NICRA - AICRPDA

National Initiative on Climate Resilient Agriculture Technology Demonstration Component Technical Program of 2011-12

ICAR

Agriculture with a human touch

National Initiative on Climate Resilient Agriculture (NICRA)

All India Coordinated Research Project for Dryland Agriculture

Central Research Institute for Dryland Agriculture

Santoshnagar, Hyderabad - 500 059

National Initiative on Climate Resilient Agriculture

Technology Demonstration Component

Technical Program of 2011-12

All India Coordinated Research Project for Dryland Agriculture

Central Research Institute for Dryland Agriculture
Santoshnagar, Hyderabad-500059
March, 2012

Citation:

Technical program of NICRA (2011-12). All India Coordinated Research Project for Dryland Agriculture, Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad-500059, India. P 132

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Preface

The All India Coordinated Research Project for Dryland Agriculture was started in 1971 with 16 centers. At present, it has a network of 22 centers located in 20 State Agricultural Universities, two other Universities (BHU, Varanasi and Agra University). Out of 22 centers, 8 centers are operating Operational Research Project (ORP) for testing the research findings on farmers' fields, receiving feedback and refinement of such technologies to enable up-scaling in the target domains. Research is being carried out on different themes such as rainwater management, integrated nutrient management, energy management, cropping system, participatory varietal selection, alternate land use, integrated farming systems, resource characterization under different agro-climatic situations. These vary from arid to semi-arid, sub-humid and humid with varying soil types such as alfisols, vertisols, inceptisols, aridisols and entisols. Depending on the seasonal rainfall distribution, the centers are conducting experiments in *kharif*, *rabi* and *summer* seasons, by storing rainwater *in-situ* and *ex-situ*.

Under National Initiative on climate Resilient Agriculture (NICRA), the rainfed technology demonstrations are being conducted under 4 sub-projects at 22 centers and one voluntary center at Jhansi during 2011-12. The 4 sub-projects were (i) Real time contingency plan implementation in a participatory mode; (ii) Rainwater harvesting *(in-situ and ex-situ)* and efficient use; (iii) Efficient energy use and management; and (iv) Alternate land use. There were 81 demonstrations (2444 farmers) under sub-project-1; 61 (562) under sub-project-2; 25 (262) under sub-project-3; and 38 (227) under sub-project- (iv) under on-farm condition covering a total area of 1910.79 ha. Similarly, there were 42, 17, 4 and 32 demonstrations under the 4 sub-projects respectively in on-station condition covering an area of 70.09 ha.

I compliment the efforts of the Project Coordinating Unit, Scientists and staff of AICRPDA and ORP centers for compiling the technical program of the NICRA project with different details. This will help for efficient monitoring and evaluation of the NICRA activities. I thank Dr.AK. Singh, Deputy Director General (NRM) and Dr.JC. Dagar, Assistant Director General (Agronomy, ICAR for providing the guidance and support to AICRPDA from time to time.

(B. Venkateswarlu)
Director

21st March 2012

Contents

Chapter 1

Background

There is now adequate evidence about the impending climate change and consequences thereof. The fourth assessment report of IPCC observed that warming of climate system is now unequivocal, as is now evident from observations of increase in global air and ocean temperatures, wide spread melting of snow and ice, and rising global sea level (IPCC, 2007). Climate change impacts on agriculture are being witnessed all over the world, but countries like India are more vulnerable in view of large population depending on agriculture, excessive pressure on natural resources and poor coping mechanism. Several models predict that rising temperatures, increased climatic variability and extreme weather events could significantly impact food production in coming years. Climate change projections made up to 2100 for India indicate an overall increase in temperature by 2- 4°C with no substantial change in precipitation. However, different regions are expected to experience differential change in the amount of rainfall in the coming decade (Kavikumar 2010). Besides, changed rainfall patterns, it is predicted that extreme events are likely to increase in the country resulting in more droughts and floods. Within agriculture, the rainfed agriculture which constitutes nearly 58% of the net cultivated area and accounts for 40% of the country's food production and support 40% human and 60% livestock population will be most impacted for two reasons. First, rainfed agriculture is practiced on fragile, degraded and sloppy lands which are thirsty as well as hungry and prone to erosion. Second, the people dependent on rainfed agriculture are also less endowed in terms of financial, physical, human and social capital limiting their capacity to adapt to the changing climate. In fact, there has been a significant rise in the frequency of extreme weather events in recent years affecting the productivity and income at the farm level and also impacting the availability of staple food grains at the national level. For example heat wave during February- March in North India caused an estimated loss of 6 million tonnes of wheat in 2002-03. A decline in production of 60% in rapeseed and 50% in linseed was observed in Himachal Pradesh due to heat wave in March 2004. Pigeonpea crop in area of 7000 ha was damaged in Madhya Pradesh due to frost and cold (Venkateswarlu *et al,* 2011). Similarly, delayed onset of monsoon, mid season and terminal droughts particularly in rainfed areas are causing huge losses to agriculture and livestock production. This is not only affecting the livelihood of farmers but causing a setback to agricultural and national economy as such. Within a span of one year, the country is experiencing severe droughts and floods in the same region posing serious problems to the farmers, agricultural scientists and extension staff. Fall in the yield of staples and consequent shortage of food grain lead to price rise and inflation affecting the poor most. Therefore, it is of utmost importance to enhance the resilience of Indian agriculture to climate change. Both application of improved technologies and new policies will contribute to the resilience.

The Indian farmers have evolved many coping and adaptation mechanisms over time, but these mechanisms are often unable to cope with the extreme weather events being witnessed in recent times. Lack of effectiveness of traditional adaptation mechanisms may not be only due to their poor technical soundness but also due to changing rural social dynamics and institutional structures. Hence, a strong need has been felt by the policy makers to use modern science combined with indigenous wisdom of farmers to enhance the climate resilience of Indian agriculture.

To cope with the disasters and extreme weather events, the Government of India has initiated the process of developing district level contingency plans for all the 600 districts of the country with CRIDA, Hyderabad as the nodal agency at national level with overall responsibility of planning, coordinating and preparing district level plans by involving other ICAR institutes and SAUs. However, in the long term it is important not only to have a coping strategy to deal with the disaster/ vulnerability when it struck, but to make our agriculture more climate resilient through location specific adaptation and mitigation strategies to climatic variability by using available technologies and capacity building of the stakeholders.

Hence, to make the Indian agriculture more climate resilient, besides undertaking research to develop location specific climate resilient agricultural technologies, the need is to make immediate efforts to transfer the already available agricultural technologies to the farmers' field especially in more vulnerable regions. At the same time, there is also need to put in place innovative institutional mechanisms at the field level for successful technology adoption and up scaling. In order to deal with climate change in the right earnest, it has therefore been planned to conduct extensive farmer participatory demonstrations of location specific climate resilient agricultural technologies/ package of practices developed by 23 AICRPDA centers under on-station and on-farm condition on farmers' fields as part of National Initiative on Climate Resilient Agriculture (NICRA). Hence the technology demonstration component of NICRA envisages identifying climatic vulnerabilities to agriculture in the selected village in each of the 28 districts based on historical weather data from the nearest weather station, farmers' experiences and perceptions, and then preparing and implementing coping, adaptation and mitigation strategies following the bottom-up approach. The focus of the programme is not only to demonstrate the climate resilient agriculture technologies but also to institutionalize mechanisms at the village level for implementation of climate change adaptation and mitigation strategy for sustainable agricultural production. One village or a cluster of villages from each of the 28 selected districts was selected for technology demonstration. The technology demonstration component in the selected districts is being undertaken by the respective AICRPDA centers.

The All India Coordinated Research Project for Dryland Agriculture (AICRPDA) is the network programme under Central Research Institute for Dryland Agriculture (CRIDA) with Natural Resource Management (NRM) Division of Indian Council of Agricultural Research

(ICAR). AICRPDA network has 22 centers (Fig.1) viz. twenty centers located in State Agricultural Universities and two in general universities. There are 3 voluntary centers at IGFRI, Jhansi; CSWCRTI, Bellary; and CAZRI, Jodhpur. The mandate of the centers is: (i) to optimize the use of natural resources, i.e. rainfall, land and water, and to minimize soil and water loss and degradation of environment; (ii) to evolve a simple technologies to increase crop productivity and viability; (iii) to increase stability of crop production over years by providing improvements in natural resources and crop management systems and alternate crop production technologies matching weather aberrations; (iv) to develop alternate and sustainable land use systems; and (v) to evaluate and study transferability of improved dryland technology to farmers' fields. The AICRPDA network has 8 Operational Research Projects (ORPs) centers with the main objectives of evaluating the performance of each component of dryland technology under the farmers management conditions in order to provide feedback to the research stations for refinement of the recommendations and to achieve a first hand working experience in the development of micro-watersheds so that they may serve as models for extension agencies.

The research under AICRPDA network centers during 1985-2010 was focused to address the location specific problems considering agro-ecological characteristics, predominant rainfed production systems and socio-economic settings with specific emphasis on soil conservation and rainwater management, evaluation of crops/varieties, cropping/farming systems and contingency planning, integrated nutrient management, tillage and farm machinery and alternate land use systems. In the last few years, more focus was given on farming systems, tillage and integrated nutrient management, alternate land use systems for diversification and efficient implements on a template of resource management particularly rainwater management. The on-station research findings generated at the centres were evaluated on farmers' fields in ORP watersheds/ villages. The Technical Programme 2011-12 of NICRA under AICRPDA was finalized during the XIII working group meeting of AICRPDA held at CRIDA, Hyderabad during 24-27, November 2010.

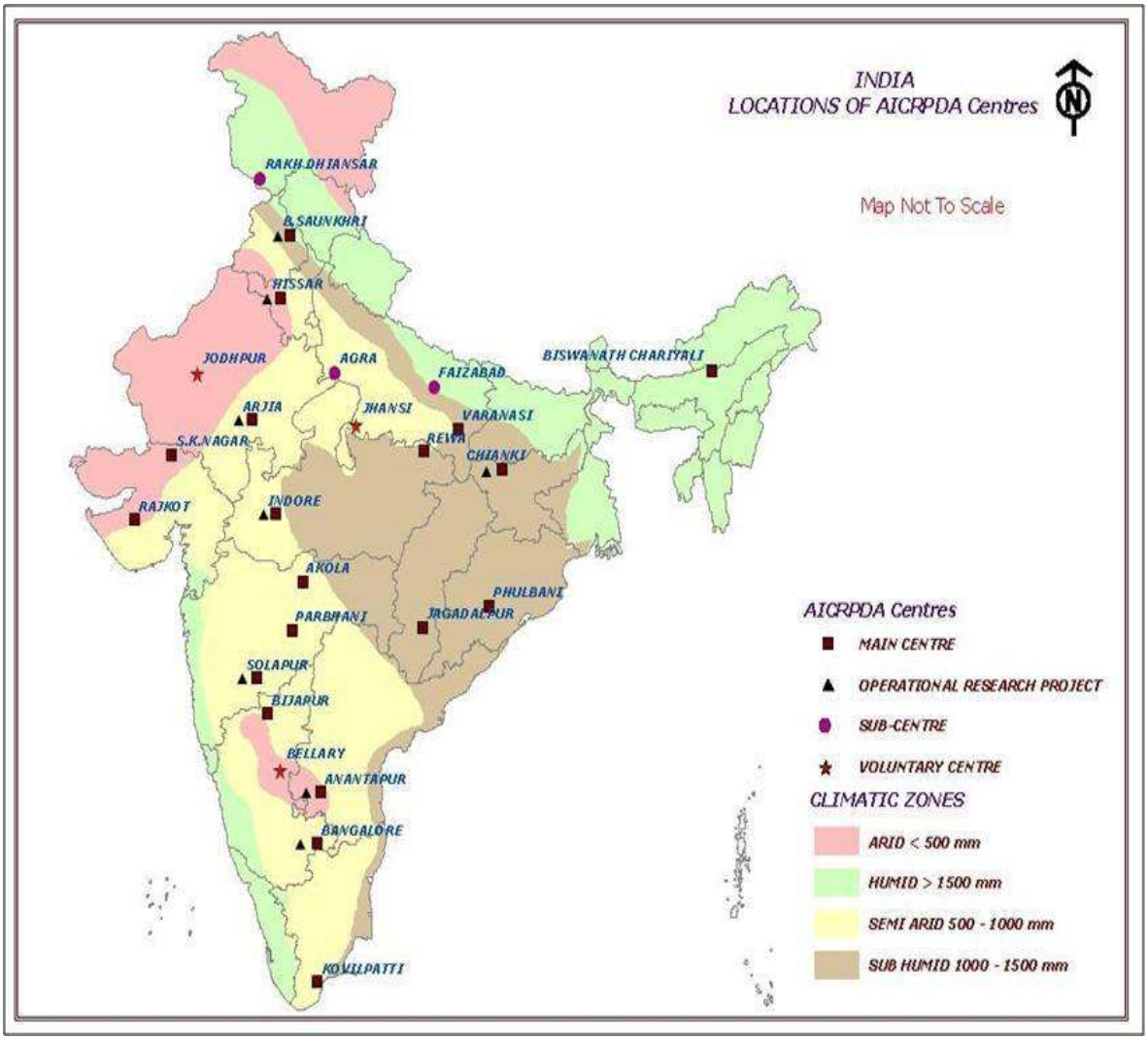


Fig.1. Location of different AICRPDA centers

Chapter 2

Activities under NICRA at different centers

Climatic characteristics of the village: Once the village was selected, each center collected time series climatic/weather data pertaining to the selected village or from the nearby weather station in order to understand the extent of vulnerability of the village's agriculture to climatic variability. The information was collected and analyzed related to the following:

Rainfall-annual as well as during Kharif season: Normal; trend in past 10 years (if any) increase/decrease.

