seed germination and 5.25% insect damage after nine months of storage.

C. Pearl millet

JAU, Jamnagar

All insecticidal treatments maintained high seed germination (81-83%) compared to control (78%) after nine months of storage. Among the insecticidal treatments emamectin benzoate, spinosad, indoxacarb, profenofos and deltamethrin provided complete protection up to nine months of storage whereas other insecticidal treatments recorded 0.67-1.0% insect damage. Control recorded 12% insect damage after nine months of storage. After 12 months of storage all the treatments failed to meet both the standards (G 72-74% and ID 1.0-2.33%). Cumulative mortality of *R. dominica* adults was 50-76.7% within 15 days of release in all insecticides treated seed stored for 12 months. Emamectin benzoate was most toxic with 76.7% cumulative toxicity followed by deltamethrin, profenofos and spinosad.

MPKV, Rahuri

All the insecticidal treatments maintained seed germination above IMSCS after six months of storage and restricted insect damage within permissible limit (ID 0.0-0.33%). After nine months of storage only emamectin benzoate, spinosad, and deltamethrin treated seeds were able to meet both the standards of seed germination and insect damage. Control recorded 63% seed germination and 6.0% insect damage after nine months of storage. After twelve months storage all the treatments failed to meet both the standards.

D. Paddy

OUA&T, Bhubaneswar

After three months of storage, all the treatments recorded germination above IMSCS (87-93%) but only emamectin benzoate, spinosad, chlorfenapyr and deltamethrin treated seeds restricted insect damage within permissible limit (0.17-0.5%).In other seed treatments insect damage was beyond permissible limit.

After 6 months of storage spinosad, chlorfenapyr and deltamethrin maintained seed germination above IMSCS and restricted insect damage (0.50%) within permissible limit up to six months of storage. Emamectin benzoate and chlorfenapyr recorded 96.7% cumulative mortality within 15 days of adult release in treated seed stored for six months whereas spinosad and deltamethrin recorded 93.3% cumulative mortality within 15 days of adult release.

AAU, Jorhat

After nine months of storage all the treatments except control maintained seed germination above the IMSCS but only rynaxypyr, deltamethrin, profenofos, spinosad and emamectin benzoate could restrict insect damage within permissible limit. Control recorded 77% seed germination and 5.0% insect damage. After twelve months of storage rynaxypyr and deltamethrin restricted insect damage (ID 0.33-0.42%) within permissible limit but failed to meet the standards of seed germination. Control recorded 67% seed germination and 9.7% insect damage.

PJTSAU, Hyderabad

All the treatments except indoxacarb maintained seed germination (91-96%) above IMSCS up to 12 months of storage but only spinosad provided complete protection (ID-nil). All other treatments failed to restrict insect damage within permissible limit (ID 1.45-9.47%) whereas control recorded 63.3 % seed germination and 12% insect damage after 12 months of storage.

E. Pigeon Pea

NDUA&T, Faizabad

After six months of storage, all the treatments recorded seed germination above IMSCS (76-80%). All the insecticidal treatments were significantly better than untreated control but only emamectin benzoate, spinosad and novaluron could restrict insect damage (ID 0.67-1.0%) within permissible limit. Other insecticidal treatments recorded 1.3-2.7% insect damage after six months of storage. Control recorded 7.7% insect damage and 67% seed germination after six months of storage.

PDKV, Akola

All the treatments restricted insect damage (0.10-0.33%) within permissible limit and maintained seed germination (76-85%) above IMSCS up to six months of storage. All the treatments restricted insect damage within permissible limit up to nine months of storage but emamectin benzoate, spinosad, profenofos, novaluron and deltamethrin were significantly better than other treatments. All the treatments except chlorfenapyr, profenofos and novaluron maintained seed germination (75-83%) above IMSCS up to nine months of storage. After twelve months of storage, only emamectin benzoate and deltamethrin maintained seed germination (78-81%) above IMSCS and restricted insect damage (0.33-036%) within permissible limit whereas control recorded 62.3% seed germination and 1.9% insect damage.

F. Mungbean

SKNAU, Durgapura

All the insecticidal treatments maintained seed germination (87-97%) above IMSCS but only emamectin benzoate and deltamethrin provided complete protection (ID-nil) against pulse bruchid infestation in mungbean seed up to six months of storage. Other insecticidal treatments failed to restrict insect damage within permissible limit (ID-2-8%). About 12% seed was damaged in control and recorded only 82% seed germination. Although emamectin benzoate, spinosad, novaluron and deltamethrin recorded seed germination above IMSCS after nine months of storage but failed to provide adequate protection against pulse beetles (ID 1.7-10.3%). After12 months of storage only emamectin benzoate and deltamethrin maintained seed germination above IMSCS and recorded 2.7% 3.7% insect damage respectively while control was having 78% insect damage.

MPKV, Rahuri

All the insecticidal treatments maintained seed germination above IMSCS after six months of storage and restricted insect damage within permissible limit (<1.0% ID). After nine months of storage only emamectin benzoate, spinosad, and deltamethrin treated seeds were able to meet both the standards of seed germination and insect damage. Control recorded 62% seed germination and 9% insect damage after nine months of storage.

After twelve months of storage, all the treatments failed to meet both the standards of seed germination and insect damage. Cumulative mortality ranged between 40-60% within 7 days of adult release on emamectin benzoate, spinosad, and deltamethrin treated seed stored for nine months.

OUA&T, Bhubaneswar

After six months of storage, emamectin benzoate, spinosad, chlorfenapyr, profenofos and deltamethrin maintained seed germination above IMSCS (75-83%) but only emamectin benzoate, spinosad and deltamethrin restricted insect damage within permissible limit. Control recorded 10.3% insect damage and 68.3% seed germination after six months of storage. Cumulative mortality ranged between 63.3-83.3% within 7 days of adult release in treated seed stored for six months spinosad being most effective followed by emamectin benzoate and deltamethrin (cumulative mortality-76.7%).

G. Chick pea

JAU, Jamnagar

All insecticidal treatments except chlorfenapyr, rynaxypyr and novaluron (ID 0.67-1.0%) provided complete protection (ID-nil) up to nine months of storage while control had 18.7% insect damage. All insecticidal treatments maintained significantly high seed germination (87—88%) compared to control (84%) after nine months of storage. After 12 months of storage all the insecticidal treatments failed to meet both the standards. Per cent seed germination ranged from 83 to 84 and per cent insect damage ranged between 5.7-10.9 while control recorded 77% seed germination and 29.2% insect damage after 12 months of storage. Cumulative mortality of *C. chinensis* adults was in the range of 60-87% within 7 days of release in all insecticide treated seeds stored for nine months whereas cumulative mortality ranged between 56-83% within 7 days of release in all insecticide treated seeds stored for 12 months.

PJTSAU, Hyderabad

After 12 months of storage, all the treatments maintained seed germination above IMSCS (93-100%) but spinosad, chlorfenapyr and indoxacarb treated seeds restricted insect damage (ID 0.0-0.34%) within permissible limit. Among these treatments spinosad, chlorfenapyr treated seeds remained free from insect damage upto 12 months of storage while control recorded 9.4 % insect damage.

H. Black gram

TNAU, Coimbatore

After nine months of storage all the insecticidal treatments provided reasonable control of insect infestation (within permissible standard) and maintained seed germination (90-92%) above IMSCS while untreated control recorded 2.2% insect damage. After twelve months of storage although all the insecticidal treatments maintained seed germination above IMSCS but failed to restrict insect damage within permissible standard (ID 1.5-1.9%) while control recorded 6.9% insect damage. Cumulative mortality of *Callosobruchus* sp. adults was in the range of 26.6-36.6% within 15 days of release in emamectin benzoate and indoxacarb treated seeds stored for twelve months while mortality was not observed in other insecticide treated seeds.

I. Field pea

CSAUA&T, Kanpur

After nine months of storage all the insecticidal treatments maintained seed germination above IMSCS (80-84%) but only spinosad, rynaxypyr, chlorfenapyr and deltamethrin restricted insect damage within permissible limit (ID 0.66-1.0%) and maintained seed germination above IMSCS. Control recorded 77.7% seed germination and 2.66% insect damage after six months of storage. After 12 months of storage all the treatments maintained

seed germination above IMSCS but none of the seed treatments except deltamethrin restricted insect damage within permissible limit.

I. Cow pea

UAS, Bangalore

All the treatments including control maintained seed germination (G 93.3-95.3%) above IMSCS up to six months of storage and insect damage was not observed in any of the seed treatments except novaluron. Control recorded 93.3% seed germination and 0.75% insect damage after six months of storage. Cumulative per cent mortality ranged between 47-80% within 15 days of adult release on 6 months stored treated seeds spinosad being the most effective and novaluron being the least effective insecticide.

Conclusions: There were variations in results due to differences in seed materials, ambient conditions or prevailing insect pests, their density and proximity to stored material. All those treatment(s) where seed germination was above IMSCS and insect damage (ID) was within permissible limit under IMSCS i.e. 1% for maize and pulses and 0.5% for other crop seeds were taken as effective and safe for seed. Results indicated that Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed), Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed) were at par with Deltamethrin (Decis 2.8 EC) @1.0 ppm and provided control of storage insects infesting cereals and pulses under different agro-climatic conditions up to 6-9 months. Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed),Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed), Rynaxypyr (Coragen 20 SC) @ 2ppm (0.01ml/kg seed) and Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed) were also effective to some extent in some of the centres but were not as effective as Emamectin benzoate, Spinosad or Deltamethrin.

Table 1.1: Effective seed treatment insecticide molecules and storage periods for different crops at various centres

Crop	Centre	Variety / Hybrid	Safe period of storage (months)	Effective treatments
Wheat	SKNAU, Durgapura	Raj 3765	6	Emamectin benzoate, novaluron and Deltamethrin
	IISS, Mau	-	9	Emamectin benzoate
Maize	TNAU, Coimbatore	COH (M) 5	6	All insecticidal treatments
	UAS, Bangalore	-	9	spinosad
Pearl millet	JAU, Jamnagar	GHB 558	9	Emamectin benzoate, spinosad, indoxacarb, profenofos and deltamethrin
	MPKV, Rahuri	-	9	Emamectin benzoate, Spinosad and Deltamethrin
Paddy	OUA&T, Bhubaneswar	Parijat	6	Spinosad and deltamethrin
	AAU, Jorhat	Dishang	9	Rynaxypyr, deltamethrin, profenofos, spinosad and emamectin benzoate
	PJTSAU, Hyderabad	MTU 1010	12	Spinosad
Pigeon pea	NDUA&T, Faizabad	NDA-1	6	Emamectin benzoate, spinosad and novaluron
	PDKV, Akola;	PKV-Tara	12	Emamectin benzoate, and Deltamethrin

Mung bean	SKNAU, Durgapura	RMG-492	6	Emamectin benzoate, deltamethrin
	OUA&T, Bhubaneswar	local	6	Emamectin benzoate, spinosad and deltamethrin
	MPKV, Rahuri	-	9	Emamectin benzoate, spinosad and deltamethrin
Chick pea	JAU, Jamnagar	GG-3	9	All insecticidal treatments
	PJTSAU	NBeG-3	12	Spinosad, chlorfenapyr indoxacarb
Black gram	TNAU, Coimbatore	VBN 3	9	All insecticidal treatments
Field pea	CSAUA&T, Kanpur	KPMR-400	9	Spinosad, rynaxypyr, chlorfenapyr and deltamethrin
Cow pea	UAS, Bangalore	-	6	All insecticidal treatments

Table 1.2: Effect of insecticidal seed treatment on per cent seed germination and percent insect damage in wheat and maize seeds

Treat.	Crop	Wheat										Maize							
	Centres	SKNAU, Durgapura						IISS, Mau				TNAU, Coimbatore				UAS, Bangalore			
	Storage duration	6 months		9 months		12 months		6 months		9 months		6 months		9 months		6 months		9 months	
	Treatments	*G	*ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1	Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)	96.3	0.0	95.0	1.7	94.3	2.3	89	0.2	87	0.3	91.0	0.01	85	0.24	96.7	0.67	94.0	1.17
T_2	Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)	94.3	2.0	88.0	8.0	84.0	11.7	91	0.3	85	0.9	91.3	0.00	85	0.33	97.7	0.50	95.3	0.75
T_3	Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)	87.0	9.3	81.7	14.0	75.3	20.0	89	0.4	84	1.7	91.7	0.01	85	0.5	94.0	1.42	91.0	1.83
T_4	Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)	83.7	11.7	79.3	17.3	70.0	24.3	87	1.5	83	4.1	92.3	0.01	85	0.36	95.7	1.25	92.7	1.67
T_5	Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)	88.0	7.3	81.0	14.0	64.7	30.0	89	0.3	80	1.6	90.7	0.01	85	0.6	92.7	1.75	91.7	2.25
T_6	Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)	95.0	1.7	82.7	12.7	73.0	20.3	87	0.8	82	3.2	91.0	0.01	85	0.23	91.3	2.00	90.3	2.58
T_7	Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed	96.0	0.0	82.0	12.0	77.0	18.0	87	0.7	81	1.7	90.7	0.00	84	0.45	91.0	2.17	89.7	3.08
T_8	Deltamethrin 2.8 EC @ 1 ppm (0.04 ml/kg seed)	96.3	0.0	94.3	2.3	91.0	3.7	89	0.6	81	1.0	91.0	0.00	85	0.33	96.0	1.00	93.0	1.25
T9	Untreated control	76.7	17.7	53.7	41.3	22.3	70.7	83	13.8	71	48.2	90.7	2.00	85	3.73	90.7	2.75	88.0	5.25

*G- per cent seed germination and ID- per cent insect damage

Table 1.3: Effect of insecticidal seed treatment on seed germination and insect damage in paddy and pearl millet seeds

Symbol	Crop	Paddy												Pearl millet							
	Centres	OUAT, Bhubaneswar				AAU, Assam				PJTSAU, Hyderabad				JAU, Jamnagar				MPKV, Rahuri			
	Storage duration	3 months		6 months		9 months		12 months		9 months		12 months		9 months		12 months		9 months		12 months	
	Treatments	*G	*ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1	Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)	92.7	0.17	84.7	0.5	81.7	0.50	78.7	1.50	94.7	0.88	93.0	1.45	82.7	0.00	74.3	1.00	80.0	0.33	63.0	1.67
T_2	Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)	91.3	0.33	82.0	0.83	81.0	0.42	79.0	1.33	97.0	0.00	96.0	0.00	81.7	0.00	73.7	1.00	79.7	0.33	64.3	2.00
T_3	Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)	87.67	1.0	77.7	1.83	81.0	0.58	77.0	1.00	82.7	1.17	75.0	1.51	82.0	0.00	72.7	1.33	74.0	1.00	61.0	3.33
T_4	Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)	89.0	0.67	80.3	1.5	81.0	0.17	72.7	0.33	95.7	4.60	91.3	7.52	81.7	1.00	72.0	1.33	70.0	1.33	58.3	3.00
T_5	Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)	89.7	0.50	80.7	0.83	82.3	0.67	75.7	1.00	94.7	0.67	94.0	0.70	82.0	0.67	71.7	1.67	68.0	2.00	54 .0	4 .00
T_6	Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)	87.0	1.33	75.0	2.33	81.0	0.42	74.3	0.83	96.0	1.88	95.0	2.29	81.7	0.00	72.0	1.00	72.0	1.00	63.3	2.00
T_7	Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed	86.7	1.67	75.3	2.33	80.7	1.33	72.0	1.83	94.0	4.50	91.7	9.47	81.0	1.00	71.7	2.33	68.0	2.00	57.0	4.33
T_8	Deltamethrin 2.8 EC @ 1 ppm (0.04 ml/kg seed)	90.3	0.33	82.7	0.5	82.3	0.08	78.3	0.42	89.0	0.77	91.3	2.12	82.3	0.00	72.7	1.33	83.0	0.00	71.3	1.33
T_9	Untreated control	83.3	4.17	70.7	8.7	77.0	5.00	67.0	9.67	87.3	9.67	63.3	12.1	78.3	12.0	65.7	17.3	63.0	6.00	47.3	11.00

*G- per cent seed germination and ID- per cent insect damage

Table 1.4: Effect of insecticidal seed treatment on seed germination and insect damage in mungbean seeds

Symbol	Treatments	Mungbean											
		SKNAU, Durgapura				MPKV, Rahuri				OUAT, Bhubaneswar			
		6 months		9 months		9months		12 months		3 months		6 months	
		G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1	Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)	97.0	0.0	94.7	1.7	78.3	0.33	66.0	2.00	92.0	0.67	80.3	0.83
T_2	Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)	92.7	4.0	85.0	10.3	77.0	0.33	64.0	2.33	94.3	0.00	83.0	0.50
T_3	Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)	89.0	7.0	75.3	20.7	69.0	1.33	60.7	4.00	85.3	2.33	72.0	3.67
T_4	Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)	87.0	8.3	71.0	24.0	67.0	2.33	60.3	6.00	90.7	0.83	74.0	1.83
T_5	Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)	88.0	7.3	77.0	18.3	67.3	3.00	58.3	4.00	89.0	1.17	75.3	1.50
T_6	Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)	91.0	5.7	79.3	15.0	72.0	1.33	62.0	2 .00	88.7	0.83	78.7	1.17
T_7	Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed	96.0	2.0	85.3	9.7	68.0	2.00	61.0	3.00	88.3	1.83	73.7	2.67
T_8	Deltamethrin 2.8 EC @ 1 ppm (0.04 ml/kg seed)	96.7	0.0	93.7	2.0	81.0	0.00	68.0	1.00	92.6	0.33	80.0	0.83
T_9	Untreated control	82.0	12.0	49.7	41.0	62.0	9.00	55.3	15.00	80.7	5.50	68.3	10.30

Table 1.5: Effect of insecticidal seed treatment on seed germination and insect damage in blackgram, chickpea and cowpea seeds

Symbol	Treatments	Blackgram				Chickpea								Cowpea			
		TNAU, Coimbatore				PJTSAU, Hyderabad				JAU, Jamnagar				UAS, Bangalore			
		9 months		12 months		9 months		12 months		9 months		12 months		3 months		6 months	
		ID	G	ID	G	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1	*Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)*	92	0.24	87	1.53	99.3	0.67	98.7	1.65	88.0	0.00	84.0	5.74	95.7	0.00	95.3	0.00
T_2	*Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)*	91	0.27	87	1.56	99.3	0.00	97.3	0.00	88.0	0.00	83.7	8.47	96.3	0.00	95.3	0.00
T_3	*Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)*	91	0.48	86	1.75	99.3	0.40	100	0.34	87.3	0.00	84.0	7.95	95.0	0.00	94.3	0.00
T_4	*Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)*	90	0.31	87	1.61	98.0	2.37	98.0	2.37	87.0	1.00	83.7	9.88	95.3	0.00	94.7	0.00
T_5	*Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)*	92	0.62	86	1.91	99.3	0.00	100	0.00	86.7	0.67	83.3	9.88	94.3	0.00	93.7	0.00
T_6	*Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)*	90	0.3	87	1.69	98.7	1.61	100	1.61	87.7	0.00	83.7	6.54	95.0	0.00	94.7	0.00
T_7	*Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed*	90	0.41	87	1.73	99.3	2.57	93.3	2.17	87.0	0.67	84.0	10.86	94.3	0.00	94.0	0.33
T_8	*Deltamethrin 2.8 EC @ 1 ppm (0.04 ml/kg seed)*	91	0.24	87	1.67	100	2.14	97.3	1.85	87.0	0.00	83.0	7.95	95.3	0.00	95.0	0.00
T_9	*Untreated control*	92	2.2	88	6.9	96.7	8.50	94.7	9.40	83.7	18.7	76.7	29.2	94.3	0.00	93.3	0.75

Table 1.6: Effect of insecticidal seed treatment on seed germination and insect damage in fieldpea and pigeonpea seeds

Symbol	Treatments	Field pea				Pigeon pea									
		CSAUAT, Kanpur				PDKV, Akola						NDUAT, Faizabad			
		9 months		12 months		6 months		9 months		12 months		3 months		6 months	
		G	ID	G	ID	G	ID	G	ID	G	ID	G	ID		
T_1	*Emamectin benzoate (Proclaim 5SG) @ 2 ppm (40.0 mg/kg seed)*	81.0	2.33	80.3	3.00	85.0	0.10	83.0	0.13	81.0	0.33	82.7	0.67	79.7	0.67
T_2	*Spinosad (Tracer 45 SC) @ 2 ppm (4.4 mg/kg seed)*	82.3	1.00	81.7	1.66	81.7	0.23	77.6	0.36	72.0	0.50	82.7	1.00	78.3	1.00
T_3	*Indoxacarb (Avaunt 14.5 SC) @ 2 ppm (13.8 mg/kg seed)*	81.3	2.33	81.0	2.66	81.3	0.33	76.6	0.40	72.0	0.53	81.3	2.00	75.7	2.66
T_4	*Rynaxypyr (Coragen 20 SC) @2ppm (0.01ml/kg seed)*	80.7	1.00	80.7	1.33	78.7	0.33	75.0	0.46	71.0	0.50	82.3	1.33	77.7	1.66
T_5	*Chlorfenapyr (Intrepid 10 EC)@2ppm (0.02ml/kg seed)*	82.0	1.00	82.0	1.66	79.0	0.46	74.0	0.60	71.0	0.70	81.7	1.67	76.3	2.33
T_6	*Profenofos (Curacron 50 EC) @2ppm (0.004ml/kg seed)*	80.0	2.00	79.7	2.66	77.3	0.26	73.6	0.36	70.3	0.53	82.3	1.33	77.3	1.67
T_7	*Novaluron (Rimon 10 EC) @ 5ppm (0.05ml/kg seed*	-	-	-	-	75.7	0.26	71.3	0.33	70.7	0.43	83.3	0.67	79.3	1.00
T_8	*Deltamethrin 2.8 EC @ 1 ppm (0.04 ml/kg seed)*	84.0	0.66	83.3	1.00	83.7	0.16	83.0	0.23	78.0	0.36	82..0	1.00	78.0	1.33
T9	*Untreated control*	77.7	2.66	73.0	4.33	75.3	0.66	67.7	0.86	62.3	1.93	77.6	4.33	67.0	7.66

Experiment 2 : Survey and evaluation of seed health status of farmers' saved seed with respect to insect infestation

Objectives:

1. To know the type and level of infestation by insects under storage condition.
2. Impact of insect infestation on seed quality
3. Farmer's practice, if any, to store / protect seeds from insect damage.

Date of start: 2006; **all NSP centers including voluntary centers will do the experiment**

Methodology: About 500g of seeds of crop/ variety will be collected from farmers / seed producers before sowing on payment or gratis. While collecting seed a questionnaire will also be filled to know crop / variety, period and conditions of storage, treatments, if any, source of seed, if it is not farmer's saved one. The following observations are to be recorded.

1. Seed moisture content (%)
2. Live insect, its species and storage
3. Damage in 400 seed samples including internal infestation
4. Germination (%)
5. Vigour test

Results: (Tables 2.1 – 2.11)

MPKV, Rahuri

Total two hundred forty five farmers' saved seed samples of various crops (soybean-43, pearl millet-31, sorghum-44, wheat-55 and chickpea - 72) were collected from Ahmednagar and Pune district for evaluation of seed health status. Among 265 seed samples, 55 seed samples (22.4%) were found infested with various insects like *Callosobruchus* Sp., *Rhizopertha dominica* and *Sitophilus oryzae*. About 15.1% seed samples were having insect damage beyond permissible limit. The moisture content of different seed samples ranged between 7.1 to 9.11%. About 77.6% samples were having seed germination above seed certification standard (table-2.1)

JAU, Jamnagar

For survey and evaluation of seed health status of farmer's saved seed with respect to insect infestation, total 100 groundnut seed samples were collected from four districts *viz*., Jamnagar (63 samples), Porbander (15 samples), Devbhoomi Dwarka (21 samples) and Amreli (1 sample) district of Saurashtra region. Average moisture content was 7.70% whereas; average seed germination was 97.0%. Seed vigor index was observed from 445 to 1090 with an average 746. Incidence of groundnut seed beetle, *Caryedon serratus* was observed in 19 samples and 81 samples were found free from insect infestation. Average intensity of infestation was noticed 3.64 % and maximum damage was found 40%. The life stages i.e. larvae, pupae and adults of *Caryedon serratus* and adults of *Tribolium* were observed in infested samples. The farmers usually stored the seed by giving the treatment of methyl parathion 2% dust on gunny bags, celphos fumigation, fenvalerate 0.4% dust on gunny bags, DDVP on gunny bags, mixing of neem leaves and sun drying once after storage. The average storage period was 7-9 months.

PDKV, Akola

During survey three hundred and forty-three seed samples (Soybean-98nos., Pigeonpea-60 nos., Mungbean-41nos., Urdbean-38 nos., Chick pea-76 nos. and wheat-32 nos.) were collected from Vidarbha region of Maharastra (table-2.3). Storage period of these samples ranged between 6-8 months. About 24% seed samples were infested with various storage insects and 5.8% samples were having insect damage beyond permissible limit. The moisture content of seed samples ranged between7.2 to 9.6%. About 62% seed samples recorded higher seed germination than IMSCS. The insect damage in different samples varied from 0.10 to 2.9%.

AAU, Jorhat

To study the seed health status of farmer's saved seeds with respect to insect infestation, paddy seed samples were collected from Sivasagar district of Assam in upper Brahmaputra Valley Zone. Total eighty one seed samples (18 different paddy varieties) were collected from three Sub-divisions. Out of 81 samples, 63% samples recorded seed germination above IMSCS. Per cent seed germination ranged within 16 to 96. The storage period of most of samples was 7 to 8 months. Seed moisture content ranged between 12 to 15%. Overall 23.5% seed samples were infested by *Sitophilus oryzae, Sitotroga cerealella* and *Rhizopertha dominica*. Out of total seed samples 12.3% samples had insect damage beyond permissible limit under IMSCS. The insect damage ranged between 0.25 to 12%. The vigour index of the collected seed samples ranged from 360 to 2104.

OUAT, Bhubaneswar

Paddy seed samples (105 nos.) were collected from farmers belonging to Mayurbhanj, Puri, Cuttack, Jagatsinghpur, Rayagarh, Nayagarh, Sundargarh, Dhenkanal, Jajpur, Khurda, Ganjam, and Angul districts of Orissa. Out of these samples, 37 seed samples were infested with Angoumois grain moth and lesser grain borer and insect damage was beyond permissible limit in 20.9% samples. Insect damage level usually ranged between 1.0–6.6%. About 82.6% seed samples were having seed germination above IMSCS (table-2.5).

NDUAT, Faizabad

Paddy seed samples (105 nos.)were collected from farmers of different districts of eastern part of Uttar Pradesh viz. Faizabad, Barabanki, Sultanpur, Maharajganj, and Gorakhpur and wheat seed samples (80 nos.) were collected from Faizabad, Barabanki, Sultanpur, Siddarthnagar and Maharajganj (table-2.6). About 95% paddy seed samples were infested with various storage insects namely, *Rhyzopertha dominica*, *Sitotroga cerealella*, *Sitophilus oryzae* and about 72.4% samples were having insect damage beyond permissible limit (>0.5% ID). Whereas in case of wheat 98.8% samples were infested with various storage insects namely, *Rhyzopertha dominica*, *Sitophilus oryzae* and insect damage was beyond permissible limit (>0.5% ID) in all infested samples. Per cent seed germination ranged between 62-96 in paddy and 30-89 in case of wheat. About 33% of paddy seed samples and 35% of wheat seed samples were having seed germination above IMSCS.

TNAU, Coimbatore

Survey was made in three districts of Tamil Nadu *viz*., Kanyakumari, Tirunelveli and Thoothukudi from 25th to 29thJuly, 2016 to collect farmers saved seed samples. Total 79 seed samples (Paddy – 44, blackgram - 15, green gram – 7, sorghum – 3, sunflower – 2, cowpea, cotton, fox tail millet (tenai), little millet (samai), kodo millet (varagu), prosomillet (panivaragu), barnyard millet (kuthiraivalli) and chilli (one sample each) were collected. Only few farmers were used proper dunnage for storing seeds. Out of 43 farmers met during the survey, 36

farmers used gunny bags, 7 farmers used high density polyethylene bags and wooden structure was used by one farmer (table 2.7).

Out of 44 paddy seed samples, 43 samples showed insect infestation, mainly by angoumois grain moth (*Sitotroga cerealella*), lesser grain borer (*Rhizopertha dominica*) and red flour beetle (*Tribolium castaneum*). Seed damage level varied from 0.10 to 22.7% among the samples. About 34.1% of total collected samples were having seed damage beyond permissible limit. Moisture content of samples ranged between 10.8-16.3%. Seed germination ranged between 0.0 to 84%. About 11.4% of the seed samples collected was having seed germination above minimum seed certification standard. Out of 15 blackgram samples collected 13 samples were infested with *Callosobruchus* and about 13.3% samples were having insect damage >1%. Per cent seed germination varied from 0.0-100 and the samples had seed germination above IMSCS level. All seed samples of green gram (7nos.) were infested with pulse bruchid. Per cent seed germination ranged from 82 to 100 with 80% samples meeting the seed certification standard. Out of 13 seed samples of other crops only 2 samples were infested with various insects and about 7.7% samples were having insect damage >0.5%. Per cent seed germination varied from 64-84 with 61.5% samples above IMSCS level.

PJTSAU, Hyderabad

Under the survey and evaluation of seed health status of farmers saved seed a total of 71 samples were collected (Paddy: 46, Maize: 20 and Bengalgram: 5) from Nizamabad, Mahaboobnagar, Nalgonda, Medak, Karimnagar and Warangal districts of Telangana State (table-2.8). Storage period of these samples ranged between 3 - 8 months. Paddy seed samples were infested by *Sitotroga cerealella, Rhyzopertha dominica* and *Tribolium.* Seed germination of 42 paddy samples (93.3%) were above IMSCS. Moisture content of these seed samples varied from 10.8 to 14.5%. Maize seed samples collected from Nizamabad with storage period of three months recorded nil incidences of stored grain pests. Maize seed samples collected from Karimnagar with storage period of twelve months were infested by *Sitophilus oryzae, Sitotroga cerealella, Rhyzopertha dominica* and *Tribolium.* Five samples of Bengalgram were collected from Warangal district having storage period of 12 months. All these seed samples were infested with pulse beetle but maintained germination above IMSCS (85- 93.3%).

PAJANCOA & RI, Karaikal

Sixty one samples of paddy (20 varieties) were collected from three different regions of Puducherry (UT) *viz.* Puducherry, Karaikal and Mahe. Only 8% of the samples maintained the physical purity standard (98%). Similarly, only 36% of the samples fulfilled IMSCS for germination (80%). All the samples collected had insect infestation ranging between 0.55 and 8.73%. *Rhyzopertha dominica* was the insect predominantly found in the seed samples (58 samples) followed by *Sitotroga cerealella* (16 samples). Seed moisture content ranged between 9-13.6% (table 2.9).

IISS, Mau

During survey sixty seed samples of wheat were collected from five locations (Pkhaypur, Rhajaniya, Ohnaich, Kushmaur and Saidpur) of Uttar Pradesh (table-2.10). Storage period of these samples was 6 months. About 15% seed samples were infested with various storage insects and 13% samples were having insect damage beyond permissible limit. The moisture content of seed samples ranged between 9.3 to 12.7%. About 66.7% seed samples recorded seed germination above IMSCS. The insect damage in different samples varied from 0.25 to 1.5 %. Most of the farmers (56.7%) used ITKs like mixing of cowdung cake ash (@200g/Kg

Seed), mixture of chilli powder (@0.5g/Kg Seed) and salt (@5g/Kg Seed) or mixture of Garlic powder (@2.5g/Kg Seed) and salt (@5g/Kg Seed) for protecting wheat seed from storage insects.

UAS, Dharwad

One hundred samples each of soybean and chickpea were collected from the farmers before sowing. In case of soybean about 18% samples had insect infestation and seed moisture content ranged between 6.8-12.4% (table-2.11). Seed germination ranged between 21-69% and all the samples failed to meet the required seed germination standard. About 24% chickpea samples were infested with various insects. Moisture content ranged between 7-16% while seed germination ranged between 42-66%. None of the samples had seed germination above IMSCS.

Conclusion

The survey has been conducted in ten states and one union territory across the country and about 1542 nos. of farmers' saved seed samples have been collected and analysed for seed quality. The survey revealed that about 45.6% seed samples were having germination bellow IMSCS and about 39.7% seed samples were infested with various storage pests. About 26.2% samples were having insect damage beyond permissible limit. The intensity of damaged seed usually varied from 0.25-5.0%. Therefore, there is ample scope of improvement of seed health status of farmers' saved seed.

