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किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
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भाकृअनुप
ICAR

PULSES Newsletter

ICAR-Indian Institute of Pulses Research, Kanpur

VOLUME 29, No. 1 JANUARY - MARCH, 2018

State Minister of Agriculture visited IIPR & Scientist – Farmer Meet organized

On March 17, 2018, a Scientist – Farmer Interactive Meet was organized at IIPR, Kanpur. The programme was inaugurated by Hon. Minister of State for Agriculture, Shri Ranvendra Pratap Singh and Hon. MLA, Kalyanpur, Smt. Neelima Katiyar was the guest of honour in the presence of Dr. N.P. Singh, Director, IIPR, Kanpur. Around 1,000 participants including scientists, educationists, students, industrialists and farmers participated in this important meet. Scientists discussed the research activities and advancements in achieving the self sufficiency and nutritional security in pulses in the country. On the occasion, two important bulletins were also released.

Speaking on the occasion, the Chief Guest congratulated the pulse scientists for achieving an all time high 22.95 million tonnes production of pulses. While expressing his concern over the fluctuating production of pulses in the country, he urged the scientists to work for the allround benefit of the farmers. He opined that farmers ought to be partners in various research based programmes and this research, if applied on their fields, will surely give better results. Admiring the research of the pulse scientists, Smt. Neelima

Katiyar also expressed her views on the research advancements in achieving the self sufficiency and nutritional security in pulses in the country.

Dr. N.P. Singh, Director, IIPR, briefed about the activities going on in the Institute. He informed that the various projects under national programmes have been successful. In the 'International Year of Pulses', research and development activities of the Institute were further strengthened towards increasing productivity which

resulted in all time high production of pulses to the tune of 22.95 million tonnes. Dr. Rajesh Kumar, Head of the Division presented vote of thanks to all the esteemed guests and participants.

CONTENTS

Improved technologies for sustainable pulse production

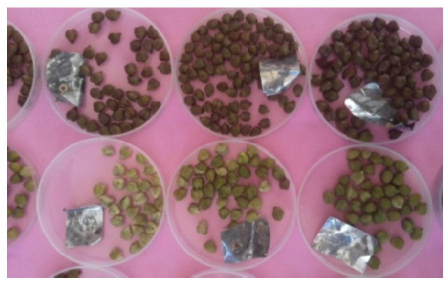
IIPR, Kanpur organized a training programnme on **"Improved Technologies for Sustainable Pulse Production"** between February 05-14, 2018 sponsored by National Institute of Agricultural Extension Management (MANAGE), Hyderabad. Twenty two officers from State Agriculture Department/KVKs of different states (Himachal Pradesh, U.P. Maharashtra,

Jharkhand, Tamil Nadu, Telangana and M.P.) participated in this programme. Trainees underwent advanced knowledge and skill based training on various pulse crops and specific focus on improved varieties, agronomic and cultural practices for sustainability, impact of climate change, resource use efficiency, integrated disease and pest management and post-harvest management of pulses. The trainees were updated about various innovative extension methodologies so that they can reach large number of farmers effectively. They were also shown demonstrations of pulses in villages and interacted with the farmers.

Research Highlights

Chickpea breeding lines with stable green grains developed

Retention of green colour by the green seeded chickpea (*Cicer arietinum* L.) genotypes after cooking/ boiling remains a major bottleneck in popularizing green seeded chickpea as an alternate to green seeded or vegetable type pea grains. In past also, ICAR-IIPR utilized GL 84038 in hybridization and progenies from crosses were screened (boiling in water) for retention of green colour after cooking. All the elite breeding lines derived from GL 84038 turned black or greenish black indicating unsuitability of green seeded chickpea as alternate of green peas or vegetable peas. Later,



26 plant progenies (F_5) of cross (IPC 2008-103 x ICCV 15614) of *desi* chickpea were developed and screened for green seed colour upon cooking. Out of 26 single plant progenies, three maintained green colour of the grains even after cooking. The line IPC 2008-103 is a derivative of cross (IPC 94-132 x BGD 112). These efforts are opening doors for development and popularization of green seeded chickpea varieties for their use as alternate to the green seeded vegetable pea.