Number of rainy days (seasonal as well as annual): Overall average, decadal average (1971-80, 1981-90, 1991-2000, 2001-09).

Intensive rain-spells (above 60 mm per day): Decadal average (1971-80, 1981-90, 1991-2000, 2001-09).

Number of dry-spells in past 10 years: Exceeding 15 days, exceeding 10 days in the *Kharif* season as well as in the whole year.

Length of growing season: Changes during past one decade

Number of floods severely/ completely damaging crops and livestock: Decade-wise number for the past three decades

Other extreme events: Information on damage (number. of events decade-wise for the past 3 decades) due to other weather extremities such as frost, heat and cold waves, hail storm, sea inundation of agricultural fields and consequent problems, information if any, on soil degradation due to extreme weather events.

Participatory appraisal of the village: The objective of the participatory appraisal of the village was to understand the farming systems, resource situation, constraints and climatic vulnerabilities and to identify opportunities of climate change adaptation and mitigation in the selected village. Every center collect information on land use pattern, area, production and productivity of different agricultural and horticultural crops, livestock composition and production, fishery production, awareness level of farmers about climate change, ground water level and its use, income from agriculture and allied activities, level of risk of crop loss due to climatic variability in the past one decade. This information was collected from the farmers and village key informants. The participatory appraisal was undertaken as follows:

Assessment of natural resource status: To understand as to why the agriculture in the selected village remains vulnerable to climatic change, it was planned to assess the status of natural resources, socio-economic, institutional and infrastructural status and major farming systems. The status of natural resources may cover type, quality, organic matter status and depth of soil and its suitability for different crops, access and level of use of manure (FYM & green) and fertilizers, scope for improving organic matter in soil, access to water-rainwater (if harvested), ground water

(open wells and bore wells and whether level is declining) and canal water (timely availability and access); account of major changes in flora and fauna during past one decade and its causes. Such assessment was useful to plan NRM related interventions.

Socio-economic status institutional arrangements: The centers were suggested to collect information on land holding structure, level of income, literacy and education of farmers, asset base of farmers, participation in social networks, proportion below poverty line, access to critical inputs to agriculture and marketing opportunity for farm output, access to market information and technical knowledge, level of awareness and skills of farmers, access to different Govt. schemes, existing institutional arrangements like SHGs, commodity groups, user groups and their effectiveness, etc. Based on the social dynamics in the village, different institutional arrangements were planned to implement the project activities.

Major farming systems: The information was collected on land use pattern, extent of irrigation, type of crops and varieties grown, yield levels, level of input use (fertilizer, manure, pesticides, weedicide, etc), seed replacement rate in major crops, level of mechanization for different farm activities, system of irrigation (flood, drip, sprinkler), access to farm machines (owned/ custom hiring), access to improved seed, livestock species reared and their yields, incidence of various diseases in the livestock and consequent mortality and changes in cropping/ farming systems during the past one decade. This analysis helped in planning appropriate climatic resilient technological interventions for individual as well as group of farmers.

Constraint Analysis: The multidisciplinary team analyzed the constraints related to climatic variability based on secondary weather data, resource situation, farming systems and agricultural yields in the past few years. The major constraints resulting from climatic variability includes; water scarcity, recurrent droughts (early, mid season, terminal), cold wave, heat wave, flood, pest and diseases of crop and livestock, fodder scarcity, poor access to appropriate seeds/planting material and critical inputs and farm machinery (timeliness and cost of access). The constraints were supposed to be analyzed by the multidisciplinary team in a manner so that the actual causes of constraints and points to intervention are identified.

Climate resilient technology demonstrations proposed by AICRPDA centers

Each center had to propose technological and institutional interventions for enhancing the resilience of farming systems to the climatic variability by involving the major stakeholders such as farmers, researchers, NGOs, officers of the line departments and extension specialists. Based on the detailed analysis of farming systems, resources, constraints, needs of the village, the climatic vulnerability (drought/floods/heat wave/frost/cyclone) and the available technology options from the concerned Regional /Zonal Agricultural Research Stations of the SAU and ICAR institutes and time tested climate resilient farm practices adopted by innovative farmers, the stakeholders in the brainstorming sessions identified the gaps and selected specific interventions related to each of the four sub-projects (i) Real time contingency plan implementation in a

participatory mode (ii) Rainwater harvesting *(in-situ and ex-situ)* and efficient use (iii) Efficient energy use and management (iv) Alternate land use. It was planned to saturate the whole village with the identified interventions in order to demonstrate a discernable effect and document the constraints and lessons. Further the preference was given to the interventions targeted/ focused on the following:

- Interventions benefiting larger and resource poor group
- Interventions which give long-term and sustainable benefits
- Interventions that address resource conservation
- Interventions that promote/strengthen village level institutions

Coverage of the program

Finally the whole village was to be saturated with the climate resilient technologies; however, in the beginning the number of interventions of different types were decided as per the budget available, vulnerability status and cooperation of the farmers. The interventions which require high investment like farm pond were planned for few suitable locations in the village. The in-*situ* moisture conservation and improved agronomic practices, inter-cropping and new varieties were planned to be taken up for large number of farms in the village. In selection of beneficiaries, the farmers' most vulnerable to climatic variability and small holders were given priority. It was also ensured that the village has control farm/plot/animals for all the implemented interventions in order to assess the impact of interventions in a short period. Every centre was suggested to prepare the activity plan with details of activities along with roles and responsibilities of stakeholders, period and budget for each intervention. The AICRPDA Network centers have been included in the National Initiative on Climate Resilient Agriculture (NICRA) Project of ICAR for taking up demonstration and research activities at various dryland centers in a network mode. Accordingly, the following centers have been identified in different states of India. The demonstration components of NICRA have been finalized in these centers in a participatory mode. The villages in districts and domain districts of the centers are given in Table 1.

The abstract of the number of demonstrations number of farmers, area, number of crops conducted on each of the 4 sub-projects at centers in different production systems under on-station and on-farm condition are given in Tables 2 to 6. The technical programme is presented center wise under each production system with details of location, Agro-climatic zone, Agro-ecological sub-region, Action research area, villages, climatic vulnerabilities, programme of technology demonstration, objectives, technologies, area and number of farmers' fields for demonstration, agencies of cooperation for demonstrations.

Table 1. Details of villages under NICRA program

State / (SAU)	Name of the center	Name of the Villages	Districts	Domain districts
Andhra Pradesh (ANGRAU, Hyd)	Anantapur	Aminabad, Girigetla	1. Kurnool	Anantapur & Kurnool
Assam (AAU, Jorhat)	Biswanath Chariali	Chamua	2. Lakhlmpur	Sonitpur, Lakhimpur, Dhemaji & Darrang
Chittishgarh (IGKV, Raipur)	Jagdalpur	Tadpal, Gumiapal, Pahkapal	3. Bastar	Bastar, Dantewada, Bijapur & Nararyanpur
Gujarat (JAU, Junagadh)	Rajkot	Pata meghapar	4. Jamnagar	Rajkot, Jamnagar, Surendranagar, Amreli & Bhavnagar
Gujarat (SDAU, SK Nagar)	SK Nagar	Dholia, Kalimati, Chandanki	5. Banaskantha 6. Mehasana	Banaskantha, Mehsana, Sabarkantha, Kutch, Patan & Gandhinagar
Haryana (CCSHAU, Hisar,)	Hisar	Budhsheli, Charnod, Balawas	7. Bhiwani	Hisar, Bhiwani, Fatehbad & Mahendragarh
Jammu & Kashmir (SKUAS T, Jammu)	Rakh Dhiansar	Khaner	8. Rakh Dhiansar	Jammu, Samba, Kathua, Udhampur & Rushia
Jharkhand (BAU, Ranchi)	Chianki	Kumbhi-pankheta	9. Garhwa	Palamu, Garhwa, Latehar, Chatra, Lohardaga, Simdiga & Bhumla
Karnataka (UAS, Bengaluru)	Bengaluru	Chikkamaranahalli (Chikkamaranahalli colony, Chickaputtyanapalya, Hosapalya, Mudalapalya)	10. Bengaluru Rural	Tumkur, Bengaluru rural , Bengaluru urban , Ramanagar , Kolar & Chickballapur
Karnataka (UAS, Dharward)	Bijapur	Kaulagi	11. Bijapur	Bijapur, Bagalkot, Gadag, Koppal, Bellary, Dharwad, Belgaum, Raichur & Davangere
Madhya Pradesh (JNKVV, Jabalpur)	Rewa	Patauna	12.Rewa	Rewa, Jabalpur, Panna, Singraouli, Satna, Katni, Seoni & Sidhi
Madhya Pradesh (RVSKVV, Gwalior)	Indore	Ningnoti	13. Indore	Indore, Dhar, Ratlam, Dewas, Ujjain, Shajapur, Mandsour, Neemuch, Jhabua & Rajgarh
Maharashtra, (PDKV, Akola)	Akola	Warkhed, Belura	14.Akola	Akola, Buldana, Washim, Amaravati & Yavatmal
Maharashtra (MAU, Parbhani)	Parbhani	Pangri	15. Parbhani	Aurangabad, Jalna, Parbhani, Singole, Nanded, Osmanabad & Lathur
Maharashtra (MPKV, Rahuri)	Solapur	Raleras	16. Solapur	Solapur, Ahmednagar, Dhule, Pune, Nasik, Satara, Aurangabad, Jalgaon, Nandoorbar, Sangli, Beed & Kolhapur
Orissa (OUAT, Bhubaneswar)	Phulbani	Budhadani	17. Kandhamal	Kandhamal (Phulbhani), Rayagadha, Gajapati , Ganjam & Boud
Punjab (PAU, Ludhiana)	Ballowal Saunkhri	Naiwan, Achalpur	18. Hosiarpur	S.B.S.Nagar (Nawanshahr), Hoshiarpur, Gurdaspur & Roopnagar (Ropar)
Rajasthan (MPUAT, Udaipur)	Arjia	Kocharia, Mandpiya, Lapsiya, Sola ka kheda, Tara ka kheda	19. Bhilwara 20. Rajsamand	Bhilwara, Chittorgarh, Rajsamand, Udaipur& Sirohi
Tamil Nadu (TNAU, Coimbatore)	Kovilpatti	Nakkalamuthanpatti, Kalugachalipuram	21. Tuticorin 22. Thoothukkudi	Toothukudi, Tirunelveli, Virudhanagar & Madurai
Uttar Pradesh (NDUA&T, Faizabad)	Faizabad	Hardoia	23. Faizabad	Faizabad, Ambedkarnagar, Barabanki, Jaunpur, Sultanpur, Basti & Gonda
Uttar Pradesh (RBS College, Agra)	Agra	Nagla Duleh khan	24. Agra	Agra, Aligarh, Etah, Firozabad, Hatraspur, Mathura & Mainpuri
Uttar Pradesh (BHU, Varanasi)	Varanasi	Terha Saraya	25. Mizapur	Varanasi, Mirzapur, Sonebhadra, Chordoli & Sant Rabidash Nagar
Uttar Pradesh (IGFRI, Jhansi)	Jhansi	Kadesara Kala	26. Lalitpur	Lalitpur