Table 2.1: Survey and evaluation of seed health status of farmers saved seed (MPKV, Rahuri)

S. No.	Location	Crop/ variety	Storage period	Number of samples collected	Number of samples infected	Name of insects present	Per cent seed damage (range)	Per cent seed sample with seed damage beyond permissible limit	Seed Moisture (%) (range)	Mean Seed Germination (%) with range	Per cent seed sample with seed germination above IMSCS
1	Pune Dist & A.nagar	Pear millet	6-8 months	31	5	*Rhizopertha domonica, Sitophilus oryzae,*	0-9.0	12.9	7.3-9.0	68-91	74.2
2	Pune Dist & A.nagar	Soybean	6-8 months	43	0	-	0	0	7.1-8.9	68-79	76.7
3	Pune Dist & A.nagar	Sorghum	6-8 months	44	13	*Rhizopertha domonica, Sitophilus oryzae*	0.5-16	6.8	7.5-8.8	71-87	75.0
4	Pune Dist & A.nagar	Chickpea	6-7 months	72	21	*Callosobruchus spp*	0.5-21	22.2	7.6-9.11	77-90	76.4
5	Pune Dist & A.nagar	Wheat	6-7 months	55	16	*Rhizopertha domonica, Sitophilus oryzae,*	0.5-12	25.5	7.5-9.0	79-91	83.6

Table 2.2: Survey and evaluation of seed health status of farmers saved seed of groundnut with respect to insect infestation at JAU, Jamnagar

Districts	No. of samples collected	No. of samples infested	Crop & variety	Storage period in months (range)	Insect-pests observed	Per cent Seed damage (range)	Seed sample with seed damage beyond permissible limit	Seed Moisture (%) (range)	Germi-nation (%) in Lab. (range)	Vigour index (range)	Seed trt. Given by farmers
Jamnagar	63	12	Groundnut GG -20, GJG -22, TJ -38	7-9	*Caryedon & Tribbolium*	0.0-40.0	20.63%	3.90-6.90	54.0-96.0	444.60-1090.20	2% M. parathion on gunny bags, Cellphos, Fenvalerate 0.4% dust on gunny bags and
Porbander	15	06	Groundnut GG -20	8-9	*Caryedon & Tribbolium*	0.0-30.0	40.00%	4.10-6.90	60.0-89.0	498.40-1053.0	2% M. parathion on gunny bags, Cellphos, Fenvalerate 0.4% dust on gunny bags and DDVP on gunny bags, neem leaves.
Devbhumi Dwarka	21	01	Groundnut GG-20	7-9	*Caryedon & Tribbolium*	0.0-35.0	4.76%	3.90-7.70	54.0-97.0	486.0-1050.20	2% M. parathion on gunny bags, Cellphos , Sun drying once after storage, DDVP on gunny bags..
Amreli	1	00	Groundnut GG-20	8	-	0.0	0.0%	4.80	97.0	1086.40	Sun drying once after storage.
		Overall range	Minimum	7.00	--	0.0	--	3.90	54.0	444.60	--
			Maximum	9.00	--	40.0	--	7.70	97.0	1090.20	
			Average	8.21	--	3.64	--	5.04	80.74	746.16	

Table 2.3: Survey report of seed health status of farmer's saved seed with respect to insect infestation (PDKV, Akola)

S. No.	Location	Crop/ Variety	Storage period	Number of samples collected	Number of samples infected	Name of insects present	Per cent seed damage (range) (%)	Per cent seed sample with seed damage beyond permissible limit (%)	Seed Moisture (%) (range)	Mean Seed Germi-nation (%) with range in parenthesis	Per cent seed sample with seed germi-nation within permissible limit (%)	Mean vigour index (with range)
1	Vidarbha region of Maharashtra	Pigeonpea	6 month	60	12	*Callosobruchus chinensis*	0.2-2.9	5.0	8.9-9.6	78 (73-81)	58	1691.3 (1530-1780)
2		Udidbean	7 month	38	13	*Callosobruchus chinensis*	0.6-2.6	7.9	7.3-8.2	76 (70-79)	56	1421.0 (1620-1710)
3		Mungbean	8 month	41	15	*Callosobruchus chinensis*	0.7-1.4	4.9	7.3-8.1	75 (71-79)	61	1711.4 (1568-1742)
4		Soybean	7 month	98	8	-	0.1-0.6	-	7.2-8.1	74 (69-78)	63	1588.0 (1491-1710)
5		Wheat	7 month	32	11	*Rhyzopertha dominica*	0.5-1.6	28.1	7.9-8.7	88 (80-93)	59	1914.1 (1815-1990)
6		Chickpea	8 month	76	24	*Callosobruchus chinensis*	0.4-2.3	3.9	7.8-8.4	81 (76-83)	69	2210.5 (1560-1910)

Table 2.4: Survey and evaluation of seed health status of farmer's saved paddy seed with respect to insect infestation (AAU, Jorhat)

S. No.	Variety	Storage period (M)	No. of samples	No. of samples infested	Name of insect present	Seed damage (%) (range)	Seed sample with seed damage beyond IMSCS (%)	Seed MC (%) (range)	Seed germination (%) (range)	Sample with seed germination above IMSCS (%)	Mean vigour Index (range)
SIVASAGAR SUBDIVISION											
1	Saimari	9	6	4	SC, RD	(0 -12)	66.67	(13.6 -14.5)	34.16 (16 -82	16.66	487.8 (360 -850)
2	Adali Bao	7	5	2	SC	(0 -1.5)	20	(12.8-14.8)	56.4 (35-82)	40.00	433.83 (421-864)
3	Gajab Sali	8	4	1	SC	(0 - 0.5)	Nil	(12.6 -14.0)	73 (61-81)	50.00	1311.08 (781-1360)
4	Sarai Lahi	8	5	Nil				(12.4-13.6)	83 (76-90)	80.00	1005.96 (926-1356)
5	Bora	7	4	Nil				(12.4-14.3)	82.25 (80-84)	100.00	1756 (1511-1962)
6	Rangamalvog	7	3	2	SC	(0 - 8.5)	66.67	(14.1-14.8)	60 (54-70)	Nil	453 (211-512)
7	Kola Bao	8	4	2	SC	(0 - 1.0)	25	(13.2-13.9)	79 (75-81)	75.00	1536 (1218-1854)
8	Amona Bao	8	4	Nil			Nil	(12.5-13.6)	79.75 (76-83)	50.00	1443.4 (1106-1690)
9	Betguti	8	3	Nil			Nil	(12.9-13.5)	86.33 (84-91)	100.00	1815 (1788-2015)
10	Mahsuri	8	6	1	SC,SO	(0 - 0.5)	Nil	(13.5-14.8)	75.2 (56-87)	50.00	1319
11	Kola Joha	8	4	Nil			Nil	(13.2-14.3)	84.5 (75-90)	75.00	1634 (1822-1236)
12	Malbhog	7	3	Nil	-	-	Nil	(12.0-14.0)	88.67 (85-91)	100.00	1804 (1522-2105)
13	Joha	8	3	Nil	-	-	Nil	(13.3-13.5)	94 (91-96)	100.00	2026 (1866-2104)
14	Ranjit	8	3	1	SC	-	33.3	(12.9-14.0)	85	66.60	1470
NAZIRA SUBDIVISION											
15	Ranjit	8	4	**2**	SC	(0 - 0.25)	Nil	(12.8-14.8)	81.25 (72-91)	75.00	1543 (1190-2015)
16	Bora	9	3	Nil	-	-	Nil	(12.8-13.5)	81.33 (79-84)	66.67	1239 (1099-1466)
17	Kola Joha	8	1	Nil	-	-	Nil	13.2	80	100.0	1405
20	Mahsuri	7	2	Nil			Nil	(13.2-13.7)	82.5 (81-84)	100.0	1679 (1510-1848)
CHARAIDEO SUBDIVISION											
21	Ranjit	7	1	Nil			Nil	12.8	86	100.0	1350
22	Mahsuri	8	2	1	SC	2.5	50	(12.9-15.0)	74 (63-85)	50.00	1088 (986-1190)
23	Kola Joha	8	2	Nil			Nil	(12.9-13.9)	83.5 (81-86)	100.0	1370 (1290-1450)
24	Lahidhan	8	2	Nil			Nil	(13.2-13.7)	81 (80-82)	100.0	1288 (1206-1370)
25	Bogabora	8	1	1	SC	0.25	Nil	14.4	69	Nil	984
26	Kolabora	8	1	Nil			Nil	13.4	77	Nil	954
27	Rangalahi	8	1	1	SC	0.25	Nil	14.2	78	Nil	1021
28	Betguti	8	1	Nil			Nil	13.1	85	100.0	1700
29	Monoharsali	8	1	Nil			Nil	13.1	80	100.0	1384
30	Solpona	7	1	Nil			Nil	14.3	78	Nil	1251
31	Rangalahi	8	1	1	SC	0.25	Nil	14.2	78	Nil	1021

*SC- Sitotroga cerealella; SO-Sitophilus oryzae; RD-Rhyzopertha dominica

Table 2.5: Evaluation of seed health status of farmers saved paddy seeds with respect to insect infestation (OUAT, Bhubaneswar)

S. No.	District/ Location	Crop-paddy/ variety	Storage period	Number of samples collected	Number of samples infected	Name of insects present	Per cent seed damage (range)	Seed sample with seed damage beyond permissible limit (%)	Seed Moisture (%) (range)	Mean Seed Germination (%) with range	Seed sample with seed germination within permissible limit (%)
1	Angul Dist.(Bhalar)	Kalachampa, Gangasiuli, Pooja	6	5	2	AGM	1-1.5	40	10.0-12.0	88.2(80-94)	80
2	Dhenkanal Dist (Khalpada)	Pooja, Kalachampa, Gangasiuli, etc.	6	5	1	LGB	0.5	nil	9.5-11.0	94(90-98)	100
3	Puri Dist. (Gop/ Bayakuda)	Pooja,Swarna-Massuri,Ranidhan ,Sarala, Pratikhya, Parijat,etc.	5	15	5	LGB,AGM	0.5-4	20	10.0-12.2	90.5(79-96)	80
4	Jagatsinghpur Dist (Fakirpada)	Barsa,Panidhan,Pooja etc.	5	4	1	AGM	0.5	nil	10-11.5	93(91-94)	100
5	Cuttack Dist. (Champa, Khuntuni)	Pooja,Kharvel,Khandagiri,Parijat etc.	5	12	4	AGM,LGB	0.5-1.5	16. 7	10.5-12.5	90.08(77-95)	91.67
6	Jajpur Dist (Nanpur)	Basumati,1145,Kakharua,Jangalijata	5	6	2	AGM	1-1.5	50	10.8-11.5	87(78-93)	66.66
7	Sundargarh Dist. (Bheluadihi)	Khandagiri,Nabin, Swarna,Udayagiri ,etc.	6	8	3	LGB	0.5-1.5	12.5	9.5-11.0	89(76-96)	87.5
8	Rayagada Dist Gorakpur, Mailiguda, Bilamal	Khandagiri,Nadiarasa,Taradhana,Keshari, Konark,Kharavel etc.	7	12	4	LGB	0.5-3.0	25	10.7-12.0	87.25(72-94)	75
9	Mayurbhanj (Kukurdima, Potaldiha)	Khandagiri,Moti, GS,Swarna,Balibhanjan,1030 etc.	8	8	2	AGM,LGB	1-1.5	25	10.2-11.0	89.3 (78-93)	87.5
10	Nayagarh Dist.	Kalabhutia,Kalakoili,Keshari,Tulas, Shyamala, Pooja etc.	6	10	3	LGB	0.5-3.5	10	9.9-10.8	89.5(72-96)	90
11	Ganjam Dist.	Massuri,1075, Puspa, Keshari, Pooja, Balaram, Moti, Maheswari, etc.	5	12	3	AGM,LGB	0.5-2.5	16.7	10.2-11.5	89.3 (77-93)	83.33
12	Khurda Dist.	Ranidhan, Swarna, Parijat, Sarathi, Jajati, Konarka, Lalata, Barsa etc.	5	18	7	AGM	0.5-5.0	27.9	11.5-12.5	86.9 (75-96)	72.22

Table 2.6: Report of seed health status of farmer's saved seed with respect to insect infestation in eastern UP (NDUAT, Faizabad)

S. No.	Crop/ variety	Location	Storage period	Number of samples collected	Number of samples infected	Name of insects present	Per cent seed damage (range)	Per cent seed sample with seed damage beyond permissible limit	Seed Moisture (%) (range)	Mean Seed Germination (%) with range in parenthesis	Per cent seed sample with seed germination above IMSCS	Mean vigour index (with range)
1	Paddy	Faizabad	5-6 months	25	21	*S C RD SO*	1.76 (0.0-4)	*56*	11.38 (10 -14.1)	79.4 (68.0-92.0)	*24.0*	1309 (996 -1538.4)
2	Paddy	Barabanki		23	19	*S C RD SO*	1.59 (0.0-3.33)	*52.2*	10.33 (10.0-13.6)	81.7 (62.0-92.0)	*52.2*	1335 (924-1698.4)
3	Paddy	Sultanpur		22	22	*S C RD SO*	1.81 (1-.04.67)	*100*	11.77 (10.1-14.0)	83.3 (72.0-93.0)	*36.4*	1443 (945.0-1751.0)
4	Paddy	Maharajganj		25	25	*S C RD SO*	3.06 (1.0-6.67)	*100*	12.23 (10.2-14.01)	80.7 (72.00-96.00)	*24.0*	1507 (1078-2034)
5	Paddy	Gorakhpur		10	9	*S C RD SO*	2.1 (0.0-3.33)	*30*	11.89 (10.0-13.3)	80.2 (76.0-90.0)	*30.0*	815 (167.4-1283)
1	Wheat	Faizabad	8-9 months	10	9	*RD SO*	2.69 (1.0-3.66)	*90*	13.2 (10.5-13.2)	83.1 (68-85)	*30.0*	1533 (666.4 -1221)
2	Wheat	Barabanki		20	20	*RD SO*	2.43 (1.0-4.66)	*100*	12.48 (11.9-13.5)	60.3 (30-85)	*40.0*	796 (679-1107)
3	Wheat	Sultanpur		10	10	*RD SO*	2.43 (0.67-4)	*100*	11.9 (10.0-13.2)	70.4 (68-81 .0)	*50.0*	968 (689.4-1353)
4	Wheat	Siddarthnagar		20	20	*RD SO*	2.96 (1.66-4.0)	*100*	12.63 (12.3-13.7)	73.1 (65-82)	*20.0*	1309 (996-1538.4)
5	Wheat	Maharajganj		20	20	*RD SO*	2.79 (1.0-4.0)	*100*	12.61 (12.1-13.1)	78.0 (70.0-89)	*40.0*	1335 (924-1698.4)

Table 2.7: Survey and evaluation of seed health status of farmer's saved seed in Tamilnadu (TNAU, Coimbatore)

Sample No.	Crop	Location	Variety	Storage period	Storage structure	Insect damage (%)	Insect species present	Moisture content (%)	Germi-nation (%)	Vigour index	Treatment, if any
1.	Paddy	Tirupathisaram, Thovalai tk, Kanyakumari	ASD 16	1 Year	Gunny bag	1.5	S.c	13.2	68.0	1840.0	Pungam leaf and goat manure.
2.	Paddy	Tirupathisaram, Thovalai tk, Kanyakumari	TPS 3	6 Months	Gunny bag	0.6	R.d, S.o, Psocids	12.9	78.0	2332.0	Pungam leaf and goat manure.
3.	Paddy	Kozhikotupothai, Tirupathisaram	TPS 3	4 Months	Gunny bag	0.2	R.d, S.o,	12.7	84.0	2368.0	Goat dung, malathion dust and pungam leaf
4.	Paddy	Kozhikotupothai, Tirupathisaram	TPS 3	4 Months	Gunny bag	0.1	R.d	12.8	64.0	1984.0	Aloevera, cactus, pungam, goat dung.
5.	Paddy	Kozhikotupothai, Tirupathisaram	TPS 3	3 Months	High Density Polyethyl-ene (HDPE) bag	2.2	R.d, S.o, Procids, O.s, T.c,	14.4	82.0	2498.0	Three rimes solar drying, Mixing pungam leaf.
6.	Paddy	Kozhikotupothai, Tirupathisaram	ASD 16	15 days	HDPE bag	0.4	R.d, S.c, S.o, Psocids	16.3	80.0	2275.0	Three rimes solar drying Mixing pungam leaf
7.	Paddy	Agricultural Res. Station (ARS), Tirupathisaram	TPS 3	4 Months	Gunny bag	0.2	S.c, R.d, Cry, Psocids	11.8	72.0	2205.0	Solar drying at frequent intervals.
8.	Paddy	ARS, Tirupathisaram	TPS 3	4 Months	Gunny bag	0.9	S.c, Cry, R.d, Psocids, T.c	11.6	78.0	2594.0	Solar drying at frequent intervals.
9.	Paddy	ARS, Tirupathisaram	TPS 5	4 Months	Gunny bag	0.9	S.c, Psocids, Cry, R.d, T.C	11.0	54.0	1572.0	Malathion spraying
10.	Paddy	Kelai Str Thalakudi Tirupathisaram	TPS 3	2 Months	Gunny bag	0.9	Cry, R.d, Psocids	14.2	84.0	2468.0	--

Sample No.	Crop	Location	Variety	Storage period	Storage structure	Insect damage (%)	Insect species present	Moisture content (%)	Germi-nation (%)	Vigour index	Treatment, if any
11.	Paddy	Kelai Street Vadaseri Tirupathisaram.	TPS 3	2 Months	HDPE bag	1.3	R.d, T.c, Psocids	12.0	24	675.0	Chlorpyrifos @ 1 ml per lit
12.	Paddy	Pulikudi, Vadaseri, Tirupathisaram	TPS 3	4 Months	HDPE bag	2.5	R.d, T.c, Psocids, Cry, S.c, S.o.	13.1	50.0	1589.0	--
13.	Paddy	Thalakudi, Thovalai tk Tirupathisaram	TPS 3	2 Months	HDPE bag	0.6	R.d, T.c, Psocids	13.4	82.0	2603.0	--
14.	Paddy	Therakalpudur Tirupathisaram	TPS 3	4 Months	Gunny bag	1.3	S.c, R.d, Cry, S.p	13.5	78.0	2417.0	--
15.	Paddy	Illankottai Agasthisaram Tirupathisaram	TPS 3	2 Months	Gunny bag	3.2	R.d, S.c, Psocids, T.c, Cry	13.8	56.0	1304.0	--
16.	Paddy	Vellamadam Tirupathisaram	TPS 3	4 Months	HDPE bag	2.5	R.d, O.s, T.c, S.p, S.c	13.1	68.0	1895.0	--
17.	Paddy	Kelai Street Thalaikudi Tirupathisaram	TPS 3	45 days	Gunny bag	1.1	R.d, S.p, S.c, T.c, S.o, O.s, Psocids	14.0	72.0	2147.0	--
18.	Paddy	Thalaikudi Tirupathisaram.	TPS 3	2 Months	Gunny bag	0.3	R.d, Cry, S.c, Psocids, T.c	13.2	76.0	2224.0	--
19.	Paddy	Thalaikudi Tirupathisaram.	TPS 3	1 Month	Gunny bag	3.3	S.p, S.c	11.6	Hard Seeds	--	--
20.	Cowpea	Aasaraipalam Nagarkovil	Aravan-kolingi	1 Year	Gunny bag	2.9	Cal.	12.1	90.0	3447.0	Turmeric powder, chillies, neem leaf, Fenvalerate 0.4 D.
21.	Black gram	Aasaraipalam Nagarkovil	VBN 6	3 Months	Gunny bag	--	Cal., T.c	--	100	3869.0	Turmeric powder chillies, neem lea Fenvalerate 0.4 D
22.	Paddy	Aasaraipalam Nagarkovil	ASD 16	1 year	Gunny bag	2.2	R.d, S.c, T.c, S.o.	12.8	Hard Seeds	--	Turmeric powder chillies neem leaf *Fenvalerate* 0.4D.
23.	Paddy	Aasaraipalam Nagarkovil	CR 1009	4 months	Gunny bag	3.6	S.c, R.d, T.c, O.s, S.o	16.1	68.0	1664.0	--
24.	Paddy	Perumselvavillai Vembanur Tirupathisaram	TPS 3	6 months	Gunny bag	0.7	R.d, S.c, Cry, Psocids	12.3	56.0	1427.0	Kandharai chillies, neem leaf
25.	Paddy	Iyyankanpuram Nagerkovil	TPS 3	4 months	Gunny bag	0.3	R.d, S.c	14.6	62.0	3624.0	--
26.	Paddy	Iyyankanpuram Nagerkovil	TPS 3	6 months	Gunny bag	0.6	R.d, S.c, Psocids	14.0	68.0	2022.0	--
27.	Paddy	Iyyankanpuram Nagerkovil	CR 1009	7 months	Gunny bag	1.0	S.c, S.o, R.d, Cry, Psocids.	14.1	54.0	1345.0	--
28.	Paddy	Iyyankanpuram Nagerkovil	TPS 3	6 months	Gunny bag	0.1	R.d, S.c, Psocids.	15.1	52.0	1495.0	--
29.	Paddy	Iyyankanpuram Nagerkovil	CR 1009	5 months	Gunny bag	0.9	R.d	13.5	52.0	1534.0	--
30.	Paddy	Iyyankanpuram Nagerkovil	CR 1009	4 months	Gunny bag	0.8	R.d, S.o, S.c, Cry, Psocids.	12.8	70.0	2059.0	--
31.	Paddy	Iyyankanpuram Nagerkovil	CR 1009	5 months	Gunny bag	1.9	R.d, Cry, S.c, Psocids, O.s.	16.1	20.0	582.0	--
32.	Paddy	Ayyansingampatti Vadaku Street Ambasamudram	ADT 45	6 months	Gunny bag	4.2	S.c, R.d, S.p, T.c, S.o	12.1	--	--	Neem and Pungam leaf.
33.	Paddy	Ayyansingampatti Vadaku Street Ambasamudram	ASD 16	6 months	Gunny bag	0.7	S.c, T.c, R.d, O.s.	10.8	74.0	2151.0	Neem and Pungam leaf. Pulses stored as pods.
34.	Paddy	Singampatti Ambasamudram	IR-50	4 months	Gunny bag	22.7	S.c, S.p, T.c, R.d, S.o, Psocids.	12.7	10.0	228.0	--
35.	Paddy	Singampatti Ambasamudram	IR-50	5 months	Gunny bag	1.4	R.d, S.c, Psocids, T.c	12.7	74.0	2363.0	--

Sample No.	Crop	Location	Variety	Storage period	Storage structure	Insect damage (%)	Insect species present	Moisture content (%)	Germi-nation (%)	Vigour index	Treatment, if any
36.	Paddy	Singampatti Ambasamudram	JGL Andhrapon ni	5 months	Gunny bag	1.4	S.c, R.d, T.c, Psocids.	12.6	60.0	1445.0	--
37.	Black gram	Ravanasamuthiram Ambasamudram	VBN-5	1 month	Gunny bag	--	--	8.7	70.0	2524.0	Solar drying.
38.	Paddy	Meenachipuram Ambasamudram	CR 1009	4 months	Gunny bag	0.9	R.d, S.c, Psocids, T.c.	11.8	74.0	2007.0	--
39.	Paddy	Meenachipuram Ambasamudram	CO 50	4 months	Gunny bag	0.2	Cry, T.c, R.d, S.c, Psocids	12.4	12.0	232.0	Pungam leaf.
40.	Paddy	Meenachipuram Ambasamudram	ADT 45	15 days	Gunny bag	0.2	R.d, T.c, Psocids	13.2	68.0	1635.0	Pungam leaf.
41.	Paddy	Meenachipuram Ambasamudram	ADT 39	2 months	Gunny bag	0.4	R.d, T.c, Psocids	11.6	62.0	1598.0	--
42.	Paddy	Aalvarkuruchi Ambasamudram	CO 51	4 months	Gunny bag	--	R.d, S.c, Psocids	12.6	76.0	2023.0	--
43.	Black gram	Aalvarkuruchi Ambasamudram	VBN 5	2 months	Gunny bag	Full damage	Cal.	9.2	--	--	--
44.	Paddy	RRS, Ambasamudram	ASD 16	1 month	Gunny bag	0.2	R.d, O.s, S.c	11.2	74.0	2208.0	--
45.	Paddy	RRS, Ambasamudram	ASD 19	45 days	Gunny bag	0.5	R.d, S.c, Psocids	11.6	26	491.0	--
46.	Paddy	RRS, Ambasamudram	ASD 18	1 month	Gunny bag	0.2	R.d, S.c	10.9	84.0	2364.0	--
47.	Cotton	ARS, Kovilpatty	KC 3	25 days	Gunny bag	--	--		84.0	2360.0	--
48.	Foxtail millet (Tenai)	ARS, Kovilpatty	CO 7	1 month	Gunny bag	--	--	11.8	94.0	1184.0	--
49.	Little millet (Samai)	ARS, Kovilpatty	CO 4	1 month	Gunny bag	--	--		34.0	336.0	--
50.	Kodo millet (Varagu)	ARS, Kovilpatty	Co 4	1 month	Gunny bag	--	--	9.5	74.0	940.0	--
51.	Proso millet (Pani varagu)	ARS, Kovilpatty	CO 5	1 month	Gunny bag	--	--	11.1	74.0	1667.0	--
52.	Barnyard millet (Kudiraiv -alli)	ARS, Kovilpatty	CO 2	25 days	Gunny bag	--	--	10.5	82.0	1668.0	--
53.	Sorghum	ARS, Kovilpatty	K 8	20 days	Gunny bag	--	--	11.3	76.0	1987.0	--
54.	Sorghum	Moppanpatty Thoothukudi	local	1 month	Gunny bag	--	--	13.2	82.0	2143.0	--
55.	Paddy	Moppanpatty Thoothukudi	Aksaya	2 months	Gunny bag	0.3	R.d, S.c, Psocids	13.0	66.0	1558.0	--
56.	Paddy	Moppanpatty Thoothukudi	NLR	2 months	Gunny bag	0.1	R.d, S,c	13.2	68.0	1583.0	--
57.	Black gram	Thalavaipuram Thoothukudi	Local	90 days	Gunny bag	1.5	Cal.	9.0	100.0	3877.0	Solar drying and overnight drying
58.	Green gram	Thalavaipuram Thoothukudi	Local	90 days	Gunny bag	1.7	Cal.	9.0	82.0	2695.0	Solar drying and overnight drying
59.	Black gram	Vadakupatti Thoothukudi	VBN 4	2 months	HDPE bag	1.4	Cal.	9.6	70.0	2473.0	--
60.	Black gram	Vadakupatti Thoothukudi	Nirmal	2 months	HDPE bag	0.4	Cal.	9.2	94.0	3719.0	Mixing thulasi leaves
61.	Black gram	Vadakupatti Thoothukudi	Local	3 months	HDPE bag	0.2	Cal.	9.6	92.0	3611.0	--
62.	Sunflowe r	Vadakupatti Thoothukudi	NK	45 days	HDPE bag	--	--		78.0	2442.0	--
63.	Chilli	Vadakupatti Thoothukudi	K 2	50 days	HDPE bag	--	--	64.0		688.0	--
64.	Black gram	Thoppureddiayapat ti Thoothukudi	Nirmal	35 days	Gunny bag	0.4	Cal.		78.0	2972.0	--

Sample No.	Crop	Location	Variety	Storage period	Storage structure	Insect damage (%)	Insect species present	Moisture content (%)	Germi-nation (%)	Vigour index	Treatment, if any
65.	Green gram	Thoppureddiayapatti Thoothukudi	Local	40 days	Gunny bag	0.4	Cal.	7.7	86.0	2966.0	--
66.	Black gram	Thoppureddiayapatti Thoothukudi	VBN 8	1 month	Gunny bag	0.3	Cal.	8.6	92.0	3232.0	--
67.	Fodder sorghum	Thoppureddiayapatti Thoothukudi	Local	1 month	Gunny bag	--	--				--
68.	Black gram	Thoppureddiayapatti Thoothukudi	Nirmal	3 months	Gunny bag	0.2	Cal.	9.6	94.0	3357.0	--
69.	Green gram	Thoppureddiayapatti Thoothukudi	Vargan-oorpasi	2 months	Gunny bag	0.7	Cal.	8.3	100.0	3430.0	Monocrotophos 36 SL spraying
70.	Green gram	Muthukrishnapuram Thoothukudi	Local	1 month	Gunny bag	0.4	Cal.	9.5	96.0	3254.0	--
71.	Black gram	Muthukrishnapuram	Local	1 month	Gunny bag	0.2	Cal.	8.8	64.0	2314.0	--
72.	Black gram	Muthukrishnapuram	valukai	1 month	Gunny bag	0.3	Cal.	8.6	86.0	2944.0	--
73.	Sunflower	Muthukrishnapuram	Local	1 month	Gunny bag	0.2	--	5.2	100.0	3487.0	--
74.	Black gram	N. Kalingapatty Thoothukudi	Local	7 months	Gunny bag	0.5	Cal.	7.0	78.0	2989.0	Pungam leaves over gunny bag
75.	Green gram	N. Kalingapatty	Local	7 months	Gunny bag	0.2	Cal.	7.5	84.0	3014.0	Pungam leaves over gunny bag
76.	Green gram	N. Kalingapatty	Local	7 months	Gunny bag	0.3	Cal.	7.0	86.0	3028.0	Pungam leaves over gunny bag
77.	Green gram	N. Kalingapatty	Local	1 month	Gunny bag	0.2	Cal.	9.7	98.0	3514.0	--
78.	Black gram	N. Kalingapatty	Local	1 month	Gunny bag	0.3	Cal.	7.9	66.0	2771.0	--
79.	Black gram	N. Kalingapatty	Nirmal	2 months	Gunny bag	0.2	Cal.	9.0	90.0	3206.0	--

R.d - *Rhyzopertha dominica* (Lesser grain borer)
S.o - *Sitophilus oryzae* (Rice weevil)
O.s - *Oryzaephilus* sp (Saw toothed grain beetle)
Cal. - *Callosobruchus* sp (Pulse beetle)
S.c - *Sitotroga cerealella* (Paddy or Angoumois grain moth)
T.c - *Tribolium castaneum* (Red flour beetle)
Cry - *Cryptolestespusillus* (Flat grain beetle)
Psocids - *Liposcelis divinatorius* Badonnel

Table 2.8: Survey and evaluation of seed health status of farmer's saved seed with respect to insect infestation (PJTSAU, Hyderabad)

S. No.	Location	Crop	Storage period	No: of samples collected	No: of samples infected	Name of insects present	Per cent seed damage (range)	Per cent seed sample with seed damage beyond permissible limit	Seed Moisture (%) (range)	Mean Seed Germination (%) with range in parenthesis	seed sample with seed germination within permissible limit	Mean vigour index (with range)
1	Nizamabad	Paddy	3 M	9	3	A,R	0-0.5	NIL	11.6-14.5	92-98	100%	1739-2090
2	Mahaboonagar	Paddy	8-18 M	7	6	A,R,T	0-3.42	85.7%	11.8-12.5	76-95	66%	1089-1756
3	Nalgonda	Paddy	8-18 M	10	9	A,R,T	0-3.93	90.0%	11.6-14.5	76-97	80%	1089-1956
4	Medak	Paddy	3-12M	8	4	A,R,T	0-1.42	50%	11.6-13.5	79-96	88%	1064-1654
5	Karimnagar	Paddy	8 M	12	11	A,R,T	0-2.5	81.8%	10.8-11.9	90-98	100%	1685-1984
1	Karimnagar	Maize	12 M	10	10	RW,A,R,T	6-37.9	100%	11.3-11.5	50-90	20%	1300-2616
2	Nizamabad	Maize	3 M	10	0	0	0	NIL	10.6-11.5	90-100	100.0%	2145-2822
1	Warangal	Bengal gram	11 Months	5	5	Pulse beetle	2.2-77	100.00%	10.4-10.7	85-97	100%	1702-2084

**R- Rhyzopertha dominica; A- Angoumois grain moth; T-Tribolium castaneum; RW=Rice weevil*

Table 2.9: Survey and evaluation of seed health status of farmer's saved seed with respect to insect infestation (PAJANCOA, Karaikal)

S. No.	Location	Crop/ variety	Storage period (Month)	No. of samples collected	No. of samples infested	Name of insects present	Per cent seed damage (range)	Seed sample with seed damage beyond permissible limit	Seed Moisture (%) (range)	Seed Germination (%) (range)	Seed sample with seed germination above IMSCS
1	Puducherry	Paddy	**6-9**	30	30	R, S	1.82-8.73	100	9.0-12.2	6-97	53.3
2	Karaikal	Paddy	6-9	26	26	R, S	0.73-5.82	100	9.9-11.7	2-88	23.1
3	Mahe	Paddy	6-9	5	5	R, S	0.55-1.45	100	11.7-13.6	4-73	0.0

**R- Rhyzopertha dominica; S- Sitotroga cerealella*

Table 2.10: Survey and evaluation of seed health status of farmers saved seed of wheat seed with respect to insect infestation at IISS, MAU

S. No.	Location	Crop/ variety	Storage period	Samples collected	Number of samples infected	Name of insects present	Per cent seed damage (range)	Seed sample with seed damage beyond permissible limit (%)	Seed Moisture (%) (range)	Seed Germination (%) with range in parenthesis	Seed sample with seed germination above IMSCS	Mean vigour index (with range)
1	Pkhaypur	Wheat	6 Months	18	*3*	R; SO; SC	0.5 to 0.75	17	9.7 - 12.7	87 (72 - 98)	67	2432
2	Rhajaniya	Wheat	6 Months	8	1	SC	0.25	Nil	9.4 - 12.7	82 (70 - 90)	50	1848
3	Ohnaich	Wheat	6 Months	15	2	SO	0.5 - 0.75	13	9.6 - 12.6	92 (82 -98)	80	2516
4	Kushmaur	Wheat	6 Months	1	0	Nil	Nil	Nil	9.3	94	100	2519
5	Saidpur	Wheat	6 Months	18	3	R; SO; SC	1.25 - 1.5	17	9.8 - 12.7	90 (82 - 99)	61	2494

SO-*Sitophilus oryzae*; R- *Rhizopertha*; SC-*Sitotroga cerealella*

Table 2.11: Survey and evaluation of seed health status of farmer's saved seed with respect to insect infestation (UAS, Dharwad)

S. No.	Crop/ variety	Storage period (Month)	No. of samples collected	No. of samples infested	Seed Moisture (%) (range)	Seed Germination (%) (range)	Seed sample with seed germination above IMSCS	Mean vigour index (with range)
1	Soybean	6	100	18	6.8-12.4	21-69	Nil	977 (2045-280)
2	Chick pea	4-6	100	24	7-16	42-66	Nil	770 (502-1420)

Experiment 3 : Quality seed production through insect pollination

Objectives:

1. Collection, identification and temporal abundance of important insect pollinators.
2. Evaluation of seed quality of insect and self-pollinated products from different crops.

Date of Start 2010

Crop **Centre**

Berseem **IISS, Mau; NDUAT, Faizabad; PJTSAU, Hyderabad; JNKVV, Jabalpur**

Treatments: Entomophilous crop will be grown in 1000 sq. m or more area following recommended cultural practice.

T_1- Three random plots of 3m x 2m will be covered with insect–proof net cages measuring (length =5m, width=2m) at bud stage to exclude insect's visit to flower in order to get self-pollinated (SP) seeds.

T_2- Similarly, there will be three random plots of same size to serve as open pollinated (OP) seed.