SK Chaturvedi, B Modal, AK Srivastava and Yogesh Tewari

Determining sensitivity of embryonic axis explant for kanamycin in grasspea

Prior to genetic transformation in any genotype, it is necessary to determine its sensitivity to selection agent for the selection of transformants. The effective concentration of kanamycin for selection of grasspea (Cv. Pusa 24) transformants derived from embryonic axis explant was determined by culturing untransformed embryonic axis explants on shoot induction media (MS medium supplented with, B5 vitamins and 4 mg/ L BAP) with various concentrations of kanamycin (0, 50,100,125,150 mg/L). Kanamycin at 50 mg/L concentration was apparently ineffective. About 72 to 77% explants bleached at 100-125 mg/ L concentration while about 92.6% explants bleached completely within 15 days of inoculation at 150 mg/L. Multiple shoot regeneration was also inhibited at and above 100 mg/L kanamycin. Observations suggest that kanamycin above 100 mg/L concentration is effective for selection of transformants in Pusa 24 genotype of grasspea. However, to avoid selection escape and chimerism, 150 mg/L kanamycin would be more effective.

Neetu Singh Kushwah, Alok Das, Archana Singh, Meenal Rathore and NP Singh

Hot spot for root knot nematode, *Meloidogyne* spp infestation

A survey was carried out in Karumandhurai, a hilly village situated above 1000 MSL (Kalvarayan hills of Eastern Ghats) in Salem district of Tamil Nadu to assess root knot nematode infestation and to collect nematode infected roots and rhizosphere soil samples for isolation of nematode biocontrol agents. Severe nematode infestation was observed in common bean, *Phaseolus vulgaris* fields. The affected crops were clearly showing stunting of plants, yellowing of leaves, less number of pods and severe root knots/galls. Twelve infected roots and rhizosphere soil samples were collected from these crops for population density assessment.

Fig.1 Nematode infected field

Laboratory analysis at IIPR, Kanpur revealed that the average population density of root knot nematode was 413.33/100 cc of soil from common bean fields. High population density and wide distribution throughout the field characterizes that place as Hot Spot for root knot nematode, *Meloidogyne* spp infestation.

R. Jagadeeswaran, Jyotirmay Dubey (IIPR, Kanpur) and Tamarai Selvan (AO, PN Palayam, Salem)

Event selection trials of transgenic pigeonpea and chickpea concluded

Event selection trials of transgenic pigeonpea and chickpea (Trait: Insect Resistance) were conducted at Main Research Farm of ICAR-Indian Institute of Pulses Research, Kanpur, strictly adhering to directives provided by Review Committee on Genetic Manipulation [Permit Letter: BT/BS/17/221/2007-PID dtd 15.05.2017 and BT/BS/17/221/2007-PID dtd 22.06.2017 (pigeonpea) and BT/BS/17/221/2007-PID dtd 15.05.2017 (chickpea)] and Genetic Engineering Appraisal Committee [File No. C-12013/4/2016-CS-III (pigeonpea) and C-12013/5/2016-CS-IV (chickpea)]. The pigeonpea and chickpea trials were laid on 14th July, 2017 and 18th November, 2017, respectively, ensuring biosafety compliance. The trial of pigeonpea was harvested on 4th April, 2018 and on 23rd March, 2018 for chickpea, at full physiological maturity. The trials were intended to identify the best event each in pigeonpea and chickpea, based on trait efficacy (resistance to gram pod borer), expression of *Bt* protein at various stages and related agronomic characters including yield.

Alok Das, Meenal Rathore, Ravi Ranjan Singh, Malkhan Singh and N P Singh

Isolates of *Pasteuria penetrans*, *Meloidogyne* spp from pulse rhizosphere

Pasteuria penetrans, an obligate bacterial parasite is highly potential bio-control agent for root knot nematode, *Meloidogyne* spp and need to be exploited commercially for successful management of root knot nematode in pulses. In this regard, a survey was carried out in Varanasi district of Uttar Pradesh and Salem of Tamil Nadu and 36 nematode infected roots and rhizosphere soil samples were collected for the isolation of the bacterial parasite. The crops from which the root and soil samples collected were mungbean, urdbean, redgram, beans, tomato, brinjal and gourds. The nematode juveniles were extracted from

Fig.1 Bacterial spore encumbered 2nd stage juvenile

Fig.2 Infected juveniles inoculated for bacterial spore multiplication

egg masses and soil samples and each juvenile was carefully observed under microscope for bacterial spore attachment. It was observed that the juveniles from five samples (three from Varanasi and two from Karumandhurai) were infected with *P. penetrans* spores. These infected juveniles were immediately inoculated on susceptible host plant for host- parasite life cycle completion which is necessary for bacterial spore multiplication.