*** One village with 4 clusters**

Table 2. Details of villages, area and number of farmers under NICRA project at AICRPDA centers (on-farm and on-station)

Centre	Name of the Village	Total area (ha)	Total number of farmers
Rice based production system			
Biswanath Chariali	Chamua	766.65	228
Chianki	Khumbhi - bankheta	72.30	436
Faizabad	Hardoiya	9.15	94
Jagadalpur	Tahakapal, Gumiapal, Pahkapal	14.66	132
Phulbani	Budhadani	30.40	116
Varanasi	Terha Saraya	78.70	191
Total		971.86	1227
Maize based production system			
Arjia	Kocharia, Mandpiya, Sola ka kheda, Lapsiya, Tara ka kheda	41.40	133
Ballowal saunkhri	Naiwan, Achalpur	30.68	108
Rakh dhiansar	Khaner	14.25	118
Total		**86.33**	**359**
Fingermillet based production system			
Bangalore	Chikkamaranahalli (Chikkamaranahalli colony, Chickaputtyanapalya, Hosapalya, Mudalapalya)	90.20	129
Total		**87.20**	**129**
Pearlmillet based production system			
Agra	Nagla Duleh khan	88.00	250
Hisar	Budhsheli, Charnod, Balawas	13.70	31
SK Nagar	Dholia, Kalimati, Chandanki	20.40	112
Total		122.10	393
Sorghum based production system			
Bijapur	Kaulagi	46.00	101
Solapur	Raleras	82.20	132
Jhansi	Kadesara Kala	36.23	71
Total		**164.43**	**304**
Soybean based production system			
Indore	Ningnoti	26.58	60
Rewa	Patauna	27.20	71
Total		53.78	131
Groundnut based production system			
Anantapur	Aminabad, Girigetla	248.80	381
Rajkot	Pata meghapar	56.80	138
Total		**305.60**	**519**
Cotton based production system			
Akola	Warkhed, Belura	42.08	101
Kovilpatti	Nakkalamuthanpatti, Kalugachalipuram	20.40	40
Parbhani	Pangri	127.10	322
Total		*189.58*	*463*
Over-all		*1980.88*	*3495*

Table 3. Number of demonstrations conducted by AICRPDA centers under NICRA Project during 2011-12 (on-farm)

Center	Sub-project 1			Sub-project 2			Sub-project 3			Sub-project 4			Total		
	NOD	NOF	Area (ha)	NOD	NOF	Area (ha)	NOD	NOF	Area (ha)	NOD	NOF	Area (ha)	NOD	NOF	Area (ha)
Rice based production system															
Biswanath Chariali	5	150	737.4	2	50	26	1			4	28	3.25	12	228	766.65
Chianki	12	389	58	2	7	0.5	1			2	40		17	436	58.5
Faizabad	1	30	4	3	19	1.15	1	25	2.5	2	20	1	7	94	8.65
Jagadalpur	6	46	5.48	4	48	8.46	2	8	0.72	2	30		14	132	14.66
Phulbani	4	60	20	2	30	8	1	25		2	1	1	9	116	29
Varanasi	2	172	68.8	3	15	5.2	1			1	4	1.6	7	191	75.6
Total	**30**	**847**	**893.68**	**16**	**169**	**49.31**	**7**	**58**	**3.22**	**13**	**123**	**6.85**	**66**	**1197**	**953.06**
Maize based production system															
Arjia	5	122	33.4	3	7	3.2	1			2	4	3	11	133	39.6
Ballowal Saunkhri	3	55	14	3	20	4	2	22	4.4	2	11	2.5	10	108	24.9
Rakh Dhiansar	3	95	9.8	1			1	20	3	2	3	0.8	7	118	13.6
Total	**11**	**272**	**57.2**	**7**	**27**	**7.2**	**4**	**42**	**7.4**	**6**	**18**	**6.3**	**28**	**359**	**78.1**
Fingermillet based production system															
Bangalore	4	111	29.2	8	13	16	1		36	1	5	2	14	129	83.2
Total	**4**	**111**	**29.2**	**8**	**13**	**16**	**1**		**36**	**1**	**5**	**2**	**14**	**129**	**83.2**
Pearlmillet based production system															
Agra	5	135	54	4	91	32.4	1			2	24	1.6	12	250	88
Hisar	2	20	8	1	10	4	1			1	1	0.3	5	31	12.3
S.K.Nagar	1	59	8	2	40	6	1	13	5.2				4	112	19.2
Total	**8**	**214**	**70**	**7**	**141**	**42.4**	**3**	**13**	**5.2**	**3**	**25**	**1.9**	**21**	**393**	**119.5**

Sorghum based production system															
Bijapur	3	87	34.8	4	11	6.1	1			1	3	1.2	9	101	42.1
Solapur	3	80	64	3	50	16	1			1	2	0.2	8	132	80.2
Jhansi	1	50	10	3	14	9.43	1			2	7	1.8	7	71	21.23
Total	**7**	**217**	**108.8**	**10**	**75**	**31.53**	**3**	**0**	**0**	**4**	**12**	**3.2**	**24**	**304**	**143.53**
Soybean based production system															
Indore	2	20	8	3	5	5	1	10	4	3	25	9	9	60	26
Rewa	2	60	16	2	11	3.6	1			3		2.4	8	71	22
Total	**4**	**80**	**24**	**5**	**16**	**8.6**	**2**	**10**	**4**	**6**	**25**	**11.4**	**17**	**131**	**48**
Groundnut based production system															
Anantapur	5	213	85.8	3	23	11.6	1	129	132.4	2	16	16	11	381	245.8
Rajkot	3	120	48	2	18	7.2	1							138	55.2
Total	**8**	**333**	**133.8**	**5**	**41**	**18.8**	**2**	**129**	**132.4**	**2**	**16**	**16**	**11**	**519**	**301**
Cotton based production system															
Akola	3	100	40	1	1	0.4	1						5	101	40.4
Kovilpatti	3	29	11.6	1	8	6.4	1			3	3	0.7	8	40	18.7
Parbhani	3	241	96.9	1	71	28.4	1	10					5	322	125.3
Total	**9**	**370**	**148.5**	**3**	**80**	**35.2**	**3**	**10**	**0**	**3**	**3**	**0.7**	**18**	**463**	**184.4**
Grand Total	**81**	**2444**	**1465.18**	**61**	**562**	**209.04**	**25**	**262**	**188.22**	**38**	**227**	**48.35**	**199**	**3495**	**1910.79**
%	**40.7**	**69.9**	**76.7**	**30.7**	**16.1**	**10.9**	**12.6**	**7.5**	**9.9**	**19.1**	**6.5**	**2.5**	**100.0**	**100.0**	**100.0**

NOD: Number of demonstrations
NOF: number of farmers
Subproject 1: Real time contingency plan implementation in a participatory mode
Subproject 2: Rainwater harvesting *(in-situ and ex-situ)* and efficient use
Subproject 3: Efficient energy use and management
Subproject 4: Alternate land use / farming systems for carbon sequestration and ecosystem services

Table 4. Number of demonstrations conducted by AICRPDA centers under NICRA Project during 2011-12 (on-station)

Center	Sub-project 1		Sub-project 2		Sub-project 3		Sub-project 4		Total	
	NOD	Area (ha)	NOD	Area (ha)	NOD	Area (ha)	NOD	Area (ha)	NOD	Area (ha)
Rice based production system										
Biswanath Chariali										
Chianki	14	11.8	1				2	2	17	13.8
Faizabad			1	0.5					1	0.5
Jagadalpur										
Phulbani	1	0.4					1	1	2	1.4
Varanasi	2	1.9					1	1.2	3	3.1
Total	**17**	**14.1**	**2**	**0.5**			**4**	**4.2**	**23**	**18.8**
Maize based production system										
Arjia	3	1.3	1	0.5	1				5	1.8
Ballowal Saunkhri	3	1.95	3	1.58	1	0.2	2	2.05	9	5.78
Rakh Dhiansar	1	0.3	2	0.15	1	0.2			4	0.65
Total	**7**	**3.55**	**6**	**2.23**	**3**	**0.4**	**2**	**2.05**	**18**	**8.23**
Fingermillet based production system										
Bangalore	4	4					2	3	6	7
Total	**4**	**4**					**2**		**6**	**4**
Pearlmillet based production system										
Agra										
Hisar			1	0.4			1	1	2	1.4
S.K.Nagar	2	0.8	1	0.2	1	0.2			4	1.2
Total	**2**	**0.8**	**2**	**0.6**	**1**	**0.2**	**1**	**1**	**6**	**2.6**

Sorghum based production system										
Bijapur	3	1.3					4	2.6	7	3.9
Solapur	2	1	1				1	1	4	2
Jhansi	1	10	1	5					2	15
Total	6	12.3	2	5			5	3.6	13	20.9
Soybean based production system										
Indore	1						6	0.58	7	0.58
Rewa	2	0.8	2	2			3	2.4	7	5.2
Total	**3**	**0.8**	**2**	**2**			**9**	**2.98**	**14**	**5.78**
Groundnut based production system										
Anantapur	1	1					1	2	2	3
Rajkot	2	0.8					2	0.8	4	1.6
Total	**3**	**1.8**					**3**	**2.8**	**6**	**4.6**
Cotton based production system										
Akola			1	0.8			2	0.88	3	1.68
Kovilpatti			1	0.8			3	0.9	4	1.7
Parbhani			1	0.8			1	1	2	1.8
Total			**3**	**2.4**			**6**	**2.78**	**9**	**5.18**
Grand Total	**42**	**37.35**	**17**	**12.73**	**4**	**0.6**	**32**	**19.41**	**95**	**70.09**
%	**44.2**	**53.3**	**17.9**	**18.2**	**4.2**	**0.9**	**33.7**	**27.7**	**100.0**	**100.0**

NOD: Number of demonstrations
Subproject 1: Real time contingency plan implementation in a participatory mode
Subproject 2: Rainwater harvesting *(in-situ and ex-situ)* and efficient use
Subproject 3: Efficient energy use and management
Subproject 4: Alternate land use / farming systems for carbon sequestration and ecosystem services

Table 5. Number of crops included for demonstrations under NICRA during 2011-12 (on-farm)