T_3- And there will be three random plots of same size with partially caged with insect proof nets with 8-frame honey bee colony to serve as bee pollinated (BP) seed.

Results: (Table 3.1 – 3.6)

Berseem

PJTSAU, Hyderabad

In open pollinated plots honey bee constituted 79.9% of insect pollinators (*Apis dorsata*-8.4%, *Apis mellifera*-58.2% and *Apis florae*- 13.3%) whereas other pollinators constituted 20.1% of total insect pollinators (table- 3.1). There was almost 60.1% increase in pollinators' visit during afternoon period compared to forenoon. Bee pollinated (partially caged with 8-frame honey bee colony) (BP) plots of berseem recorded highest seed yield (85 Kg/ha) followed by open pollinated plots (64 Kg/ha) and SP plots (8.4 Kg/ha). Per cent seed setting, 1000 seed weight, seed germination and vigour index were also highest in bee pollinated plots followed by open pollinated plots and self-pollinated plots (table- 3.2).

NDUA&T, Faizabad

In open pollinated plots honey bees constituted 63.1% of insect pollinators (*Apis dorsata*-48.4%, *Apis mellifera*-14.7%) whereas other pollinators constituted 37.1% of total insect pollinators (table- 3.3). Bee pollinated (partially caged with 8-frame honey bee colony) (BP) plots of berseem recorded highest seed yield (3.5q/ha) followed by open pollinated plots (2.16q/ha) and SP plots (1.17q/ha). Per cent germination was also highest in bee pollinated followed by open pollinated plots and self-pollinated plots (table- 3.4).

IISS, Mau

In open pollinated plots honey bees constituted 92.1% of insect pollinators (*Apis dorsata*-66.39%, *Apis mellifera*-25.76%) whereas other pollinators constituted 7.9% of total insect pollinators (table- 3.5).Bee pollinated (partially caged with 8-frame honey bee colony) (BP) plots of berseem recorded highest seed yield (1.5q/ha) followed by open pollinated plots (1.13q/ha) and SP plots (0.57q/ha). Per cent germination was also highest in bee pollinated followed by open pollinated plots and self-pollinated plots but they were not significantly different from each other (table- 3.6).

Table 3.1: Frequency of honeybee visit (Mean No. of Bee visits /10 flowers) in berseem crop at PJTSAU, Hyderabad

	Forenoon 9-10 AM					Afternoon 3-4 PM				
Date	A.d	A.m	A.f	Others	Total	A.d	A.m	A.f	Others	Total
Day1	1	6	2	3	12	3	8	0	12	23
Day2	1	8	3	2	14	1	12	3	4	20
Day3	1	6	3	3	13	2	10	7	0	19
Day4	1	7	3	2	13	4	10	4	3	21
Day5	1	8	3	2	14	2	8	4	2	16
Day6	1	10	3	5	19	1	12	5	2	20
Day7	2	12	2	1	17	2	10	0	2	14
Day8	3	6	3	3	15	1	12	3	1	17
Day9	1	10	0	2	13	1	20	2	2	25
Day10	2	6	2	1	11	1	10	2	2	15
Day11	1	4	2	5	12	2	16	3	2	23
Day12	2	4	2	2	10	3	15	0	5	23
Day13	0	4	2	2	8	1	14	0	6	21
Day14	0	5	2	2	9	0	15	0	8	23
Day15	0	3	0	4	7	0	13	0	8	21
Total	17	99	32	39	187	24	185	33	59	301
Mean	1.13	6.6	2.13	2.6		1.6	12.33	2.2	3.93	
Percentage	9.1	52.9	17.1	20.8		8.0	61.5	11.0	19.6	
Over all percentage	8.4	58.2	13.32	20.08						

A.d.= *Apis dorsata*, A.m.=*Apis mellifera;* Af= *Apis florea*

Table 3.2: Effect of bee pollination on berseem crop at PJTSAU, Hyderabad

S. No.	Treatments	Seed setting (%)	Yield Kg/ha	1000 seed weight	Germination (%)	Vigour Index
T_1	Without insect pollination (WIP)	25.4	8.4	2.86	96.3	1365.7
T_2	Open pollination (OP)	69.1	63.8	2.94	99.0	1396.3
T_3	Bee pollination (BP)	80.0	85.0	3.10	99.7	1441.3
	$CD_{0.05}$	1.8	5.4	N.S.	0.96	54.6

Table 3.3: Frequency of honeybee visit (Mean No. of Bee visits /10 flowers) in berseem crop at NDUAT, Faizabad

Days	Pollinator population during flowering in open pollinated crop in 10 plants for 5 min.							
	Forenoon 9-10 AM				Afternoon 3-4 PM			
	A.d.	A.m.	Others	Total	A.d.	A.m.	Others	Total
1	18	3	9	29	20	5	14	39
2	15	2	10	27	19	4	16	39
3	13	2	12	27	13	6	10	29
4	17	3	8	28	10	3	10	23
5	14	6	9	29	12	8	12	32
6	16	4	6	26	16	6	8	30
7	18	5	10	33	12	4	10	26
8	10	4	12	26	10	7	11	28
9	9	2	8	19	6	2	9	17
10	3	1	5	9	3	0	6	9
Total	133	32	89	253	121	45	106	272
Percent	52.6	12.7	35.2		44.5	16.5	39.0	-
Overall Percent	48.4	14.7	37.1					

A.d.= *Apis dorsata*, A.m.=*Apis melifera*

Table 3.4: Effect of bee pollination on berseem crop at NDUAT, Faizabad

Treatment	Seed yield(g/Pot (6sqm)	Seed yield (Kg/ha)	*Seed germination (%)*
Without insect pollination (WIP)	70.0	116.7	87.7
Open pollination (OP)	129.67	216.1 (85.2% increase over WIP)	91.8
Bee pollination (BP)	210	350.0 (62% increase over OP)	93.0
$CD_{0.05}$		*2.88*	3.7

Table 3.5: Frequency of honeybee visit (Mean No. of Bee visits /m^2) in Berseem crop at IISS, Mau

Day	*Forenoon 9-10 AM*				*Afternoon 3-4 PM*			
	A.d	A.m	Others	Total	A.d	A.m	Others	Total
Day 1	14.0	14.0	1.0	29.0	38.0	26.0	1.0	65.0
Day 2	57.0	21.0	2.0	80.0	45.0	12.0	4.0	61.0
Day 3	62.0	20.0	2.0	84.0	64.0	5.0	3.0	72.0
Day 4	48.0	10.0	6.0	64.0	95.0	4.0	10.0	109.0
Day 5	63.0	8.0	4.0	75.0	109.0	10.0	5.0	124.0
Day 6	36.0	18.0	3.0	57.0	36.0	16.0	3.0	55.0
Day 7	45.0	15.0	9.0	69.0	62.0	10.0	4.0	76.0
Day 8	21.0	4.0	7.0	32.0	41.0	11.0	2.0	54.0
Day 9	6.0	16.0	2.0	24.0	35.0	4.0	0.0	39.0
Day 10	8.0	9.0	3.0	20.0	37.0	4.0	5.0	46.0
Day 11	9.0	18.0	3.0	30.0	39.0	12.0	4.0	55.0
Day 12	6.0	13.0	4.0	23.0	30.0	10.0	3.0	43.0
Day 13	0.0	24.0	2.0	26.0	5.0	22.0	3.0	30.0
Day 14	1.0	10.0	4.0	15.0	11.0	8.0	0.0	19.0
Day 15	2.0	4.0	1.0	7.0	2.0	12.0	1.0	15.0
Day 16	0.0	6.0	5.0	11.0	2.0	16.0	1.0	19.0
Day 17	0.0	5.0	4.0	9.0	0.3	3.0	2.0	5.3
Day 18	1.0	0.0	3.0	4.0	0.7	0.0	3.0	3.7
Day 19	0.0	0.0	2.0	2.0	0.0	0.0	1.0	1.0
Total	379.0	215.0	67.0	661.0	652.0	185.0	55.0	892.0
Mean	19.9	11.3	3.5	34.8	34.3	9.7	2.9	46.9
Per cent	57.3	32.5	10.1		73.1	20.7	6.2	
Overall per cent	66.39	25.76	7.86					

Table 3.6: Effect of bee pollination on Berseem crop at IISS, Mau

Treatment	Seed yield (kg/ha)	Seed germination (%)
Without insect pollination (WIP)	57	75
Open pollination (OP)	113	81
Bee pollination (BP)	150 (32.7% increase over OP)	83
$CD_{0.05}$	21.4	NS

Conclusion

Bee pollination plays major role in improving the seed yield of berseem. Apart from seed yield, parameter like seed germination and vigour improved substantially due to bee pollination. However, seed yield was very low at PJTSAU, Hyderabad.

Experiment 4 : Effect of carbon dioxide (CO_2) treatment on the control of storage insect pests and the seed quality attributes under ambient conditions.

Objectives:

1. To assess the effect of carbon dioxide (CO_2) treatment on the mortality/survival of storage insect pest under ambient conditions.
2. To monitor effect of carbon dioxide (CO_2) treatment on seed quality attributes particularly seed viability and vigour after 3, 6, 9 and 12 months of storage under carbon dioxide (CO_2) atmosphere.

Year of start: 2010

Treatment:

A. Treatment:

T_1 Normal air treatment (untreated control)

T_2 Carbon dioxide (CO_2) @ 30% of the volume

T_3 Carbon dioxide (CO_2) @ 40% of the volume

T_4 Carbon dioxide (CO_2) @ 50% of the volume

B. Exposure period (P) in months:

P_1 03

P_2 06

P_3 09

P_4 12

Replication: 3 **Design:** FCRD

Observations to be recorded at the end of each storage period

1. **Percent damaged seed (insect infestation).**
2. **Germination of undamaged seed**
3. **Seed moisture content**
4. **Number of live/dead insects in the representative sample**

Results: (tables 4.1-4.4)

Paddy

PJTSAU, Hyderabad

After six months of storage 40% and above carbon dioxide concentration restricted insect damage within permissible limit (0.2-0.5%) and maintained very high seed germination (97-98%) 50 % Carbon dioxide being the best treatment. Control recorded 1.95% insect damage and 94.6% seed germination after six months of storage.

Pigeonpea

PJTSAU, Hyderabad

After nine months of storage 50% carbon dioxide concentration restricted insect damage within permissible limit (0.66%) and maintained very high seed germination (83%). Control recorded 4.5% insect damage and 85% seed germination after nine months of storage.

Greengram

OUAT, Bhubaneswar

Carbon dioxide concentration of 40% and 50% provided complete protection (ID-nil) against pulse beetle and maintained significantly high seed germination (86-89%) compared to control (68%) up to six months of storage while 30% CO_2 recorded 0.33% insect damage. After 9 months of storage only 40 and 50% CO_2 concentration provided adequate protection (ID 0.5%) and maintained seed germination above IMSCS. Control recorded 48% seed germination and 23% insect damage. After 12 months of storage although 40 and 50% CO_2 restricted insect damage (0.67-0.83%) within permissible limit but failed to meet the standard of seed germination (71-73%). while normal air treatment (control) recorded 35% insect damage and 28% seed germination after 12 months of storage (Table 4.3).

Groundnut

TNAU, Coimbatore

Results obtained after nine months of storage showed that there was no insect damage in 50% CO_2 treatments whereas 40% and 30% CO_2 treatment also resulted very low insect damage (0.01%) but only 40% and 50% CO_2 treatments maintained seed germination above IMSCS whereas normal air treatment recorded 8.5% insect damage. After 12 months of storage 50% CO_2 treatments provided complete protection against storage insects but none of the CO_2 treatments was capable of maintaining seed germination above IMSCS (G 67-68%). Control recorded 53% seed germination and 13.4% insect damage after 12 months of storage.

Conclusion: Based on results obtained at various centres it is evident that 50% CO_2 treatment can provide effective protection against angoumois grain moth in paddy, groundnut beetle in groundnut and pulse bruchid in greengram and Pigeonpea without affecting seed quality up to 6-9 months storage. Thus CO_2 can be a good alternative to use of chemical insecticides including fumigants for preventing storage pests in wheat, groundnut, redgram and greengram.

Table 4.1: Effect of carbon dioxide (CO_2) treatment on storage insect pests and seed quality attributes of paddy seed under ambient conditions prevailing at PJTSAU, Hyderabad

Storage duration	3 months			6 months		
Treatments	G (%)	ID (%)	MC (%)	G (%)	ID (%)	MC (%)
Control	90.66	1.5	11.93	94.66	1.95	10.30
30% CO_2	92.0	0.9	11.00	94.3	0.8	10.20
40% CO_2	93.7	0.8	10.93	97.0	0.5	10.13
50% CO_2	94.0	0.4	10.80	98.0	0.2	10.30
Gunny bag	84.7	2.9	11.66	91.0	0.7	10.00
$CD_{0.05}$	2.65	0.21	0.31	1.57	0.19	NS

Table 4.2: Effect of carbon dioxide (CO_2) treatment on storage insect pests and seed quality attributes of red gram under ambient conditions prevailing at PJTSAU, Hyderabad

Storage duration	3 months			9 months		
Treatments	G (%)	ID (%)	MC (%)	G (%)	ID (%)	MC (%)
Control	92.7	0.02	13.8	85.0	4.46	9.8
30% CO_2	93.3	0.02	15	83.0	3.49	10.1
40% CO_2	94.3	0.02	14.41	86.3	2.39	10.0
50% CO_2	94.0	0.02	14.1	83.0	0.66	10.1
Gunny bag	94.0	0.01	11.2	86.3	3.53	7.7

Table 4.3: Effect of carbon dioxide (CO_2) treatment on storage insects and seed quality attributes of mungbean under ambient condition at OUAT, Bhubaneswar.

Treatments	Germination (%)			Insect damage (%)			Moisture (%)		
	6 M	9 M	12 M	6 M	9 M	12 M	6 M	9 M	12 M
Control	68.3 (55.77)	47.7 (33.65)	28.3 (32.13)	10.50 (3.39)	22.7 (4.86)	35.3 (6.02)	10.1	10.4	10.6
CO_2 @ 30%	84.3 (66.69)	77.7 (61.80)	70.7 (57.63)	0.33 (1.15)	1.67 (1.63)	2.17 (1.77)	9.1	9.7	9.9
CO_2 @ 40%.	86.3 (68.32)	80.7 (63.95)	71.3 (57.63)	0.0 (1.0)	0.50 (1.21)	0.83 (1.35)	8.8	9.3	9.5
CO_2 @ 50%	89.3 (70.95)	80.3 (63.88)	73.0 (58.70)	0.0 (1.0)	0.50 (1.22)	0.67 (1.28)	8.8	9.4	9.5
CD values @ 0.05	Treatment T=1.30, Period (P)P=1.30, T*P=2.61			Treatment (T)= 0 .13 Period (P)= 0.13 T x P = 0.26			CD of T=0.13, P=0.13, T*P=0.27		

Table 4.4: Effect of carbon dioxide (CO_2) treatment on storage insect pests and seed quality attributes of groundnut under ambient conditions prevailing at TNAU, Coimbatore.

Storage duration	9 months			12 months		
Treatments	G (%)	ID (%)	MC (%)	G (%)	ID (%)	MC (%)
Control	61.0 (51.36)	8.5	8.1 (16.50)	53.0 (46.53)	13.4	8.6 (17.05)
30% CO_2	69.0 (56.38)	0.01	7.2 (15.53)	67.0 (55.14)	0.04	6.6 (14.84)
40% CO_2	70.0 (57.00)	0.01	7.1 (15.49)	67.0 (54.74)	0.01	6.5 (14.73)
50% CO_2	70.0 (57.00)	0.0	7.1 (15.49)	68.0 (55.35)	0.0	6.5 (14.73)
$CD_{0.05}$	0.81	0.14	0.12	0.65	0.14	0.14

Experiment 5: Demonstration of efficacy of CO_2 treatment for management of insect pests of stored seeds in large capacity storage bin.

Objective:

1. To design large container to treat CO_2 for management of pests of stored seeds
2. To demonstrate efficacy of CO_2 treatment for management of insect pests of stored seeds in large capacity storage bin

Year of start: 2011

Crop seed	Centre
Pulse (Greengram or blackgram or redgram)	TNAU, Coimbatore
Paddy	UAS, Bangalore, PJTSAU, Hyderabad
Chickpea	MPKV, Rahuri

The methodology and design of storage bin will be standardized for treating stored paddy / pulse seeds. Required quantity of seeds will be taken and artificially infested with 100 pairs of lesser grain borer (in paddy) and pulse beetle (in pulses) prior to experimentation and then treated with 0 and 50% CO_2 (in two separate

containers) and the percent seed damage due to insect, insect population (live and dead adults in 100g sample), seed germination and moisture will be recorded at 3, 6 and 9 months after treatment. The level of CO_2 in the containers will be assessed periodically. The temperature and RH of storage room will be recorded on weekly basis.

Results:

Green gram

TNAU, Coimbatore

Demonstration of efficacy of CO_2 treatment for management of storage insect of green gram was conducted in large capacity bin (200 L capacity). Per cent seed germination (85.0%) was highest in 50% CO_2 treatment as compared to untreated control (70.0%) after nine months of storage. Insect damage was not noticed in CO_2 treated container whereas 2.2% insect damage was observed in untreated control after nine months of storage (Table 5.1).

Paddy

UAS, Bangalore

Demonstration of efficacy of CO_2 treatment for management of storage insect of paddy was conducted in large capacity bin. Germination (86.0%) was highest as compared to untreated control (82.0%) after six months of storage. Insect damage was not noticed in CO_2 treated container whereas 5.0% damage was observed in untreated control after six months of storage (Table 5.2).

PJTSAU, Hyderabad:

In large capacity bin per cent seed germination (96.8) in CO_2 treatment was better than untreated control (89.9) after six months of storage. There was 0.20% insect damage in 50% CO_2 treated container whereas 1.9%insect damage was recorded in untreated control after six months of storage (Table 5.3).

Conclusion: The result obtained with capacity containers at UAS, Bangalore, TNAU, Coimbatore and PJTSAU, Hyderabad clearly demonstrated that large scale CO_2 treatment would be equally effective in controlling storage pests in paddy and green gram. Thus Carbon dioxide can provide a relief from toxic residue building chemical insecticides in the arena of storage insect control.

Large capacity CO_2 treatment bin developed at TNAU, Coimbatore

Large capacity CO_2 treatment bin developed at UAS, Bangalore

Fig. 2: Design of CO_2 fumigation container

Table 5.1: Demonstration of efficacy of CO_2 treatment for management of insect pests of stored Green gram seeds in large capacity storage bin at TNAU, Coimbatore.

Treatment	Storage duration				
	9 months				
	Germination (%)	Moisture content (%)	Insect damage (%)	Insect count in 100 g seed sample	
				Live	Dead
T_1 – CO_2 treatment (50 per cent)	85.0	9.6	0.0	-	23
T_2 – Untreated	70.0	11.0	2.2	7	64

Table 5.2: Effect of CO_2 in large capacity storage bin on germination, moisture content and insect damage of paddy at UAS, Bangalore

	Storage duration					
	3 months after storage			6 months after storage		
	Germination (%)	Moisture Content (%)	Insect Damage (%)	Germination (%)	Moisture Content (%)	Insect Damage (%)
CO_2 treated	87.0	9.86	-	86.0	10.50	-
Control	84.0	10.20	2.0	82.0	11.15	5.0

Table 5.3: Effect of CO_2 in large capacity storage bin on germination, moisture content and insect damage of paddy at PJTSAU, Hyderabad

	Storage duration (6 months)							
	Germination (%)		Insect infestation (%)		Vigour index		Moisture content (%)	
CO_2 concentration	0%	50%	0%	50%	0%	50%	0%	50%
R_1	90	97	2.2	0	1944	2949	11.7	10.5
R_2	91	97	1.5	0	2366	2832	11.8	10.4
R_3	92	95	1.7	0.6	2208	2831	11.7	10.4
R_4	89	96	2.3	0.5	2522	2371	11.6	10.4
R_5	90	98	1.2	0	2414	2530	11.7	10.5
R_6	90	98	2.8	0.8	2655	3077	11.7	10.5
R_7	89	98	1.6	0	2065	2865	11.7	10.5
R_8	88	95	1.9	0	2106	2982	11.8	10.5
Mean	89.9	96.8	1.9	0.2	2285.0	2804.6	11.7	10.5

Experiment 6: Efficacy of insecticides and botanicals against storage insects of seeds and their influence on seed viability during storage under ambient condition.

Objectives:

1. To evaluate insecticides/ botanicals against major storage insect-pests damaging seeds.
2. Study of the storability of treated seeds.

Year of Start: 2015

Crop	Centre
Wheat	SKNAU, Durgapura; IISS, Mau
Maize	TNAU, Coimbatore
Paddy	OUAT, Bhubaneswar; AAU, Jorhat, PJTSAU, Hyderabad, PAJANCOA,Karaikal
Pigeonpea	NDUAT, Faizabad, PDKV, Akola
Cowpea	UAS, Bangalore
Chickpea	PJTSAU, Hyderabad; JAU, Jamnagar;
Black gram	TNAU, Coimbatore, PAJANCOA,Karaikal
Field pea	CSAUAT, Kanpur

Treatment:

A. Insecticides/botanicals

1. Emamectin benzoate @ 2ppm (40.0mg/kg seed)
2. Deltamethrin @ 1ppm (0.04 ml/kg seed)
3. Neemazal 10000ppm @ 1.5ml/kg seed (=15 mg Azadirachtin./kg seed)
4. Karanj (*Pongamia pinnata*) oil @5ml/kg seed
5. Citronella oil @ 5 ml/kg seed
6. *Acorus calamus* TNAU Formulation @10ml/kg
7. Untreated control

B. Packaging Material: Gunny bag of 2 kg capacity

Replications: 3 **Design:** CRD

Results-2015-16:(Tables 6.1 to 6.4)

A. Wheat

SKNAU, Durgapura

After three months of storage, all the seed treatments maintained significantly better seed germination (above IMSCS) compared to control and chemical insecticides provided complete protection (ID-nil) against storage insects. Although tested botanicals recorded significantly low insect damage (2.3-3.3%) compared to control (ID-18%) but insect damage was beyond permissible limit after three months of storage.

IISS, Mau

All the seed treatments except karanj oil maintained 85-87% seed germination (above IMSCS). Among the botanicals karanj oil, *Acorus calamus TNAU* formulation and citronella oil restricted insect damage within permissible limit. Control recorded 1.32% insect damage and 84% seed germination after six months of storage. After nine months of storage emamectin benzoate, citronella oil and *Acorus calamus* TNAU formulation maintained seed germination above IMSCS but only storage emamectin benzoate, citronella oil and *Acorus calamus* TNAU formulation restricted insect damage (0.07-0.4%) within permissible limit. Control recorded 3.3% insect damage and 81% seed germination nine months of storage. After twelve months of storage all the treatments failed to meet both the standard.

B. Maize

TNAU, Coimbatore

After six months of storage all the treatments including control had insect damage within permissible limit but only emamectin benzoate and deltamethrin maintained seed germination above IMSCS. All other treatments maintained high seed germination (85-89%) compared to control (G-79%) but failed to maintain seed germination standard under IMSCS even after three months of storage. Previous year's results revealed that all the botanicals restricted seed damage (0.29-0.66%) within permissible limit up to 9 months of storage but seed germination fall below IMSCS even after 6 months of storage.

C. Paddy

AAU, Jorhat

All the treatments except control maintained seed germination above IMSCS (80-83%) after nine months of storage. Among the botanicals only neemazal and *Acorus calamus* TNAU formulation restricted insect damage within permissible limit. After 12 months of storage although *Acorus calamus* TNAU formulation recorded least insect damage (0.58%) among the botanicals but none of the treatments could maintain seed germination above IMSCS. Among the botanicals neemazal and *Acorus calamus* TNAU formulation recorded 83.3% and 60% cumulative mortality respectively within15 days of adult release on 3 months stored treated seeds while other botanicals provided <55% cumulative mortality within15 days of adult release.

PAJANCOA, Karaikal

All the treatments were significantly better than control and maintained seed germination above IMSCS upto 4 months of storage and all botanicals except neemazal restricted insect damage within permissible limit. Among the botanicals *Acorus Calamus* TNAU Formulation maintained very high seed germination (95%)and recorded 0.30% insect damage while control recorded 89% seed germination and 3.6%insect damage after 4 months of storage.

PJTSAU, Hyderabad

All the treatments maintained seed germination above IMSCS and restricted insect damage (0.13-0.47%) within permissible limit while control recorded3.2% insect damage after 6 months of storage. Among the botanicals neemazal was the best treatment (ID 0.13%) followed by citronella oil (ID 0.2%) and *Acorus calamus* TNAU formulation (ID 0.3%).

D. Pigeonpea

NDUAT, Faizabad

The results obtained after three months of storage revealed that all the seed treatments except citronella oil restricted insect damage within permissible limit and maintained seed germination above IMSCS (84-92%) while control recorded 72.3% seed germination and 3.0% insect damage. Among the botanicals *Acorus calamus* formulation recorded least insect damage (0.33%) while neem formulation and karanj oil recorded 1.0% insect damage after three months of storage.

PDKV, Akola

All the seed treatments (botanicals and insecticides) restricted insect damage (0.3-0.4%) within permissible limit and maintained high seed germination (78-86%) compared to control after nine months of storage. After 12 months of storage all the treatments restricted insect damage within permissible limit but karanj oil and citronella oil could not maintain seed germination above IMSCS. Among the botanicals *Acorus calamus* formulation and neem formulation were at par with respect to insect damage (0.53%) but *Acorus calamus* formulation recorded significantly high seed germination than neem formulation after 12 months of storage. Control recorded 67% seed germination and 1.3% insect damage after 12 months of storage.

E. Cowpea

UAS, Bangalore

All seed treatments maintained seed germination above IMSCS after three months of storage. Among the botanicals neem formulation 10000 ppm @1.5ml/kg seed and *Acorus calamus* TNAU formulation recorded insect damage within permissible limit (ID 1%). Control recorded 1.92 % insect damage after three months of storage. All the treatments maintained seed germination above IMSCS up to12 months of storage but failed to restrict insect damage within permissible limit even after 6 months storage. Among the botanicals neem formulation recorded lowest insect damage (ID 3.42%) followed by *Acorus calamus* TNAU formulation (ID 5.25%) compared to control (ID 7.75%).

F. Chick pea

PJTSAU, Hyderabad

All the insecticidal treatments maintained seed germination above IMSCS (93-100%) up to twelve months of storage while control recorded only 51% seed germination. Although all insecticides restricted insect damage within permissible limit but among the botanicals only A*corus calamus* TNAU formulation restricted insect damage within permissible limit after 12 months of storage.

JAU, Jamnagar

All the treatments maintained seed germination above IMSCS up to six months of storage. All insecticidal treatments were free from any insect damage while control recorded 3.3 % insect damage after six months of storage.

G. Black gram

TNAU, Coimbatore

All the treatments maintained seed germination (91-92%) above IMSCS and restricted insect damage (ID 0.24-0.56%) within permissible limit after nine months of storage while control recorded 2.3% insect damage. Among the botanicals *Acorus calamus* formulation was significantly better than other botanicals in terms of insect control. After twelve months of storage all the treatments maintained seed germination above IMSCS (G 87-88%) but none of the treatments was capable of restricting insect damage (ID 1.53-2.36%) within permissible limit. Cumulative mortality data of adults released on nine months stored treated seeds revealed that among the botanicals only *Acorus calamus* formulation recorded insect mortality (16.7%) within 15 days of release.

PAJANCOA, Karaikal

All the treatments were significantly better than control and maintained seed germination above IMSCS upto four months of storage and all botanicals except neemazal restricted insect damage within permissible limit. Among the botanicals *Acorus Calamus* TNAU Formulation maintained very high seed germination (92%)and recorded 0.42% insect damage while control recorded 74% seed germination and 35.1% insect damage after four months of storage.

H. Field pea

CSAUA&T, Kanpur

After three months of storage all treatments maintained seed germination above IMSCS and restricted insect damage within permissible limit. Control recorded 83% seed germination and 2.33% insect damage. Among the botanicals *Acorus calamus* formulation recorded significantly high seed germination compared to other botanicals but neemazal and karanj oil provided complete protection up to three months of storage.

I. Mungbean

OUA&T, Bhubaneswar

All the seed treatments maintained seed germination (G 86-93%) above IMSCS after three months of storage. All the seed treatments except Karanj oil and citronella oil restricted insect damage within permissible limit. Among the botanicals *Acorus calamus* formulation recorded least insect damage (0.33%) followed by neemazal (ID 0.67%) while control recorded 81% seed germination and 4.8% insect damage. Although seed treatment with *Acorus calamus* formulation recorded least insect damage (1.33%) among the botanicals tested and significantly better than the control (ID 11.5%) after six months of storage but insect damage was beyond permissible limit. Cumulative mortality of adults released on 6 months stored treated seeds was70% in case of *Acorus calamus* formulation and 53-63% in other botanicals within 7 days of release.

Conclusion: Various botanicals like Karanj oil, citronella oil and neem formulation (neemazal 10000ppm) were tested along with *Acorus calamus* TNAU formulation. Although there were variations in results from centre to centre, in most of the crops *Acorus calamus* formulation recorded least insect damage among the botanicals and at par with neem formulation. *Acorus calamus* formulation @ 10 ml/kg seed and neemazal 10000ppm @ 1.5ml/kg seed can be used for management of storage insects up to 3-6 months in most of the crops without affecting seed germination.