R. Jagadeeswaran, Jyotirmay Dubey (IIPR, Kanpur), Sellaperumal (IIVR, Varanasi) and Tamarai Selvan (AO, PN Palayam, Salem)

Frequency of distribution of foliar diseases of chickpea

A field survey was conducted duing *Rabi* 2017-18 in major chickpea growing tracts of Punjab, Jammu, Uttarakhand and the North Rajasthan for the prevalence major foliar diseases such as Ascochyta blight (AB) and Botrytis gray mold (BGM). The 38 chickpea fields sampled from Ludhiana, Bhatinda, Jalandhar and Gurdaspur districts of Punjab exhibited 2 (PBG 7) to 100 per cent incidence of AB on susceptible cultivar (L 550) at Ludhiana and < 1 per cent BGM incidence on PBG 5. In Gurdaspur district, upto 50 per cent disease severity was observed as compared to < 2 per cent in other districts of Punjab. In Pantnagar, Udham Singh Nagar, Nainital districts of Uttarkhand and Bareilly district of U.P., 2-5 per cent AB and 20-90 per cent of BGM was recorded on local varieties, PG 114 and PG 186 cultivars in all the chickpea growing fields. The severity was very high on local cultivars as compared to PG 114 and PG 186 cultivars. Very high disease severity was observed in Udham Singh Nagar district of Uttarakhand. This information might be useful for farmers to grow resistant cultivars for the management of foliar diseases of chickpea and also helpful to prioritise the breeding programme for the development of resistant cultivars against Ascochyta blight and Botrytis gray mold of chickpea.

Fig: Occurrence of Ascochyta blight severity on L 550 cultivar in Ludhiana

L Manjunatha, Upasana Rani, NP Singh, GP Dixit and Krishna Kumar

Exploring rajmash germplasm for their nodulation potential

Nodulation of rajmash is a big problem in Indo-Gangetic plains. This may be due to lack of compatible rhizobia in soil, various edaphic or climatic factors. Efficient rajmash genotype-*Rhizobium* combination can drastically reduce the cost of nitrogen input. Keeping this in mind, rajmash genotypes were screened for nodulation at New Research Campus, ICAR-IIPR. Among them, 12 genotypes were found positive for nodulation.

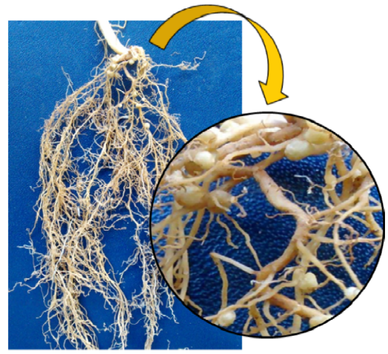


Fig. Root nodules of rajmash

Nodule number varied from 1 to 12. Rhizobia associated with each genotype were isolated from root nodules. Plant infection test confirmed nodulation potential of all 12 genotypes. Further studies on nodulation pattern and mechanism can help us to establish effective plant-*Rhizobium* symbiosis in rajmash.

Krishnashis Das, Basavaraja T., Yaduendra S.Y. and Senthilkumar M.

DUS characters and agronomic evaluation of transgenic chickpea lines

Agronomic evaluation of transgenic plants is an important endeavour for characterization of transgenic lines. Guidelines for conduct of test for Distinctness, Uniformity and Stability (DUS) prescribed by PPV & FRA, Government of India serves as standard document to establish identity of genotype. We have developed transgenic chickpea lines harbouring synthetic *Bt* gene in the background genotype of popular chickpea cultivar, DCP 92-3. Twenty one characters specific to chickpea genotype articulated in the Table of Characteristics (Section VII) of the Guidelines are being evaluated and recorded in all the transgenic lines *vis-a-vis* parental genotype, DCP 92-3, at different stages (*viz*. seedling, pre-flowering, post-flowering and maturity).