Center	Sub-project 1: Real time contingency plan implementation in a participatory mode	Sub-project 2: Rainwater harvesting (in-situ and ex-situ) and efficient use	Sub-project 3: Efficient energy use and management	Sub-project 4: Alternate land use	Total
Rice based production system					
Biswanath Chariali	Toria, Rice, Potato, Vegetables, Pea, Sesame, Blackgram, Greengram, Ginger, Turmeric, Pigeonpea, Lathyrus (12)	Potato, Ginger, Turmeric (3)	-	Guinea, Napier, Setaria and Oats (4)	19
Chianki	Rice, Maize, Sorghum, Pigeonpea, Niger, Sesame, Castor, Chickpea, Mustard, Linseed, Horsegram, Okra (12)	-	-	Mushroom (1)	13
Faizabad	Blackgram, Sesame, Sorghum, Chickpea, Toria, Pigeonpea, Lentil, Linseed, Maize (9)	Blackgram, Sesame, Sorghum, Chickpea, Toria, Pigeonpea, Lentil, Linseed, Maize, Mustard (10)	-	Aonla, Guava, Leucaena, Cenchrus, S. seabran, Hamat, Tamarind, C. ciliaris (8)	27
Jagadalpur	Rice, Safflower, Chickpea, Okra, Cowpea, Linseed (6)	Rice, Chickpea, Linseed Lathyrns, Field pea, Vegetables, Brinjal, Tomato, Chilli, Onion, Bottle gourd, Cauliflower (12)	Rice, Chickpea (2)	Aonla, Cashew, Mango, Guava, Litchi, Papaya Maize, Cowpea, Blackgram, Sesame, Fingermillet, Mushroom (12)	32
Phulbani	Rice, Turmeric, Maize, Cowpea, Runner bean, Cucumber, Ridge gourd, Greengram, Blackgram, Niger, Mustard, Horsegram (12)	-	-	-	12
Varanasi	Rice, Maize, Pearlmillet, Greengram, Pigeonpea, Sesame, Barley, Chickpea, Lentil, Mustard, Linseed, Wheat (12)	Rice, Pigeonpea, Vegetables, Fruit orchard, Aonla, Ber, Guava, Karonda (8)	-	Aonla, Sesame, Ber, Custard apple, Fruit orchard (5)	25
Maize based production system					
Arjia	Maize, Sesame, Sorghum, Blackgram, Taramira, Mustard, Wheat, Groundnut, Greengram (9)	Maize, Blackgram, Groundnut, Sesame, Mustard (5)	-	Karonda, Ber, Groundnut, Maize, Blackgram, Cowpea, Sorghum, Greengram, Taramira, Mustard, Black anjan, Desi babool, Custard apple, Ber, Dhaman grass, Aloevera (16)	30

Ballowal Saunkhri	Maize, Blackgram, Greengram, Toria, Gobisarsan, Wheat, Chickpea, Lentil, Raya, Taramira, Ashgourd (11)	Maize (1)	Maize, Wheat (2)	Guava, Amla, Blackgram, Sesame, Lentil, Taramira, Raya, Guinea grass, *Cenchrus sp. Napier*, Pearlmillet hybrid (10)	24
Rakh Dhiansar	Maize, Cowpea, Sesame (3)	-	Maize, Wheat (2)	-	5
Crops (No. of centers)	Maize (3), Sesame (2), Sorghum (1), Blackgram (2), Taramira (2), Mustard (1), Wheat (2), Groundnut (1), Greengram (2), Toria (1), Gobisarsan (1), Chickpea (1), Lentil (1), Raya (1), Ashgourd (1), Cowpea (1)	Maize (2), Sesame (1), Blackgram (1), Mustard (1), Groundnut (1)	Maize (2), Wheat (2)	Maize (1), Sesame (1), Sorghum (1), Blackgram (2), Taramira (2), Mustard (1), Groundnut (1), Greengram (1) Karonda (1), Ber (1), Groundnut (1), Cowpea (1), Mustard (1), Black anjan (1), Desi babool (1), Custard apple (1), Dhaman grass (1) , Aloevera (1), Guava (1), Amla (1), Guinea grass (1), *Cenchrus sp*.(1) *Napier* (1), Pearlmillet hybrid (1)	
Total	**23**	**6**	**4**	**26**	**59**
Sorghum based production system					
Bijapur	Pearlmillet, Pigeonpea, Groundnut, Castor, Sesame, Horsegram, Greengram, China moong, Cotton, *Rabi* sorghum, Chickpea, Sunflower, Safflower, Chilli, Onion, Cotton (16)	Horsegram, Glyricidia, Mulberry, Sapota, Jasmine, Cucumber, Greengram, Sorghum, Chickpea, Pigeonpea (10)	-	Tamarind, Custard apple, Jamun, Sapota, Aonla, Wood apple (6)	32
Solapur	Pearlmillet, Greengram, *Rabi* sorghum, Chickpea, Sunflower, Blackgram, Pigeonpea (7)	Pigeonpea (1)	-	*Acaica,* Subabul, Madras anjan, *Marval stylo* (4)	12
Jhansi	Blackgram, Sesame, Sorghum, Chickpea, Clusterbean, Toria, Wheat, Groundnut, Pigeonpea, Subabul, Lentil, Linseed, Maize (13)	Aonla, Guava, Subabul (3)	-	Citrus, Guava, *Leucanea, Cenchrus, S. seabrana Hamata, C. ciliaris, Aonla (8)*	24
Crops (No. of centers)	Pearlmillet (2), Pigeonpea (3), Groundnut (2), Castor (1), Sesame (2), Horsegram (1) , Greengram (2), China moong (1), Cotton (2), *Rabi* sorghum (2), Chickpea (3), Sunflower (2), Safflower (1), Chilli (1), Onion (1), Blackgram (2), Sorghum (1), Clusterbean (1), Toria (1), Wheat (1), Subabul (1), Lentil (1), Linseed (1), Maize (1)	Horsegram (1), Glyricidia (1), Mulberry (1), Sapota (1), Jasmine (1), Cucumber (1), Greengram (1), Sorghum (1), Chickpea (1), Pigeonpea (2), Aonla (1), Guava (1), Subabul (1)		*Acaica*(1), Subabul (1), Madras anjan (1), *Marval stylo* (1), Citrus (1), Guava (1), *Leucanea* (1), *Cenchrus* (1) , *S. seabrana* (1), *Hamata* (1), *C. ciliaris* (1), *Aonla* (2), Tamarind (1), Custard apple (1), Jamun (1), Sapota (1), Wood apple (1)	

Total	**36**	**14**	**-**	**18**	**68**
Soybean based production system					
Indore	Soybean, Maize, Pigeonpea, Chickpea, Wheat, Potato, Sweet corn, Linoleum flower (8)	Wheat, Chickpea, Potato (3)	Wheat, Chickpea (2)	Aonla, Drumstick, Mango, Guava (4)	17
Rewa	Soybean, Blackgram, Pigeonpea, Sesame, Chickpea, Wheat, Linseed, Mustard, Onion, Chilli, Lentil, Rice (12)	Guava, Aonla (2)	-	-	14
Crops (No. of centers)	Soybean (2), Blackgram (2), Pigeonpea (2), Sesame (1), Chickpea (2), Wheat (2), Linseed (1), Mustard (1), Onion (1), Chilli (1), Lentil (1), Rice (1), Potato (1), Sweet corn (1), Linoleum flower (1)	Wheat (1), Chickpea (1), Potato (1), Guava (1), Aonla (1)	Wheat (1), Chickpea (1)	Aonla (1), Drumstick (1), Mango (1), Guava (1)	
Total	**20**	**5**	**2**	**4**	**31**
Groundnut based production system					
Anantapur	Groundnut, Cowpea, Castor, Horsegram (4)	-	-	Groundnut (1)	5
Rajkot	Groundnut, Castor, Cotton, Sesame, Greengram, Wheat, Cumin, Chickpea, Fenugreek, Blackgram (10)	Groundnut, Cotton (2)	-	-	12
Crops (No. of centers)	Groundnut (2), Castor (2), Cotton (1), Sesame (1), Greengram (1), Wheat (1), Cumin (1), Chickpea (1), Fenugreek (1), Blackgram (1), Cowpea (1), Horsegram (1)	Groundnut (1), Cotton (1)	-	Groundnut (1)	
Total	**14**	**2**	**-**	**1**	**17**

Cotton based production system					
Akola	Soybean, Sorghum, Safflower, Greengram, Pigeonpea, Chickpea, Cotton, Mustard (8)	-	-	-	8
Kovilpatti	Sunflower, Greengram, Blackgram, Pigeonpea, Maize, Pearlmillet, Cotton, Cowpea (8)	Maize, Cotton, Greengram, Blackgram (4)		Aonla, Cluster bean, Cowpea, Green gram Sapota, Coriander, Bittergourd, Pumkin Acid lime, Chickpea (10)	22
Parbhani	Cotton, Soybean, Sorghum, Pigeonpea, Sunflower, Greengram, Blackgram, *Rabi* sorghum, Safflower, Chickpea, Pearlmillet (11)	Cotton, Soybean, Sorghum, Pigeonpea (4)	-		15
Crops (No. of centers)	Cotton (3), Soybean (2), Sorghum (2), Pigeonpea (3), Sunflower (2), Greengram (3), Blackgram (2), *Rabi* sorghum (1), Safflower (2), Chickpea (2), Pearlmillet (2), Cowpea (1), Mustard (1), Maize (1)	Maize (1), Cotton (2), Greengram (1), Blackgram (1), Soybean (1), Sorghum (1), Pigeonpea (1)	-	Aonla (1), Clusterbean (1), Cowpea (1), Greengram (1), Sapota (1), Coriander (1), Bittergourd (1), Pumkin (1), Acid lime (1), Chickpea (1)	
Total	**27**	**8**	**-**	**10**	**45**

Table 6. Number of crops included for demonstrations under NICRA during 2011-12 (on-station)

Center/	Sub-project 1: Real time Contingency Plan implementation in a Participatory mode	Sub-project 2: Rainwater harvesting *(in- situ and ex-situ)* and efficient use	Sub-project 3: Efficient energy sue and management	Sub-project 4: Alternate land use	Total
Rice based production system					
Biswanath Chariali	-	-	-	-	-
Chianki	Rice, Maize, Sorghum, Lentil, Pigeonpea, Niger, Sesame, Castor, Chickpea, Mustard, Horsegram (11)	-	-	Mushroom, Guava, Rice, Pigeonpea, Maize, Sorghum, Chickpea (7)	18
Faizabad	-	-	-	-	-
Jagadalpur	-	-	-	-	-
Phulbani	Niger, Mustard, Horsegram, (3)	-	-	-	3
Varanasi	Rice, Maize, Pearlmillet, Sesame, Lentil, Mustard, Pigeonpea (7)	-	-	Aonla, Sesame, Ber, Custard apple, Pearlmillet (5)	12
Crops (No. of centers)	Rice (2), Maize (2), Sorghum (1), Lentil (2), Pigeonpea (2), Niger (2), Sesame (2), Castor (1), Chickpea (1), Mustard (3), Horsegram (2), Pearlmillet (1)			Mushroom (1), Guava (1), Rice (1), Pigeonpea (1), Maize (1), Sorghum (1), Chickpea (1), Aonla (1), Sesame (1), Ber (1), Custard apple (1), Pearlmillet (1)	
Total	**21**	**-**	**-**	**12**	**33**
Maize based production system					
Arjia	Maize, Sesame, Sorghum, Blackgram, Horsegram, Clusterbean Taramira, Mustard, Groundnut, Greengram (10)	Maize, Blackgram, Groundnut, Sesame, Mustard (5)	-	-	15
Ballowal Saunkhri	Maize, Blackgram, Greengram, Toria, Gobisarson, Wheat, Chickpea, Lentil, Raya, Taramira, Ashgourd (11)	-	Maize, Wheat (2)	Guava, Amla, Blackgram, Sesame, Lentil, Taramira, Raya, Gunia grass, *Cenchrus sp. Napier*, Bajra hybrid (10)	23
Rakh Dhiansar	Maize, Cowpea (2)	-	-	-	2