Table 6.1: Effective seed treatment botanicals and storage periods for different crops at various centres

Crop	Centre	Safe period of storage (months)	Effective botanicals
Wheat	SKNAU, Durgapura	-	None of the botanicals
	IISS, Mau	9	*Acorus calamus* TNAU formulation
Maize	TNAU, Coimbatore	-	None of the botanicals
Paddy	AAU, Jorhat	9	Neemazal and *Acorus calamus* TNAU formulation
	PJTSAU, Hyderabad	6	All treatments
	PAJANCOA,Karaikal	4	All botanicals except neemazal.
Pigeon pea	NDUA&T, Faizabad	3	*Acorus calamus* formulation,neemazal and karanj oil
	PDKV, Akola;	12	*Acorus calamus* formulation and neemazal
Mung bean	OUA&T, Bhubaneswar	3	*Acorus calamus* formulation and neemazal
Chickpea	PJTSAU, Hyderabad	12	*Acorus calamus* formulation
	JAU, Jamnagar	6	All treatments
Blackgram	TNAU, Coimbatore	9	All treatments
	PAJANCOA,Karaikal	4	All botanicals except neemazal.
Fieldpea	CSAUA&T, Kanpur	3	All treatments
Cowpea	UAS, Bangalore	3	Neem formulation and *Acorus calamus* formulation

Table 6.2: Effect of insecticides and botanicals against storage insects of seeds and their influence on seed viability during storage under ambient conditions

Crop	Wheat						Maize				Paddy									
Centres	SKNAU, Durgapura		IISS, Mau				TNAU, Coimbatore				PAJANCOA, Karaikal				AAU, Assam				PJTSAU, Hyderabad	
Storage duration	3 months		6 months		9 month		3 months		6 months		2 months		4 months		9 months		12 months		6 months	
Treatments	*G	*ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1=Emamectin benzoate 5 SG @ 2 ppm (40.0 mg/kg seed)	97.7	0.00	86	0.03	85	0.07	93	0.13	93	0.01	90	0.24	92	0.30	81.7	0.08	76.0	0.25	99.7	0.40
T_2=Deltamethrin 2.8 EC @ 1.0 ppm (0.04 ml/kg seed)	97.3	0.00	85	0.47	84	0.60	91	0.01	91	0.04	93	0.49	91	0.55	81.7	0.00	77.7	0.17	98.0	0.37
T_3=Neem Azal 10000ppm @ 1.5ml/kg seed	97.0	2.66	85	0.56	83	0.76	84	0.06	87	0.13	97	0.36	89	0.97	81.0	0.25	74.7	0.75	96.3	0.13
T_4=*Pongamia pinnata* oil @5ml/kg seed	96.0	2.33	84	0.48	83	1.38	85	0.0	85	0.2	93	0.24	88	0.24	82.3	1.00	74.7	1.75	95.0	0.47
T_5=Citronella oil @ 5 ml/kg of seed	96.7	3.33	85	0.27	85	0.61	86	0.05	88	0.03	80	0.18	84	0.24	80.0	0.83	73.3	1.33	94.7	0.20
T_6=*Acorus calamus* TNAU Formulation @10ml/kg	96.3	2.66	87	0.32	85	0.40	87	0.11	89	0.04	94	0.18	95	0.30	82.7	0.25	76.7	0.58	97.3	0.30
T_7=Untreated control	78.0	18.00	84	1.32	81	3.30	78	0.06	79	0.63	93	2.18	89	3.64	78.7	1.83	71.0	5.00	100	3.2

G- per cent seed germination and ID- per cent insect damage

Table 6.3: Effect of insecticides and botanicals against storage insects of seeds and their influence on seed viability during storage under ambient conditions

Treatments	Black gram								Green gram				Pigeon pea		Cow pea					
	TNAU, Coimbatore				PAJANCOA, Karaikal				OUAT, Bhubaneswar				PDKV, Akola		UAS, Bangalore					
	9 months		12 months		2 months		4 months		3 months		6 months		12 months		3 months		6 months		12 months	
	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1=Emamectin benzoate (Proclaim 5 SG) @ 2 ppm (40.0 mg/kg seed)	91	0.24	87	1.53	95	1.88	93	0.67	93.3	0.17	80.7	0.50	83.0	0.40	91.0	0.92	90.0	1.33	87.0	2.50
T_2=Deltamethrin 2. 8 EC @ 1.0 ppm (0.04 ml/kg seed)	91	0.24	87	1.67	93	1.21	95	1.03	91.7	0.33	80.0	0.67	82.3	0.46	88.3	1.25	87.3	2.17	85.3	4.50
T_3=Neem formulation 10000 ppm @1.5ml/kg seed (=15mg azadirachtin/kg seed)	92	0.52	88	2.36	90	2.12	86	4.00	90.3	0.67	74.7	2.00	77.7	0.53	90.3	1.00	88.3	2.08	86.0	3.42
T_4=Karanja (*Pongamia pinnata*) oil @ 5 ml/kg seed	91	0.53	88	1.61	83	0.73	82	0.36	86.3	1.83	72.7	3.17	72.7	0.66	89.3	1.17	87.7	2.33	84.3	6.25
T_5=Citronella oil @ 5 ml/kg of seed	92	0.56	87	2.33	89	0.61	88	0.36	88.7	1.50	73.3	2.50	73.7	0.73	87.0	1.50	86.7	2.25	83.0	6.58
T_6= *Acorus calamus* TNAU formulation @10 ml/kg	91	0.39	88	1.72	94	0.36	92	0.42	91.0	0.33	77.3	1.33	80.3	0.53	89.0	1.00	87.0	2.00	85.0	5.25
T_7= Untreated control	91	2.3	88	6.87	82	27.9	74	35.1	81.0	4.83	69.3	11.50	67.3	1.3	88.3	1.92	85.7	2.42	81.0	7.75

Table 6.4: Effect of insecticides and botanicals against storage insects of seeds and their influence on seed viability during storage under ambient conditions

Treatments	Chick pea						Pigeon pea						Field pea		Cow pea					
	JAU, Jamnagar		PJTSAU, Hyderabad				NDUAT, Faizabad		PDKV, Akola				CSAUAT, Kanpur		UAS, Bangalore					
	6 months		9 months		12 months		3 months		9 months		12 months		3 months		3 months		6 months		12 months	
	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
T_1=Emamectin benzoate (Proclaim 5 SG) @ 2 ppm (40.0 mg/kg seed)	90.0	0.0	98.7	0.32	97.3	0.26	92.0	0.0	86.0	0.30	83.0	0.40	86.3	0.66	91.0	0.92	90.0	1.33	87.0	2.50
T_2=Deltamethrin 2. 8 EC @ 1.0 ppm (0.04 ml/kg seed)	89.7	0.0	99.0	0.21	98.7	0.00	90.0	0.0	84.3	0.36	82.3	0.46	87.3	1.00	88.3	1.25	87.3	2.17	85.3	4.50
T_3=Neem formulation 10000 ppm @1.5ml/kg seed (=15mg azadirachtin/kg seed)	89.3	0.0	98.7	2.07	97.3	1.57	88.7	1.0	81.3	0.46	77.7	0.53	90.7	0.0	90.3	1.00	88.3	2.08	86.0	3.42
T_4=Karanja (*Pongamia pinnata*) oil @ 5 ml/kg seed	89.3	0.0	95.3	3.19	93.0	1.28	85.7	1.0	77.7	0.60	72.7	0.66	84.7	0.0	89.3	1.17	87.7	2.33	84.3	6.25
T_5=Citronella oil @ 5 ml/kg of seed	89.0	0.0	94.7	2.65	95.0	1.96	84.3	1.3	78.0	0.60	73.7	0.73	81.7	0.66	87.0	1.50	86.7	2.25	83.0	6.58
T_6= *Acorus calamus* TNAU formulation @10 ml/kg	89.0	0.0	99.3	0.76	100	1.0	88.7	0.3	82.7	0.40	80.3	0.53	91.3	0.66	89.0	1.00	87.0	2.00	85.0	5.25
T_7= Untreated control	88.3	3.33	96.3	10.4	51.0	10.7	72.3	3.0	75.7	0.90	67.3	1.3	83.0	2.33	88.3	1.92	85.7	2.42	81.0	7.75

G- per cent seed germination and ID- per cent insect damage

Experiment 7: Management of groundnut pod borer (*Caryedon serratus*) in groundnut pods during storage

Objectives:

1. To know the sources of infestation and alternate host plants existing in groundnut growing areas of different states
2. Management by pod treatments with new insecticides molecules

Year of Start: 2014

Groundnut JAU, Jamnagar; PDKV, Akola; MPKV, Rahuri; PJTSAU, Hyderabad

Treatments:

1. Emamectin benzoate (Proclaim 5 SG) @ 2ppm (40mg/kg pod)
2. Spinosad (Tracer 45 SC)@2ppm (4.4mg/kg pod)
3. Thiodicarb (Larvin 75 WP)@ 2ppm (2.7 mg/kg pod)
4. Rynaxypyr (Coragen 20 SC) @2ppm (0.01 ml/kg pod)
5. Profenofos (Curacron 50 EC) @2ppm (0.004 ml/kg pod)

6. Novaluron (Rimon 10 EC)@ 5ppm (0.05 ml/kg pod)
7. Deltamethrin 2.8Ec @ 1ppm (0.04 ml/kg pod)
8. Untreated control

Packaging material: Gunny bag of 2 kg capacity

Replications: 3 **Design:** CRD

Results: (Tables-7.1-7.2)

PJTSAU, Hyderabad

All treatments restricted insect damage within permissible limit but Emamectin benzoate, spinosad, profenofos and deltamethrin provided complete protection upto 9 months of storage. All the treatments maintained seed germination above IMSCS (72-85%) while control recorded 74% seed germination and 1.5% insect damage after nine months storage. Although some of the treatments (emamectin benzoate, spinosad, thiodicarb, profenofos and deltamethrin) provided adequate protection upto twelve months of storage but per cent seed germination (34-62%) was far below IMSCS. Control recorded 32% seed germination and 4.4% insect damage after twelve months of storage.

JAU, Jamnagar

All the seed treatments provided complete protection (ID-nil) and maintained seed germination (G 77-79%) above IMSCS up to nine months of storage while control recorded 68% seed germination and 14.4% insect damage. Although all seed treatments restricted insect damage (ID 0.33-0.67%) within permissible limit but failed to maintain seed germination above IMSCS after 12 months of storage. Control recorded 46% seed germination and 20.3% insect damage after 12 months of storage.

MPKV, Rahuri

All insecticidal treatments maintained seed germination above IMSCS and restricted insect damage within permissible limit upto 6 months of storage. Deltamethrin provided complete protection against groundnut pod borer upto nine months of storage and was closely followed by emamectin benzoateand spinosad (ID 0.33%). Only these three treatments maintained seed germination (G 73-77%) above IMSCS upto nine months. Control recorded 61.0% seed germination and 6.0% insect damage after nine months of storage. After twelve months of storage all treatments failed to meet both the standards.

PDKV, Akola

All the treatments restricted insect damage within permissible limit (ID 0.44-0.72%) and maintained seed germination above IMSCS (84-90%) upto six months of storage while control recorded 82% seed germination and 1.0% insect damage. After 9 months of storage all the treatments maintained seed germination above IMSCS but failed to restrict insect damage level as per IMSCS.

Conclusion: Groundnut pod borer causes great problem in storage of groundnut pods for seed purpose. The results indicated that almost all the insecticides were effective in managing pod borer but emamectin benzoate, spinosad and deltamethrin were highly effective as they provided better protection upto 6-9 months of storage and maintained seed germination above IMSCS.

Table 7.1: Effective seed treatment and storage periods groundnut pods at various centres

Crop	Centre	Safe period of storage (months)	Effective botanicals
Groundnut	PJTSAU, Hyderabad	9	All treatments
	JAU, Jamnagar	9	All treatments
	MPKV, Rahuri	9	Deltamethrin, emamectin benzoate, spinosad
	PDKV, Akola	6	All treatments

Table 7.2: Effect of new insecticides on groundnut pod borer (*Caryedon serratus*) in groundnut pods during storage

S. No	Centres	PJTSAU, Hyderabad				JAU, Jamnagar				MPKV, Rahuri				PDKV, Akola			
		9 months		12 months		9 months		12 months		9 months		12 months		6 months		9 months	
	Treatments	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID	G	ID
1	Emamectin benzoate (40 mg/kg)	84.3	0.0	62.3	0.00	78.7	0	69.0	0.33	74.0	0.33	65.0	2.00	89.7	0.44	85.0	1.14
2	Spinosad (4.4 mg/kg)	81.7	0.0	54.3	0.00	77.3	0	68.7	0.33	73.0	0.33	61.0	2.67	88.0	0.45	84.7	1.37
3	Thiodicarb (2.7 mg/kg)	72.3	0.7	38.0	1.50	77.0	0	68.0	0.67	69.0	1.33	59.3	3.33	86.0	0.54	83.3	1.60
4	Rynaxypyr (0.01 ml/kg)	73.3	0.3	41.7	2.50	77.3	0	68.3	0.33	69.0	2.00	56.0	4.00	84.7	0.52	80.0	1.80
5	Profenophos (0.004 ml/kg)	80.7	0.0	44.0	0.00	78.3	0	68.7	0.33	68.0	1 .00	55.3	2.33	85.7	0.53	82.7	1.73
6	Novaluron (0.05 ml/kg)	76.0	0.8	34.0	3.30	77.3	0	67.7	0.67	68.0	1.67	56.0	4 .00	84.0	0.72	82.0	1.70
7	Deltamethrin (0.04 ml/kg)	84.7	0.0	41.0	0.87	77.3	0	68.7	0.33	77.0	0.0	64.0	2.00	88.0	0.61	86.0	1.63
8	Untreated control	74.3	1.5	32.3	4.40	68.3	14.3	45.7	20.33	61.0	6.0	49.0	9.33	81.7	1.00	80.0	2.13

Experiment 8: Evaluation of pre-harvest spraying of insecticides for management of pulse beetle (*Callosobruchus* sp)

Objective:

1. To evaluate efficacy of pre-harvest spray of insecticides for management of field infestation of pulse beetle.

Year of Start: 2015

Crop	Centre
Pigeonpea	UAS, Bangalore;PJTSAU, Hyderabad; PDKV, Akola
Green gram	OUAT, Bhubaneswar; JAU, Jamnagar;
Chickpea	MPKV,Rahuri; SKNAU, Durgapura; NDUAT, Faizabad
Black gram	TNAU, Coimbatore; PAJANCOA,Karaikal; AAU,Assam

Treatments:

A. Insecticides/Botanicals

1. Emamectin benzoate @0.3ml/L
2. Malathion dust @10kg/acre
3. Profenofos 50EC @1ml/L

4. Neemazal 10000ppm @1ml/L
5. Control

B. Spraying schedule

1. Spraying at 50% pod maturity (S1)
2. Spraying at maturity (S2)
3. Spraying at 50% pod maturity and maturity (S3)

Replication: 3 **Design:** split plot

Results

Greengram

JAU, Jamnagar

Among the insecticides profenofos was the best treatment followed by emamectin benzoate, malathion dust and neemazal. Among the spraying schedule, spraying at pod maturity (S2) was better than spraying at 50%pod maturity (S1) but both were outperformed by Spraying at 50% pod maturity and maturity (S3). There was no adult emergence within two months of storage in three treatments viz. one time spraying of profenofos at pod maturity (I_3S_2), twice spraying of profenofos at 50% pod maturity and maturity (I_3S_3) and twice spraying of emamectin benzoate at 50% pod maturity and maturity (I_1S_3). Control recorded 446.7 mean adult emergence within two months of storage period.

OUAT, Bhubaneswar

Spraying of emamectin benzoate at 50% pod maturity and maturity was the best treatment with 0.67% adult emergence on 8th week of storage of green gram seed and was followed by spraying of neemazal at 50% pod maturity and maturity with 1.33% adult emergence. Spraying of profenofos at 50% pod maturity and maturity recorded 2.17% adult emergence on 8th week of storage of greengram seed while control recorded 7.4% adult emergence.

Black gram

TNAU, Coimbatore

Spraying of emamectin benzoate at 50% pod maturity and maturity was the best treatment with 51.7 mean adult emergence within two months of storage of blackgram seed and was followed by dusting of Malathion at 50% pod maturity and maturity [(61.7) mean adult emergence] and spraying of profenofos at 50% pod maturity and maturity [(71.7) mean adult emergence]. There was 190.6 adult emergence in control within two months of storage.

PAJANCOA, Karaikal

Among the treatments, emamectin benzoate @ 0.3ml/l(78.4) was on par with profenofos 50EC @ 1ml/L (80.1) and Malathion @ 10kg/ac (84.6) recorded significantly lesser number of exit holes as compared to other treatments in all weekly observations. Among the spray schedules, the number of exit holes was found to be significantly lesser in spraying at 50% maturity and maturity S_3 (75.3) followed spraying at 50% maturity S_2 (91.4) and maturity S_1 (120.3).

AAU, Jorhat

There was no adult emergence in the entire spraying schedule except spraying of emamectin benzoate at 50% maturity and spraying of neemazal at 50% maturity. Therefore any of the treatment can be successful in controlling pulse beetle infestation during storage by controlling field infestation.

Chickpea

MPKV, Rahuri

Spraying of profenofos at 50% pod maturity and maturity was the best treatment with nil adult emergence within two months of storage of chickpea seed and was followed by spraying of profenofos at maturity with 2% mean adult emergence. However, there was no significant difference between spraying of profenofos at 50% maturity and maturity. Spraying of neemazal at 50% pod maturity and maturity also reduced adult emergence within 2 months storage (2.33% adult emergence).

NDUAT, Faizabad

Twice spraying of insecticide at 50% pod maturity and maturity was better than other spraying schedules irrespective of insecticide. Among the insecticides emamectin benzoate was the best treatment with 3.33% mean adult emergence within two months of storage of chick pea seed and was followed by profenofos (3.67% mean adult emergence), neemazal (3.67% mean adult emergence) and dusting of Malathion at 50% pod maturity and maturity (4.0% mean adult emergence). There was 5.89% adult emergence in control within two months of storage.

Pigeonpea

UAS, Bangalore

There was no adult emergence in case of twice spraying (50% pod maturity and maturity) of emamectin benzoate or profenofos upto 6 weeks of storage. Spraying of neemazal and Malathion at 50% pod maturity and maturity recorded 1.25% and 2.17% mean adult emergence, respectively up to 6 weeks of storage.

PJTSAU, Hyderabad

Spraying of profenofos at 50% pod maturity and maturity was the best treatment with 2.0 mean adult emergence within two months of storage of pigeonpea seed and was followed by spraying of profenofos at 50% maturity (6 mean adult emergence) and maturity (9.7 mean adult emergence). Among other insecticides spraying of neemazalat 50% maturity and maturity was also having very low adult emergence (15.3 mean adult emergence) followed by emamectin benzoate and malathion.

Conclusion: There were variation in results due to difference in level of field infestationin at various centres. However in most of the centres spraying of profenofos and emamectin benzoate at 50% pod maturity and maturity were effective in controlling insect population during storage of pulses.

Table 8.1: Effective pre-harvest spraying schedule of insecticides/botanicals for different crops at various centres

Crop	Centre	Insecticide/ Botanical	Spraying schedule	Remarks
Green gram	JAU, Jamnagar	Profenofos	Profenofos at pod maturity	No adult emergence
	OUAT, Bhubaneswar	Emamectin benzoate	Spraying at 50% pod maturity and maturity	Lesser no. of exit hole
Black gram	TNAU, Coimbatore	Emamectin benzoate/ Profenofos/ Malathion	Spraying at 50% pod maturity and maturity Spraying at 50% pod maturity and maturity	Lesser no. of exit hole
	PAJANCOA, Karaikal	Emamectin benzoate/ Profenofos/ Malathion	Spraying at 50% pod maturity and maturity	Lesser no. of exit hole
	AAU, Assam	All insecticides/ botanical	Any spraying schedule except spraying of emamectin benzoate at 50% maturity and spraying of neemazal at 50% maturity or maturity	No adult emergence
Chickpea	MPKV, Rahuri	Profenofos	Spraying at 50% pod maturity and maturity	No adult emergence
	NDUAT, Faizabad	Emamectin benzoate> Profenofos/ Neemazal	Spraying at 50% pod maturity and maturity	Lesser no. of exit hole
Pigeonpea	UAS, Bangalore	Emamectin benzoate / profenofos	Spraying at 50% pod maturity and maturity	No adult emergence
	PJTSAU, Hyderabad	Profenofos	Spraying at 50% pod maturity and maturity	Lesser no. of exit hole

Table 8.2: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle during 2 month of storage period in green gram at JAU, Jamnagar

Treatment	Adult emergence					
	Observation recorded after week of storage					
	3	4	5	6	7	8
I_1 (Emamectin benzoate) S_1 (Spraying at 50% pod maturity)	0.00 (0.71)	0.00 (0.71)	1.00 (1.22)	1.00 (1.17)	2.33 (1.68)	4.67 (2.27)
I_1 (Emamectin benzoate) S_2 (Spraying at Maturity)	0.00 (0.71)	0.00 (0.71)	22.00 (4.73)	32.33 (5.69)	41.00 (6.36)	65.67 (8.05)
I_1(Emamectin benzoate) S_3 (Spraying at 50% pod maturity and maturity)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
I_2 (Malathion dust) S_1	0.00 (0.71)	0.00 (0.71)	5.33 (2.23)	11.67 (3.37)	16.33 (3.92)	22.33 (4.61)
$I_2 S_2$	0.00 (0.71)	0.00 (0.71)	8.67 (3.00)	18.33 (4.31)	29.33 (5.43)	50.33 (7.06)
$I_2 S_3$	0.00 (0.71)	10.67 (3.27)	0.67 (1.05)	1.67 (1.46)	4.33 (2.19)	6.67 (2.67)
I_3 (Profenofos) S_1	0.00 (0.71)	37.67 (6.04)	71.67 (8.48)	102.00 (10.12)	183.33 (13.55)	280.00 (16.69)

Treatment	Adult emergence					
	Observation recorded after week of storage					
	3	4	5	6	7	8
I_3S_2	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
I_3S_3	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
I_4 (Neemazal) S_1	0.00 (0.71)	9.00 (3.06)	18.33 (4.33)	27.67 (5.30)	33.67 (5.84)	56.33 (7.48)
I_4S_2	0.00 (0.71)	4.67 (2.11)	13.33 (3.63)	24.33 (4.91)	34.00 (5.73)	54.33 (7.19)
I_4S_3	0.00 (0.71)	2.33 (1.68))	7.00 (2.72)	17.33 (4.21)	28.33 (5.37)	40.0 (6.36)
I_5 (Control)S_1	16.00 (4.02)	38.33 (6.14)	93.33 (9.46)	144.67 (11.94)	220.00 (14.73)	433.33 (20.75)
I_5S_2	16.67 (4.12)	34.33 (5.87)	78.67 (8.85)	153.33 (12.39)	260.00 (16.10)	401.67 (19.96)
I_5S_3	16.33 (4.02)	44.00 (6.63)	11.00 (10.21)	173.33 (13.00)	295.00 (17.13)	505.00 (22.47
S.Em.	0.20	0.39	0.68	0.59	0.63	0.76
C.D. at 5 %	0.57	1.13	1.96	1.72	1.81	2.20
CV %	24.70	27.33	28.41	19.33	16.22	15.51

N.B. figures in parentheses are Square root transformed values.

Table 8.3: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle during 6 weeks of storage period in mungbean at OUA&T, Bhubaneswar

Treatment		Adult emergence				
		Observation recorded after week of storage				
		4	5	6	7	8
I_1 (Emamectin benzoate)S_1 (Spraying at 50% pod maturity)		1.50 (1.57)	2.67 (1.86)	3.17 (2.04)	3.83 (2.20)	4.67 (2.38)
I_1 (Emamectin benzoate)S_2 (Spraying at Maturity)		0.0 (1.0)	0.0 (1.0)	1.17 (1.44)	2.67 (1.91)	3.67 (2.16)
I_1(Emamectin benzoate)S_3 (Spraying at 50% pod maturity and maturity)		0.0 (1.0)	0.0 (1.0)	0.0 (1.0)	0.0 (1.0)	0.67 (1.28)
I_2 (Malathion dust) S_1		2.17 (1.77)	3.33 (2.08)	3.67 (2.16)	4.83 (2.41)	6.17 (2.67)
I_2S_2		1.17 (1.46)	2.17 (1.78)	2.5 (1.87)	3.17 (2.04)	4.17 (2.27)
I_2S_3		0.0 (1.0)	0.0 (1.0)	0.67 (1.27)	2.0 (1.73)	2.83 (1.96)
I_3 (Profenofos)S_1		1.67 (1.63)	3.0 (1.99)	3.33 (2.08)	4.17 (2.27)	5.33 (2.50)
I_3S_2		0.0 (1.0)	0.0 (1.0)	1.17 (1.47)	2.33 (1.82)	3.16 (2.04)
I_3S_3		0.0 (1.0)	0.0 (1.0)	0.33 (1.15)	1.5 (1.57)	2.17 (1.78)
I_4 (Neemazal) S_1		2.0 (1.72)	3.0 (2.0)	3.5 (2.12)	4.17 (2.27)	6.0 (2.64)
I_4S_2		1.33 (1.52)	2.33 (1.82)	2.67 (1.91)	3.17 (2.04)	4.33 (2.31)
I_4S_3		0.0 (1.0)	0.0 (1.0)	0.0 (1.0)	0.5 (1.21)	1.33 (1.52)
I_5 (Control)S_1		3.0 (1.99)	4.33 (2.31)	4.83 (2.41)	6.0 (2.64)	8.33 (3.05)
I_5S_2		2.0 (1.72)	3.67 (2.16)	4.0 (2.23)	5.33 (2.52)	7.0 (2.82)
I_5S_3		2.67 (1.91)	3.83 (2.19)	4.17 (2.27)	5.67 (2.58)	7.0 (2.83)
$CD_{0.05}$	I	0.1	0.09	0.11	0.11	0.14
	S	0.12	0.11	0.21	0.07	0.12
	I*S	0.16	0.16	0.22	0.19	0.24

Table 8.4: Effect of pre-harvest spraying of insecticides on adult pulse beetle emergence in black gram seed at TNAU, Coimbatore

Treatments	T_1	T_2	T_3	T_4	T_5	Mean
S_1	105.00*	126.67	115.00	128.33	185.00	132.00
S_2	113.33	125.00	101.67	123.33	183.33	129.33
S_3	51.67	61.67	71.67	98.33	203.33	97.33
Mean	90.00	104.44	96.11	116.67	190.56	119.56
	T	S	T at S	S at T		
S.Em.	4.20	8.68	6.07	9.92		
CD (0.05)	11.66	37.34	25.51	42.67		

* - Mean of three replications, Total no. of adult pulse beetles emerged at weekly intervals for two months

T_1 : Emamectin benzoate @ 0.3 g / L T_2 : Malathion 5 % DP @ 10 kg/ acre T_3 : Profenofos 50 EC @ 1 ml/ Lz

T_4 : Neemazal 10,000 ppm @ 1 ml/ L T_5 : Control

S_1 : Spraying at 50 per cent pod maturity S_2 : Spraying at pod maturity S_3 : Spraying at 50 per cent pod maturity and maturity

Table 8.5: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle during 6 weeks of storage period in Chickpea at *Karaikal*

Treatments			Adult emergence					
			Observation recorded after week storage					
	1	2	3	4	5	6	7	8
I_1 (Emamectin benzoate)S_1 (Spraying at 50% pod maturity)	2.0	5.7	4.7	7.0	45.3	95.0	197.7	430.7
I_1 (Emamectin benzoate)S_2 (Spraying at Maturity)	0.7	4.0	4.0	4.7	37.0	69.0	141.0	369.3
I_1 (Emamectin benzoate)S_3 (Spraying at 50% pod maturity and maturity)	0.0	3.3	3.3	4.0	26.7	39.3	60.0	327.0
I_2 (Malathion dust) S_1	2.0	6.0	6.0	6.7	26.3	62.0	143.7	693.0
$I_2 S_2$	1.7	4.3	5.3	6.0	24.0	58.3	109.7	404.3
$I_2 S_3$	0.7	3.7	5.0	5.3	14.0	20.3	64.7	356.7
I_3 (Profenofos)S_1	2.7	5.3	6.0	6.7	33.7	59.7	121.7	565.0
$I_3 S_2$	1.7	4.0	4.7	5.7	33.0	52.7	104.7	451.7
$I_3 S_3$	1.0	3.0	3.3	3.7	32.0	49.0	68.3	302.0
I_4 (Neemazal) S_1	1.3	5.3	7.0	9.3	65.0	102.3	185.0	748.0
$I_4 S_2$	1.0	5.0	6.1	5.7	31.7	84.0	117.3	614.7
$I_4 S_3$	1.0	4.7	5.0	5.3	31.7	79.3	97.7	612.0
I_5 (Control)S_1	2.7	6.7	7.3	8.7	83.3	122.7	172.3	742.0
$I_5 S_2$	2.0	6.0	7.3	8.7	66.7	87.7	165.3	546.0
$I_5 S_3$	2.0	6.0	6.3	9.0	67.0	86.0	151.3	451.0
C.D. at 5 %	I-10.8	S-7.7	w-15.9	IxS-17.2	WxIxS-48.5			

Table 8.6: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle in black gram during storage at AAU, Jorhat

Treatments		Adult emergence (%)					
		2nd week	3rd week	4th week	5th week	6th week	7th week
T_1	Emamectin benzoate at 50% pod maturity	0.00	0.33	0.67	1.33	2.00	2.67
T_2	E. benzoate at maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_3	E. benzoate at 50% pod maturity & maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_4	Malathion 5% dust @ 10kg/acre at 50% pod maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_5	Malathion at maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_6	Malathion at 50% pod maturity & maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_7	Profenofos at 50% pod maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_8	Profenofos at maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_9	Profenofos 50% pod maturity & maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_{10}	Neemazal at 50% pod maturity	0.33	1.33	2.33	4.00	5.67	8.33
T_{11}	Neemazal at maturity	0.00	0.00	0.00	0.67	1.67	3.00
T_{12}	Neemazal at 50% pod maturity & maturity	0.00	0.00	0.00	0.00	0.00	0.00
T_{13}	Control	0.67	1.33	3.33	6.00	7.67	12.33
	CD 5 % (Insecticide) =		0.500	1.119	1.602	1.970	2.477
	CD 5 % (Time of Spraying) =		0.489	1.094	1.567	1.927	2.422
	CD 5 % (Insecticide x Time of spraying) =		0.725	1.620	2.320	2.853	3.587

Table 8.7: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle during 6 weeks of storage period in Chickpea at MPKV, Rahuri

Treatments	Adult emergence						
	Observation recorded after week storage						
	3	4	5	6	7	8	Mean
I_1 (Emamectin benzoate)S_1 (Spraying at 50% pod maturity)	0.00 (0.71)	2.67 (1.77)	3.33 (1.95)	3.67 (2.03)	4.67 (2.27)	5.67 (2.47)	3.34
I_1 (Emamectin benzoate)S_2 (Spraying at Maturity)	0.00 (0.71)	2.33 (1.68)	3.00 (1.86)	3.33 (1.94)	3.67 (2.04)	5.00 (2.35)	2.89
I_1(Emamectin benzoate)S_3 (Spraying at 50% pod maturity and maturity)	0.00 (0.71)	2.0 (1.56)	2.67 (1.77)	3.00 (1.86)	3.33 (1.94)	4.67 (2.26)	2.61
I_2 (Malathion dust) S_1	0.00 (0.71)	2.33 (1.67)	3.00 (1.82)	4.00 (2.09)	4.33 (2.20)	4.33 (2.20)	3.00
$I_2 S_2$	0.00 (0.71)	2.00 (1.56)	2.67 (1.74)	3.33 (1.95)	4.00 (2.11)	4.00 (2.11)	2.67
$I_2 S_3$	0.00 (0.71)	1.67 (1.46)	2.00 (1.52)	2.67 (1.77)	3.00 (1.82)	3.67 (2.03)	2.17
I_3 (Profenofos)S_1	0.00 (0.71)	0.00 (0.71)	0 .00 (0.71)	0.00 (0.71)	1.67 (1.46)	2.33 (1.68)	0.67
I_3S_2	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.33 (1.34)	2.00 (1.56)	0.56

Treatments	Adult emergence						
	Observation recorded after week storage						
	3	4	5	6	7	8	Mean
I_3S_3	0 .00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00
I_4 (Neemazal) S_1	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	2.67 (1.77)	3.00 (1.84)	0.95
I_4S_2	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.67 (1.46)	2.67 (1.77)	0.72
I_4S_3	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.33 (1.34)	2.33 (1.68)	0.61
I_5 (Control)S_1	1.67 (1.46)	2.67 (1.77)	4.00 (2.08)	4.67 (2.28)	5.33 (2.41)	6.67 (2.68)	4.17
I_5S_2	1.00 (1.22)	2.33 (1.64)	3.67 (2.03)	4.33 (2.20)	5.00 (2.32)	6.33 (2.62)	3.78
I_5S_3	1.33 (1.34)	2.00 (1.52)	3.00 (1.82)	4 .00 (2.12)	4.67 (2.27)	6.33 (2.61)	3.56
$CD_{0.05}$ I	0.07	0.23	0.3	0.14	0.23	0.2	
$CD_{0.05}$ S	NS	NS	NS	NS	0.18	0.16	

Table 8.8: Evaluation of pre-harvest spraying of insecticides for management of pulse beetle (*Callosobruchus* sp) in chick pea at NDUA&T

Treatments	No of adult emergence (Exit hole)					
	Observation recorded after week storage					
	3	4	5	6	7	8
I_1 (Emamectin benzoate)S_1 (Spraying at 50% pod maturity)	0.67	1.67	2.67	3.67	4.33	4.67
I_1 (Emamectin benzoate)S_2 (Spraying at Maturity)	0.33	0.67	2.00	3.00	3.33	4.00
I_1(Emamectin benzoate)S_3 (Spraying at 50% pod maturity and maturity)	0.33	0.33	0.67	1.00	2.33	3.33
I_2 (Malathion dust) S_1	0.67	2.33	3.67	4.33	5.00	5.33
I_2S_2	0.67	1.67	3.00	3.67	4.00	4.67
I_2S_3	0.33	1.33	1.67	2.00	3.00	4.00
I_3 (Profenofos)S_1	0.00	1.67	2.33	3.33	4.00	5.00
I_3S_2	0.33	0.67	1.33	2.33	3.67	4.33
I_3S_3	0.33	0.33	0.67	1.00	2.00	3.67
I_4 (Neemazal) S_1	0.00	1.33	2.00	3.00	4.00	5.33
I_4S_2	0.67	1.00	1.33	2.33	3.67	4.33
I_4S_3	0.33	0.33	1.00	1.67	2.67	3.67
I_5 (Control)S_1	1.00	2.33	2.67	3.33	4.67	5.67
I_5S_2	1.33	2.33	3.33	4.00	5.00	6.00
I_5S_3	1.00	2.67	3.67	4.33	5.00	6.00
$CD_{0.05}$	NS	0.46	0.65	0.44	0.32	0.24

Table 8.9: Effect of pre-harvest spraying of insecticides and botanicals on adult emergence of pulse beetle during 6 weeks of storage period in red gram at UAS, Bangalore

Treatments	Adult emergence						
	Observation recorded after week of storage						
	1	2	3	4	5	6	Mean
I_1 (Emamectin benzoate)S_1 (Spraying at 50% pod maturity)	0.00	0.00	0.83	0.50	0.75	1.00	0.51
I_1 (Emamectin benzoate)S_2 (Spraying at Maturity)	0.00	0.00	0.83	0.17	0.50	0.58	0.35
I_1(Emamectin benzoate)S_3 (Spraying at 50% pod maturity and maturity)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I_2 (Malathion dust) S_1	0.00	0.00	0.58	1.75	2.08	3.08	1.25
$I_2 S_2$	0.00	0.00	0.17	1.17	1.50	3.00	0.97
$I_2 S_3$	0.00	0.00	0.00	0.42	1.00	2.17	0.60
I_3 (Profenofos)S_1	0.00	0.00	0.17	0.25	0.33	0.67	0.24
I_3S_2	0.00	0.00	0.00	0.00	0.08	0.42	0.08
I_3S_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I_4 (Neemazal) S_1	0.00	0.00	0.33	1.00	2.17	2.50	1.00
I_4S_2	0.00	0.00	0.08	0.42	0.67	1.75	0.49
I_4S_3	0.00	0.00	0.00	0.00	0.08	1.25	0.22
I_5 (Control)S_1	0.17	0.50	1.33	2.08	3.42	4.58	2.01
$I_5 S_2$	0.17	0.33	1.00	1.92	3.08	4.50	1.83
$I_5 S_3$	0.08	0.25	1.25	1.58	3.17	4.42	1.79
SEm±				*0.13*	*0.12*	0.14	
$CD_{0.05}$				*0.37*	*0.34*	*0.40*	

Table 8.10: Effect of pre-harvest spray of insecticides on adult pulse beetle emergence in Redgram seed at PJTSAU, Hyderabad

Treatments	T_1	T_2	T_3	T_4	T_5	Mean
S_1	38	61	6	37	106.7	49.7
S_2	56.3	78.7	9.7	52.3	115	62.4
S_3	20.3	25	2	15.3	132.67	39.1
Mean	38.2	54.9	5.9	34.9	118.1	50.4
	T	S	T at S	S at T		
S.Em.	1.94	2.44	4.53	4.74		
CD (0.05)	4.49	6.79	9.62	10.87		

* - Mean of three replications

* - Total no. of adult pulse beetles emerged at weekly intervals for two months

T_1 : Emamectin benzoate @ 0.3 g/ L T_2 : Malathion 5 % DP @ 10 kg/ acre T_3 : Profenofos 50 EC@1 ml/L

T_4 : Neemazal 10,000 ppm @ 1 ml/ L T_5 : Control

S_1 : Spraying at 50 per cent pod maturity S_2 : Spraying at pod maturity S_3 : Spraying at 50 per cent pod maturity and maturity

Experiment 9: Effect of new packaging material (insecticide incorporated polypropylene bags - Zerofly) on storability of seed under ambient condition.