Alok Das, Alok Shukla, Jamal Ansari, Meenal Rathore, Ravi Ranjan Singh, Malkhan Singh and N P Singh

First report of stem rot disease in *Rhynchosia brachita*

Seventy nine wild pigeonpea accessions from three distinct genera of *Cajanus*, *Rhynchosia* and *Flemingia* were grown at ICAR-Indian Institute of Pulses Research, Kanpur during *Kharif* 2017-18 for screening against biotic stresses. Water soaked lesions on the leaflets and rotting of stem (Figure 1a & 1b) were observed on *Rhynchosia brachita* (Accession No. ICP 817) under natural field condition. Lesions on leaves and stem turned straw coloured (Fig.1b).

The diseased samples were collected and examined. Presence of white fluffy mycelium on affected plant parts and sclerotia on the affected parts indicated the involvement of *Sclerotina sclerotiorum.*

Rhynchosia brachita has not been reported as a natural host of *S. sclerotiorum* in India till date. Hence, this is the first report of stem rot on wild pigoenpea, *Rhynchosia brachita* (Accession No. ICP 817).

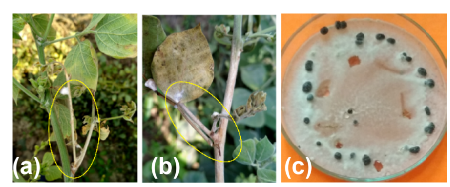


Fig. 1 (a, b) Stem rot affected wild pigeonpea stem, branches and leaves (c) Fluffy white mycelium growth with black sclerotia on PDA

RK Mishra, Monika Mishra, Naimuddin, Satheesh Naik, Abhishek Bohra and Krishna Kumar

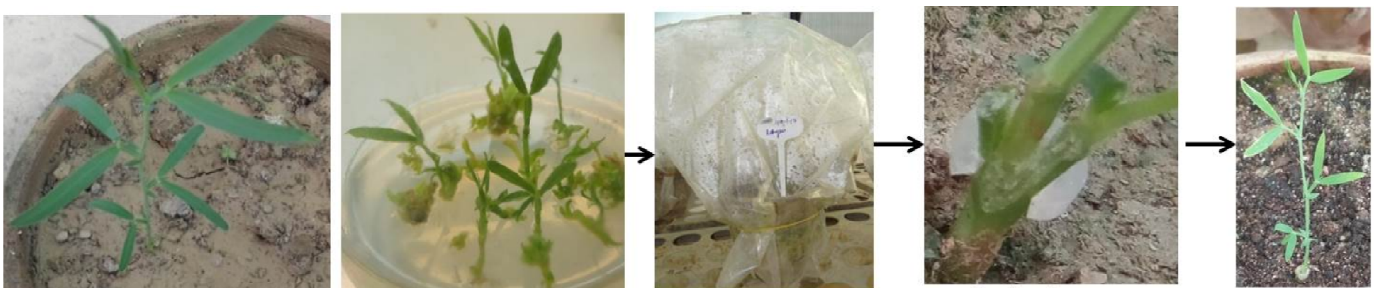
Estimation of NPTII protein in transgenic chickpea and pigeonpea tissues

Transgenic chickpea and pigeonpea lines undergoing Event Selection Trial, harbour *nptII* gene (Neomycin phosphotransferase II, aminoglycoside 3í-phosphotransferase II) derived from transposon Tn5 from the bacterium *E. coli*. The gene was used as a dominant selectable marker in the initial stage of plant cell selection following transformation. Plants surviving kanamycin selection are considered to harbour *nptII* gene. The 29 kDa enzyme catalyses the transfer of a phosphate group from ATP to a hydroxyl group of aminoglycoside antibiotics like kanamycin, thereby inactivating the antibiotics. We estimated the level of NPTII protein in various tissues of transgenic chickpea and pigeonpea lines, based on quantitative ELISA technique. In 242 days old transgenic pigeonpea, expression was higher in leaf (5.28-7.25 ng/mg TSP) in comparison to pod wall (2.68-4.73 ng/mg TSP) and immature seeds (approx. 3.08 ng/mg TSP). Similarly, in 118 days old transgenic chickpea lines, expression was higher in leaf (4.09-6.86 ng/mg TSP) followed by pod wall (2.62-5.18 ng/mg TSP) and immature seeds (1.63-3.84 ng/mg TSP).