Crops (No. of centers)	Maize (3), Blackgram (2), Greengram (2), Toria (1), Gobisarson (1), Wheat (1), Chickpea (1), Lentil (1), Raya (1), Taramira (1), Ashgourd (1), Cowpea (1), Horsegram (1), Clusterbean (1), Taramira (1), Mustard (1), Groundnut (1), Sesame (1), Sorghum (1)	Maize (1), Blackgram (1), Groundnut (1), Sesame (1), Mustard (1)	Maize (1), Wheat (1)	Guava (1), Amla (1), Blackgram (1), Sesame (1), Lentil (1), Taramira (1), Raya (1), Gunia grass (1), *Cenchrus sp.*(1), *Napier* (1), Bajra hybrid (1)	
Total	**23**	**5**	**2**	**10**	**40**
Finger millet based production system					
Bangalore	Pigeonpea, Cowpea, Field bean, Groundnut, Fingermillet (5)	-	-	Amla, Fingermillet, Maize, Amaranthus, Cowpea, Horsegram, Field bean, Niger, Green chilli, Custard apple (10)	15
Crops (No. of centers)	Pigeonpea (1), Cowpea (1), Field bean (1), Groundnut (1), Fingermillet (1)	-	-	Amla (1), Fingermillet (1), Maize (1), Amaranthus (1), Cowpea (1), Horsegram (1), Field bean (1), Niger (1), Green chilli (1), Custard apple (1)	
Total	**5**	**-**	**-**	**10**	**15**
Pearlmillet based production system					
Agra	-	-	-	-	-
Hisar	-	-	-	Ber, Guava (2)	2
SK Nagar	Pearlmillet, Maize, Cotton, Greengram, Clusterbean, Blackgram, Castor (7)	Castor, Cotton, Cumin, Pearlmillet (4)	-	-	11
Crops (No. of centers)	Pearlmillet (1), Maize (1), Cotton (1), Greengram (1), Clusterbean (1), Blackgram (1), Castor (1)	Castor (1), Cotton (1), Cumin (1), Pearlmillet (1)	-	Ber (1), Guava(1)	
Total	**7**	**4**	**-**	**2**	**13**

Sorghum based production system					
Bijapur	Pigeonpea, Chickpea, Sorghum, Greengram, *Rabi* sorghum, Sunflower (6)	-		Henna, Chickpea, Safflower, Sapota, Guava, Custard apple, Aonla, Drum stick, Fig, Tamarind (10)	16
Solapur	Pearlmillet, Greengram, *Rabi* sorghum, Chickpea, Blackgram, Pigeonpea (6)	-	-	-	6
Jhansi	Blackgram, Sesame, Sorghum, Chickpea, Guar, Toria, Wheat, Groundnut, Pigeonpea, Subabul, Lentil, Linseed, Maize (13)	-	-	-	13
Crops (No. of centers)	Blackgram (2), Sesame (1), Sorghum (2), Chickpea (3), Guar (1), Toria (1), Wheat (1), Groundnut (1), Pigeonpea (3), Subabul (1), Lentil (1), Linseed (1), Maize (1), *Rabi* sorghum (2), Greengram (2), Sunflower (1), Pearlmillet (1)	-	-	Henna (1), Chickpea (1), Safflower (1), Sapota (1), Guava (1), Custard apple (1), Aonla (1), Drum stick (1), Fig (1), Tamarind (1)	
Total	**25**	**-**	**-**	**10**	**35**
Soybean based production system					
Indore	-	-	-	Soybean, Chickpea, Maize, Blackgram, Horsegram, Clusterbean, Sunflower, Pigeonpea (8)	8
Rewa	Soybean, Blackgram, Pigeonpea, Sesame, Linseed, Chickpea (6)	-	-	Aonla, Soybean, Chickpea, Custard apple, Guava, Lime Drumstick, Blackgram, (8)	14
Crops (No. of centers)	Soybean (1), Blackgram (1), Pigeonpea (1), Sesame (1), Linseed (1), Chickpea (1)	-	-	Soybean (2), Chickpea (2), Maize (1), Blackgram (2), Horsegram (1), Clusterbean (1), Sunflower (1), Pigeonpea (1), Aonla (1), Custard apple (1), Guava (1), Lime (1), Drumstick (1)	
Total	**6**	**-**	**-**	**16**	**22**

Groundnut based production system					
Anantapur	Groundnut, Castor (2)	-	-	Groundnut, Pigeonpea (2)	4
Rajkot	Groundnut, Castor, Sesame, Blackgram (4)	-	-	Guava, Blackgram, Groundnut (3)	7
Crops (No. of centers)	Groundnut (2), Castor (2), Sesame (1), Blackgram (1)	-	-	Guava (1), Blackgram (1), Groundnut (2), Pigeonpea (1)	
Total	**6**	**-**	**-**	**5**	**11**
Cotton based production system					
Akola	-	-	-	Custard apple, Soybean, Greengram, Hanumanphal, Blackgram, Pigeonpea (6)	6
Kovilpatti	-	-	-	Cluster apple, Okra, Sapota, Greengram, Horsegram, Clusterbean, Bitter gourd, Pumpkin, Coriander, Cowpea (10)	10
Parbhani	-	-	-	Drumstick, Greengram, Blackgram, Soybean (4)	4
	-	-	-	Custard apple (2), Soybean (2), Greengram (3), Hanumanphal (1), Blackgram (2), Pigeonpea (1) Drumstick (1), Okra (1), Sapota (1), Horsegram (1), Clusterbean (1), Bitter gourd (1), Pumpkin (1), Coriander (1), Cowpea (1)	
Total	**-**	**-**	**-**	**20**	**20**

1. Rice based production system

1.1 Biswanath Chariali

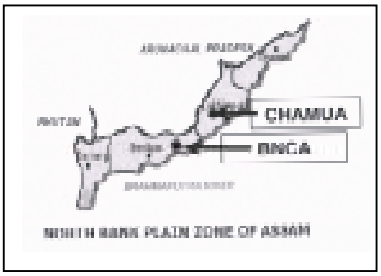
1.1.1 Agro-climatic Zone: Humid (North Bank Plain Zone of Assam)

1.1.2 Agro-ecological sub-region: 15.2

1.1.3 Action research area: Technology demonstration

1.1.4 Village details: Chamua village, Lakhimpur district

1.1.5 Climatic vulnerabilities:



The climate of village is characterized by hot and humid summer, and dry and cool winter. The village is situated in the high rainfall zone. The long term average annual rainfall of two nearby stations of the village is 1987 mm (Biswanath Chariali) and 2900 mm (North Lakhimpur) with 125 rainy days. The rainy season in the village starts in March and quantum of rainfall as well as number of rainy days increases gradually and reaches maximum in the months of June/July and then decline to minimum during December/January. Temperatures of the village generally remain within comfortable range. However, when there is a dry spell during summer season, high temperature along with high humidity become unbearable and increases insect-pests population and infestation of crops by diseases. August is the hottest month and February is the coldest month. In recent years, substantial reduction of rainfall amount during monsoon season was noticed in this region. The village experienced drought like situation in recent years *viz.* 2001, 2005, 2006, 2009 and 2011. There was a substantial yield reduction of Sali rice during those years. Nath and Deka (2010) reported that there was a reduction of rainfall at the rate of 0.52, 1.86 and 0.24 mm per annum during pre-monsoon, monsoon and post monsoon seasons respectively in Lakhimpur District.

- Early season drought/ Normal onset followed by 15-20 days dry spell, mid season drought, long dry spell etc (2001, 2005, 2006, 2009 and 2011).
- Rice grown on medium and upland situations often suffer from agricultural drought during different stages of crop growth.
- Erratic and scanty rainfall during *rabi* season
- Inundation of a portion of the village by occasional flash flood due to occurrence of very heavy rainfall.
- Ground water was contaminated with Arsenic and problem of iron toxicity.
- High rainfall and inundation of field at the time of harvest of *Ahu* rice (summer rice) is a limiting factor.
- More infestation of *rabi* crops (eg. Rapeseed) by insect-pests in late sown condition.
- Infestation of potato by late blight and often total crop failure due to prevailing optimum weather condition for growth of the disease.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Demonstration and promotion of cultivation of toria with life saving irrigation from harvested water

Objective:

- To demonstrate the performance of high yielding toria varieties under rainfed situation

Technology:

- Cultivation of toria varieties like TS -36, M-27 and TS -38 will be promoted in the upland situation which has been lying fallow year after year due to lack of water.

Area and number of farmers to be demonstrated: 12 ha & 40 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

RARS, Lakhimpur; KVK, Lakhimpur; State Department of Agriculture, Narayanpur

Programme 2: Promotion of cultivation of early to medium duration rice varieties for vacation of land for *rabi* crop

Objective:

- To demonstrate the suitability of early to medium duration high yielding rice varieties for growing profitable *rabi* crops.

Technology:

- Cultivation of early to medium duration varieties like Satya ranjan, Basundhara, Bihari Ahu, Dihangi *etc.,* to fit in rice- Potato/toria/vegetables/Pea cropping system

Area and number of farmers to be demonstrated: 5.2 ha & 52 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

RARS, Lakhimpur; KVK, Lakhimpur; State Department of Agriculture, Narayanpur

Programme 3: Promotion of profitable intercropping systems

Objective:

- To demonstrate the profitability of intercropping systems in comparison to sole crops.

Technology: Profitable intercropping systems

- Sesame + Black gram/Green gram
- Ginger/Turmeric + Pigeonpea
- Rice+ pea/Lathyrus (relay cropping)

Area and number of farmers to be demonstrated: 3.2 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

RARS, Lakhimpur; KVK, Lakhimpur; State Department of Agriculture, Narayanpur

Programme 4: Integrated Weed – Disease – Pest management and intercultural operations based on agromet advisory services.

Objective:

- To make farmers aware of the agro- advisory systems for timely operation of intercultural and pest – disease management.

Technology:

- The existing agromet advisory system under operation in the institution will be utilized for monitoring as well as suggest appropriate time for application in farmers' field

Area and number of farmers to be demonstrated: 2 ha &10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Agromet Advisory Service Unit, BN College of Agriculture, KVK Lakhimpur

Programme 5: Development of dry land technology park along with water harvesting tank

Objective:

- To demonstrate dryland /rainfed agricultural technology

Technology:

- Dryland technolgy park with different crops/ varities and their management practices
- Water harvesting tank for providing critical irrigation to crops

Area and number of farmers to be demonstrated: 2 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Agromet Advisory Service Unit, BN College of Agriculture, KVK Lakhimpur

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: Technology intervention through mulching for efficient rain water conservation

Objective:

- Demonstration on the effect of mulching in conservation of rain water and weed suppression and increasing yield of crop through soil mulching.

Technology:

- Mulching of rainfed crop like Ginger/Turmeric/ potato with locally available mulch materials like rice husk, water hyacinth, straw of toria and rice.

Area and number of farmers to be demonstrated: 1 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

RARS, Lakhimpur; KVK, Lakhimpur; State Department of Agriculture, Narayanpur

Programme 2: Demonstration of rain water harvesting using farm pond

Objective:

- To demonstrate the use of farm ponds for cost effective irrigation during soil moisture stress.

Technology:

- Excavation and renovation of farm pond
- Lining with polythene/cement + stone.
- Lifting of water from farm pond and watering through micro irrigation system.

Area and number of farmers to be demonstrated: 25 ha & 40 farmers

Renovation of 4 farm ponds of size 30 m X 20m X 2m and bank lining with cement, soil and stone

Cooperation of Agricultural research station of KVK/state department/NGO:

RARS, Lakhimpur; KVK, Lakhimpur; State department of Agricultural engineering; State Department of Agriculture, Narayanpur

Theme 3. Efficient energy use and management

Programme 1: Establishment of custom hiring centre for timely field operations

Objective:

- To perform timely and precise field operations

Technology:

- Plant protection equipments
- Animal drawn and tractor drawn implements will be procured/demonstrated based on custom hiring through Self Help Group (SHG)

Area and number of farmers to be demonstrated:

One custom hiring centre will be established in Chamua village.

Cooperation of Agricultural research station of KVK/state department/NGO:

Department of Agriculture; KVK, Lakhimpur

Theme 4. Alternate land use/ farming system for carbon sequestration and eco-system services

On-farm:

Programme 1: Encouraging production of improved organic manure

Objective:

- On-farm generation of organic manure

Technology:

- Promotion of household based vermin-compost production

Area and number of farmers to be demonstrated: 4 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
SHG, KVK, Lakhimpur

Programme 2a: Demonstration of suitable fodder crops
Objective:

- To promote cultivation of fodder crops among farmers to feed live stocks in lean period and also increase productivity of animals

Technology:

- Cultivation of recommended varieties of fodder crops like Guinea, Napier, Setaria, oats etc.