Objectives:

1. To study the effect of new packaging material (insecticide incorporated polypropylene bags)on storability of seed
2. To evaluate the effectiveness of new packaging material (insecticide incorporated polypropylene bags) against major storage insect-pests damaging seed

Year of Start : 2015

Crop	Centre
Paddy	OUAT, Bhubaneswar; UAS, Bangalore; IISS, Mau
Mungbean	OUAT, Bhubaneswar; UAS, Bangalore
Sunflower	OUAT, Bhubaneswar; UAS, Bangalore
Wheat	SKNAU, Durgapura; IISS, Mau
Chickpea	SKNAU, Durgapura; IISS, Mau

Treatments

A. Seed treatment

1. Treated with Emamectin benzoate @ 2 ppm (40.0 mg/kg seed)
2. Untreated seed

B. Packaging material

1. Insecticide incorporated polypropylene storage bag
2. Untreated bag (same fabric i.e. PP Bag)
3. Gunny bag (control)

Replication: 3 **Design:** FCRD

Results: (tables 9.1-9.8)

Paddy

OUAT, Bhubaneswar

All treated seeds stored in different types of packaging materials maintained high seed germination above IMSCS but treated seeds stored in 'zerofly' bags only restricted insect damage (ID 0.33%) within permissible limit. Untreated seeds stored in 'zerofly' bags also maintained seed germination above IMSCS and restricted insect damage within permissible limit after six months of storage. Other packaging materials recorded 71-76% seed germination and 4.33-9.33% insect damage after six months of storage.

UAS, Bangalore

New packaging material "Zerofly" bag was significantly superior to other packaging materials in reducing insect damage of untreated seeds upto six months of storage and maintained high seed germination but failed to restrict insect damage within permissible standard (ID >0.5%) even after 4 months of storage.

IISS, Mau

Untreated seeds stored in 'Zerofly' bags provided complete protection upto six months of storage and maintained seed germination (91%) above IMSCS whereas control recorded 2.33% insect damage and 83% seed germination. Untreated seeds stored in 'Zerofly' bags were significantly superior to other packaging materials in terms of insect damage (0.04%) after eight monhts of storage. Control recorded 80% seed germination and 9.12% insect damage after eight months of storage.

Wheat

ARS, Durgapura

Treated seed remained insect damage free up to four months of storage irrespective of packaging materials and maintained high seed germination. In case of storage of untreated seeds 'zerofly' bag and polypropylene bag of same fabric storage provided complete protection (ID-nil) after four months of storage while control recorded 84% seed germination and 11.7% insect damage. After six months of storage treated seed stored in 'zerofly' bag and polypropylene bag of same fabric remained insect damage free but none of the packaging materials restricted insect damage within permissible limit in case of untreated seed. Although two types of packaging material were significantly superior to the control in reducing insect damage but they did not differ significantly among themselves when untreated seed was stored.

IISS, Mau

Untreated seeds stored in 'Zerofly' bags were significantly superior to other packaging materials in terms of insect damage (0.0%) and maintained seed germination (93%) above IMSCS after eight monhts of storage. Control recorded 88% seed germination and 11.0% insect damage after eight months of storage.

Chickpea

IISS, Mau

Untreated seeds stored in 'Zero fly' bags maintained seed germination (91%) above IMSCS and restricted insect damage (0.10%) within permissible limit upto six months of storage whereas other packaging materials failed to meet the standard of insect damage. Control recorded 3.84% insect damage and 82% seed germination after six months of storage. Untreated seeds stored in 'Zerofly' bags were significantly superior to other packaging materials in terms of insect damage (0.31%) after eight months of storage but failed to maintain seed germination (84%) above IMSCS. Control recorded 68% seed germination and 10.5% insect damage after eight months of storage. Treated seeds stored in zero fly bags only met both the standards after eight months of storage.

Green gram

OUAT, Bhubaneswar

Treated seeds stored in different types of packaging materials maintained seed germination above IMSCS and insect damage was <1.0% 'Zerofly' bag was significantly superior to other packaging materials in terms of both seed germination (85.3%) and insect damage (0.17%) after six months of storage. Untreated seeds stored in 'Zerofly' bags only maintained seed germination (82%) above IMSCS and restricted insect damage (0.83%) within permissible limit after six months of storage. Other packaging materials recorded 70-73% seed germination and 3.7-10.7 % insect damage after six months of storage.

Sunflower

OUAT, Bhubaneswar

Untreated seed stored in 'zerofly' bags maintained significantly high seed germination (74%) compared to other packaging materials and insect damage (0.5%) was within permissible limit after six months of storage. Other packaging materials recorded 67-70% seed germination and 1.8-7.7% insect damage in untreated seeds after six months of storage.

UAS, Bangalore

Insect damage was not observed in any of the treatments up to six months of storage. 'Zerofly' bag was superior over other packaging materials in terms of seedling vigour when treated seeds were stored in 'zerofly' bags. The experiment is under progress.

Seed stored in 'Zero fly' bags

Conclusion: New types of packaging material (insecticide incorporated polypropylene bag) i.e. 'Zerofly' bags were tested for storability paddy, wheat, sunflower, green gram and chickpea seed at various centres. In most of centres 'Zerofly' bags were significantly superior to other packaging materials and highly effective in management of storage insects (insect damage –nil or within permissible) up to 6-8 months. Seeds stored in 'Zerofly' bags also maintained seed germination above IMSCS in paddy, wheat, greengram, chickpea and sunflower upto 6-8 months.

Table 9.1: Effective packaging materials and storage periods for different crops at various centres

Crop	Centre	Safe period of storage (months)	Effective packaging materials	Remarks
Wheat	SKNAU, Durgapura	4	'Zerofly' bags	No significant difference
	IISS, Mau	8	'Zerofly' bags	Insect damage -nil
Paddy	IISS, Mau	8	'Zerofly' bags	Insect damage <0.5%
	OUAT, Bhubaneswar	6	'Zerofly' bags	Insect damage <0.5%
	UAS, Bangalore	4	'Zerofly' bags	Insect damage <0.5%
Greengram	OUAT, Bhubaneswar	6	'Zerofly' bags	Insect damage <1.0%
Chick pea	IISS, Mau	6	'Zerofly' bags	Insect damage <0.5%
Sunflower	OUAT, Bhubaneswar	6	'Zerofly' bags	Insect damage <0.5%
	UAS, Bangalore	6	All packaging materials	Insect damage-nil

Table 9.2: Effect of new packaging material (Insecticide impregnated bags) on storability of Paddy, Mungbean, Sunflower seed at OUAT, Bhubaneswar

	Parameter	Storage duration 6 months					
		Paddy		Mungbean		Sunflower	
		Seed Germination (%)	Insect damage (%)	Seed Germination (%)	Insect damage (%)	Seed Germination (%)	Insect damage (%)
Treated Seed (Emamectin benzoate @ 2 ppm)	Insecticide incorporated polypropylene storage bag (Zerofly bag)	86.7 (9.31)	0.33 (1.15)	85.3 (9.25)	0.17 (1.07)	75.7 (8.70)	0.50 (1.22)
	Untreated bag (same fabric i.e. pp Bag)	83.3 (9.12)	0.67 (1.28)	82.7 (9.09)	0.83 (1.35)	73.3 (8.56)	1.0 (1.40)
	Gunny bag (control)	82.0 (9.05)	0.83 (1.35)	81.0 (9.0)	1.0 (1.41)	72.0 (8.48)	1.17 (1.47)
Untreated seed	Insecticide incorporated polypropylene storage bag (Zerofly bag)	86.0 (9.27)	0.5 (1.22)	82.0 (9.05)	0.83 (1.34)	74.0 (8.60)	0.50 (1.21)
	Untreated bag (same fabric i.e. pp Bag)	75.7 (8.70)	4.33 (2.31)	72.7 (8.52)	3.67 (2.16)	70.3 (8.39)	1.83 (1.68)
	Gunny bag (control)	71.3 (8.45)	9.33 (3.21)	70.0 (8.37)	10.67 (3.41)	67.3 (8.18)	7.67 (2.93)
	CD @5%	T=0.08,P=0.10, T*P=0.14	T=0.17,P=0.15, T*P=0.22	T=0.08, P=0.10, T*P=0.14	T=0.14,P=0.17 , T*P=0.25	T=0.08,P=0.09, T*P=NS	T=0.19,P=0.24, T*P=0.34

Table 9.3: Effect of new packaging material (Insecticide impregnated bags) on storability of paddy seed at UAS, Bangalore

Treatments	Packaging material	2 months after storage				4 months after storage				6 months after storage			
		G (%)	ID (%)	VG-I	*VG-II*	G (%)	ID (%)	VG-I	*VG-II*	G (%)	ID (%)	VG-I	*VG-II*
Seeds treated with Emamectin benzoate @ 2ppm (40.0mg/kg of seed)	Insecticide incorporated polypropylene storage bag	87.3	0.00	2036	719	86.3	0.00	1506	636	85.0	0.00	1567	470
	Untreated bag (same fabric i.e. PP bags)	86.7	0.00	2000	627	85.3	0.00	1452	531	84.7	0.00	1327	468
	Gunny bag (Control)	86.0	0.00	1780	579	85.0	0.00	1224	498	83.3	0.75	1399	397
Untreated seeds	Insecticide incorporated polypropylene storage bag	86.3	0.00	1853	645	85.7	0.58	1388	556	84.0	1.67	1326	462
	Untreated bag (Same fabric i.e. PP bags)	85.3	0.67	1711	560	84.3	4.83	1415	483	82.7	3.08	1329	432
	Gunny bag (Control)	84.7	1.25	1622	522	84.3	5.67	1238	463	83.0	4.17	1131	368
	SEm±	0.76	0.068	88	13.4	0.96	0.024	53.0	10.0	1.86	0.186	39.1	8.9
	CD(0.05) TXP	0.76	0.20	221	34	0.96	0.06	134	25	1.86	0.47	98	22

Table 9.4: Effect of new packaging material (Insecticide impregnated bags-Zerofly bag) on storability of paddy seed at IISS, Mau

	Parameter (P)	Storage duration (D)								
		4 months			6 months			8 months		
		Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I
Treated Seed (Emamectin benzoate @ 2 ppm)	Insecticide incorporated polypropylene storage bag (Zerofly bag)	95	0.00	3231	93	0.00	3020	89	0.05	2726
	Untreated bag (same fabric i.e. pp Bag)	93	0.00	2963	88	0.05	2773	82	0.48	2210
	Gunny bag (control)	91	0.00	2665	85	0.08	2396	81	1.19	2115
Untreated seed	Insecticide incorporated polypropylene storage bag (Zerofly bag)	93	0.00	3022	91	0.00	2689	89	0.04	2855
	Untreated bag (same fabric i.e. pp Bag)	94	0.01	2928	87	0.23	2519	84	2.08	2654
	Gunny bag (control)	92	0.05	2738	83	2.33	2207	80	9.12	2435
	$CD_{0.05}$(Germination)	T=NS	P-1.35	D-1.56	T X P-NS	T X D-NS	P X D=2.7	T X P X D =NS		
	$CD_{0.05}$(Insect damage)	T=0.32	P=0.40	D=0.46	T X P=0.56	T X D=0.88	P X D=0.65	T X P X D=1.12		
	$CD_{0.05}$(VG-I)	T=100	P=122	D=141	T X P=173	T X D=245	P X D=200	T X P X D=346		

Table 9.5: Effect of new packaging material (Insecticide impregnated bags-Zerofly bag) on storability of Wheat seed at SKNAU, Durgapur

	Parameter	Wheat					
		2 months		4 months		6 months	
		Seed Germination (%)	Insect damage (%)	Seed Germination (%)	Insect damage (%)	Seed Germination (%)	Insect damage (%)
Treated Seed (Emamectin benzoate @ 2 ppm)	Insecticide incorporated polypropylene storage bag (Zerofly bag)	97.7(81.5)	0.0 (0.0)	97.7 (81.4)	0.0 (0.0)	96.0 (78.5)	0.0 (0.0)
	Untreated bag (same fabric i.e. pp Bag)	97.3(80.9)	0.0 (0.0)	97.0(80.1)	0.0 (0.0)	95.7 (78.0)	0.0 (0.0)
	Gunny bag (control)	97.3(80.7)	0.0 (0.0)	96.3(79.0)	0.0 (0.0)	95.0 (77.1)	2.3 (8.7)
Untreated seed	Insecticide incorporated polypropylene storage bag (Zerofly bag)	96.7(79.6)	0.0 (0.0)	94.7(79.1)	0.0 (0.0)	87.0 (68.9)	8.3 (16.7)
	Untreated bag (same fabric i.e. pp Bag)	96.3(79.1)	0.0 (0.0)	95.7(78.0)	0.0 (0.0)	87.7(69.5)	7.0 (15.3)
	Gunny bag (control)	95.0 (77.1)	2.3 (8.74)	84.0(66.4)	11.7 (19.9)	69.3 (56.4)	25.3 (30.2)
	SEm	0.96	0.18	0.72	0.38	0.57	0.50
	CD @5%	NS	0.55	2.23	1.17	1.67	1.54

Table 9.6: Effect of new packaging material (Insecticide impregnated bags-Zerofly bag) on storability of Wheat seed at IISS, Mau

	Parameter (P)	Storage duration (D)								
		4 months			6 months			8 months		
		Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I
Treated Seed (Emamectin benzoate @ 2 ppm)	Insecticide incorporated polypropylene storage bag (Zerofly bag)	96	0.00	2946	90	0.00	2784	88	0.00	2562
	Untreated bag (same fabric i.e. pp Bag)	94	0.01	2930	88	0.17	2624	83	0.78	2367
	Gunny bag (control)	93	0.00	2918	89	1.31	2498	82	1.32	2086
Untreated seed	Insecticide incorporated polypropylene storage bag (Zerofly bag)	94	0.00	2803	91	0.05	2667	93	0.00	2576
	Untreated bag (same fabric i.e. pp Bag)	93	0.41	2901	85	0.79	2457	89	2.70	2192
	Gunny bag (control)	90	1.65	2702	84	3.48	2153	88	11.08	1817
	$CD_{0.05}$(Germination)	T=1.1	P=1.4	D=1.6	T X P=2.0	T X D=2.8	P X D=2.3	T X P X D=4.0		
	$CD_{0.05}$(Insect damage)	T=0.42	P=0.52	D=0.60	T X P=0.73	T X D=1.03	P X D=0.84	T X P X D=1.46		
	$CD_{0.05}$(VG-I)	T=NS	P=187	D=216	T X P=NS	T X D=NS	P X D=NS	T X P X D=NS		

Table 9.7: Effect of new packaging material (Insecticide impregnated bags-Zerofly bag) on storability of chickpea seed at IISS, Mau

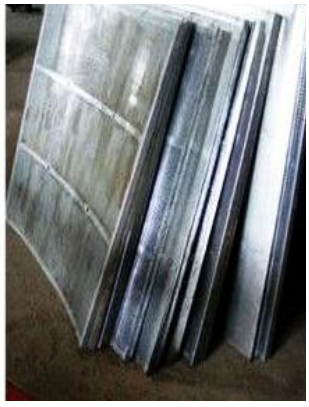
	Parameter (P)	Storage duration (D)								
		4 months			6 months			8 months		
		Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I	Seed Germination (%)	Insect damage (%)	VG-I
Treated Seed (Emamectin benzoate @ 2 ppm)	Insecticide incorporated polypropylene storage bag (Zerofly bag)	94	0.00	4204	91	0.00	3898	87	0.00	3549
	Untreated bag (same fabric i.e. pp Bag)	92	0.00	3973	88	0.18	3759	80	1.39	2711
	Gunny bag (control)	90	0.00	3869	87	0.39	3579	76	4.07	2614
Untreated seed	Insecticide incorporated polypropylene storage bag (Zerofly bag)	95	0.00	4031	91	0.10	3855	84	0.31	3373
	Untreated bag (same fabric i.e. pp Bag)	92	0.12	3777	87	1.22	3513	75	6.07	2598
	Gunny bag (control)	89	0.67	3661	82	3.84	3120	68	10.49	2282
	$CD_{0.05}$(Germination)	T=1.1	P=1.4	D=1.6	T X P=2.0	T X D=2.8	P X D=2.3	T X P X D=4.0		
	$CD_{0.05}$(Insect damage)	T=0.42	P=0.52	D=0.60	T X P=0.73	T X D=1.03	P X D=0.84	T X P X D=1.46		
	$CD_{0.05}$(VG-I)	T=NS	P=187	D=216	T X P=NS	T X D=NS	P X D=NS	T X P X D=NS		

Table 9.8: Effect of new packaging material (Insecticide impregnated bags) on storability of sunflower seed at UAS, Bangalore

Treatments	Packaging material	2 months after storage				4 months after storage				6 months after storage			
		G (%)	ID (%)	VG-I	VG-II	G (%)	ID (%)	VG-I	VG-II	G (%)	ID (%)	VG-I	VG-II
Seeds treated with Emamectin benzoate @ 2ppm (40.0mg/kg of seed)	Insecticide incorporated polypropylene storage bag	89.3	0.0	2633	1920	88.3	0.0	2386	1899	87.0	0.0	2044	1696
	Untreated bag (same fabric i.e. PP bags)	89.0	0.0	2463	1854	87.7	0.0	2265	1826	87.0	0.0	1989	1696
	Gunny bag (Control)	88.0	0.0	2280	1818	87.3	0.0	2261	1761	86.3	0.0	2034	1530
Untreated seeds	Insecticide incorporated polypropylene storage bag	89.0	0.0	2548	1794	87.7	0.0	2446	1782	87.0	0.0	1870	1560
	Untreated bag (Same fabric i.e. PP bags)	88.3	0.0	2400	1693	87.3	0.0	2238	1671	86.0	0.0	1883	1530
	Gunny bag (Control)	88.3	0.0	2205	1663	87.0	0.0	1947	1638	86.3	0.0	1814	1485
	Mean												
	SEm±	0.41		47	37	0.30	-	38	43.8	0.45	-	62.9	33.7
	CD(0.05) TXP	1.25	-	141	114	0.93	-	117	135	1.39	-	193	103

Seed Processing





भाकृअनुप
ICAR

E. Seed Processing

Experiment 1 : Optimum sieve size and type of screen for grading seeds of different crop varieties and hybrids including their parents.

Objectives:

1. Crop-wise classification of varieties in seed chain with respect to their seed size.
2. To standardize the size and type of grading sieve.

Crop	Centres
Chickpea	PDKV, Akola; MPKV, Rahuri & UAS, Raichur
Pigeon pea	UAS, Bangalore and UAS, Raichur
Soybean	UAS, Dharwad; MPKV, Rahuri; PDKV, Akola & UAS, Raichur
Wheat	HPKVV, Palampur; CSAUA&T, Kanpur; CCSHAU, Hisar & ICAR-IARI RS, Karnal
Paddy	UAS, Bengaluru; PAJANCOA, Karaikal; TNAU, Coimbatore & ICAR-IARI RS, Karnal
Maize	UAS, Bangalore
Mustard	CSAUA&T, Kanpur & HPKVV, Palampur
Greengram	UAS, Dharwad
Fieldbean	UAS, Bengaluru
Fingermillet	UAS, Bengaluru

Treatment details:

i. Crop : as above
ii. Machine : Standard sieve shaker
iii. Sieve size : Grading sieve
   a. Recommended sieve (as per IMSCS)
   b. Two sieves above the recommended sieve
   c. Two sieves below the recommended sieve

Results

Wheat

HPKVV, Palampur

Three popular wheat varieties viz. HPW 236, HPW 249 and HPW 349 were selected for the experiment. The optimum grading screen size was found to be 2.75 mm. The germination (%), SV-I, physical purity (%) and test weight (g) were studied with products received from all standard grading screen. However, about 10 % more seed recovery was observed with the 2.75 mm grading screen (Table 1). The moisture content of seed was recorded about 10.0 % for all the variety under study.

CSAUAT, Kanpur

Five wheat varieties viz. DBW-17, K-607, K-9423, K-7903 & DBW-107 were studied employing five grading screen i.e. 1.7, 1.9, 2.1, 2.3 & 2.5 mm (oblong). The optimum grading screen size was found to be 2.1 mm exhibiting maximum seed recovery along with high seed quality parameters considered under the study (Table 2). The moisture content of seed was found in the range of 12.4 to 13.2%.

CCSHAU, Hisar

Four wheat varieties viz., WH-711, WH-1025, WH-1105 and WH-1124 along with five grading screen i.e. 2.1 mm, 2.2 mm, 2.3 mm, 2.4 mm and 2.5 mm were employed in the experiment. On scanning of data it was found that grading sieve size of 2.1 mm was effective for thickness grading of these varieties as it was registering maximum seed recovery as well as meeting the IMSCS with respect to physical purity and germination (Table 3).

ICAR- IARI-RS, Karnal

Three wheat varieties viz. HD 2967, HD 2851, WR 544 was selected along with five oblong sieves i.e. 3.25, 2.8, 2.4, 2.2 and 1.95 mm. Each variety was representing different class i.e. timely sown, late sown and very late sown, respectively. The sieve size 2.4mm harnessed seed recovery of 96.2, 94.9 and 94.6% for HD 2967, HD 2851, WR 544, respectively and also comply IMSCS with respect to physical purity (%) and germination (%) (Table 4). The moisture content of seed was found around 11 %.

Table 1: Grading screen size and quality parameters of wheat seed at HPKVV, Palampur

Sieve Size (mm)	Recovery (%)	Physical purity (%)	Germ. (%)	Vigour Index	1000 Seed Wt. (g)	MC (%)
HPW 236						
2.75	95.20	97.00	97.00	20.37	43.20	10.10
3.40	84.50	98.00	98.00	22.54	43.80	10.20
4.00	17.60	100.00	100.00	24.00	44.40	10.10
HPW 249						
2.75	97.10	98.00	96.00	22.08	43.50	10.20
3.40	86.70	98.00	99.00	23.76	43.70	10.20
4.00	14.20	99.00	99.00	24.25	44.00	10.10
HPW 349						
2.75	94.20	98.00	95.00	19.95	42.80	10.30
3.40	84.20	100.00	97.00	21.34	43.30	10.20
4.00	11.40	100.00	98.00	22.54	43.50	10.20

Table 2: Grading screen size and quality parameters of wheat seed at CSAUA&T, Kanpur

Sieve Size (mm)	Recovery (%)	Physical purity (%)	1000- Seed- wt. (g)	Germ. (%)	Vigour Index I	Vigour Index II
DBW-17						
1.70	97.00	99.59	37.82	95.00	2019.70	11.40
1.90	95.80	99.38	39.15	98.00	2181.48	13.72
2.10	93.80	99.09	38.84	95.00	2185.00	13.30
2.30	85.60	99.73	38.80	93.00	2287.80	13.95
2.50	77.40	99.56	39.35	96.00	1759.68	15.36
K-607						
1.70	98.20	99.28	41.06	94.00	2017.24	12.22
1.90	97.20	99.68	41.07	94.00	2054.84	12.25
2.10	93.60	99.83	41.46	94.00	2124.40	12.22
2.30	82.20	99.58	41.64	94.00	2237.20	13.16
2.50	75.20	99.60	41.67	96.00	2239.68	13.44
K-9423						
1.70	99.00	100.00	33.10	97.00	2139.82	12.61
1.90	98.20	99.93	41.86	97.00	2217.42	12.61
2.10	95.00	99.83	45.45	97.00	2192.20	13.58
2.30	88.00	99.63	45.81	96.00	2112.00	13.44
2.50	68.60	99.83	45.90	97.00	2134.00	13.58

Table 3: Grading screen size and quality parameters of wheat seed at CCSHAU, Hisar

Sieve size (mm)	Recovery (%)	Germination (%)	Vigour index	Physical purity (%)	1000 seed wt.(g)	Moisture content (%)
WH-711						
2.10	88.51	87.67	2175.31	98.27	39.03	9.80
2.20	86.91	89.00	2271.58	98.87	39.72	9.83
2.30	85.70	90.00	2329.20	98.93	40.05	9.80
2.40	81.51	90.33	2348.06	99.37	40.62	9.77
2.50	78.60	91.33	2427.32	99.87	41.03	9.77
WH-1025						
2.10	87.87	87.67	1899.75	98.23	34.65	9.87
2.20	85.73	89.67	1962.80	98.50	34.69	9.83
2.30	81.71	90.00	2007.84	98.97	34.87	9.80
2.40	78.50	91.00	2082.69	99.53	35.19	9.80
2.50	74.20	91.00	2145.19	99.87	36.03	9.77
WH-1105						
2.10	85.55	89.67	2825.69	98.70	42.09	9.87
2.20	83.04	91.00	2875.92	98.80	42.39	9.80
2.30	80.91	92.00	2932.97	99.00	42.66	9.77
2.40	78.00	92.00	2964.23	99.27	43.25	9.83
2.50	74.19	93.00	3004.52	99.90	43.45	9.73
WH-1124						
2.10	87.66	87.00	1931.99	98.47	38.00	9.93
2.20	86.39	87.67	1962.57	98.90	38.17	9.87
2.30	83.14	88.33	1995.45	99.40	38.39	9.83
2.40	79.90	89.00	2029.19	99.80	38.75	9.80
2.50	75.61	89.67	2089.24	99.80	39.03	9.73
Variety	0.26	0.62	15.95	0.15	0.05	N.S.
Sieve	0.32	0.76	19.53	0.19	0.06	0.06
Variety X sieve	0.64	N.S.	39.06	0.38	0.12	N.S.

Table 4: Grading screen size and quality parameters of wheat seed at ICAR-IARI, Karnal

Sieve Size (mm)	Recovery (%)	Physical purity (%)	Germ. (%)	Vigour Index I	Vigour Index II	1000 Seed Wt. (g)
HD 2967 (Normal Sown)						
3.25s	14.3	99.4	90	2134	46.8	50.1
2.8s	83.4	99.6	90	2124	45.0	49.74
2.4s	95.6	98.8	88	2078	41.36	48.78
2.2s	96.9	97.2	86	1902	39.56	46.3
1.95s	99.4	86.5	83	1794	34.03	45.92
HD 2851 (Late Sown)						
3.25s	1.9	100	91	2272	49.14	47.94
2.8s	70.3	99.4	90	2339	46.8	46.82
2.4s	94.4	98.6	90	2209	47.7	45.38
2.2s	97.4	97.2	88	2148	45.76	43.76
1.95s	99.5	84.3	82	1879	40.18	41.02
WR 544 (Very Late Sown)						
3.25s	1.5	99.8	89	2284	48.95	45.06
2.8s	59.4	99.2	88	2248	46.64	44.02
2.4s	94.2	98.4	89	2251	48.06	43.72
2.2s	97.5	97.3	85	2111	43.35	43.08
1.95s	99.6	82.4	80	1932	39.2	41.9

Paddy

ICAR- IARI-RS, Karnal

Seed of three paddy varieties viz. Pusa 44, PB 1121, PB 1509 was selected along with five slotted sieve i.e. 2.2, 2.1, 1.9, 1.8 and 1.6 mm for the experiment. It was found that 1.8 mm oblong sieve was optimum for

thickness grading of paddy as with it graded seed achieved higher germination (%) and physical purity (%) as well as recovery was also higher (Table 5). The moisture content of seed was around 13 %.

Table 5: Grading screen size and quality parameters of paddy seed at ICAR-IARI, Karnal

Sieve Size (mm)	Recovery (%)	Physical purity (%)	Germ. (%)	Vigour index I	Vigour index II	1000 Seed Wt. (g)
Pusa 44 (Non Basmati)						
2.2s	1.20	99.60	89.00	2746.00	8.28	23.72
2.1s	4.70	99.20	90.00	2736.00	8.19	23.46
1.9s	86.60	98.70	89.00	2713.00	8.19	23.04
1.8s	95.10	98.30	88.00	2658.00	7.83	22.42
1.6s	99.30	96.50	85.00	2530.00	7.06	22.04
PB 1121 (Basmati)						
2.2s	0.10	99.00	93.00	3297.00	10.70	29.12
2.1s	1.10	99.30	94.00	3284.00	11.19	28.78
1.9s	64.70	99.10	90.00	3173.00	10.44	28.34
1.8s	88.90	98.50	91.00	3152.00	9.92	28.06
1.6s	99.20	97.20	85.00	2898.00	8.67	27.84
PB 1509 (Basmati)						
2.2s	0.50	99.20	90.00	2787.00	9.18	30.46
2.1s	1.90	99.10	90.00	2760.00	8.91	30.42
1.9s	83.10	98.40	92.00	2812.00	9.11	30.02
1.8s	95.50	98.10	89.00	2665.00	8.46	29.64
1.6s	99.80	96.50	84.00	2461.00	7.64	29.04

Chickpea

PDKV, Akola

Seeds of five chickpea varieties viz. Saki-9516, Vijay, Vishal, Jaki-9218 and Digvijay and five round sieves i.e. 4.0 mm, 4.5 mm, 5.0 mm, 5.5 mm and 6.0 mm were employed in the study. The results revealed that optimum grading sieve size should be 5.0r mm, 5.5r mm and 6.0r mm for small seeded (Saki-9516 and Vijay), medium seeded (Vishal & Jaki-9218) and bold seeded (Digvijay), respectively (Table 6).

Table 6: Effect of grading screen size on quality and processing parameters of chickpea seed PDKV, Akola

Treatment	Recovery (%)	Germination (%)	Physical purity (%)	Seedling length (cm)	VI-I	1000 seed wt. (g)
Variety						
Saki-9516	72.7	87.6	95.8	23.642	2089.15	212.54
Vijay	72.8	87.1	95.2	24.392	2144.19	143.25
Jaki-9218	73.1	87.0	94.2	23.175	2028.86	222.78
Digvijay	72.8	90.8	93.7	25.133	2283.89	342.86
Vishal	76.3	90.5	93.0	24.025	2177.1	343.7
SE(m)+	0.13	0.25	0.17	0.13	14.03	0.42
CD 5%	0.4	0.73	0.5	0.39	40.73	1.22
Sieve size (mm)						
4.0	91.3	82.5	89.1	19.64	1619.59	249.43
4.5	89.0	87.6	93.6	23.15	2025.39	252.55
5.0	86.7	91.3	96.3	25.84	2353.54	252.98
5.5	85.6	93.7	98.0	28.15	2632.84	255.72
6.0	85.3	95.3	98.8	30.28	2885.19	256.94
SE(m)+	0.15	0.28	0.18	0.14	15.38	0.46
CD 5%	0.44	0.8	0.54	0.43	44.62	1.34

UAS, Raichur

Chickpea cv. GBM 2 was subjected for study with five round sieves i.e. 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm and 6.75 mm. The sieve size 5.0r mm was found optimum for grading the seed as it registered highest seed recovery (%) as well as seed quality parameters (Table 7).

Table 7: Effect of grading screen size on quality and processing parameters of chickpea seed UAS, Raichur

Sieve Size (mm)	Recovery (%)	Physical purity (%)	Germination (%)	100 seed wt. (g)	SV-I	PLS (%)
5.0	98.84	98.03	87	23.45	2956	85.52
5.5	97.35	98.29	93	23.62	2903	91.41
6.0	92.47	98.73	91	23.85	3116	89.59
6.5	89.89	98.88	92	24	2877	90.72
6.75	74.03	99.01	93	25.78	3385	92.08
SEM	0.27	0.32	1.45	0.25	186.28	1.28
CD 1%	1.12	1.4	6.03	0.96	776.3	5.35

Table 8: Effect of grading screen size on quality and processing parameters of chickpea seed MPKV, Rahuri

Treatment	Recovery (%)	Germination (%)	Physical Purity (%)	1000 - Seed wt. (g)	VI- I	VI- II
Variety						
Digvijay	91.43	98.50	98.89	263.41	2451.81	64.18
Vishal	92.72	98.16	98.86	279.50	2427.06	63.43
Virat	92.74	97.66	98.23	296.80	2163.76	54.24
SE (m) ±	0.25	0.73	0.40	2.52	27.44	0.62
CD at 5%	0.78	N.S.	1.26	7.85	85.49	1.93
Sieve Size (mm)						
6.50	96.55	97.55	98.32	269.13	2277.92	59.40
7.00	88.05	98.66	99.00	290.67	2417.17	61.83
SE (m) ±	0.21	0.59	0.33	2.06	22.40	0.50
CD at 5%	0.64	1.85	1.03	6.41	69.81	1.57

MPKV, Rahuri

Seed of five chickpea varieties viz. Digvijay, Vishal and Virat were selected along with two round sieves i.e. 6.5 mm and 7.0 mm. Results revealed that grading screen size 6.5r mm and 7.0r mm was optimum for desi varieties i.e. Digvijay and Vishal and Kabuli variety i.e. Virat, respectively (Table 8).

Soybean

UAS, Raichur

Soybean cv. DSB-21 along with five oblong sieves 3.75 mm, 4.0 mm, 4.3 mm, 4.5 mm, and 4.75 mm were employed for the study. Grading sieve size 3.75o mm registered highest seed recovery (88.90 %), physical purity (98.48 %), germination (80.00 %), 100 seed weight (12.54 g), pure live seed (62.24 %) and vigour index-I (3095) (Table 9).

PDKV, Akola

The seed of soybean cultivars viz. JS-335 and MACS-13 were graded using three slotted sieves of 3.2 mm, 3.6 mm and 4.0 mm sizes. The optimum size for grading sieve was found to be 3.6 mm as it exhibited maximum seed recovery with higher values for seed quality parameters (Table 10).

MPKV, Rahuri

Seed of four soybean varieties viz. JS 335, P. Agrani, JS 93 05 and P. Kalyani was selected along with three round sieves i.e. 3.25 mm, 3.75 mm and 4.0 mm. The moisture content of seed was observed to be about 15 %. The results revealed that optimum grading sieve size should be 3.75 mm round (Table 11). The seed quality traits and grading sieve size has shown significant interaction with cultivar.

UAS, Dharwad

Seed of soybean cv. DSb-21 and DGGV-2 were selected along with eight round sieves i.e. 4.4 mm, 4.3 mm, 4.0 mm, 3.2mm, 3.00 mm, 2.8 mm, 2.4 mm and 2.0 mm. The optimum grading sieve size was found to be 4.00 mm round and 2.8 mm round for DSb-21 and DGGV-2, respectively, which exhibited higher seed recovery and better seed quality (Table 12).