Alok Das, Alok Shukla, Meenal Rathore and N P Singh

Micrografting in grasspea for establishment of *in vitro* regenerated shoots in soil

For quick establishment of *in vitro*-regenerated shoots in soil, micro-grafting was attempted in grasspea (cv. Pusa 24). Rootstocks were grown in earthen pots in containment facility and the *in vitro* regenerated shoots obtained from embryonic axis explant cultured on medium comprising of MS salts, B5 vitamins, 3% sucrose, 0.8% agar and growth regulator [6-benzyl amino purine (BAP)] were used as scions (Fig 1). Thirteen scions were grafted into the pre-germinated root stock of Pusa 24 of which 11 showed grafting reunion, however, only five survived, produced flowers and seeds.This reveals that grasspea is responsive to micro-grafting and hence, it could be used for routine establishment of *in vitro* derived shoots of grasspea in soil. This would aid in byepassing the tedious *in vitro* rooting and hardening process for establishment of *in vitro* derived shoots in soil.



Pre-germinated rootstock — Scion → Grafting and covering with plastic sheets → Graft union → Successfully established grafted plant

Fig. Micrografting in grasspea

Neetu Singh Kushwah, Jamal Ansari, Alok Das, Meenal Rathore and NP Singh

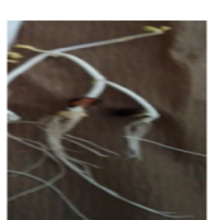
Identification of resistant donors against Bean common mosaic virus (BCMV)

Bean common mosaic virus (BCMV) is an emerging *Potyvirus* belonging to the family *Potiviridae* which causes severe damage to rajmash (*Phaseolus vulgaris*) crop. BCMV is transmitted by many species of aphids in a non persistent manner. A total of 300 germplasm accessions obtained from ICAR-NBPGR, New Delhi were screened under natural conditions during *Rabi* 2015-18. The 56 lines which performed better in yield and agronomical traits and initial resistance to BCMV were further tested against BCMV-Kanpur isolate through sap inoculation. These accessions were sown in pots in green house with two replications and sap inoculation was done at cotyledonary stage of the crop using phosphate buffer. The experiment was repeated twice. The highly susceptible genotype IC 431338 showed 100 per cent disease incidence during previous two seasons was included as check. The accessions EC-150250, GPR-203, EC-541703, IC-356063, EC-400414, BD-9116291, EC-400414 and EC-31084 were found resistant for three years, both under natural and artificial virus inoculation conditions. These resistant sources will be highly useful to plant breeders in developing resistant cultivars.

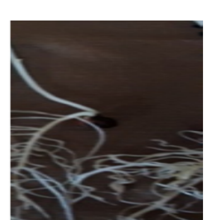
L Manjunatha T. Basavaraj, Veer Singh, Krishna Kumar and NP Singh

Enhancing physiological efficiency by seed priming

Among the seed priming agents *e.g.* KNO_3, $MgSO_4$, $Ca(NO_3)_2$ and tap water, Priming of one year old chickpea varieties (Ujjwal and JG 14) seeds with 0.2% KNO_3 for 06 hours was found to be superior in terms of enhancing germination per cent, seedling length, seedling dry weight and finally seedling vigour I and II under normal as well as water deficit condition over rest of the priming agents and their respective unprimed control.