Area and number of farmers to be demonstrated: 1 ha & 10 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
State Department of Veterinary, Bihpuria; State Department of Agriculture, Narayanpur; KVK, Lakhimpur

Programme 2b: Bamboo based agriculture
Objective:

- To demonstrate bamboo based agri –silvi culture

Technology:

- Growing of bamboo trees in combination with crops/ silvi-pasture species

Area and number of farmers to be demonstrated: 2 ha & 10 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
State Department of Agriculture, Narayanpur; KVK, Lakhimpur

Programme 3: Promotion of integrated farming system
Technology: Fish culture cum horticulture/agriculture farming system
Objective:

- To get higher net returns from a unit area

Area and number of farmers to be demonstrated: 0.25 ha & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
State Department of Fishery, Naraynpur; State Department of Agriculture, Narayanpur; KVK, Lakhimpur

1.2 Chianki

1.2.1 Agroclimatic Zone: Eastern plateau and Hills (Rainshadow) zone in Jharkhand

1.2.2 Agro-ecological subregion: 11.0

1.2.3 Action Research Area: Technology demonstration

1.2.4 Village details: Khumbhi & Bankheta, Meral- block, Garhwa-district

1.2.5 Climatic vulnerabilities:

- The villages selected for the project work are Kumbhi & Bankheta of Meral block in garhwa district (longitude between $83^0$10'13" and $83^0$56'38", latitude between $23^0$34'11" and $24^0$32'05" and altitude 350m above MSL)
- That cropped area of the villages is 65.82% of which net sown area is 26.58% and area sown more than once is only 6.33% clearly indicating the importance of rainfed agriculture
- The total cultivated area of both the selected villages (Kumbhi & Bankheta) put together is 210 ha and wasteland occupies 60 ha out of total 790 ha
- The most predominant farming situation is rainfed with cropping intensity 109%, sandy loam to clay (p^H 6.5-8.0) and organic matter ranges from 0.35 to 0.45%, N from 150-165 kg / ha, P from 12-18 kg/ha, while K ranges from 210 -275 kg/ha Rice, maize sorghum, chickpea, pigeonpea, hordegram, lentil, kusum, niger & linseed and vegetable pea, potato, tomato bringal and okra respectively are cultivated
- Average rainfall of Palamau is 1179.3 mm (mean of 50 years). Out of this, 90% occers during June – September (erratic and irregular). About 60% goes waste as runoff due to undulating topography. Cultivation of crops is done on terrace farms (4-5% slop in upland and 1-2% slop in medium land)
- Climatically, this region (Palamau) and these villages are changing towards semi-arid because of the reason of increase in maximum (daily) temperature as well as gradual decrease in minimum (daily) temperature. Frequency of drought during 2000-2010 has increased to a tune of alternate year instead of once in 3 years in the decade during 1990-2000. In the above context, dryland technologies have to play a vital role in resisting bad effect of climate change at farm level. Rainwater harvesting, popularizing drought tolerant crops, fruit crops, animals & fodder etc will make prominent components of developments & research of the region (in rain-shadow area of 7 districts i.e. Palamau, Latehar, Garhwa, Chatra, Simdega, Gumla and Lohardaga of Jharkhand)
- In recent two decades, the rainfall indicates high degree of variability to depend on rainwater harvesting for dependable rainfed Agriculture. There are water harvesting tanks, 99 open wells with 25 ha under irrigation in both the villages
- Thus frequent droughts, low and erratic rainfall, prolonged dryspells during the crop season always dictating the productivity from the rainfed crops
- The economy of this village depends mainly on rainfed agriculture, followed by animal husbandry components consisting of cattle, milch animals and small ruminants.
- Fodder shortage in these villages exists from February-June
- As land is undulating (2-4% slope), farmers are still using local traditional pora tubes attached to the bullock drawn fertilizer drill for drilling the seeds. However, under such topographic situation, mechanization fits well which not only saves labour and money but also saves time
- There is every scope to increase the productivity through real time contingency plans, rainwater conservation technology enhancing fodder, production and popularizing the improved tools and implements in these two villages. Hence, the selected villages are suitable for executing the proposed project work
- 12% resource rich, 30% medium resource and 58% poor resource farmers are there in two villages. As per land holdings, there are 5 land less, 270 marginal, 176 small 88 medium and 17 large farmers
- About 4 ha land is used as pasture in the 2 villages

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm: *Kharif*

Programme 1: Promoting drought tolerant high yielding rice varieties technology

Objective:

- To create awareness about drought tolerant high yielding short duration varieties
- Aerobic rice production

Technology 1:

- Upland rice direct sown aerobic cultivation varieties like Vandana, BVD-109 and BVD-110

Area and number of farmers to be demonstrated: 0.4 ha & 4 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Objective:

- To create awareness about drought tolerant high yielding short duration varieties

Technology 2:

- Medium land drought tolerant high yielding short duration varieties and hybrids of rice like Naveen, Sahabhagi, 27-P-31, PAC-801, PAC-807 and PHB-71 etc

Area and number of farmers to be demonstrated: 9.2 ha & 23 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Objective:

- To create awareness about drought tolerant high yielding varieties
- To create awareness about SRI

Technology 3:

- Lowland short duration high yielding varieties / hybrids of rice like MTU-7029 and Arize-6444

Area and number of farmers to be demonstrated: 0.20 ha & 8 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 2: Programme of high yielding and short duration varieties /hybrids of maize

Objective:

- To create awareness about like sowing and aerating

Technology:

- Drought tolerant high yielding short duration varieties of maize like BVM-1, BVM-2 and HQPM-1

Area and number of farmers to be demonstrated: 0.2 ha & 12 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 3: Promoting drought tolerant high yielding sorghum variety

Objective:

- To create awareness about drought tolerant high yielding variety

Technology:

- Drought tolerant high yielding variety like CSV-20 is suitable in the area.

Area and number of farmers to be demonstrated: 2.4 ha & 25 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 4: Promoting of high yielding short duration varieties /hybrids of pigeonpea in rainfed upland condition

Objectives:

- To create awareness about short duration, high yielding varieties/hybrids.
- To create awareness about like sowing, recommended spacing, seedrate and earthing etc

Technology:

- Evaluation of suitable short duration and high yielding varieties /hybrids like Birsa Arhar-1 and ICPH-2671

Area and number of farmers to be demonstrated: 5 ha & 28 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 5: Promoting drought tolerant high yielding horsegram variety
Objective:

- To create awareness about drought tolerant high yielding variety of horsegram

Technology:

- Drought tolerant high yielding variety like Birsa kulthi -1

Area and number of farmers to be demonstrated: 5.6 ha & 40 farmers.
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 6: Promoting high yielding variety of niger in rainfed upland condition
Objective:

- To create awareness about drought tolerant high yielding variety of niger

Technology:

- Drought tolerant high yielding variety like Birsa Niger -1

Area and number of farmers to be demonstrated: 8 ha & 40 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 7: Promoting high yielding and drought tolerant variety of sesame in the region
Objective:

- To create awareness about drought tolerant high yielding variety of sesame

Technology:

- Drought tolerant high yielding variety like Kanke white

Area and number of farmers to be demonstrated: 2 ha & 5 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 8: Promoting hybrids of castor
Objective:

- To create awareness about high yielding variety of castor

Technology:

- Improved variety of castor GCH-9

Area and number of farmers to be demonstrated: 3.2 ha & 8 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

On-farm: *Rabi*
Programme 1: Promoting high yielding variety of wheat

Objective:

- To create awareness about high yielding variety of wheat

Technology:

- Improved variety of wheat K-9107

Area and number of farmers to be demonstrated: 7.2 ha & 72 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 2: Production of high yielding varieties of chickpea
Objective:

- To enhance the net returns per unit area

Technology:

- Drought tolerant high yielding varieties of chickpea like KAK-2 and KPG-59

Area and number of farmers to be demonstrated: 5.2 ha & 52 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 3: Promoting of suitable variety of mustard
Objective:

- To create awareness about high yielding variety of mustard

Technology:

- Improved variety of mustard Shivani

Area and number of farmers to be demonstrated: 4.4 ha & 22 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 4: Promoting suitable variety of linseed
Objective:

- To create awareness about high yielding variety of linseed

Technology:

- Improved variety of linseed T-397

Area and number of farmers to be demonstrated: 5 ha & 50 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA,

On-station: *Kharif*
Programme 1: Promoting drought tolerant high yielding variety of upland rice
Objective:

- Evaluation of promising drought tolerant varieties of rice in rainfed upland and using the conservation furrow for *in-situ* moisture conservation

Technology:

- Drought tolerant high yielding and short duration varieties like BVD-108, BVD-109, BVD-110 and Vandana

Area and number of farmers to be demonstrated: 1.6 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 2: Promoting drought tolerant high yielding variety of rice for medium land condition
Objective:

- Evaluation of high yielding varieties/hybrids of rice in rainfed medium land and using compartment bunding for *in-situ* moisture conservation

Technology:

- Drought tolerant high yielding and short duration varieties like Naveen, Sahbhagi, PAC-801, and PAC-807

Area and number of farmers to be demonstrated: 1.60 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 3: Promoting compartment bunding in high yielding rice for *in-situ* moisture conservation
Objective;

- Evaluation of high yielding varieties/hybrids of rice in rainfed lowland and using compartment bunding for for *in-situ* moisture conservation

Technology:

- Promoting compartment bunding for *in-situ* moisture conservation with high yielding variety like Arize – 6444, MTU-1001, BPT-5204, MTU-7029 etc.

Area and number of farmers to be demonstrated: 1.6 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 4: Promoting drought tolerant high yielding variety of maize
Objective:

- Evaluation of high yielding varieties/hybrids of maize for rainfed upland condition

Technology:

- Drought tolerant high yielding and short duration and quality protein maize like BM-1, BVM-2, Suwan -1 and HQPM-1

Area and number of farmers to be demonstrated: 1 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 5: Promoting drought tolerant high yielding varieties of pigeonpea
Objective:

- Evaluation of high yielding varieties/hybrids of pigeonpea in rainfed upland condition

Technology:

- Drought tolerant high yielding and short duration varieties/hybrids of pigeonpea like – Birsa Arhar-1, ICPH-2671 and Asha.

Area and number of farmers to be demonstrated: 1 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 6: Drought tolerant high yielding varieties of sesame
Objective:

- Evaluation of high yielding varieties of sesame in rainfed upland.

Technology:

- Drought tolerant high yielding varieties of sesame like Kanke white

Area and number of farmers to be demonstrated: 1 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 7: Promoting of different varieties of horse gram
Objective:

- Evaluation of high yielding varieties of horsegram

Technology:

- Different varieties of horsegram like Birsa kulthi-1 GHG-19, GHG-13, AK-21 and madhu

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 8: Promoting of different varieties of niger
Objective:

- Evaluation of high yielding varieties of niger in rainfed upland

Technology:

- Promoting drought tolerant high yielding and short duration varieties/ hybrids of niger like BN-1, BN-2, and BN-3 etc

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 9: Study of pigeonpea based intercropping system
Objective:

- Study on pigeonpea based intercropping system
- To enhance the net returns per unit area

Technology:

- Intercropping (ICPH-2671) pigeonpea + sorghum, pigeonpea + (HQPM) maize, pigeonpea + okra (SG-152) used varieties /hybrids

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 10: Intercropping sorghum + pigeonpea mixed with pulses
Objective:

- To minimize the runoff losses
- To enhance the net returns per unit area

Technology:

- Pulses like pigeonpea will be mixed with sorghum and sown as intercrop in1:1 ratio

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

On-station: *Rabi*
Programme 1: Promotion of different varieties/hybrids of chickpea
Objective:

- Evaluation of high yielding varieties of chickpea under rainfed condition of Jharkhand

Technology:

- Chickpea is identified as suitable crops in this area. Different varieties like KAK-2, KWR-108, KPG-59, and BG-3 will be demonstrated

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 2: Promotion of different varieties/hybrids of lentil
Objective:

- Evaluation of high yielding varieties of lentil under rain fed condition of Jharkhand.