Table 9: Effect of grading screen size on quality and processing parameters of soybean seed at UAS, Raichur

Sieve Size (mm)	Recovery (%)	Physical Purity (%)	Germination (%)	100 seed weight (g)	Vigour index	Pure live seed (%)
JS 335						
3.75	83.9	98.49	75.00	15.685	2826	74.11
4.00	82.95	98.52	77.00	15.776	3033	76.1
4.30	80.55	98.55	82.00	15.84	3226	80.69
4.50	76.35	98.58	86.50	15.904	3546	85.27
4.75	70.85	98.68	87.75	16.869	3732	86.59
SEM	0.48	0.06	0.87	0.12	94.62	0.83
CD 1%	1.99	0.23	3.61	0.49	394.29	3.44
DSB-21						
3.75	88.9	98.48	80.00	12.54	3095	78.29
4.00	86.9	98.51	85.00	12.7	3355	83.49
4.30	82.54	98.54	86.00	13.05	3430	84.49
4.50	78.17	98.56	87.00	13.4	3497	85.26
4.75	67.35	98.66	87.00	13.43	3656	85.84
SEM	0.2	0.06	0.61	0.1	60.46	0.58
CD 1%	0.82	0.24	2.55	0.4	251.96	2.43

Table 10: Effect of grading screen size on quality and processing parameters of soybean seed at PDKV, Akola

Treatment	Recovery (%)	Germination (%)	Physical purity (%)	Seedling length (cm)	V.I.	1000 seed wt. (g)
Variety						
JS-335	90.77	69.75	96.50	28.73	2004.77	11.53
MACS-13	90.67	74.50	98.13	27.47	2045.28	11.64
SE(m)+	0.11	0.14	0.12	0.23	15.1	0.04
CD 5%	NS	0.47	0.39	0.77	NS	NS
Sieve size (mm)						
3.2	93.22	67.12	96.3	28.23	1895.94	11.34
3.6	87.40	74.17	98.4	29.53	2189.62	11.77
4.0	82.27	76.55	99.15	26.36	2016.61	12.13
SE(m)+	0.16	0.2	0.17	0.33	21.35	0.06
CD 5%	0.56	0.66	0.56	1.1	70.72	0.2

Table 11: Effect of grading screen size on quality and processing parameters of soybean seed at MPKV, Rahuri

Variety/Sieve Size	Recovery (%)	1000 - Seed wt. (g)	Germination (%)	VI- I	VI- II	MC (%)
Variety						
JS-335	94.97	114.38	85.88	2720.68	102.24	6.72
P. Agrani	96.44	118.78	87.33	3020.6	108.3	6.97
JS -93-05	94.82	118.72	84.33	2690.58	96.8	6.77
P. Kalyani	95.8	123.31	86	2748.25	105.35	7.25
SE (m) ±	0.00067	0.184	0.53	20.05	0.35	0.077
CD at 5%	0.0019	0.541	1.58	58.8	1.04	0.228
Sieve Size (mm)						
	95.81	117.46	86.5	2837.12	105.19	6.92
3.75	95.40	118.73	85.91	2829.14	103.25	6.87
4.00	95.31	120.2	85.25	2718.83	101.07	7.00
SE (m) ±	0.0017	0.159	0.46	17.36	0.3	0.067
CD at 5%	0.0005	0.469	1.36	50.92	0.9	0.197

Table 12: Effect of grading screen size on quality and processing parameters of soybean seed at UAS, Dharwad

Sieve Size (mm)	Recovery (%)	Germination (%)	VI- I	Physical purity (%)	1000 Seed weight (g)
DSb-21					
4.4	78.47	80.43	1916	98.13	156.11
4.3	79.98	81.98	1910	98.12	152.25
4.0	82.84	84.91	2063	98.25	150.25
3.5	88.64	90.85	2243	97.75	147.5
3.2	91.97	94.27	2122	96.25	147.5
SE m ±	0.08	0.07	153	0.43	0.92
CD (0.05)	0.23	0.24	473	1.31	2.85
DGGV-2					
3.5	74.49	80.66	2768	98.75	34.54
3.2	75.96	80.3	2731	98.38	34.23
2.8	84.62	85.63	2816	98.11	34.06
2.4	87.01	89.18	2912	98	33.13
2.0	89.39	91.63	3008	96	32.01
SE m ±	0.09	1.06	66	0.32	0.18
CD (0.05)	0.27	3.27	203	0.97	0.55

Pigeonpea

UAS, Raichur

The seed of pigeonpea cultivar viz. TS-3R was selected along with five round sieves i.e. 3.75 mm, 4.0 mm, 4.3 mm, 4.5 mm, and 4.75 mm. It was evident from the data that the optimum sieve size of 3.75 mm recorded maximum seed recovery (91.63 %), Physical purity (98.05%), germination (91.00%), 100 seed weight (11.95 g), pure live seed (88.78%) and vigour index- I (2842), which was above the IMSCS (Table 13).

UAS, Bengaluru

The pigeonpea variety BRG-5 was subjected for grading using air screen cleaner with five different round sieves viz. 4.0 mm, 4.5 mm, 4.75 mm, 5.0 mm and 5.5 mm. The optimum sieve size was found to be 5.0 mm for grading of pigeonpea variety BRG-5 which recorded significantly higher seed germination (84.0%), pure seed (99.10%), 100 seed weight (12.60g), mean seedling length (32.67cm) and seedling vigour index-I (2741). Although sieve size 4.00 mm registered significantly higher seed recovery (99.10%) but other seed quality parameters were significantly lower (Tables 14).

Table 13: Effect of grading screen size on quality and processing parameters of pigeonpea seed at UAS, Raichur

Sieve Size (mm)	Recovery (%)	Physical purity (%)	Germination (%)	100 seed wt (g)	SV- I	PLS (%)
3.75	91.35	98.00	93.00	12.42	3548.00	90.89
4.00	86.75	98.54	93.50	12.45	3689.00	92.13
4.30	81.93	98.55	94.00	12.64	3573.00	92.64
4.50	80.69	98.58	94.00	12.76	3624.00	92.66
4.75	51.38	99.19	96.00	14.10	3805.00	95.22
SEM	0.33	0.36	0.98	0.24	145.48	0.81
CD 1%	1.37	1.51	4.09	1.02	606.24	3.36

Table 14: Effect of grading screen size on quality and processing parameters of Pigeon pea seed at UAS, Bangalore

Screen size (mm)	Recovery (%)	Physical purity (%)	100 seed weight (g)	Germination (%)	Vigour Index I
4.00	99.10	98.23	10.33	82.67	2717
4.50	97.60	98.83	11.40	86.33	1840
4.75	94.90	98.70	11.40	87.00	2857
5. 0	89.97	99.10	12.60	84.00	2741
5.50	44.33	98.77	11.63	83.67	2164
S.Em±	0.418	0.397	0.153	1.277	221.37
CD (0.05P)	1.316	1.222	0.471	3.934	682.11
CV (%)	0.849	0.698	2.348	2.664	10.71

Mustard

CSAUAT, Kanpur

Three varieties of mustard viz. Rohini, Varuna and Urvashi along with two round sieve sizes i.e. 1.2 and 1.7 mm were selected for the study. The seed recovery was more (93.5 to 98%) with 1.2 mm sieve size than that of 1.7 mm sieve size (86 to 95%), exhibiting an average difference of 3 to 6.5%. Though, superior results have been reported for most of quality parameters by 1.7 mm sieve size graded seed but most of these are non-significant except for seed vigour index-I & II (Table 15). Hence, 1.2 mm sieve size found to be optimum for thickness grading of mustard varieties (Rohini, Varuna & Urvashi).

Table 15: Effect of grading screen size on quality and processing parameters of mustard seed at CSAUA&T, Kanpur

Sieve Size (mm)	Recovery (%)	Physical purity (%)	1000- Seed- wt. (g)	Germination (%)	Seed vigour Index I	Seed vigour Index II
Rohini						
1.2	98.00	98.06	5.09	96.00	996.19	1.649
1.7	86.00	98.19	5.15	97.00	957.39	3.201
Varuna						
1.2	96.50	97.81	5.91	98.00	1051.54	2.976
1.7	95.00	98.12	6.01	99.00	1163.26	3.038
Urvashi						
1.2	93.50	98.25	5.79	97.00	1118.41	2.592
1.7	88.00	98.69	5.89	97.00	1118.41	3.686

Fieldbean

The seeds of fieldbean cv. HA-4 were graded with air screen cleaner using five different round sieves viz. 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm and 7.0 mm. It was found that the sieve size of 6.5 mm was optimum for grading of field bean cv. HA-4 which recorded significantly higher seed germination (93.3%), physical purity (99.23%), 100 seed weight (18.40g), seedling length (40.33cm) seed recovery (89.50%) and seedling vigour index-I (3763). Although, the screen size of 5.00 mm registered significantly higher seed recovery (99.0%) but other seed quality parameters were significantly lower (Tables 16).

Table16: Effect of grading screen size on quality and processing parameters of fieldbean seed at UAS, Bengaluru

Screen size (mm)	Recovery (%)	Physical purity (%)	100 seed weight (g)	Germination (%)	Vigour Index I
5.00	99.00	98.50	16.80	89.33	2769
5.50	97.83	98.87	17.00	90.00	3012
6.00	96.10	98.97	16.38	91.33	3288
6.50	89.50	99.23	18.40	93.33	3763
7.00	55.17	99.23	16.67	92.00	3498
S.Em±	0.273	0.334	0.28	0.72	92.67
CD (0.05P)	0.86	1.031	0.88	2.219	285.5
CV (%)	0.54	0.588	2.95	1.379	5.1

Conclusion

The physical properties of seed were found closely linked with cultivar and production environment. Hence, it is imperative to select optimum sieve size for grading screen in order to reduce seed loss, maximizing seed recovery and enhance the processed seed quality, during seed processing. The grading screen should be determined for the specific crop, variety and lot.

Experiment 2 : To study the management of mechanical damage due to different harvesting and threshing methods.

Objectives:

1. To study the management of mechanical damage due to different harvesting and threshing methods

Crop	Centres
Paddy	PAJANCOA, Karaiakal; TNAU, Coimbatore
Chickpea	MPKV, Rahuri; UAS, Dharwad
Soybean	MPKV, Rahuri; UAS, Dharwad; PDKV, Akola
Wheat	HPKVV, Palampur

Treatment details:

Treatment

I. Harvesting
   1. Traditional method (by sickle)
   2. Mechanical method (by combine harvester)

II. Threshing
   1. Traditional (by stick beating)
   2. Multi-crop thresher at varied speed
   3. Combine harvester at varied speed

Wheat

HPKVV, Palampur

The experiment was conducted for wheat cv. HPW 349 during Rabi 2016. Harvesting was done using traditional method with sickles and with Reaper-cum-binder. Observations were recorded from an area of 400 m^2 in four replications. Threshing was done through stick beating and multi crop thresher. Immediately after harvesting and threshing, the observations on seed quality parameters were recorded. The seed was stored under ambient conditions and data after two months interval i.e. June, August, October & December were recorded. Higher field loss was observed in mechanical harvesting and threshing. However there were not any significant differences observed in germination and physical purity by mechanical harvesting and threshing of wheat seed (Table 17). Similarly, there was not any considerable difference in germination and vigour of manual and mechanical methods among stored seeds upto six months.

Table 17: Effect of harvesting and threshing methods on seed quality of wheat seed at HPKVV, Palampur

Character	Harvesting and threshing method	
	Traditional	Mechanical
Field losses (%/400m^2)	1	4.5
Mechanical damage (%)	-	1.5
Broken seeds (%)	-	0.5
Germination (%)	98	98
Physical purity (%)	100	99
Pure live seeds (%)	98	98
Vigour index	24.5	23.52
Moisture content straw % (at harvest)	20	21

Paddy

TNAU, Coimbatore

The experiment was conducted for paddy cv. CO (R) 51. The crop was harvested and threshed with the following methods viz. manual harvesting + manual threshing; manual harvesting + multicrop threshing; combined harvesting with 500 rpm speed and combine harvesting with 900 rpm. Manual harvesting and manual threshing was found at par with manual harvesting and mechanical threshing using multi crop thresher in terms of germination. However, combine harvester induced significant adverse effect on germination as well as increased mechanical damage. The mechanical damage to seed was found to be increased significantly with increase of cylinder speed. It had been observed that at higher cylinder speed the germination of seed also reduced considerably (Table 18).

Table 18: Effect of harvesting and threshing methods on seed quality of paddy seed at TNAU, Coimbatore

Treatment	Germination (%)	Mechanical damage (%)	Vigour index- I
Manual harvesting + Manual threshing	97.2	2.4	3172
Manual harvesting + Multicrop threshing	97.2	2.9	3118
Combine harvesting with 500m rpm	96.9	3.1	3101
Combine harvesting with 900m rpm	90.9	4.7	2716
Mean	95.6	3.3	3027
SEd	0.68	1.09	36.51
CD (P=0.05)	1.4	2.22	73.06

Chickpea

MPKV, Rahuri

Harvesting of three varieties viz. Digvijay, Vishal and Virat of chickpea were done manually. The threshing was done manual (stick beating), mechanical using multi crop thresher at cylinder speed of 500 and 600 rpm. It was found that manual threshing recorded the lowest broken seed (0.69%), highest germination (80.69%), physical purity (80.29%), 1000-seed weight (274.90 g), vigour index-I (2428.47), vigour index-II (62.42). However, seed threshing with multi crop thresher with 600 rpm recorded the highest broken seed (12.55%), lowest germination (74.06%), physical purity (75.19%), vigour index-I (2193.77) and vigour index-II (58.62). The experiment deduced that mechanical threshing should be conducted at 500 rpm in order avoid mechanical injury to seed of chickpea (Table 19).

Table 19: Effect of harvesting and threshing methods on seed quality of Chickpea seed at MPKV, Rahuri

Characters	Broken (%)	Germination (%)	Physical Purity (%)	1000 - Seed wt. (g)	VI- I	VI- II	MC Straw at Harvesting (%)	MC Straw at Threshing (%)
Variety								
Digvijay	1.78	96	95.64	261.79	2354.84	62.28	13.3	11.05
Vishal	1.94	96.25	96.14	264.84	2370.29	64.69	13.19	11.13
Virat)	3.22	92	93.89	291.95	2204.68	54.38	13.35	11.17
SE (m) ±		1.177	0.221	2.905	10.707	0.295	0.157	0.191
CD at 5%		3.455	0.65	8.528	31.436	0.866	N.S.	N.S.
Threshing method								
Stick beating	0.69	97.33	97.07	274.9	2428.47	62.42	13.25	11.12
Tractor trading	0.98	96	96.02	272.98	2347.94	60.94	13.33	11.11
Multi- crop thresher with 500 rpm	2.75	93.66	94.34	274.15	2269.55	59.82	13.27	11.16
Multi- crop thresher with 600 rpm	4.83	92	93.47	274.74	2193.77	58.62	13.25	11.08
SE (m) ±	0.264	1.359	0.256	3.354	12.363	0.34	0.182	0.221
CD at 5%	0.774	3.989	0.751	N.S.	36.299	1	N.S.	N.S.

Soybean

PDKV, Akola

The soybean cv. JS-335 was subjected for manual harvesting and manual threshing, manual harvesting and mechanical threshing, combine harvesting at cylinder speed of 500, 700 and 900 rpm. The threshing losses were found minimum with multi-crop thresher. The threshed seed of multi-crop thresher exhibited mechanical damage of 5.2 % with germination 87.3 %, physical purity 81.7 %, seedling length 31.2 cm and vigour index- I 2724.77 at 12.9 % moisture content. However, harvesting with combine and threshing at 900 rpm cylinder speed demonstrated maximum mechanical injury of 8.3 % with minimum germination 79.6 %. It is evident from the data (Table 20) that the combine harvester at 500 rpm of cylinder speed is optimum harvesting of soybean crop.

Table 20: Effect of harvesting and threshing methods on seed quality of soybean seed at PDKV, Akola

Treatment	Mechanical damage (%)	1000 seed weight	Germination (%)	Physical Purity (%)	Moisture content (%)	Vigour Index
Manual	6.1	85.4	89.6	86.7	12.9	2866.8
Th. 500	5.2	85.77	87.3	81.7	12.9	2724.7
CH 500	5.5	85.67	84.6	83.7	12.9	2653.0
CH 700	7.1	85.53	81.0	85.0	13.1	2472.4
CH 900	8.3	85.27	79.6	87.0	13.6	2249.2
SE (m) ±	0.07	0.13	0.25	0.69	0.07	46.1
CD (5%)	0.23	0.42	0.82	2.26	0.23	149.8

Conclusion

Mechanical harvesting and threshing of seed crop have threat of mechanical injury to seed. It can be minimized with optimizing the operational parameters in relation to crop and machine. The cylinder speed found to be the most critical operational parameter for threshing operation of seed crop in respect of physical injury to seed. Pulse seed crops are more prone to mechanical injury during mechanical threshing operation.

Monitoring Team Report

भाकृअनुप
ICAR

Monitoring Team Report 2016-17

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1	Dr. S.K. Yadav, ICAR- IARI, New Delhi	Convener
2	Dr. Ravi Kant, RPCAU, Pusa, Bihar	Member
3	Dr. Anjani Kumar, SKUAS&T, Jammu, J&K	Member
4	Dr. Govind Pal, ICAR- IISS, Mau, UP	Member

Date of monitoring: 03-08 October, 2016

Monitoring was not done at SKUAS&T, Srinagar due to prevailing conditions in Srinagar. However, it is proposed that monitoring may be done during February/ March, 2017.

SKUAS&T, Jammu

S No.	Items for monitoring	Remarks	
1	Achievements of Breeder seed production under AICRP- NSP (Crops) against GoI and State indents and problem faced if any	Not applicable.	
2	Discipline-wise progress of STR experiments- No. of experiments conducted, its status and results, reasons for non-conduct of any experiments, problem faced, etc.	Not applicable.	
3	Status of revolving fund in AICRP- NSP (Crops) and ICAR Seed project- profit generated, problem in utilization if any	• Under ICAR Seed project, the available balance on 31st March, 2016 was Rs. 1,50,04,814.00 • Under ICAR Seed project (Horticulture crops), the available balance on 31st March, 2016 was Rs. 3,47,383.00	
4	Progress of ICAR Seed project- Breeder seed, foundation seed, certified and truthfully labeled seed	• Around 35.50 acre canal area is cultivated under breeder seed production in *Kharif* crops (2016) against 6.35 q indent from state Government. • Around 7.0 acre area is cultivated under foundation seed production in *Kharif* crops (2016). • Around 80.0 acre area is cultivated under certified seed production in *Kharif* crops (2016).	
5	Participatory seed production programme especially under ICAR Seed project (Quantity/ quality/ class)	Nil	
6	Status of fund utilization	• Under ICAR Seed project, the available balance on 31st March, 2016 was Rs. 36,18,742.00 • Under TSP, the available balance on 31st March, 2016 was Rs. 8,040.00	
7	Land and infrastructure development	Nil	
8	Transfer of technology- No. of training organized, Farm women participation	Two training programmes were organized for 70 participants (Women participants- 6)	
9	Capacity building- No. of training attended, etc.	One	
10	Status of submission of AUC and SOE	AUC and SOE submitted	
11	Grading of each centre based on the performance	Unit	Performance of centre
		BSP unit	NA
		STR unit	NA
		ICAR Seed project	**Good**
		TSP	**Good**

12	Any other remarks by the committee	• Extensive attention is required to be given to basic principles of seed production i.e. isolation distance, line sowing, rouging etc. by the concerned seed production in-charges/officers for all classes of seeds. • All those who are involved in Nucleus/ Breeder Seed Production need to be suitably trained. • Nodal Officer (seed) has limited role in utilization of Revolving fund money, this needs to be revisited by concerned authorities for effective implementation of scheme. • Effective procedure needs to be worked out so as the Indented seed quantity by State Department of Agriculture is timely lifted.

CSKHPKV, Palampur

S. No.	Items for monitoring	Remarks	
1	Achievements of Breeder seed production under AICRP- NSP (Crops) against GoI and State indents and problem faced if any	The total breeder seed production was 285.11q against indent of 251.83q from both GoI and State Government in all crop categories.	
2	Discipline-wise progress of STR experiments- No. of experiments conducted, its status and results, reasons for non-conduct of any experiments, problem faced, etc.	The experiments on seed production & certification, seed physiology & storage, seed processing and seed pathology have been conducted as per approved technical programme.	
3	Status of revolving fund in AICRP- NSP (Crops) and ICAR Seed project- profit generated, problem in utilization if any	• RFS under ICAR Seed project- the available balance on 31st March, 2016 was Rs. 41,37,163.00	
4	Progress of ICAR Seed project- Breeder seed, Foundation seed, Certified and Truthfully labeled seed	The foundation seed and planting material produced at University farm were 683.75q and 14.00q respectively of various crops during 2015-16 against target of 566.41q and 11.50q respectively.	
5	Participatory seed production programme especially under ICAR Seed project (Quantity/ quality/ class)	Truthfully labeled seed of 2226.60q of various crops was produced against target of 1895.00q on farmer's field during 2015-16.	
6	Status of fund utilization	• Under AICRP- NSP (Crops)- BSP, the available balance on 31st March, 2016 was Rs. 7,22,812.00 • Under AICRP- NSP (Crops)- STR, the available balance on 31st March, 2016 was Rs. 27,72,958.00 • Under ICAR Seed project, the available balance on 31st March, 2016 was Rs. 3,84,071.00 • Under TSP, the available balance on 31st March, 2016 was Rs. 11,00,017.00	
7	Land and infrastructure development	Nil	
8	Transfer of technology- No. of training organized, Farm women participation	One training programme was organized	
9	Capacity building- No. of training attended, etc.	Nil	
10	Status of submission of AUC and SOE	AUC and SOE submitted	
11	Grading of each centre based on the performance	Unit	Performance of centre
		BSP unit	**Very good**
		STR unit	**Good**
		ICAR Seed project	**Very good**
		TSP	**Good**
12	Any other remarks by the committee	• Nodal Officer (seed) has limited role in utilization of Revolving fund money, this needs to be revisited by concerned authorities for effective implementation of scheme. • More attention should be given on objective of observations being recorded under STR experiments. • One row gap after every 8-10 rows in seed production plots is required to be maintained. • Fencing of seed production plots is required for protection from wild animals.	

PAU, Ludhiana

S No.	Items for monitoring	Remarks	
1	Achievements of Breeder seed production under AICRP-NSP (Crops) against GoI and State indents and problem faced if any	The total breeder seed production was 5165.11q against indent of 3361.19q from both GoI and State Government.	
2	Discipline-wise progress of STR experiments- No. of experiments conducted, its status and results, reasons for non-conduct of any experiments, problem faced, etc.	The experiments on seed production & certification, seed physiology, storage & testing and seed pathology have been conducted as per approved technical programme.	
3	Status of revolving fund in AICRP- NSP (Crops) and ICAR Seed project- profit generated, problem in utilization if any	• RFS under ICAR Seed project (Field crops)- the available balance on 31st March, 2016 was Rs. 696.84 lakh. • RFS under ICAR Seed project (Horticulture crops)- the available balance on 31st March, 2016 was Rs. 323.27 lakh.	
4	Progress of ICAR Seed project- Breeder seed, Foundation seed, Certified and Truthfully labeled seed	The foundation, certified and truthfully labeled seed produced were 7,221.71q, 3,258.13q and 41,114.67q respectively of various crops during 2015-16.	
5	Participatory seed production programme especially under ICAR Seed project (Quantity/ quality/ class)	Certified seed of 3055.00q of wheat crops (HD 3086) was produced during 2015-16 under participatory seed production programme.	
6	Status of fund utilization	• Under AICRP- NSP (Crops)- BSP, the available balance on 31st March, 2016 was Rs. 27,69,283.00 • Under AICRP- NSP (Crops)- STR, the available balance on 31st March, 2016 was Rs. 34,45,196.00 • Under ICAR Seed project, the available balance on 31st March, 2016 was Rs. 9,14,610.00	
7	Land and infrastructure development	Tractor, Seeder, Ridger, Rotavator, Disc harrow and Seed counter (one of each) have been purchased amounting Rs. 16.47 lakh.	
8	Transfer of technology- No. of training organized, Farm women participation	• Four training programmes were organized for 225 beneficiaries. • Fourteen Kisan Mela was organized for 4,75,000 beneficiaries.	
9	Capacity building- No. of training attended, etc.	Nil	
10	Status of submission of AUC and SOE	AUC and SOE submitted	
11	Grading of each centre based on the performance	Unit	Performance of centre
		BSP unit	**Very Good**
		STR unit	**Very Good**
		ICAR Seed project	**Very Good**
		TSP	NA
12	Any other remarks by the committee	• Funds may be released in time for effective implementation of the programme. • Frequent faculty transfer needs to be stopped for smooth functioning of the programme. • One row gap after every 8-10 rows in seed production plots is required to be maintained. • The seed pathological experiments need to be conducted in more thoughtful manner.	

Breeder seed production of paddy at SKUAS&T, Jammu

Monitoring team at Rice and Wheat research station, Malan (CSKHPKV, Palampur)

Monitoring team at PAU, Ludhiana

Breeder seed production of soybean at CSKHPKV, Palampur

North Zone Group-II

1	Dr. A.K. Shinde, KKV, Dapoli	Convener
2	Dr. G.K. Koutu. JNKVV, Jabalpur	Member
3	Dr. Zahoor Ahmed Bhat, SKUAST, Srinagar	Member
4	Dr. S.C. Vimal, CSAUAT, Kanpur	Member

IARI, New Delhi

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	NA
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	▪ 6 STR experiment conducted ▪ 1 experiment not conducted due to non availability of seed
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	ICAR Seed Project Rs. 4,34,69,792/- Balance.
4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Breeder Seed Production as per target Kharif : 220 q. Rabi : 1266 q. (2015-16).
5	Participatory seed production programme (Quantity/quality/class)	Participatory Truthful Seed Production 1950 q.
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	HRD: 1 training of 6 days Beneficiaries - 2 training of 1 145 day 1 Krishi Mela
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	Submitted
8	Any other remarks by the committee	--

Grading	
Name of centre	**Performance of centre**
STR	Very good
ICAR Seed Project	Excellent

CCSHAU, Hisar

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	▪ Breeder seed production as per GOI and State Government indent (220 q.) ▪ No Breeder seed production of Cowpea (HC-46) GOI indent (11 q.) as no Nucleus seed
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	Seed Production, Certification = 3 experiment = 3 Rabi Seed Physiology =2 experiment=1 *Kharif* + *Rabi* Seed Pathology = 5 experiment Seed Processing = 1 experiment Only one experiment in field in *Kharif* 2016. Nine experiment in *Rabi* 2016-17
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	NSP Rs. 22.46 lakh Balance ICAR Seed Project Rs. 74.56 lakh Balance Not refunded yet.
4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Breeder Seed, Foundation Seed, Certified Seed, Truthfully labeled Seed (3600q), Planting Material Produced
5	Participatory seed production programme (Quantity/quality/class)	No Participatory Seed Production
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	4 training (3-5 days) : 150 Beneficiaries
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	AUC Not submitted for AICRP-NSP and ICAR Seed Project More Balance amount STR = Rs. 31.27 lakh, BSP = Rs. 28.05 lakh
8	Any other remarks by the committee	Scientist / Supporting / Vacant BSP 1 / 2 / 1 STR 3 / 3 / 1 No sufficient working staff at the centre

Grading	
Name of centre	**Performance of centre**
BSP Unit	Very Good
STR	Good
ICAR Seed Project	Good

SVPUA&T, Meerut

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	NA
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	NA
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	ICAR Seed Project Rs. 122.56 lakh Balance Original Revolving Fund Rs. 20 lakh refunded

4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Breeder Seed, Foundation Seed, Truthful Seed Production *Kharif* 2015 = 1678 q., *Rabi* 2015-16 = 1914 q. Target *Kharif* 2016 = 1680 q. Target *Rabi* 2016-17 = 2095 q.
5	Participatory seed production programme (Quantity/quality/class)	No Participatory Seed Production
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	Amount Received 9.0 lakh Expenditure 9.62 lakh (2015-16) Balance 8.19 lakh
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	Submitted
8	Any other remarks by the committee	--

Grading	
Name of centre	**Performance of centre**
BSP Unit	--
STR	--
ICAR Seed Project	Very Good
TSP	--

GBPUA&T, Pantnagar

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	▪ Breeder Seed Production ▪ DAC Indent 8.0 q., Production 1211 q. ▪ More Production than target ▪ Breeder Seed Production 5444 q. ▪ No GOT Conducted
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	Seed Pathology = 7 experiments Seed Physiology = 4 experiments, 1 field, 1 lab (packaging), 2 demonstration, Seed Production and Certification = *Rabi* 2 experiment = 1 not conducted as no seed supply.
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	▪ AICRP-NSP Rs. 1439 lakh ▪ ICAR Seed Project Received Rs. 52.32 lakh Balance Rs. 44.87 lakh ▪ No refund, loss in Horticulture and Fisheries Component
4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Foundation Seed Production 3286q. Certified Seed 142q, Truthful Seed 285q Sugarcane 12500q. Care need to be taken for foundation seed.
5	Participatory seed production programme (Quantity/quality/class)	No Participatory Seed Production
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	▪ BSP = Rs. 26.40 lakh Balance (2015-16) ▪ ICAR Seed Project = Balance Rs. 17.53 lakh ▪ TSP = Balance Rs. 9.0 lakh ▪ HRD = 3 Trainings (230 Beneficiaries) expenditure Rs. 2.0 lakh ▪ TSP = 5 Trainings (320 Beneficiaries) Rs. 5.0 lakh ▪ STR = Rs. 22.63 lakh (--) Required for Centre
7	AUC (submitted/not submitted)	Submitted
8	Any other remarks by the committee	▪ BSP = 1 Associate Professor, 1 Assistant Professor, 3 Technical Assistant, 4 Field Assistant, 1 Driver, 1 Tractor Driver, 1 Mechanical - Vacant ▪ STR = 3 Scientists, 3 Supporting ▪ No sufficient working of staff of the centre.

Grading	
Name of centre	**Performance of centre**
BSP Unit	Very Good
STR	Good
ICAR Seed Project	Good
TSP	Good

VPKAS, Almora

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	NA
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	NA
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	AICRP-NSP Balance Rs. 18.59 lakh ICAR Seed Project Rs. 20.08 lakh
4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Production as per DAC Indent : Kharif = 36.0 q. Rabi = 104.0 q.
5	Participatory seed production programme (Quantity/quality/class)	Participatory 132 q.
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	5 days 35 beneficiaries 1 day 35 beneficiaries
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	Submitted
8	Any other remarks by the committee	--

Grading	
Name of centre	**Performance of centre**
BSP Unit	--
STR	--
ICAR Seed Project	Very Good
TSP	--

ICAR- IARI, Karnal

S No.	Items for monitoring	Remarks	
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	Breeder Seed *Rabi* 2015-16 :	
		GOI Indent (q.)	Production (q.)
		1019.20	1284.40
		26.00	33.00
		1045.20	**1317.40**
		Breeder Seed *Kharif* 2016 :	
		GOI Indent (q.)	Production (q.)
		211.50	
		17.00	
		228.50	**250.00**
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	STR = 1 Experiment (Seed Processing)	
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	AICRP-NSP (2015-16) Profit Rs. 39.79 lakh Mega Seed (2015-16) Profit Rs. 5.18 lakh	

4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	Farmers Field : *Kharif* 2015 = 2083 q. *Rabi* 2015-16 = 1233 q.
5	Participatory seed production programme (Quantity/ quality/class)	Participatory Seed Production 105 q.
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	NRC Balance Rs. 4.61 lakh AICRP NSP Expenditure made ICAR Seed Project - Expenditure made HRD = 2 training Non lifting of breeder seed problem for station
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	Submitted
8	Any other remarks by the committee	Excellent Nucleus, Breeder Seed Production and Maintenance breeding.