Control

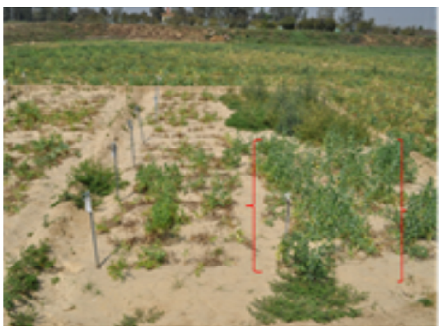


KNO_3 primed

TN Tewari

P-637: A post emergence herbicide (Metribuzin) tolerant line in fieldpea

Based on last two years screening, a set of fifteen genotypes was made involving highly tolerant, tolerant, moderately tolerant, sensitive and highly sensitive genotypes. These genotypes were examined in larger plot for resistance against popular post-emergence herbicide metribuzin @ 500 g/ha. The plants were scored for herbicide toxicity at three different stages *i.e.* 15 days after application (DAA), 30 DAA and 60 DAA on a scale of 1–5. Based on scoring for visual appearance and toxicity on plants, the genotype P-637 was found tolerant. The Institute Germplasm and Genotypes Identification Committee (GGIC) of ICAR-IIPR also visited field and observed its performance. This genotype consistently witnessed tolerance for metribuzin @ 500 g/ha during previous two years also. Therefore, this genotype could be utilized as donor in future fieldpea breeding programme for the development of herbicide (metribuzin) tolerance variety.



Tolerantgenotype (P 637)

GGI Committee visit

AK Parihar, GP Dixit, Narendra Kumar, CP Nath, SK Chaturvedi and NP Singh

Screening of fieldpea breeding materials for rust

Rust is one of the most important biotic stresses of fieldpea caused by *Uromyces fabae* and occurs at flowering and fruiting stage of the crops. During *Rabi* 2017-18, total 439 single plant progeny of filial generation (F_5) of 43 crosses along with three checks were screened for rust resistance under natural field condition. Rust severity was recorded using 0-5 disease rating scale on randomly selected five plants in each progenies. Out of 433 progenies evaluated, 301 showed resistance, 6 were moderately resistant, 61 were susceptible and 65 showed highly susceptible reaction against rust. Similarly, 176 advanced breeding lines (F_6) were also evaluated, of which 141 lines were resistant, 8 were moderately resistant, 15 were susceptible and 10 were highly susceptible. The results revealed the presence of ample amount of genetic variability for rust reaction in fieldpea breeding materials. The identified resistant progenies will be revalidated next year. These lines will also be evaluated for grain yield potential and subsequently in multi-location testing.

AK Parihar, RK Mishra and GP Dixit

प्रौद्योगिकी हस्तांतरण

Model pulse villages developed in Kanpur Dehat and Jalaun districts

DBT supported project on "Socio-economic and technological empowerment of pulse farmers of Uttar Pradesh state" was initiated by ICAR-IIPR, Kanpur with the aim of creating awareness on improved pulses production technologies through development of Model Pulse Villages in Kanpur Dehat and Jalaun districts of Uttar Pradesh state. Under the project, the activities were focused in four villages *i.e.,* Salempur and Silhara in Kanpur Dehat district and Barai and Sohrapur in Jalaun district of Uttar Pradesh state, which were developed as model pulse villages.

For purpose of encouraging entrepreneurship among partner farmers and farm youth as well as for enhancing the availability of quality seed of improved pulse varieties, pulse growing farmers and farm youth were mobilised to form three registered farmers organisations as *"Bairai Kisan Sewa Samiti"*, *"Salempur Beej Vikas Samiti"* and *"Silhara Kisan Sewa Samiti"* in the model villages.

The project villages are currently being recognised as local hubs of improved seed of pulse crops in the region.

Uma Sah, Narendra Kumar, Sujayanand, GK, PR Sabale and RK Mishra

Pulse based bio-village sustainable models

A project entitled "Development of pulses based bio-village sustainable models through action research for livelihood security under different agro-ecosystems in Uttar Pradesh" funded by DBT, Govt of India was implemented in collaboration with KVKs in village. Benipur in district Shahjahanpur and Kucharam in Chitrakoot were

selected. The two training programmes, each of two days were oragnised at KVK, Shahjahanpur and Chitrakoot where 70 farmers from adopted villages participated.