Technology:

- Drought tolerant high yielding varieties/hybrids of lentil like PL-406,PL-639,DPL-62, KLS-218

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 3: Promotion of different varieties/hybrids of mustard
Objective:

- Evaluation of high yielding varieties of mustard under rainfed condition of Jharkhand

Technology:

- High yielding short duration varieties of mustard like shivani, pusabold, kranti and vardan

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA, Daltonganj

Programme 4: Fertilizer management in late sown condition in chickpea
Technology
High yielding short duration varieties of chickpea like KPG-59, KAK-2KWR-108
Objective:

- Study on fertilizer management in late sown condition of different varieties of chickpea

Area and number of farmers to be demonstrated: 0.5 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Garwah; KVK Chianki; ATMA Garwah; ATMA Lathehar and ATMA Daltonganj

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On farm:

Programme 1: Promoting conservation furrows in different rainfed crops for *in-situ* moisture conservation
Objective:

- To conserve rainwater *in-situ*

Technology:

- Conservation furrows will be formed with a country plough at regular interval in between crop rows to minimize the velocity of run off flow and to create more opportunity for rainwater to infiltrate.

Area and numbers of farmers to be demonstrated: 0.5 ha & 5 farmers
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

Programme 2: Catchment-storage-command relationship of farm ponds for efficient use of harvested water

Objectives:

- To demonstrate the usefulness of farm pond in alleviating the effects of dryspells and increasing productivity

Technology:

- Excavation/renovation of farm pond
- Lifting water and irrigation with micro-irrigation system

Area and numbers of farmers to be demonstrated: 2 ponds & 2 farmers with 300 m^3
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

On-station:

Programme 1: Catchment-storage-command relationship of farm ponds for efficient use of harvested water
Objectives:

- To demonstrate the usefulness of farm pond in alleviating the effects of dryspells and increasing productivity

Technology:

- Excavation of farm pond
- Lifting water and irrigation with micro – irrigation system

Area and numbers of farmers to be demonstrated: 2 farm ponds
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

Theme 3. Efficient energy use and management

On-farm

Programme 1: Establishment of custom hiring centres with all improved bullock/tractor drawn tools and implements for timely and precise field operations

Objective:

- To perform timely and precise field operations
- One custom hiring center will be established in village

Technology:

- All improved bullock/tractor drawn tools and implements and diesel engines/pumps useful for rainfed agriculture

Area and numbers of farmers to be demonstrated:
AICRPDA Main center, Chianki
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

Theme 4. Alternate land use / Farming systems for carbon sequestration and ecosystem services

On-farm:

Programme 1: Encouraging on farm generation of organic manure
Objective:

- For on-farm generation of organic manure

Technology:

- Community/household based vermin composting /composting will be promoted.

Area and numbers of farmers to be demonstrated:
10'x3'x2.5' each and 20 farmers community /household based vermi compost components/compost pits will be established
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

Programme 2: On-farm livelihood mushroom cultivation
Objective:

- For enhancing food & health security at village level

Technology:
Community/household based mushroom cultivation promoted.
Area and number of farmers to be demonstrated: 20 bags & 20 farmers
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

On-station:

Programme 1: Development of alternate land use system
Objectives:

- To improve productivity and income per unit area
- To assess opportunity of employment in the entire year in agricultural allied activity
- Assessment of staggered income

Technology:

- Fruit crops (Guava) + drought tolerant agricultural crops (Upland paddy, Upland paddy+ pigeonpea, Maize, Maize+ pigeonpea, sorghum, sorghum + pigeonpea) can enhance land use and production per unit area in uncultivated lands.

Area and numbers of farmers to be demonstrated: 1 ha
Cooperation of agriculture research station, KVK/State Department/NGO:
AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

Programme 2: Farming System under Alternate land use System for livelihood improvement of farmers
Objectives:

- To improve productivity and income per unit area.

- To assess opportunity of employment in the entire year in agricultural allied activity.
- Assessment of staggered income**.**

Technology:

- Agriculture-fish-vermicompost-fruit& vegetables.-mushroom components together can enhance land use and production per unit area

Area and numbers of farmers to be demonstrated: 1 ha

Cooperation of agriculture research station, KVK/State Department/NGO:

AICRPDA Main Center, Zonal Research Station and KVK, Garhwa

1.3 Faizabad

1.3.1 Agro-climatic Zone: Eastern Plain zone in Uttar Pradesh
1.3.2 Agro-ecological sub-region: 9.2
1.3.3 Action research area: Technology demonstration
1.3.4 Village details: Hardoiya village, Harington block, Faizabad district
1.3.5 Climatic vulnerabilities:

- The annual average rainfall of the district is about 1050 mm with high degree of variability (CV = 38.3%)
- The south-west monsoon contributes about 80% to the total rainfall
- The probability of occurrence of normal rainfall is 33.3%
- The south-west monsoon starts from 3rd week of June and extends up to end of September. In past two decades (1990-2010), the mean annual rainfall had decreased by 145.7 mm from the long period average
- The ground water potential is medium. Further the scarcity of fodder to livestock's particularly during drought periods is very acute
- Pests and diseases of crops & livestock are common
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential
- Migration from the region due to undulating topography, meager employment opportunity, frequent droughts, poor crop and livestock productivity has attracted the attention of the country
- Poor access to improved seeds and agricultural inputs, farm machinery leads to delayed sowing, reduced and uneven germination when under abnormal monsoon

Theme 1. Real time contingency plans implementation under both on-station and on-farm in participatory mode

On-farm:

Programme 1: Evaluation of drought tolerant varieties and different crop management strategies for weather aberration

Objective:

- Evaluation of drought tolerant varieties and different crop management strategies for weatheraberration

Technology:

(i) For arable lands

Cropping systems

For early onset
- Blackgram + sesame – fallow
- Sorghum (fodder) – chickpea
- Sorghum + blackgram (Fodder) – toria
- Maize + pigeonpea
- Maize + blackgram - lentil +linseed

For delayed onset
- Sesame + blackgram – fallow
- Sorghum (Fodder) – chickpea
- Fallow – chickpea + mustard
- Maize (cob) – toria
- Pigeonpea + sorghum (grain)
- Blackgram – lentil

Vegetables
- Suitable vegetable crops

For CPRs/ PPRs

Establishing hortipasture/ Silvipasture systems for Alternate land use

Management practices

- **Farmers' (Conventional knowledge) practices**
- **Soil moisture conservation practices**
- Deep summer ploughing alternate year
- Minimum tillage/zero till seeding for *rabi*
- Line sowing with wider spacing for *rabi*
- *In-situ* water harvesting
- Improved varieties
- Prompt weed control

Area and number of farmers to be demonstrated: 4.0 ha & 30 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ* and efficient use

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: Foliar spray of 2% urea on standing crops and additional N application of 10-15 Kg N/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils.

Technology:

- Conservation furrow
- Deep ploughing every year with residue incorporation
- Compartmental bunding
- Set furrow cultivation- *leucaena* green leaf manure + residue

Area and number of farmers to be demonstrated: 0.25 ha & 12 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (Catchment – storage -command relationships of farm ponds, with efficient use of water micro irrigation systems etc.)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

- Adoption of micro-irrigation system for horticulture crops

Production systems:

Arable crops

For early onset

- Blackgram + sesame – fallow
- Sorghum (fodder) – chickpea
- Sorghum + blckgram (Fodder) – toria
- Maize + pigeonpea
- Maize + blackgram - lentil +linseed

For delayed onset

- Sesame + blackgram – fallow
- Sorghum (Fodder) – chickpea
- Fallow – chickpea + mustard
- Maize (cob) – toria
- pigeonpea + sorghum (grain)
- Blackgram – lentil

Vegetable

- Suitable vegetable crops

Non arable lands

- Aonla based hortipasture
- Guava based hortipasture
- Subabul based Silvipasture

Area and number of farmers to be demonstrated: 0.4 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

Programme 3: Catchment-storage-command area relationship for increasing water productivity in micro watersheds

Objectives:

- Develop catchment-storage-command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving technique
- To promote double cropping system and techniques enhance cropping intensity and crop yield by efficient utilization of water

Technology:

- Excavation of farm pond
- Lining of farm pond for restricting the seepage and percolation loss

Area and number of farmers to be demonstrated: 0.5 ha & 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

On-station:

Programme 1: Catchment – storage - command area relationship for increasing water productivity in micro watersheds

Objectives:

- Develop catchment –storage - command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving technique
- To promote double cropping system and techniques enhance cropping intensity and crop yield by efficient utilization of water

Technology:

- Excavation pf farm pond
- Lining of farm pond for restricting the seepage and percolation loss

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

Theme 3. Efficient energy use and management

Programme: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon

Technology:

A custom hiring center will be established in the identified micro - watershed. The following automatic and conventional implements viz., tractor drawn automatic seed drill (2 nos.), Rotavator (1 no.), Weeders cum mulchers (5 nos.), Ridger (5 nos.), Bund former (5 nos.) and tractor drawn furrow openers (1 no.) will be purchased and kept in the custom hire centre for further use by the farmers

Objectives:

- Establishment of custom hiring centre to create awareness amount the farming community about their use at different growth stages of crops
- Custom hiring services for the following implements

Area and number of farmers to be demonstrated: 25 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Faizabad with line departments and KVKs, Faizabad, Ambedkarnagar, Barabanki

Theme 4. Alternate land use / Farming systems for carbon sequestration and ecosystem services

Programme 1: Use of CPRs depending on the type and availability for fodder cultivation for meeting fodder needs during droughts and low crop residue availability (Linkage with local departments etc.)

Technology:

- Aonla + guava + *Leucaena* + *Cenchrus* +*S. seabrana/ hamata* based Horti – silvopastoral systems
- Aonla based Agri-horti systems

- Aonla, Tamarind + *C. ciliaris*

Objectives:

- Rehabilitation of shallow, marginal and denuded soil with organic carbon for resilient agriculture

Area and number of farmers to be demonstrated: 0.5 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre, Faizabad

Programme 2: Studies on Aonla/guava/ bel/ *Leucaena* based Agri-silvi- horti systems.

Objectives:

- To increase productivity of the land
- To find out the impact of Aonla/bel/guava / *Leucaena* based Agri-silvi- horti systems on soil fertility and productivity and carbon sequestration

Area and number of farmers to be demonstrated: 0.5 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre, Faizabad

1.4 Jagdalpur

1.4.1 Agro-climatic Zone: Bastar Plateau zone in Chattigarh
1.4.2 Agro-ecological sub-region: 12.1
1.4.3 Action Research Area: Bastar district, Bastar Plateau ACZ
1.4.4 Village details: Upland (Marhan), Midland (Mal), Lowland (Gabhar) situation of Tahakapal village, District –Bastar
1.4.5 Climatic vulnerabilities:

Selected villages are having all the farming situations, climate, soil and socio-economic status representing Bastar Plateau ACZ. The landscape is hummocky having five distinct farming situations on topo-sequence. Homestead garden (Badi) exists on top most situation followed by upper (Marhan) and sloppy uplands (Tikra), midland (Mal) and lowland (Gabhar). This topography & high rainfall (1200-1400 mm) is responsible for severe erosion and land degradation. Uneven rainfall distribution is also a major problem in this area. Crop diversification, intensification, integrated farming and soil and water conservation are priority issues for livelihood improvement. The socio-economic status of people of the selected villages indicated that they are very poor and the livelihood depends on subsistence agriculture, collection of non-timber forest produce (NTFP), labour etc.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: To evaluate adoption of drought tolerant short duration rice varieties for Upland (Marhan/ Tikra), Midland (Mal), Lowland (Gabhar)

Objective *(Kharif)*:

- PVS on drought tolerant short duration varieties of Rice

Technology:

- **Technology for Upland (Marhan/ Tikra) Rice:**

Entries: 12 (JDP 2-1, JDP 39-1, JDP 382, JDP 383, VL 3288, Anjali, Pornima, Danteshwari, Smbleshwari, MTU-1010, IR 64 & Bodal local)
Plot size: 5m x 6m (24 rows, 25 cm apart, 5 m long)
Spacing: Row to row: 25 cm
Fertilizer: 60:40:20 N:P:K kg/ha