Grading	
Name of centre	**Performance of centre**
BSP Unit	Excellent
STR	--
ICAR Seed Project	Very Good
TSP	--

ICAR-IIWBR, Karnal

S No.	Items for monitoring	Remarks	
1	Achievements of Breeder Seed Production under AICAR-NSP (Crops) especially GOI and State indent and problems faced if any	AICRP-NSP (Crops) Rabi 2015-16 :	
		GOI Indent (q.)	Production (q.)
		937.60 122.30	1236.00 135.00
		1059.90	**1371.00**
		Kharif 2016 : Rice - Truthful Seed Production	
2	Implementation of STR experiments their status and problem Discipline-wise no. of experiment conducted/not conducted	NA	
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	NA	
4	Progress of ICAR seed project - Breeder Seed, Foundation, Certified and Truthfully labeled seed	-	
5	Participatory seed production programme (Quantity/quality/class)	-	
6	Utilization of Funds, Infrastructure Development, Transfer of Technology (No. of trainings organized) and Capacity Building	-	
7	Audit Utilization Certificate (AUC) (submitted/not submitted)	Submitted	
8	Any other remarks by the committee	-	

Grading	
Name of centre	**Performance of centre**
BSP Unit	Very Good
STR	--
ICAR Seed Project	--
TSP	--

Monitoring team at IARI, New Delhi

Monitoring team at SVBPUAT, Meerut

Monitoring team at CCSHAU, Hisar

Monitoring at ICAR-IARI, Karnal

Eastern Zone I

1	Dr. R.S. Shukla, JNKVV, Jabalpur	Convener
2	Dr. N.K. Gupta, SKNAU, Jobner	Member
3	Dr. A.K. Tiwari, IISS, Mau	Member
4	Dr. C.S. Kar, CRIJAF, Barrackpore	Member
5	Dr. R.A. Chauhan, NAU, Navsari	Member

Date of monitoring : 06-09th March, 2017

S. No.	Items of monitoring	IIPR, Kanpur	CSAUAT, Kanpur	IISR, Lucknow	NDUAT, Faizabad	BHU, Varanasi
1.	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indent and problems faced of any	Producing more than indent	Producing more than indent	Nil	As per indent	Producing more than indent
2.	Implementation of STR experiments- their status and problem	Nil	Conducted	No STR, component	Conducted	Nil
3.	Status of revolving fund-AICRP-NSP (Crops) and ICAR Seed Project	Target achieved	Properly operated	-	Target achieved	Target achieved

4.	Progress of ICAR seed project-Breeder Seed, Foundation, Certified and Truthfully labelled seed	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
5.	Participatory seed production programme (Quantity/ quality/ class)	Conducted	Not taking	Conducted	Implemented	Conducted
6.	Utilization of funds, Infrastructure Development, Transfer of Technology and Capacity Building	It will be utilized by the end of this month	Need funds for payment of salaries	- -	Need funds for payment of salaries	It will be utilized by the end of this month
7.	Audit Utilization certificate (AUC) submitted/not	Submitted	Submitted	Submitted	Submitted	Submitted
8.	Grading of each centre based on the performance	Excellent	Very good	Very good	Very good	Excellent

Name of centre	Performance of centre				
	IIPR, Kanpur	CSAUAT, Kanpur	IISR, Lucknow	NDUAT, Faizabad	BHU, Varanasi
BSP Unit	Excellent	Very good	Very good	Very good	Excellent
STR	-	Good	-	Very good	-
ICAR Seed	Excellent	Very good	-	Very good	Excellent
TSP	-	-	-	-	-

9. Any other remarks by the committee : Nil

East Zone Group II

1	Dr. J. K. Sharma, HPKV, Palampur	Convener
2	Dr. P.K. Singh, BHU, Varanasi	Member
3	Dr. I. Megha Chandra Singh, ICAR RC NEH Manipur	Member
4	Dr. A.K. Kar, OUAT, Bhubaneshwar	Member
5	Dr. K.V. Ramesh, ICAR-IISS, Mau	Member

Date of monitoring: 21-27 October 2016

In general, the rainfall during *Kharif* season has been very less and erratic, particularly from tillering to maturity stage; hence the expected production was less from the targets in all the centers. Center-wise detailed report and specific observations are presented as below:

ICAR-CRIJAF, Barrackpore

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	The breeder seed plots of jute, sunhemp and mesta are well maintained, plots properly isolated and true to type healthy plants. The GOI indent will be fulfilled.
2	Discipline-wise progress of STR experiments	NA
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	AICRP-NSP revolving fund returned and under ICAR seed project Rs. 10.00 lakh yet to be returned to ICAR-IISS.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	A total of 637.59q of breeder, certified, truthfully labeled seeds of jute, mesta, sunhemp, paddy and dhaincha were produced
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	-
6	Status of Fund Utilization.	Satisfactory
7	Land and Infrastructure Development.	Nil

8	Transfer of Technology – No. of trainings organized, Farm women participation.	–
9	Capacity Building – No. of trainings attended, etc.	Nil
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	–
	Item	**Performance of Centre**
	BSP Unit	Very good
	STR	NA
	ICAR Seed Project	NA
	TSP	NA
12	Any other remarks by the committee.	Nil

BCKV, Nadia

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	The total breeder seed production of 60.00 q is expected against the GOI indent of 48.00 q for Gontra Bidhan-1 and 3.
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	• The experiment, 'Recognition of seed film coating polymers for efficient and health friendly seed treatment operation for certified seeds of cereals and legumes' has been conducted as per technical programme. • The experiment, 'Standardization of seed production technology in green manure crops', is been conducted with dhaincha and sunhemp however pillipesara was not sown due to unavailability of seed.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated problems in utilization if any.	AICRP-NSP revolving fund returned and under ICAR seed project Rs. 15.00 lakh yet to be returned to ICAR-IISS.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Production achieved in different classes of seeds in paddy, blackgram, jute, mustard, linseed lentil, moong, lathyrus & sesame.
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	1558.50 q of certified and truthfully labeled seeds were produced under participatory seed production programme
6	Status of Fund Utilization.	Satisfactory
7	Land and Infrastructure Development.	Nil
8	Transfer of Technology – No. of trainings organized, Farm women participation.	–
9	Capacity Building – No. of trainings attended, etc.	Nil
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	Very good
	STR	Good
	ICAR Seed Project	Very Good
	TSP	-
12	Any other remarks by the committee.	One scientific post for NSP may be sanctioned.

BAU, Ranchi

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Breeder seed production of 19 crops is been taken in BAU, Ranchi and the state and GOI indents will be fulfilled except for groundnut (Birsa Bold) and paddy (Birsa Vikas Dhan 109). Non-lifting of breeder seeds is faced for Birsa Vikas Dhan 109.
2	Discipline-wise progress of STR experiments	NA
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated problems in utilization if any.	AICRP-NSP revolving fund returned and under ICAR seed project Rs. 5.50 lakh yet to be returned to ICAR-IISS.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Major shortfall was observed in breeder and foundation seed production with production of 174.42q of breeder seed against target of 4483.90q and 1000q shortfall in foundation seed.
5	Participatory seed production programme especially under ICAR Seed Project	Pulse seed production was 30.00q against the target of 245.00 q for arhar, mung and urd.
6	Status of Fund Utilization.	Satisfactory
7	Land and Infrastructure Development.	Nil
8	Transfer of Technology – No. of trainings organized, Farm women participation.	–
9	Capacity Building – No. of trainings attended, etc.	Nil
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	Good
	STR	-
	ICAR Seed Project	Good
	TSP	-
12	Any other remarks by the committee.	

BAU, Sabour

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	BSP component does not exist with the center.
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	STR component does not exist with the center.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	-
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Production achieved in different classes of seed.
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	-
6	Status of Fund Utilization.	Satisfactory
7	Land and Infrastructure Development.	-
8	Transfer of Technology – No. of trainings organized, Farm women participation.	-
9	Capacity Building – No. of trainings attended, etc.	-
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	-
	STR	-
	ICAR Seed Project	Good
	TSP	-
12	Any other remarks by the committee.	May be considered for volunteer center under STR Component

RPCAU, Pusa

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	• In cereals, the GOI and state indents are met with production of 1073.15q against 1021.95q indent • Major shortfall is observed in pulses and oilseed crops with production of 35.70q against the indent of 126.90 in pulses.
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	• The experiment, 'Pilot project on alternative area for hybrid paddy seed production' was not initiated due to low seed vigour of parental lines • No flowering in pillipesara and no seed setting was observed in sunhemp under the experiment standardization of seed production technology in green manure crops.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project– profit generated, problems in utilization if any.	• AICRP-NSP revolving fund returned and maintaining good margin of profit under ICAR seed project and yet to return the seed amount to ICAR-IISS.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	• Major shortfall observed in foundation and truthfully labeled seed production of cereals, pulses and oilseeds.
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	• 33q of certified seed and 66q of foundation seed of moong were produced under participatory seed production programme.
6	Status of Fund Utilization.	• Allotted fund are properly utilized except under TSP.
7	Land and Infrastructure Development.	• Satisfactory
8	Transfer of Technology – No. of trainings organized, Farm women participation.	• Filed day/ seed days and kisanmela were organized.
9	Capacity Building – No. of trainings attended, etc.	-
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	• Submitted
11	Grading of each centre based on the performance by mentioning	

Item	Performance of Centre
BSP Unit	Good
STR	Good
ICAR Seed Project	Good
TSP	

12	Any other remarks by the committee.	Nil

Monitoring at RPCAU, Pusa, Bihar

Monitoring at BAU, Sabour, Bihar

Monitoring at BAU, Ranchi, Jharkhand

Monitoring at BCKV, Nadia

Central Zone Group- I

1	Dr. Basave Gowda, UAS, Raichur	Convener
2	Dr. Pradeep Wali, SKUAST, Jammu	Member
3	Dr. K Kanaka Durga, PJTSAU, Hyderabad	Member
4	Dr. Suhas Lande, PDKV, Akola	Member

VSI, Pune

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	NA
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	NA
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	Closing balance at the end of 2015-16 is 62 lakhs.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	No problem in utilization of revolving fund.
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	Nil
6	Status of Fund Utilization.	Satisfactory
7	Land and Infrastructure Development.	Revolving fund is being used for various developmental activities.
8	Transfer of Technology – No. of trainings organized, Farm women participation.	In progress
9	Capacity Building – No. of trainings attended, etc.	-
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted

11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	-
	STR	-
	ICAR Seed Project	Excellent
	TSP	Very good
12	Any other remarks by the committee.	• Organised National Seed Day on 01.10.2016 • Extra grant may be provided for organizing training programmes under HRD component. • Successful in increasing the average productivity of sugarcane in tribal areas.

BSKVV, Dapoli

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Achieving the targeted seed production
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Satisfactory, all *Kharif* experiments are in progress.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	AICRP-NSP (Crops): 26 lakhs is maintained at the end of 2015-16. ICAR Seed Project: The profit at the end of financial year 2015-16 is around 117 lakhs.
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted production
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	Nil
6	Status of Fund Utilization.	NRC amount is being utilized efficiently for purchase of equipment
7	Land and Infrastructure Development.	Revolving fund is being used for various developmental activities.
8	Transfer of Technology – No. of trainings organized, Farm women participation.	-
9	Capacity Building – No. of trainings attended, etc.	Proposed to organize trainings shortly
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	Very good
	STR	-
	ICAR Seed Project	Very good
	TSP	Good
12	Any other remarks by the committee.	• Seed processing plant located at Wakwali needs maintenance. • Suggested to display uniform sized field boards in all the seed production plots and experiments. • IISS may issue the guidelines for field boards with fixed size, colour and font size etc.,

MPKV, Rahuri

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Achieving the targeted seed production
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Satisfactory, STL has been notified by the Govt. of Maharashtra.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	AICRP-NSP (Crops): As on 31.08.2016, balance is 10.3 lakhs. ICAR Seed Project: Closing balance is 74.6 lakhs as on 31.08.2016 and an amount of Rs 14.6 lakhs is yet to be returned to ICAR
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted seed production
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	Nil
6	Status of Fund Utilization.	NRC amount is being utilized efficiently for purchase of equipment
7	Land and Infrastructure Development.	Revolving fund is being used for various developmental activities.
8	Transfer of Technology – No. of trainings organized, Farm women participation.	-
9	Capacity Building – No. of trainings attended, etc.	One training programme was organised
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	

Item	Performance of Centre
BSP Unit	Very good
STR	Very good
ICAR Seed Project	Good
TSP	Good

12	Any other remarks by the committee.	• Seed processing and godown needs to repaired and upgraded. • Suggested to display uniform sized field boards. • Suggested to conduct experiment on standardization sieve sizes for the recently released varieties

VNMKV, Parbhani

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Achieving the targeted seed production. Suggested to maintain processing hall in good condition. Suggested to maintain seed production plots as per the required standards.
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	All *Kharif* experiments conducted and are in progress. However, due to severe incidence of shoot fly on sorghum, the crop condition is bad. Hence the experiment entitled "Development of technologies to mitigate the effect of elevated temperatures on seed set, yield and quality" may be vitiated and the centre was advised to conduct the experiment during *Rabi* season under elevated temperature and not during *Kharif*.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	ICAR Seed Project: Around 324 lakhs profit was generated. ICAR revolving fund should be separated and should not be clubbed with university revolving fund
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted seed production of CS, FS and TFL

5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	Nil
6	Status of Fund Utilization.	NRC amount is being utilized efficiently for purchase of equipment
7	Land and Infrastructure Development.	Revolving fund is not being utilized for development of infrastructure facilities.
8	Transfer of Technology – No. of trainings organized, Farm women participation.	-
9	Capacity Building – No. of trainings attended, etc.	One training programme was organised
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	

Item	Performance of Centre
BSP Unit	Satisfactory
STR	Satisfactory
ICAR Seed Project	Satisfactory
TSP	Satisfactory

12	Any other remarks by the committee.	• Suggested to display uniform sized field boards. • Vacant position of Associate Director (Seeds) in the BSP unit and ASRO (Pathology) in the STR unit may be filled up • Delegation of financial powers to Associate Director (Seeds) as the financial powers vested with Associate Director (Seeds) is up to Rs. 10,000/- that needs to revised up to Rs.50,000/- as that of other university for effective implementation of the programme.. • Suggested to produce TFL seed of newly released and notified varieties under ICAR Seed Project under farmers participatory approach. • The centre is advised to follow bar coding for breeder seed. • The performance of the centre needs to be improved. • The seed processing plant and godown needs maintenance.

Dr. PDKV, Akola

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Achieving the targeted seed production
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	All *kharif* experiments executed and are in progress. Suggested to execute the experiment on "Development of technologies to mitigate the effect of elevated temperatures on seed set, yield and quality" during *Rabi* season under elevated temperature.
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	ICAR Seed Project: Around 56 lakhs profit as on 1st April. An amount of Rs 11 lakhs is yet to be refunded to ICAR
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted seed production of CS, FS and TFL
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	Seed production of soybean and redgram is taken up
6	Status of Fund Utilization.	-
7	Land and Infrastructure Development.	Revolving fund is not being utilized for development of infrastructure facilities.
8	Transfer of Technology – No. of trainings organized, Farm women participation.	-
9	Capacity Building – No. of trainings attended, etc.	One training programme was organised

10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	
	Item	**Performance of Centre**
	BSP Unit	Very good
	STR	Good
	ICAR Seed Project	Very good
	TSP	-
12	Any other remarks by the committee.	• Suggested to display uniform sized field boards. • Central Demonstration Farm, Wani Rambhapur has vast and potential area suitable for cultivation and the same may be utilized efficiently for seed production with farmer's participatory approach. • Suggested to utilize the NRC. • The centre is advised to follow bar coding for breeder seed. • Suggested to utilize the HRD amount.

ICAR-IISR, Indore

S No.	Items for monitoring	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any.	Achieving the targeted seed production
2	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	One experiment on soybean polymer coating is under taken
3	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project – profit generated, problems in utilization if any.	-
4	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted seed production of CS, FS and TFL
5	Participatory seed production programme especially under ICAR Seed Project (Quantity / quality / class).	-
6	Status of Fund Utilization.	-
7	Land and Infrastructure Development.	-
8	Transfer of Technology – No. of trainings organized, Farm women participation.	Nil
9	Capacity Building – No. of trainings attended, etc.	One
10	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning **Item** BSP Unit STR ICAR Seed Project TSP	 **Performance of Centre** Very good Good Good
12	Any other remarks by the committee.	• Processing unit and seed godown needs proper maintenance and old equipments need to be replaced with latest machineries. • Should involve in participatory seed production of newly released varieties of soybean.

General Remarks

- For effective utilization of resources both the STR and BSP may be clubbed.
- Some of the experiments like UTLIEF experiments of M/s. Incotec Company, where the company not sending any results of the samples need to discontinued.
- Polymer coating experiments without knowing its composition needs to be discontinued.
- General guidelines should be sent to all the centres to display uniform field boards.

Monitoring at BSKKV, Dapoli

Monitoring at MPKV, Rahuri

Monitoring at Dr. PDKV, Akola

Monitoring at ICAR-IISR, Indore

Central Zone Group-II

1	Dr. V. J. Bhatia, JAU, Junagadh	Convener
2	Dr. P.K. Singh, IISR, Lucknow	Member
3	Dr. V. Vakeshwaran, TNAU, Coimbatore	Member
4	Dr. T.R. Shashidhar, UAS, Dharwad	Member

Date of Monitoring: 03-10, September 2016

JNKVV, Jabalpur

S. No.	Item of Monitoring	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP – NSP (Crops) against GOI and State indents and problems faced, if any	Total of 3759.64q of breeder seed of several crops was produced during last *Kharif* 2015-16 and fulfilled the indent of GOI and state.
2	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Out of total six experiments, one experiment was not conducted due to non supply of sesame seed from incotec - Ahmedabad. The experimental condition of the five conducted experiments of various disciplines was good.
3	Status of Revolving Fund – AICRP -NSP (Crops) and ICAR Seed Project -profit generated problems in utilization, if any.	ISP: 65 lakhs provided as revolving fund, seed money Rs. 26 lakhs was refunded. Now, the center has Rs.20.86 lakhs as on 30th July 2016.
4	Progress of ICAR Seed Project - Breeder, Foundation, Certified and Truthfully Labeled Seed.	In summer 2016, center has produced sufficient quantities of breeder and foundation seeds of various crops. During *Kharif* 2016, BSPFC, BSPGN, BSPSOY and BSPVEG programme is undertaken in an area of 70.35, 43.70, 66.00 and 41.10 ha, respectively. The target will be fulfilled.
5	Participatory Seed Production Programme especially under ICAR Seed Project (Quantity /Quality / Class)	Participatory seed production programme of different crops like mungbean, paddy, arhar, sesame and kodomillet of different cultivars has been taken on farmer's field in collaboration with cooperative societies with buy back policy. Total production was 11400q of foundation seeds.
6	Status of Fund Utilization	Good infrastructure has been developed under megaseed project. Procurement of equipments/ implements is under progress.
7	Land and Infrastructure Development	Nil
8	Transfer of Technology - No. of trainings organized, farm women participation	One off campus training programme was organized.
9	Capacity Building - No. of trainings attended, etc.	Three
10	Status of submission of Audit Utilization Certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	-
12	Name of Centre	Performance of Centre
	BSP Unit	Excellent
	STR	Excellent
	ICAR Seed Project	Excellent
	TSP	Excellent

CICR, Nagpur

S. No.	Item of Monitoring	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP – NSP (Crops) against GOI and State indents and problems faced, if any	Total of 2.37q of breeder seed of cotton was produced during *Kharif* 2015-16.
2	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	No Project
3	Status of Revolving Fund – AICRP -NSP (Crops) and ICAR Seed Project -profit generated problems in utilization, if any.	ISP: Out of total 10 lakhs provided as revolving fund, no seed money was refunded.
4	Progress of ICAR Seed Project - Breeder, Foundation, Certified and Truthfully Labeled Seed.	During *Kharif* 2015-16, center has produced 2.37q and 187.51q of breeder and certified seed, respectively.
5	Participatory Seed Production Programme especially under ICAR Seed Project (Quantity /Quality / Class)	Total of 115.19q of truthfully labeled seeds of cotton under participatory seed production.
6	Status of Fund Utilization	One farm was developed.
7	Land and Infrastructure Development	Nil
8	Transfer of Technology - No. of trainings organized, farm women participation	Three *Kishan Gosti* were arranged.
9	Capacity Building - No. of trainings attended	Nil
10	Status of submission of Audit Utilization Certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	-
	Name of Centre	Performance of Centre
	BSP Unit	Poor
	STR	-
	ICAR Seed Project	Poor
	TSP	-

IGKVV, Raipur

S. No.	Item of Monitoring	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP – NSP (Crops) against GOI and State indents and problems faced, if any	Total of 1609q of breeder seed of several crops was produced during *Kharif* 2015-16 and fulfilled the indent of GOI and state.
2	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	No Project
3	Status of Revolving Fund – AICRP -NSP (Crops) and ICAR Seed Project -profit generated problems in utilization, if any.	All the money refunded. AICRP-NSP profit Rs.265.9 lakhs. ICAR Seed Project profit Rs.12.93 lakhs
4	Progress of ICAR Seed Project - Breeder, Foundation, Certified and Truthfully Labeled Seed.	During *Kharif* 2016-17, Sufficient quantities of breeder, foundation and certified seed will be produced and the target will be fulfilled.
5	Participatory Seed Production Programme especially under ICAR Seed Project (Quantity /Quality / Class)	Total of 2250q of truthfully labeled seeds of various crops and different varieties were produced on farmer's field.
6	Status of Fund Utilization	Good infrastructure has been development under Megaseed project procurement of equipments/ implements is under process.
7	Land and Infrastructure Development	Nil
8	Transfer of Technology - No. of trainings organized, farm women participation	Six off campus trainings were organized.
9	Capacity Building - No. of trainings attended, etc.	Two
10	Status of submission of Audit Utilization Certificate (AUC) and Statement of Expenditure.	Submitted

11	Grading of each centre based on the performance by mentioning	-
	Name of Centre	Performance of Centre
	BSP Unit	Excellent
	STR	Excellent
	ICAR Seed Project	Excellent
	TSP	Excellent

OUAT, Bhubaneswar

S. No.	Item of Monitoring	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP – NSP (Crops) against GOI and State indents and problems faced, if any	Total of 1251q of breeder seed of several crops was produced during *Kharif* 2015-16 and fulfilled the indent of GOI and state.
2	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Out of total six experiments, one experiment was not conducted due to non supply of sesame seed from incotec - Ahmedabad. The experimental condition of the five conducted experiments of various disciplines was good.
3	Status of Revolving Fund – AICRP -NSP (Crops) and ICAR Seed Project -profit generated problems in utilization, if any.	All the seed money refunded. Rs. 23.50 lakhs is profit balance.
4	Progress of ICAR Seed Project - Breeder, Foundation, Certified and Truthfully Labeled Seed.	In summer 2016, center has produced sufficient quantities of breeder and foundation seed of various crops. During *Kharif* 2016-17, center has an indent of breeder seed is 1193.66q, however, planned to produce 1251q of seed for different crops.
5	Participatory Seed Production Programme especially under ICAR Seed Project (Quantity /Quality / Class)	Total of 150q of truthfully labeled seeds of various crops and different varieties were produced on farmer's field.
6	Status of Fund Utilization	Good infrastructure has been developed under Megaseed project. Procurement of equipments/ implements is under process.
7	Land and Infrastructure Development	Nil
8	Transfer of Technology - No. of trainings organized, farm women participation	Five off campus trainings were organized.
9	Capacity Building - No. of trainings attended, etc.	Two
10	Status of submission of Audit Utilization Certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	-
	Name of Centre	Performance of Centre
	BSP Unit	Excellent
	STR	Excellent
	ICAR Seed Project	Excellent
	TSP	Excellent

CRRI, Cuttack

S. No.	Item of Monitoring	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP – NSP (Crops) against GOI and State indents and problems faced, if any	Total of 261.30q of breeder seed of paddy was produced during last *Kharif* 2015-16 and fulfilled the indent of GOI and state.
2	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	No Project
3	Status of Revolving Fund – AICRP -NSP (Crops) and ICAR Seed Project -profit generated problems in utilization, if any.	All the seed money refunded, Rs. 46.22 lakhs is profit balance.
4	Progress of ICAR Seed Project - Breeder, Foundation, Certified and Truthfully Labeled Seed.	Sufficient quantities of breeder and truthful seed will be produced during *Kharif* 2016-17.

5	Participatory Seed Production Programme especially under ICAR Seed Project (Quantity /Quality / Class)	Total of 1005.75q of truthfully labelled seed of various crops and different varieties were produced on farmer's field.
6	Status of Fund Utilization	Good infrastructure has been developed under Megaseed project. Procurement of equipments/ implements is under process.
7	Land and Infrastructure Development	Nil
8	Transfer of Technology - No. of trainings organized, farm women participation	Two off campus trainings were organized.
9	Capacity Building - No. of trainings attended, etc.	Three
10	Status of submission of Audit Utilization Certificate (AUC) and Statement of Expenditure.	Submitted
11	Grading of each centre based on the performance by mentioning	-
	Name of Centre	Performance of Centre
	BSP Unit	Excellent
	STR	No Project
	ICAR Seed Project	Excellent
	TSP	No Project

Monitoring team at JNKVV, Jabalpur

Monitoring at CICR, Nagpur

Monitoring at IGKV, Raipur

Monitoring at ICAR-NRRI, Cuttack

Southern Zone I

1	Dr. V. Devadas, KAU, Thrissur, Kerala	Convener
2	Dr. T. Ramanadane, PAJANCOA & RI, Karaikal	Member
3	Dr. N. Nethra, GKVK, UAS, Bangalore	Member
4	Dr. N. Indra, TNAU, Coimbatore	Member

Date of monitoring: 03-06, October 2016

UAS, Dharwad

S. No.	Monitoring items	Observation/ Report
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	▪ The centre has reported the full achievement for allocated targets in breeder seeds.
2	Implementation of STR experiments –their status and problem	▪ Out of 20 experiments allotted only six have been conducted / initiated.
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	• Earned a cumulative profit of Rs.252 lakhs under NSP (Crops) and refunded the entire amount of Rs.18 lakhs. • Under ICAR Seed Project, generated a profit of Rs.150 Lakhs and refunded an amount of Rs.50.00 lakhs out of Rs.63.00 lakhs sanctioned.
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	• Production was achieved against the targeted quantities in different classes of the seeds.
5	Participatory Seed Production programme (Quantity/quality/class)	• Certified seeds were produced under Participatory Seed Production in paddy, maize, greengram, blackgram, groundnut and soybean.
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	**NSP (Crops) – STR** Utilization of funds is very poor. Especially in Non-recurring contingencies out of Rs.20.85 lakhs allotted, only Rs.1.31lakhs has been spent during 2015-16. In the current year also, out of Rs. 6.00 lakhs of recurring contingencies allotted, only Rs.2.00 lakhs has been utilized. **ICAR Seed Project** Out of 15.00 Lakhs of Non-recurring contingencies allotted only Rs.1.22 has been spent during 2015-16. In the current year (2016-17), only 1.62 lakhs has been spent out of Rs.23.78 lakhs of recurring contingencies allotted. **TSP** The entire amount of Rs. 2.25 lakhs allotted remains unspent. **Infrastructure developed** Constructed a Seed Technology Lab cum office building for Rs.118.00 Lakhs and purchased instruments worth of Rs. 0.57 lakhs. Transfer of Technology: To be organized during Rabi, 2016-17.
7	Audit utilization certificate (AUC)	Submitted
8	Grading of each centre based on the performance	

Activity	Grade
BSP	A
STR	B
ICAR Seed Project	A

Remarks

- Lay out of trial plots are good
- Labelling of trial plots shall be made properly
- Field boards should be self-explanatory
- The centre has also stated that man power is insufficient under STR component and needs to be considered

ICAR- CCARI, Goa

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	NA
2	Implementation of STR experiments –their status and problem	**NA**
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	-
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	Only TL seed production in an area of 2.0 ac is taken up in the Institutional farm.
5	Participatory Seed Production programme (Quantity/quality/class)	Informed that TL seed production in rice under Participatory mode is undertaken in 10 ha.
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	No information
7	Audit utilization certificate (AUC)	No information
8	Grading of each centre based on the performance	

Activity	Grade
ICAR Seed Project	B

Remarks

- Hard copy of the Progress report needs to be spared to the visiting Monitoring team.
- Proper arrangements to be made by the Nodal Officer / Institute to brief the activities made under ICAR Seed Projects / NSP (Crops)/TSP to the Monitoring team

PJTSAU, Hyderabad

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	▪ The Breeder seed crop in *Kharif* Paddy in 17 varieties is in active tillering stage. ▪ The Breeder seed crop of *Kharif* Maize in five varieties and two parental lines are in grain formation to maturity stage. ▪ The Breeder seed crops of redgram in 10 varieties are in vegetative stage. ▪ The Breeder seed crops of soybean in two varieties and sesame in three are in pod hardening to maturity stage.
2	Implementation of STR experiments –their status and problem	▪ Out of 27 experiments allotted, 21 experiments have been conducted. ▪ Under experiment 7, there was a delay in receiving the *Trichoderma harzianum* strains from the source centres.
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	Earned a cumulative profit of Rs.5.93 lakhs and Rs.25.33 lakhs under NSP (Crops) and ICAR Seed Project, respectively and also refunded the entire amount of Rs.18.00 lakhs and Rs.40.00 lakhs sanctioned under NSP (Crops) and ICAR Seed Project, respectively.
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	The Breeder seed production is taken up in seven crops and foundation seed production in six crops during *Kharif* season. Certified seed production will be in *Rabi*, 2016-17.
5	Participatory Seed Production programme (Quantity/quality/class)	The TL seed production is undertaken in five paddy varieties, six red gram varieties, one variety each in greengram and soybean and four varieties in fodder and forage crops.

6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	▪ Out of Rs.29.43 lakhs allotted as Non-Recurring contingencies under AICRP-NSP (Crops)-STR, only Rs.1.44 lakhs was utilized. The centre has expressed that still the budget is allotted in the name of ANGRAU and it is taking time for reallocation of budget from ANGRAU to PJTSAU. ▪ The centre has also requested to enhance the recurring contingencies since the labour wages was enhanced to the tune of 45%. ▪ It is also observed that the entire recurring contingencies of Rs.7,00,000/- under ICAR Seed Project and Rs.50000/- under Tribal Sub Plan remain unutilized. ▪ Strengthened the infrastructure to the tune of Rs.2,07,800/- utilizing the Non-recurring contingencies of NSP (Crops) and ICAR Seed Project. ▪ Organized each two trainings under ICAR Seed Project and Tribal Sub Plan.
7	Audit utilization certificate (AUC)	Submitted for all the project.
8	Grading of each centre based on the performance	

Activity	Grade
BSP	A
STR	A
ICAR Seed Project	A

Remarks

- Funds may be allotted in the name of PJTSAU and sent directly to the PJTSAU
- The Nucleus and Breeder seed production plots of rice are very well maintained and deserve appreciation
- The field experiments are laid in proper way with required plot size and replications
- The Expt. on Identification of seed vigour traits under Seed Physiology, Storage and Testing has to be conducted for Hybrids and their parental lines and not for varieties as per the Technical Programme of NSP-STR, 2016-17

ICAR-IIRR, Hyderabad

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	Breeder seed production of rice varieties as per the DAC indent.
2	Implementation of STR experiments –their status and problem	Only two STR Expt. for 2016-17 and to be conducted during Rabi-2016-17.
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	No information
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	-
5	Participatory Seed Production programme (Quantity/quality/class)	No information
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	No information
7	Audit utilization certificate (AUC)	No information
8	Grading of each centre based on the performance	

Activity	Grade
BSP	A
STR	-
ICAR Seed Project	A

Remarks

- Information relevant to the current year 2016-17 needs to be furnished as per the format circulated by IISS, Mau to the Convener of NSP (Crops) Monitoring team of Southern Zone II

ICAR-IIMR, Hyderabad

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	The centre has reported the full achievements for allocated targets.
2	Implementation of STR experiments –their status and problem	Only one STR experiment is in progress
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	• Generated a profit of Rs.24.62 and 60.65 lakhs under NSP (Crops) and ICAR Seed Project, respectively. • The allotted grant of Rs.10.50 lakhs under NSP (Crops) has already been returned to ICAR. • Under ICAR Seed Project, Rs.2.00 lakhs out of allotted amount of Rs.5.00 lakhs to be returned.
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	The breeder seed production in four varieties, certified seeds in eight varieties and TL seeds in one variety of sorghum are undertaken.
5	Participatory Seed Production programme (Quantity/quality/class)	The entire quantities of Breeder, Certified and TL seeds are produced under Participatory seed production only.
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	▪ Funds are well utilized. ▪ Only NRC remains unspent under ICAR Seed Project. ▪ Strengthened the farm with Rs.5.09 lakhs under AICRP-NSP (Crops). ▪ Organized three Field Days each one at Nandyal, Bellary and Raichur.
7	Audit utilization certificate (AUC)	Submitted
8	Grading of each centre based on the performance	

Activity	Grade
BSP	A
STR	-
ICAR Seed Project	A

Remarks

- It is also observed that the centre is effectively utilizing the cold storage units of private sector located in and around seed farms for storing of buffer seed stocks as well as excess quantities of seeds produced and distributed the seeds as and when needed.

ICAR-IIOR, Hyderabad

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	To be produced during *Rabi*, 2016-17.
2	Implementation of STR experiments –their status and problem	Nil
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	• Earned a cumulative profit of Rs.54.72 lakhs under ICAR Seed Project. • The allotted grant of Rs.5.00 under ICAR Seed Project will be returned this year.
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	The Breeder seed production is taken up in seven genotypes of castor, six genotypes of sunflower and two varieties of sesame.
5	Participatory Seed Production programme (Quantity/quality/class)	Participatory seed production is undertaken in two hybrids of Castor and two varieties of Sesame.
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	• Funds are poorly utilized. • The entire amount of recurring contingencies allotted under ICAR seed Project and TSP remains unutilized.
7	Audit utilization certificate (AUC)	Submitted
8	Grading of each centre based on the performance	

Activity	Grade
STR	-
ICAR Seed Project	B

Remarks

- The centre has also requested that necessary financial support may be extended for construction of seed storage godown.

UAS, Raichur

S. No.	Monitoring indicator	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI indents and problems faced if any	The centre has reported the full achievements for allocated targets of Breeder seeds in Red gram, Green gram, Sunflower, Soy bean, Paddy and Fox tail millet.
2	Implementation of STR experiments –their status and problem	Voluntary centre for NSP-STR, out of 7 experiments allotted, 3 experiments have been conducted.
3	Status of revolving fund - AICRP-NSP (Crops) and ICAR Seed Project	NA
4	Progress of ICAR Seed Project – Breeder Seed, Foundation, Certified and truthfully labeled seed	The foundation, certified and TL seed production in pigeonpea, greengram, blackgram, paddy and foxtail millet in 11 varieties are undertaken during *Kharif*, 2016.
5	Participatory Seed Production programme (Quantity/quality/class)	The foundation, certified and TL seed production in pigeon pea, greengram, blackgram and soybean in seven varieties are undertaken under Participatory seed production during *Kharif*, 2016.
6	Utilization of funds, Infrastructure development, Transfer of Technology and capacity building	▪ Out of Rs.10.44 lakhs allotted as Recurring contingencies under AICRP-NSP (Crops)-STR, only Rs.2.49 lakhs was utilized. Under ICAR Seed Project, the entire amount of Rs. 5.95 Lakhs under Non-recurring contingencies remains unspent. ▪ Organized six Seed Days and two trainings under ICAR Seed Project.
7	Audit utilization certificate (AUC)	Submitted for both the projects.
8	Grading of each centre based on the performance	

Activity	Grade
BSP	A
STR	B
ICAR Seed Project	A

Remarks

- The field experiments are properly conducted.
- The name of the STR experiment on groundnut under Seed Physiology, Storage and Testing may be read as "To prolong groundnut seed (off shell, kernel) longevity by storing in Super grain bags" instead of 700 gauge polyethylene bags since the Super grain bags are being used in the said experiment.