Purushottam, Rajesh Kumar and Ravindra Singh

Field Day organized on chickpea and pigeonpea under Farmer FIRST project

Field Day on Chickpea and Pigeonpea was organized on March 22, 2018 at Karchalpur village of Fatehpur under Farmer FIRST project. One hundred fifty farmers participated in the programme. Institute Scientists Dr. Rajesh Kumar, Dr. C.S. Praharaj, Dr. Purushottam. Dr. Yogesh Kumar, Dr. R.K. Mishra and Dr. Shripad Bhat visited chickpea and pigeonpea fields and informed the farmers about different interventions implemented in the project area. Farmers had on interaction with the Scientists about pulse production techniques. Plant protection equipments and implements were displayed by private entrepreneurs for the benefit of the farming community.

Employment generation for rural women under farmer FIRST project

Goats were provided to rural women for employment generation and doubling income in the Karchalpur village under farmer FIRST project. One goat was provided to each rural women farmer for employment generation and doubling the income of women farmers in the presence of *Gram Pradhan*,

Karchalpur village. Women farmers were also briefed about the management of goats. They were informed that in no condition, goats should be sold or given to any other person. It was also decided that one kid will be taken and given to other women farmer.

भ्रमण द्वारा प्रदर्शन

रिर्पोट की अवधि के दौरान उत्तर प्रदेश से 348, मध्य प्रदेश से 279 और छत्तीसगढ़ से 15 किसानों/छात्रों ने संस्थान का भ्रमण किया। किसानों/छात्रों को ग्रीष्मकालीन मूँग के प्रक्षेत्रों का भ्रमण कराया गया एवं संग्रहालय दिखाया गया। उन्हें संस्थान द्वारा प्रकाशित साहित्य भी उपलब्ध कराया गया।

- 16-19 जनवरी, 2018 के मध्य, मोबाइल एग्रीकल्चर स्कूल एण्ड इंस्टिट्यूट, राँची, झारखण्ड द्वारा प्रायोजित ''दलहनी फसलों की उन्नत उत्पादन प्रौद्योगिकी'' विषय पर, झारखण्ड के राँची जिले के 48 किसानों के लिए चार दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया।
- 21-24 फरवरी, 2018 के मध्य ''दलहनी फसलों की उन्नत उत्पादन प्रौद्योगिकी'' विषय पर आत्मा, धनबाद, बिहार द्वारा प्रायोजित चार दिवसीय प्रशिक्षण धनबाद के 47 किसानों के लिए आयोजित किया गया।
- 21-22 फरवरी, 2018 को प्रज्ञा ग्रामोधाम सेवा समिति, बिहार द्वारा प्रायोजित ''दलहनी फसलों की उन्नत उत्पादन प्रौद्योगिकी'' विषय पर, उ.प्र. के फतेहपुर जिले के 18 किसानों के लिए दो दिवसीय प्रशिक्षण का आयोजन किया गया।
- 06-09 मार्च, 2018 के मध्य, आत्मा, गधवा, झारखण्ड द्वारा प्रायोजित ''दलहनी फसलों की उन्नत उत्पादन प्रौद्योगिकी'' विषय पर गधवा के 24 किसानों के लिए, चार दिवसीय प्रशिक्षण का आयोजन किया गया।
- 20-23 मार्च, 2018 के मध्य मोबाइल एग्रीकल्चर स्कूल एण्ड इन्सीट्यूट, राँची (झारखण्ड) द्वारा प्रायोजित ''दलहनी फसलों की उन्नत उत्पादन प्रौद्योगिकी'' विषय पर राँची के 26 किसानों के लिए चार दिवसीय प्रशिक्षण का आयोजन किया गया।

Personnel

Promotion

Name	Grade to which promoted	w.e.f.
Dr. M. Senthil Kumar	Pr. Scientist PB-4 ₹ 37400-67000+10000 (RGP)	03.01.2017
Dr. Awinindra Kumar Singh	Pr. Scientist PB-4 ₹ 37400-67000+10000 (RGP)	14.02.2017
Sh. R.K.P. Sinha	Assistant Level 6	08.12.2017
Sh. K.A. Chaturvedi	UDC Level 5	08.12.2017

Transfer

Name	Post	From	To	Date
Smt. Kirti Singh	Assistant	IIPR, Kanpur	IISR, Lucknow	09.01.2018