Monitoring team at UAS, Dharwad

Monitoring at ICAR-CCARI, Goa

Monitoring at PJTSAU, Hyderabad

Monitoring at ICAR-IIMR, Hyderabad

South Zone II

1	Dr. T. Pradeep, PJTSAU, Hyderabad	Convener
2	Dr. Vijay Shelar, MPKV, Rahuri	Member
3	Dr. B.S. Ganigar, UAS, Raichur	Member
4	Dr. Sripathy K.V., ICAR-IISS, Mau	Member

Date of monitoring: 17-22, October 2016

PAJANCOA&RI, Karaikal

S. No.	Items of monitoring	Remarks
1.	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any	No mandate
2.	Discipline-wise progress of STR experiments – No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	All experiments were conducted
3.	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project - profit generated, problems in utilization if any.	No Revolving Fund under AICRP-NSP (Crops)
4.	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	12.0q of breeder seed and 10.0q of foundation seed of different rice varieties were produced. Seed production during *Rabi* season may be hampered due to non receipt of rains and lake of assured irrigation facilities.
5.	Participatory seed production programme especially under ICAR Seed Project (quantity / quality / class).	It is planned to produce TL seed of seven rice varieties in the present *Rabi* season in an area of about 18 to 20 acres
6.	Status of Fund Utilization.	It is being utilized properly
7.	Land and Infrastructure Development.	New STR lab was established by utilizing the funds sanction under AICRP-NSP (Crops) (Rs.10.00 lakhs) and ICAR- Seed Project (Rs.4.0 lakhs). A new tractor with cultivator, tipper and power tiller and a set of cage wheels were also purchased.
8.	Transfer of Technology - No. of trainings organized, Farm women participation	Will be organized during this *Rabi* season
9.	Capacity Building – No. of trainings attended, etc.	Nil
10.	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11.	Grading of each centre based on the performance by mentioning	STR: Excellent ISP: Excellent
12.	Others if any	The Nodal Officer of the centre has taken personal interest in leading the centre and developed infrastructure required to conduct the STR experiments in a befitting manner.

TNAU, Coimbatore

S. No.	Items of monitoring	Remarks
1.	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any	Breeder seed requirements were met during 2015-16. A total quantity of 1173.68 q was produced against the target of 1475.14 q
2.	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	All the 27 experiments except one on seed processing was not conducted. Since this experiment require sieve shaker it will be conducted after obtaining sieve shaker from PAJANCOA, Karaikal
3.	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project - profit generated problems in utilization if any.	A cumulative profit of Rs.205.57 lakhs is agreed is accrued under the project over a period of 27 years
4.	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	About 18000 q of seed in different classes was produced during 2015-16. In the present year a target of 5643 q of TFL seed is fixed for production in various crops. A target of 75,000 kg of turmeric rhizomes and 567775 no. of planting material in horticultural crops is also targeted.
5.	Participatory seed production programme especially under ICAR Seed Project (quantity/ quality / class).	Foundation seed : 4260.87 q Certified/TFL seed : 12316.69 q **Total : 16577.56 q**

6.	Status of Fund Utilization.	An amount of Rs. 20.00 lakhs sanctioned for purchase of equipment and Rs. 11.00 lakhs under TSP is yet to be spent. The Special Officer (Seeds) was requested to expedited the purchases and utilization of funds under TSP
7.	Land and Infrastructure Development.	The following infrastructural facilities were created with an amount of Rs. 91.00 lakhs during 2015-16 1. Seed processing unit : 25.00 lakhs 2. Millet processing unit : 4.50 lakhs 3. Tractor with accessories : 10.00 lakhs 4. Laboratory equipment : 22.00 lakhs 5. Renovation of seed lab : 29.80 lakhs **Total : 91.00 lakhs**
8.	Transfer of Technology - No. of trainings organized, Farm women participation,	One training programme on seed quality regulations (5 days) and another under TSP on seed production technologies and value addition techniques were organized during 2015-16. Similarly farmers day, Agri Intex and Krishi Unnathi Mela were also organize for the benefit of farming community
9.	Capacity Building – No. of trainings attended, etc.	Nil
10.	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11.	Grading of each centre based on the performance by mentioning	BSP: Excellent STR: Excellent ISP: Excellent
12.	Others if any	The Special Officer (Seeds) was requested to spend the money sanction for equipments and under TSP

UAS, Bangalore

S. No.	Items of monitoring	Remarks
1.	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any	During 2016-17, targeted to produce 1484q of breeder seed against an indent of 992q in different crops. At ZARS, Mandya, breeder seed production of ragi, rice and maize was taken up in an area of 2 ha, 1.2 ha and 0.2 ha, respectively.
2.	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Out of 16 allotted experiments, 13 were conducted and the remaining three will be initiated in *Rabi/summer* 2016-17. STR Unit has generated an amount of Rs. 16,546/- through seed testing services.
3.	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project - profit generated problems in utilization if any.	Closing balance as on 31-3-2016 is Rs. 49,06,668 lakhs under ICAR Seed Project
4.	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Planned for production of 905q of breeder seed against an indent of 491q. During *Kharif* season, 450q of breeder seed production in various crops is anticipated.
5.	Participatory seed production programme especially under ICAR Seed Project (quantity / quality / class).	At ZARS, Mandya, seed production of different classes of seed (FS, CS, TL) was taken up in rice, ragi and maize under quality seed production programme (On farm, SFPP & RRF-SFPP) and expected quantity of seed is 9154q.
6.	Status of Fund Utilization.	An amount of Rs.21.33 lakhs was sanctioned under NRC and purchase of seed image analyzer, dry block heating unit/cooling system is in progress
7.	Land and Infrastructure Development.	Under ICAR Seed Project, an amount of Rs. 244.39 lakhs have been utilized, during 2015-16 for strengthening of the following infrastructure facilities Modern seed processing unit : 86.00 lakhs Mini Tractor : 4.35 lakhs Q.R. code system : 0.93 lakhs Web based mobile app. Software: 0.93 lakhs Seed godowns, threshing cum drying yards at Kunigal, Mandya & GKVK: 132.0 lakhs

8.	Transfer of Technology - No. of trainings organized, Farm women participation	Two national level training programmes on "Innovative Techniques in Varietal Purity Testing (5 days) and Advances in Seed Testing and Quality Enhancement (3 days), three training programmes on Advances in Seed Quality Assurance, Seed Quality and its Regulatory Mechanisms in India and another under Tribal Sub Plan were organized during 2015-16. Two field days on redgram seed production and two Krishi Melas were also organized to showcase the technology and to popularize the new varieties/hybrids.
9.	Capacity Building – No. of trainings attended, etc.	Nil
10.	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11.	Grading of each centre based on the performance by mentioning	BSP: Excellent STR: Excellent ISP: Excellent TSP: Excellent
12.	Others if any	Requested for increase of the ORC grants due to escalated cost of inputs and for repairs and servicing of lab equipments.

RARS, Pattambi (KAU, Thrissur)

S. No.	Items of monitoring	Remarks
1.	Achievements of Breeder Seed Production under AICRP-NSP (Crops) against GOI and State indents and problems faced if any	The centre aims to achieve the targeted seed production of 16.21q
2.	Discipline-wise progress of STR experiments - No. of experiments conducted, its status and results, reason for non-conduct of any experiments, problems faced, etc.	Two experiments were executed (voluntary centre)
3.	Status of revolving fund in AICRP-NSP (Crops) and ICAR Seed Project - profit generated problems in utilization if any.	NSP – Rs. 19.14 lakhs as on 30-09-2016 MSP – Rs. 11.07 lakhs
4.	Progress of ICAR Seed Project - Breeder Seed, Foundation, Certified and Truthfully Labeled Seed.	Achieving the targeted seed production of 16.21 q
5.	Participatory seed production programme especially under ICAR Seed Project (quantity / quality / class).	Participatory seed production programme is being implemented in an area of 40 acres in Palakkad district and approximately 80 tonnes of quality paddy seed is expected during 2016-17.
6.	Status of Fund Utilization.	Amount generated under Breeder Seed Production is being utilized for infrastructure development and for improving research facilities. While, the amount generated under ICAR seed project is being utilized for seed production activities.
7.	Land and Infrastructure Development.	Developmental activities were taken up.
8.	Transfer of Technology - No. of trainings organized, Farm women participation	Farmers training programme on "Crop Management Techniques in Rice" was organized on 30-08-2016. Training on "Quality seed production was conducted on 01-09-2016. Training programme under TSP and trainings for agricultural students are yet to be organized.
9.	Capacity Building – No. of trainings attended, etc.	Nil
10.	Status of Submission of Audit Utilization certificate (AUC) and Statement of Expenditure.	Submitted
11.	Grading of each centre based on the performance by mentioning	BSP: Excellent ISP: Excellent TSP: Very good
12.	Others if any	In view of the higher labour wages recurring contingencies under BSP and ICAR Seed Project may be enhanced. The centre may be elevated to a regular STR centre.

Monitoring team at TNAU, Coimbatore

Monitoring at KAU, Pattambhi

Monitoring at UAS, Bengaluru

Monitoring at PAJANCOA&RI, Karaikal

North Eastern Zone

The monitoring of progress of seed production under AICRP-NSP (Crops) BSP and ICAR Seed Project "Seed Production in Agricultural Crops" and status of experiments under AICRP-NSP (Crops) - STR was undertaken during 3-10 November, 2016 with the following member.

1. Dr. P. Selvaraju, TNAU, Coimbatore — Convener
2. Dr. P.N. Sharma, CSKHPKV, Palampur — Member
3. Sh. Somasundaram, G, ICAR-IISS, Mau — Member

Centre-wise details are as follows

ICAR Research Complex for North Eastern Hill Region - Manipur Centre

S. No.	Particulars	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	No indent was received from both GOI and state government. Non-receipt of indent / late indenting of state govt. for breeder seed production is the major problem.
2	Implementation of STR experiments their status and problem	Three experiments were initiated during *kharif*, 2016 and the experiments are in progress.
3	Status of revolving fund 1. AICRP-NSP (Crops) 2. ICAR Seed Project	No revolving fund was provided but, the centre needs revolving fund to further strengthen seed production through participatory mode in farmers' field.

4	Progress of ICAR seed project	The breeder seeds of 37 quintals (estimate) against the target of 44 quintals; foundation seeds of 17 quintals against the target of 14 were produced.
5	Participatory seed production programme (Quantity/ quality/class)	707 quintals of quality seed against the target of 587 quintals were produced in the farmers' field.
6	Fund Utilization	Except works head (Rs. 154 lakh), the funds in all other head were utilized sufficiently.
7	Infrastructure Development	Seed processing cum drying shed is constructed. Machineries like Tractor, Air screen cleaner cum grader, seed blower, seed grinder, batch dryer were purchased
8	Transfer of Technology / Capacity Building	Seed day on Rice – 02 nos. – 98 farmers got benefitted. Demonstrations – 115 – 115 farmers got benefitted.
9	Audit Utilization Certificate (AUC) for 2015-16	Submitted
10	Remarks of the committee	1. Revolving fund may be allotted to undertake commercial seed production in farmers' field. 2. Provision may be provided to recruit RAs or SRFs to undertake seed production and research under ORC head. 3. GOI and the concerned state governments may requested to place breeder seed indent. 4. Seed certification system needs to be strengthened in all NEH states.

Grade based on the performance

Scheme / Project	Grade
AICRP – NSP (Crops) - BSP	Very Good
AICRP – NSP (Crops) - STR	Very Good
ICAR Seed Project	Excellent

ICAR Research Complex for North Eastern Hill Region - Tripura Centre

S. No.	Particulars	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	Not Applicable
2	Implementation of STR experiments their status and problem	All three experiments under Seed Physiology and Storage have been initiated and progressing well.
3	Status of revolving fund 1. AICRP-NSP (Crops) 2. ICAR Seed Project	Not Applicable
4	Progress of ICAR seed project	229 quintals of breeder seed of rice were produced and utilized for further multiplication by the centre.
5	Participatory seed production programme (Quantity/quality/class)	Truth Fully Labeled (TFL) seed production in rice is carried out in collaboration with Farmers club. 6000 quintals of quality TFL seeds of rice were produced and distributed to the farmers through KVKs and farmers' club.
6	Fund Utilization	Most of the fund is utilized.
7	Infrastructure Development	▪ Seed processing cum storage godown yet to be constructed. ▪ Tractor and equipment necessary for seed technology laboratory were procured.
8	Transfer of Technology / Capacity Building	▪ Eight field day / seed day were organized with the participation of more than 1500 farmers. ▪ 20 demonstrations were organized at farmer's field.
9	Audit Utilization Certificate (AUC) for 2015-16	Submitted
10	Remarks of the committee	1. Seed processing facility is very much required which is yet to be established. 2. Revolving fund may be provided to strengthen participatory seed production.

Grade based on the performance

Scheme / Project	Grade
AICRP – NSP (Crops) - BSP	Good
AICRP – NSP (Crops) – STR	Very Good
ICAR Seed Project	Excellent

Central Agricultural University (CAU), Imphal, Manipur

S. No.	Particulars	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	Not Applicable
2	Implementation of STR experiments their status and problem	Not applicable
3	Status of revolving fund 1. AICRP-NSP (Crops) 2. ICAR Seed Project	▪ Under the RF of ICAR Seed Project, Rs, 5.8 lakh is generated through seed production.
4	Progress of ICAR seed project	13 quintals of breeder seed was produced against the target of 14 quintals. In addition, 2.0 quintals of FS is produced in the university farm.
5	Participatory seed production programme (Quantity/quality/class)	TFL seed of 173 quintals were produced during *kharif*, 2016.
6	Fund Utilization	▪ Most of the fundis utilized. ▪ The centre facing problem in purchase of equipment from Nov 2016 due to economic blockade in the state.
7	Infrastructure Development	Only pick-up van is purchased. Other equipments are not purchased due to local disturbance in the state.

8	Transfer of Technology / Capacity Building	Seed sale and seed production technologies were briefed to the farmers during North East Agri Fair.
9	Audit Utilization Certificate (AUC) for 2015-16	Submitted
10	Remarks of the committee	▪ Fund support may be provided for farm developmental activities like irrigation, water harvesting structure, etc. ▪ In addition, support may also extended to strengthen seed processing plant cum quality control lab. ▪ Non receipt of indent from state is a major problem. The state govt. may be requested to place indent.

Grade based on the performance

Scheme / Project	Grade
AICRP – NSP (Crops) - BSP	Not Applicable
AICRP – NSP (Crops) - STR	Not Applicable
ICAR Seed Project	Excellent

Assam Agricultural University (AAU), Jorhat, Assam

S. No.	Particulars	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	Breeder seed target will be achieved in all the varieties in all the crops. About 400 quintals of breeder seed were produced during *kharif*, 2016.
2	Implementation of STR experiments their status and problem	All the 11 experiments allotted for kharif, 2016 were initiated and in progress.

3	Status of revolving fund 1. AICRP-NSP (Crops) 2. ICAR Seed Project	From the revolving fund, Rs. 1.47 lakh profit is generated.
4	Progress of ICAR seed project	About 4700 quintals of quality seeds of different classes were produced in the university farm.
5	Participatory seed production programme (Quantity/quality/class)	About 1200 quintals of TFL seed were produced in the farmers' field through participatory mode. Swarna sub I Foundation Seed in 19.0 ha was in the field.
6	Fund Utilization	Almost all (80%) of fund given was utilized.
7	Infrastructure Development	All the necessary basic infrastructure for seed production was developed.
8	Transfer of Technology / Capacity Building	-
9	Audit Utilization Certificate (AUC) for 2015-16	Submitted
10	Remarks of the committee	1. Non-receipt of timely indent is the major problem faced by the centre. 2. The centre has good network of KVKs which is ready to strengthen seed production in the state. Mechanism may be developed to utilize the KVKs to strengthen seed system in Assam.

Grade based on the performance

Scheme / Project	Grade
AICRP – NSP (Crops) - BSP	Very good
AICRP – NSP (Crops) - STR	Very good
ICAR Seed Project	Excellent

Uttar Banga Krishi Vishwavidyalaya, Pundibari, Cooch Behar, West Bengal

S. No.	Particulars	Remarks
1	Achievements of Breeder Seed Production under AICRP-NSP (Crops) especially GOI and State indent and problems faced if any	Not Applicable
2	Implementation of STR experiments their status and problem	Not Applicable
3	Status of revolving fund 1. AICRP-NSP (Crops) 2. ICAR Seed Project	Under ICAR Seed Project, Income generated up to October, 2016 is Rs. 83.96 lakh (approx.). During 2015-16, Rs. 67.6 lakh of revenue generated through sale of seed / seedlings.
4	Progress of ICAR seed project	▪ In addition to field crops, seeds / planting materials of horticultural crops viz. citrus, guava, cashew, jack fruit, potato, brinjal, chilli, etc. also produced and sold by the centre. ▪ Seed / planting material production achieved the target. ▪ 1005 quintals of quality seeds (FS/CS/TFL) were produced.
5	Participatory seed production programme (Quantity/quality/class)	During *Kharif,* 2016, 1074 quintals of quality seeds against the target of 860 quintals were produced in the farmers' field.
6	Fund Utilization	Most fund (95%) provided is utilized properly.
7	Infrastructure Development	Seed grader, power reaper, rice transplanter, seed drier and water pumps were purchased in the earlier years. In the current year (2016-17), no purchase were made as there was no provision for non-recurring.
8	Transfer of Technology / Capacity Building	▪ Kisanmela / ghosthi – 03 organized – 210 farmers participated. ▪ Field / Seed day – 06 organized – 180 farmers got benefitted. ▪ Demonstrations – 02 organized – 50 farmers got benefitted.
9	Audit Utilization Certificate (AUC) for 2015-16	Submitted
10	Remarks of the committee	▪ Regular training programmes were organized for tribal farmers under TSP is appreciable. ▪ Centre may be included in BSP component of AICRP-NSP (Crops) as voluntary / regular centre. ▪ Fund support may be provided to establish a good seed processing facility which is lacking now.

Grading based on performance in following schemes/projects

Scheme / Project	Grade
AICRP – NSP (Crops) - BSP	Not Applicable
AICRP – NSP (Crops) - STR	Not Applicable
ICAR Seed Project	Excellent


FARMERS' PARTICIPATORY SEED PRODUCTION OF
RICE
Under TSP-MEGA SEED Project(Phase-I)
Uttar Banga Krishi Viswavidyalaya
Pundibari, Cooch Behar

Tribal Sub Plan Programme (TSP)

भाकृअनुप
ICAR

Tribal Sub Plan Programme (TSP)

With the objective of improving the livelihood of tribal farmers and, as per the directives received from council for formulation, implementation and monitoring of TSP, the following cooperating centres of AICRP-NSP (Crops) were provided with funds under TSP as detailed below for the year 2016-17.

(Rs. in lakhs)

Sl. No.	Centre	AICRP –NSP (Crops)
		Tribal Sub Plan
1	SKUA& T, Srinagar	9.00
2	HPKVV, Palampur	8.00
3	MAF, Kota	6.00
4	AAU, Anand	7.00
5	MPKV, Rahuri	7.00
6	PDKV, Akola	8.00
7	UAS, Bangalore	9.00
8	TNAU, Coimbatore	7.00
9	CRIJAF, Barrackpore	3.00
10	CAZRI, Jodhpur	4.00
11	NRRI, Cuttack	4.00
12	IIRR, Hyderabad	5.00
13	IIMR, Hyderabad	6.00
14	CICR, Nagpur	2.00
	Total	**85.00**

Summary of physical achievements under Tribal Sub Plan of AICRP-NSP (Crops)-2016-17

Centres	Seed distributed (kg.)	Seed storage bins; sprayers, small farm implements (No's)	Training (No's)	FLDs (No's)	Exhibition (No's)	Exposure visit (No's)	Beneficiary (No's)
SKUA&T, Srinagar	3720	-	5	-	-	-	240
CSHPKV, Palampur	450	450	9	18	2	-	500
AU, Kota	-	50	1	-	-	-	50
AAU, Anand	800	200	2	-	-	2	100
MPKV, Rahuri	10000	-	2	1	-	4	316
PDKV, Akola	-	40	8	-	-	-	40
UAS, Bengaluru	5190	720	2	-	1	-	360
TNAU, Coimbatore	-	1*	3	-	1	-	400
CRIJAF, Barrackpore	2000	246	2	45	-	3	909
CAZRI, Jodhpur	4800	-	-	-	-	-	120
IIMR, Hyderabad	1530	-	3	10	2	1	650
CICR, Nagpur	-	-	7	-	-	1	1500
Total	**28490**	**1707**	**44**	**74**	**6**	**11**	**5185**

Note: In addition to above 1200 kg of fertilizers (Urea & DAP); 10 kg *Trichoderma;* 750 litre of bio-agents formulation (*Trichoderma,* PSB & Heliokil) were distributed to farmers

* Modern Millet Processing Unit installed by TNAU, Coimbatore at Salem

Various activities carried for implementation of TSP program by selected centres of AICRP-NSP (Crops) along with details of the inputs provided to tribal farmers for taking up quality seed production, improving seed health & storage and other related activities in domain of seed were detailed below.

Sher-e-Kashmir University of Agricultural Sciences & Technology, Srinagar

There is an urgent need to respond to not only sustain growth in agricultural production for food security but also improve farm incomes to meet the growing expectations and aspirations of the farming community, especially tribal farmers. Tribal Sub Plan has been implemented in various villages of Kashmir region of the state for benefiting farmers belonging to schedule tribe viz. Sarai Uri, Kundi Barjalla, Kamalkote of district Baramulla and Chanamohla and Awanmohla of district Ganderbal. With the extension of TSP in more remote areas, the socio economic condition of the farmers has improved to a great extent.

Training Programmes conducted: Under the scheme 240 tribal farmers were identified from two districts of Kashmir Valley. Six training Programmes on "Quality Seed Production in Maize and Paddy and strategies for utilizing farmers own saved seed" were conducted in each district covering tribal farmers as detailed below:

Table: Details of trainings conducted under tribal sub plan in Kashmir Tribal Sub Plan-2016-17

S. No.	Location of The Training Programme	District	Crop	Variety	No. of Farmers Benefitted	Area Covered
1	Sarai Uri	Baramulla	Paddy	Jehlum	51	20.75
2	Kundi Barjalla Uri, Bandi Sarai		Paddy	Jehlum	64	19.70
3	Kamalkote		Paddy	Jehlum	20	7.05
			Maize	C15, SMC-3, SMC-5	64	16.80
4	Chana Mohla Kangan	Ganderbal	Maize	C15	16	4.55
5	Awan Mohla Kangan		Maize	C15	25	7.65
				Total	**240**	**76.50**

Inputs distributed: In toto, 28.50 quintals of paddy (Jehlum) and 8.70 quintals of maize (C15, SMC-3 & SMC-5).


Training programme on quality seed production & seed distribution at Uri, Baramullah


Training programme on quality seed production & seed distribution at Kangan, Ganderbal

Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya, Palampur

During 2016-17, nine farmer trainings were conducted on various aspects of seed production, storage and on farm seed testing. Three trainings in villages- Kardang, Chimeret & Kukumseri of Lahual and Spiti district benefiting 100 tribal farmers and six trainings were conducted in villages- Leo, Lari, Sangla, Chitkul, Kamru & Raksham of Kinnaur district benefitting 400 tribal farmers.

Input distributed

1. Seed distribution: 350 kg of rajmash varieties, Baspa, Jwala, Kailash, Him 1 and Kanchan. 100 kg of frenchbean varieties Mridula and Contender to farmers at Kinnaur and Lahaul-Spiti.
2. Farm equipment: For weeding and interculture operations, 350 hoes were distributed in Kinnaur and 100 spades at Lahaul-Spiti.

Agricultural University, Kota

One training programme on crop protection was organized at Faldi village of Baran district during 2016-17, benefiting 50 tribal farmers. Agriculture Scientists of different discipline were involved and made available for solving the problems of tribal farmers. Interaction between Agriculture Scientists and farmers was held for one whole day on various aspects of crop protection measures in field crops. 50 hand sprayers were distributed to selected farmers among the tribal community.

Training programme on crop protection & input distribution at Faldi, Baran

Anand Agricultural University, Anand

Under tribal sub plan during 2016-17, two trainings were organized and necessary inputs were distributed to the tribal farmers for taking up quality seed production of improved varieties of maize and soybean.

Training organized: Two training programmes on "Fungi and insect-pest damaging seeds/ food grains during storage and their management" for two days each were organized at TRTC, Devgadh Baria and KVK Dahod benefiting 100 tribal farmers of Dahod district. Various aspects of pest management were dealt with and practical demonstration of methods of seed biopriming and technique for enrichment of FYM through Trichoderma were organized.

Inputs distributed: Hand operated knapsack sprayers (100 no's), Trichoderma culture (10 kg), maize and soybean seeds (800 kg), Agri-Media VCDs on cultivation of maize and soybean (100 no's) and storage bins of 100 kg capacity (100 no's).


Training conducted at Tribal Research cum Research Station, AAU, Devgadh Baria


Training conducted at KVK, Dahod

Mahatma Phule Krishi Vidyapeeth, Rahuri

Tribal farmers generally do not utilize quality seed and plant protection measures properly for grain production as well as seed production owing to lack of resources, financial problems and technical knowledge on quality seed production. Tribal farmers still using farm saved seeds (inferior quality) of traditional varieties or land races of chickpea available in their locality. Therefore, with an aim to accelerate use of quality seeds and to protect the crops from pest and diseases during 2016-17. It was decided to distribute foundation seed of chickpea, bio-pesticides and bio-fertilizers to the tribal farmers.

Input distributed: Foundation seeds of chickpea varieties Vijay and Digvijay for covering 200 ha area were distributed along with *Rhizobium*, Phosphate solubilizing bacteria and Heliokil among 316 farmers of Dhadgaon and Shahada talukas of Nandurbar district.

Inputs	Quantity
Foundation seed of chickpea var. Vijay and Digvijay	50 q each
Bio-pesecticide: Heliokil	250 lit.
Liquid Bio fertilizers: Rhizobium and PSB Culture	250 lit. each

Training organized: Two training programmes on improved crop husbandry and usage of bio-agents were organized at Dhadgaon and Shahada talukas of Nandurbar district. Each training programme was attended by 250 tribal farmers.


Field day and training at Dhadgoan


Training and input distribution at Shahada

Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola

Training programme: Under tribal sub-plan eight training programmes on "Seed Production Technology of different crops" were organized in the remote villages of Dharni and Chikhaldara Tahsil of Amravati district, benefiting 772 tribal farmers.

Input distributed: Fixed Type, Wakhar- U Type, 24 harrows were distributed to tribal farmers.


Training and input distribution organized at Dharni and Chikhaldara, Amaravati

University of Agricultural Sciences, Bengaluru

During 2016-17, survey was conducted at Chamarajanagar district and identified tribal colonies at Chamarajanagar, Biligirirangana hills of Yelandur taluk and of Kollegal taluk, respectively. The majority of tribal people are illiterate, isolated from the society; they use to grow the crops with the low yielding local varieties. Hence, it is decided to provide seeds of improved varieties of ragi, fieldbean, redgram, bean and kitchen garden kit comprising seeds of different vegetables to improve their crop productivity by providing technical knowledge on improved cultivation along with seed storage bins and tarpaulin for seed cleaning, drying etc.

Training programme & input distribution: Two one day trainings and input distribution programme were organized benefiting 240 tribal families as detailed below.

Quarter	Seed distributed (kg)	Physical assets created (No's)	Beneficiaries (family-No's)
Second	Ragi-2400, Redgram- 600, Field Bean-600, Beans- 60 & Kitchen Garden-240 kit	Storage bins- 240, Tarpaulin-240	**240**
Third	Ragi-1200, Cowpea- 30, Field Bean-300, & Kitchen Garden-120 kit	Storage bins- 120, Tarpaulin-120	**120**

Training programme and seed distribution at Kolipalya, Chamarajanagar

Training programme cum seed distribution at Kumbaragundi, Chamarajanagar

Tamil Nadu Agricultural University, Coimbatore

The detailed activities organized under tribal sub plan under the ambit of seed centre, TNAU, Coimbatore during 2016-17 were detailed below;

Training organized: Training programme on "Seed production technologies and value addition in small millets" was conducted at Thavalapatti Village, Attur Taluk, Salem District in association with KVK, Sandhiyur and TCRS, Yethapur benefiting 400 tribal farmers.

Physical assets created: A Modern Millet Processing Unit was established by the Seed Centre of Tamil Nadu Agricultural University at Thavalapatti, a tribal hamlet in Attur Taluk of Salem District. The millet processing unit comprising of seven equipments viz. destoner cum grader cum aspirator, millet mill, pulverizer, grader with aspirator, dehuller, grain polisher and poly bag packing machine was installed. One day awareness cum training programme was also organized to offer a demo and hands on training on the usage of new machineries to identified tribal farmers. The sessions on improving the quality of grains from farm to the consumer as well as the importance of value added products and its impact on consumers were delivered to the farmers. The training book on "Seed production in small millets and value addition" and the inputs like millet seeds were freely distributed to the farmers.

Exhibition organized: An exhibition on minor millet seed production technologies, value addition of minor millets, tapioca and castor cultivation aspects, management of pest and diseases, soil health testing was also organized. Scientists from TNAU delivered lectures on latest technologies in minor millet cultivation and value addition. About 400 tribal farmers participated in this exhibition.

Input distributed: The minor millet seed packets were distributed to 200 farmers along with standard package of practices.

Major outcomes: The referred scheme helped in creating awareness and interest in minor millets seed production and cultivation, which in turn improved income levels, employment generation and helped in enhancing the socio-economic status of tribal community.

Demonstration of Modernised Millet Processing Unit at Thavalapatti, Salem

Training/ exhibition millet seed production & value addition at Thavalapatti, Salem

Central Research Institute for Jute and Allied Fibres, Barrackpore

The detailed activities organized under tribal sub plan under the ambit of ICAR- CRIJAF, Barrackpore during 2016-17 were detailed below;

Training organized: Training programme entitled "Quality seed production and post-harvest technology of Paddy" was organized at Siakuldoba, Bankura. About 50 tribal farmers participated in training programme. Lectures on importance of farmers saved seed, seed production techniques of paddy in drier tract of West Bengal, techniques of Storage of paddy seed were covered. Another training on " Improving productivity of Rabi crops through use of quality seed" was oragnized at Saltora block of West bengal and about 100 tribal farmers participated in the training programme. 45 FLDs on Improved paddy variety MTU 7029 were conducted in different villages of Saltora block of Bankura, West Bengal.

Input distributed: In toto, 2000 kg of paddy seed Variety MTU 7029 was distributed among 248 tribal farmers of different villages of Saltora block of Bankura, West Bengal

FLD of paddy variety MTU7029 & training programme at Siakudoba, Bankura

Central Arid Zone Research Institute, Jodhpur

The programme entitled "Livelihood improvement of Scheduled Tribe Farmers through improved agricultural interventions" was implemented with the help of gram panchayat in Jantora village of Banswara district.

Input distributed: Looking to the needs of the farmers, improved seeds of wheat and fertilizers were provided to the scheduled tribe farmer's viz. 4800 kg of certified seed of wheat var. Raj 4120, 6000 kg urea and 6000 kg DAP for enhancing the agricultural productivity benefiting 120 tribal farmers.

Input distribution programme at Jantora, Banswara

Indian Institute of Millets Research, (IIMR) Hyderabad

During 2016-17, four clusters of tribal farming communities were identified in the states of Orissa, Uttar Pradesh, Andhra Pradesh and Telangana for implementation of referred project.

Input distribution: Koraput district of Orissa: 350kg of dual purpose sorghum seeds were distributed to 100 beneficiaries in liason with MSSRF, Jeypore unit. One tonne seed of hybrid sorghum was distributed in non-traditional areas of Andhra Pradesh in coastal tribal areas. 180kg seeds were distributed to 60 beneficial tribal farmers in Telangana districts.

Central Institute of Cotton Research, Nagpur

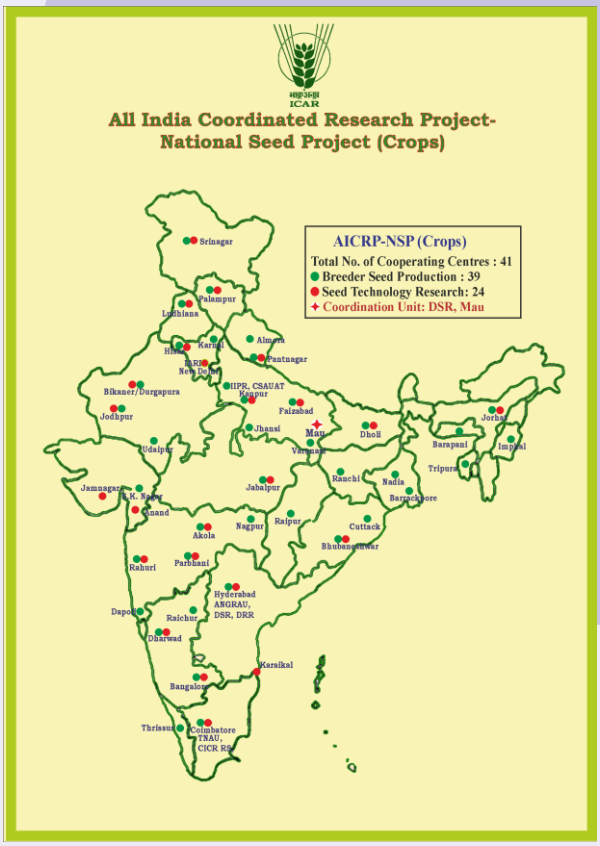
The detailed activities organized under tribal sub plan under the ambit of ICAR- CICR, Nagpur during 2016-17 were detailed below;

Training organized: Training cum Field visit was organized at the CICR, Nagpur for around 400 tribal farmers from various blocks of Nagpur and Wardha districts. Training was imparted to the tribal farmers about cotton cultivation, cotton pest problems, physiological disorders, water harvesting methods etc and necessary literatures were also provided. Farmer's field visit was arranged to exhibit various cotton varieties, multi cropping system, high density planting system etc. Another six trainings were organized at different villages viz. Ladai, Limboli, Budhla- Lohgad, Wathoda, Bela and Narhar of Nagpur district. Farmers were trained on various aspects of cotton and other crops cultivation, water harvesting methods and its benefits; bollworms, diseases, weed, leaf reddening management in cotton, usage of cotton stalks as by product, horticultural crops like vegetables, orange orchard management, poultry and goat rearing as an entrepreneurship, demonstration of orange juice making and sensitized them with various Govt. schemes available for tribal farmers.

Training programme cum field visit at CICR, Nagpur

Training programme at Ladai and Nimboli, Nagpur

31st Annual Group Meeting AICRP-National Seed Project (Crops)
19-21 April 2016 at KAU, Thrissur



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