Retirement

Name	Post held	Date of retirement
Sh. J.B. Thapa	T-5 (Driver)	28.02.2018

Director's Desk

Dear Readers,

The UN Food and Agricultural Organization (FAO) predicts that the global population is set to reach about 9.2 billion by the year 2050 from the present 7.6 billion recorded in 2018. To put this figure into perspective, the global agriculture sector will face additional two billion mouths to feed within the next 32 years. Unfortunately, decreasing natural resources will not sustain planting more crops to meet these challenges. Hence, agriculture production efficiency would likely to be based upon the innovative farming, new technologies as well as ecofriendly agricultural practices. Obviously, the big winners will be those who will get more with less. Pulses will be the major players towards future food security and eradication of malnutrition of exploding population. These crops need special attention as they require less resource and enrich our soil health. Production constraints of pulses including biotic and abiotic stresses have been extensively discussed. Apart from diseases and pests, weeds account for yield loss in pulses about 20-30% or sometimes more. One of the major causes for poor yields in pulses is attributed to the profuse growth of weeds and failure to control them in time. Pulses compete poorly with weeds and some weed management is required to successfully produce pulse crops. The problem of weeds is more severe in *kharif* as compared to *rabi* and summer seasons. With the identification of short-statured, compact and early-maturing varieties, the weed problem has become more acute. Pulse crops are very slow in seedling growth due to hypogeal germination promoting growth of roots much faster for establishment than above ground shoot. Consequently, pulses are very poor competitor of weeds. In addition, they are row-spaced and do not have much canopy in terms of branching and leaf size during initial growth to stand up to weed competition. The most commonly employed method is weeding through physical methods which include both manual and mechanical operations. However, adoption of these methods in time on a large scale in different situations may present some difficulties. In the use of herbicides for weed control, some important considerations have to be borne in mind; the herbicides should be selective and leave minimum residues in the soil to affect the subsequent crops in rotation, herbicides should not be harmful to the soil microflora that build up soil fertility and to the nodule-inducing organisms which fix atmospheric nitrogen, and edible parts

of pulses should not contain any residues that may prove toxic to man and animal. Increasing attention has been given to the role and potential of allelopathy as a management strategy for crop protection against weeds. Incorporating allelopathy into natural and agricultural management systems may reduce the use of herbicides reducing environment/soil pollution and diminish autotoxicity hazards. But allelochemicals are not being used as large scale control on weeds rather use of hazardous herbicides toxic to human health still to continue to manage weeds.

For decades, herbicides have been the main means of weed control. The extensive use of chemical substances in agriculture is generating devastating effects on our environment and is also affecting human health. Consequently, several weed species have been developing a natural resistance to the applied chemicals, hence, new and more potent herbicides have to be developed. Due to the great ecological and human health effects, the world is demanding chemical free crops from our fields. The LASER (***light amplification by stimulated emission of radiation***)-based weeding will be an excellent non-herbicide solution to weed control in future .The proposed system uses multi-spectral sensors and state of the art computer vision algorithms to detect and classify all plants on the field. After identifying the weed plants, a laser beam will be used to eliminate or to seriously damage the weeds. In this way, value crops can grow without the competition from weed and have higher yields because all available nutrients do not have to be shared. This technology has the potential for installing a new generation of sustainable crop production farms. With the use of the laser-based weeding system at large scales, herbicide use can be substantially reduced. The University of Bonn, Germany is currently developing a novel system using cameras on an all-terrain robot vehicle or even a tractor add-on, unwanted weeds will be automatically identified in the various crops and combatted in a targeted way. The robot shoots the leaves of the weeds with short laser pulses, which causes a weakening in their vitality and eventually weeds will die without affecting our crop. It is thus predicted that we will no longer need to use herbicides on our fields and the environment will be protected. Drones are already being used to photograph and analyze agricultural land to increase efficiency, decrease costs, and increase yields. The real-time aerial footage provides farmers with an immediate in-field crop analysis that enables them to make crop-management decisions much more efficiently. The agricultural automation and the use of Artificial Intelligence (AI) could quickly become critical in sustaining food production and is transforming the agriculture and helping farmers to manage the unpredictable. Although Artificial Intelligence (AI) functionality is somewhat limited its utility at the moment, applications in our immediate future have the potential to be revolutionary.

(N. P. Singh)

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