- **Technology for Midland (Mal) Rice:**

Entries: 12 (Anjali**,** Pornima, Danteshwari, Smbleshwari, MTU-1010, IR 64, Vandana, Rajeshwari, Indira , barani dhan – 1, R 1488-686-320-2-1-1, Syamla & IR-36**)**
Plot size: 5 m x 6 m (30 rows, 20 cm apart, 5 m long)
Spacing: Row to row: 20 cm
Fertilizer: 60:40:20 N: P: K kg/ha

- **Technology for Lowland (Gabhar) Rice:**

Entries: 10 (MTU-1001, Karma mahsuri, Swarna, CR-2658, Syamla, Maheshwari, Durgeshwari, Bambleshwari, Dubraj & Jaldubi)
Plot size: 5m x 6m
(30 rows, 20cm apart, 5m long,)
Spacing: 20 cm Row to row
Fertilizer: 80:50:30 N:P:K Kg/ha
Area and number of farmers to be demonstrated: 0.8 ha & 8 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
SG CARS, IGKV, Jagdalpur; KVK, Jagdalpur/ Dantewada; Dept. of Agri./ Horti./ Agril. Engg./ Fishery/ Veterinary Jagdalpur; Zila Panchayat, Jagdalpur; RKM, Narayanpur/ PARDS, Jagdalpur (NGO's)

Programme 2: PVS on drought tolerant short duration varieties of safflower and chickpea
Objective (*Rabi)*:

- PVS on drought tolerant short duration varieties of safflower & chickpea

Technology for Safflower:
Plot size: 6.0 x 5.4 m (12 rows, 6m long, 45 cm apart)
Spacing: 45cm x 20 cm
Fertilizer: 40:40:20 N:P:K kg/ha
Varieties: A-1, JSF-1, JSI-7, S-144, Bhima, NARI-6, Manjira, Sharda, NARINH-1, NARI H-15
Technology for Chickpea:
Entries: 10 (JG 14, Rajas, JAKI 9218, JG 11, JG 16, GCP 105, Vaibhav, Subhara, DCP 92-3 & BGM 547)
Plot size (Gross): 5 m X 6 m (20 Rows, 5 m long & 30 cm apart)
Spacing: 30 X 10 cm
Fertilizer: 150 kg/ha IFFCO NPK or (12:32:16), (18:48:24)
Area and number of farmers to be demonstrated: 0.12 ha & 3 famers
Cooperation of Agricultural research station of KVK/state department/NGO:
SG CARS, IGKV, Jagdalpur; KVK, Jagdalpur/ Dantewada; Dept. of Agri. / Horti./ Agril. Engg./ Fishery/ Veterinary Jagdalpur; Zila Panchayat, Jagdalpur; RKM, Narayanpur/ PARDS, Jagdalpur (NGO's)

Programme 3: Evaluation of inter-cropping systems under rainfed condition
Farming situation: Upland (*Badi*)
Objective:

- To evaluate adaptation of the efficient crop and cropping systems with best bet practices (*In-situ* moisture conservation practices, INM) which provide resilience to climatic variability

Technology:

- Maize: Okra: Cowpea (4:2:2)
- Farmers practice (Mixed cropping)

Season: *Kharif*
Area and number of farmers to be demonstrated: 1.8 ha & 9 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
SG CARS, IGKV, Jagdalpur; KVK, Jagdalpur/ Dantewada; Dept. of Agri./ Horti./ Agril. Engg./ Fishery/ Veterinary Jagdalpur; Zila Panchayat, Jagdalpur; RKM, Narayanpur/ PARDS, Jagdalpur (NGO's)

Programme 4: Evaluation of Integrated Nutrient Management in Rice-based cropping system under rain-fed condition
Farming situation: Midland / lowland
Technology:
Kharif- Rice (MTU-1010)

- Green manuring with *Sunhemp+75% RDF*
- Green manuring with *Dhencha+75% RDF*
- Farmers practice (No green manuring)

Rabi- under utera

- Chickpea + seed treatment with Rhizobium & PSB
- Linseed + PSB
- Farmers practice (without biofertilizers)

Objective:

- To evaluate adaptation of the efficient crop and cropping systems with best bet practices (*In-situ* moisture conservation practices, INM) which provide resilience to climatic variability

Area and number of farmers to be demonstrated: 1.96 ha & 7 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
SG CARS, IGKV, Jagdalpur; KVK, Jagdalpur/ Dantewada; Dept. of Agri./ Horti./ Agril. Engg./ Fishery/ Veterinary Jagdalpur; Zila Panchayat, Jagdalpur; RKM, Narayanpur/ PARDS, Jagdalpur (NGO's)

Programme 5: Evaluation of IPM under rainfed rice-chickpea cropping system
Farming situation:
Midland /lowland
Objective:

- To evaluate adaptation of the efficient crop and cropping systems with best bet practices *in-situ* moisture conservation practices, INM) which provide resilience to climatic variability

Technology:

Kharif-	***Rabi-***
➢ Rice (MTU-1010)	➢ IPM in chickpea
➢ IPM for paddy	➢ Farmers practice (No IPM)
➢ Farmers practice (No IPM)	

Area and number of farmers to be demonstrated: 0.8 ha & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
SG CARS, IGKV, Jagdalpur; KVK, Jagdalpur/ Dantewada; Dept. of Agri./ Horti./ Agril. Engg./ Fishery/ Veterinary Jagdalpur; Zila Panchayat, Jagdalpur; RKM, Narayanpur/ PARDS, Jagdalpur (NGO's)

Programme 6: To develop and disseminate Agro-advisories through ICTs (information kiosks) combining the village level weather data linked to district advisory issued by the IMD/SAU
Objectives:

- Helping farmers regarding adjustments in routine production and post-harvest operations for achieving maximum productivity and economy
- Efficient utilization of weather sensitive inputs, fertilizers, pesticides and irrigation water

Area and number of farmers to be demonstrated: 15 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Ministry of Earth Sciences sponsored Integrated Agro meteorological Advisory Services project (MoES sponsored IAAS project)

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: *In-situ* moisture conservation and mid season corrections to over come short dry spells
Objective:

- To demonstrate efficient *in-situ* moisture conservation practice
- es to overcome short dry spells

Technology:
Upland farming situation:

- ➢ Continuous contour trenches
- ➢ Inline contour trenches
- ➢ U pits

Midland farming situation:

- ➢ Deep ploughing every year with residue incorporation
- ➢ Tied ridges
- ➢ Trenching on field ends

Lowland farming Situation

- ➢ Compartment bunding
- ➢ Tied ridges
- ➢ Sunhemp/ Glyricidia green leaf manure + residue

Area and number of farmers to be demonstrated: 3.96 ha & 9 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur.

Programme 2: Estimation and evaluation of catchment-storage-command relationships of farm ponds and shallow wells for efficient utilization of harvested water and increasing water productivity.

Objectives:

- To enable the farmers to use farm pond water for getting enhanced profit
- To demonstrate and determine WUE of different water saving techniques.
- To promote double cropping system and techniques to enhance cropping intensity and crop yield by efficient utilization of water

Technology:

Cropping systems:

- *Kharif:* Rice
- *Rabi:* Relay crops (Chickpea/ Linseed/ Lathyrus/ Field pea) using residual moisture on downstream of water harvesting structure
- Fishery and Duckery on ponds/ Water harvesting structure/ Percolation tanks
- Lifting farm pond water with conventional and non-conventional energy system

Area and number of farmers to be demonstrated:

Cost of farm pond (3 nos) (Excavation, lining and lifting): Rs. 1, 25, 000/- each

RCC shallow dug wells 8 nos (20 ft depth) on drain line from midland to low land situations. (Cost: Rs 40,000/- each)

Pond renovation (2 nos) (Cost: 75000/- each)

Total: Rs. 8.45 Lakhs

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Programme 3: Study of ground water recharge, exploitation and depletion in the whole project area

Objective:

- Adoption of ground water recharge (open wells) and sharing practices at whole village level

Technology:

- Regular monitoring of water level at various water harvesting structures, open dug wells, RCC shallow wells and bore wells throughout the project area for studying the fluctuation in water level status of the region. Measures will be adopted for recharging wells and recycling of stored water for increasing water use efficiency

Area and number of farmers to be demonstrated: 3 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Programme 4: Estimation of water use efficiency and energy efficiency of gravity operated drip irrigation system in Bastar region

Objective:

- Efficient use of harvested water by supplemental irrigation to rainfed crops through micro-irrigation systems

Technology:

- *Badi* Vegetables: Brinjal, tomato, chili, onion, bottle gourd and cauliflower etc. using gravity operated drip irrigation system

Area and number of farmers to be demonstrated: 4.5 ha & 36 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of all tillage activities with less energy and timely operations in case of stress.

Objectives:

- Establishment of a custom hiring centre to create awareness in the farming community about use of implements at different growth stages of crops
- Custom hiring services of different implements

Technology:

- A custom hiring center will be established in the project area with different improved implements. The implements are manual, bullock and tractor drawn with wide range of workability and precision farming activities.

Area and number of farmers to be demonstrated: 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Programme 2: Evaluation of establishment methods for *rabi* crop after using different *kharif* harvesting implements under midland farming situation

Objective:

- Popularization of suitable manual tools and implements, bullock/ tractor drawn implements for various operations through custom hiring

Technology:

Paddy harvesting in *kharif* using:

- Plain sickle, serrated sickle, reaper binder

Sowing methods:

- Zero till drill, sowing behind country plough, utera, broadcasting after conventional tillage

Crop: Chickpea

Area and number of farmers to be demonstrated: 0.72 ha & 3 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Theme 4. Alternate land use / Farming systems for carbon sequestration and ecosystem services

Programme 1: Integrated farming system Model in *badi* (homestead garden)

Objective:

- To strengthen the traditional farming systems and demonstrate efficient integrated farming systems

Technology:

- Selected fruit plants in rows (cashew, aonla, mango, guava, litchi, papaya)
- Intercrops between rows of fruit crops (maize, cowpea, blackgram, sesame, finger millet)
- Nutritional garden (different vegetables round the year)
- Vermicompost
- Mushroom cultivation
- Agro forestry/ N fixing plants in boundary
- Back yard poultry unit/ duckery
- Soil & Water conservation measures- Percolation wells/ water harvesting structure

Area and number of farmers to be demonstrated: 12 ha & 30 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

Programme 2: Agro – horti – silvi-pasture model under upland situation (to be taken up in 2012)

Objective:

- Use of CPRs (common pool resources) and PPR (private property resources) for fodder andother commodities and service needs

Technology:

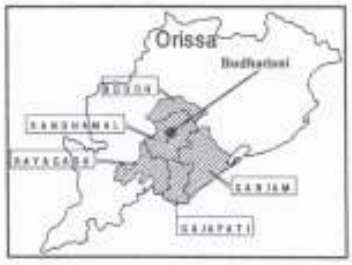
- Soil & Water conservation measures- CCT across the slope/ percolation wells/ water harvesting structures
- Agro forestry/ N fixing plants in boundary
- Selected fruit plants in rows
- Intercrops/ grasses between rows of fruit crops

Area and number of farmers to be demonstrated: 30 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK Jagdalpur; KVK Dantiwada and KVK Narayanapur

1.5 Phulbani



1.5.1 Agro-climatic Zone: North-East Ghat Zone, Orissa
1.5.2 Agro-ecological subregion: 12.1
1.5.3 Action Research Area: Technology demonstration
1.5.4 Village details: Village- Budhadani, Tehsil/Block- Phulbani, District- Kandhamal, Orissa
1.5.5 Climatic vulnerabilities:

- More than 60% of geographical area (1135 acres) is coming under hills and only 205 acres is available for cultivation.
- The village comprises of 120 house holds of which more than 60% is below the poverty line and rarely have access to the improved technologies in agriculture
- The village is hardly 10-15 km away from the AICRPDA centre which facilitates easy and frequent accessibility.
- It is a tribal dominated village of which more than 90% of population is directly or indirectly dependent on agriculture for their livelihood.
- The economy of this village depends mainly on rainfed agriculture, followed by animal husbandry component and forest products.
- Though the village receives a fairly good amount of rainfall of around 1400 mm most of which runs away as run off due to its hilly terrain and low water holding capacity of the agricultural land.
- The probability of occurrence of severe drought is once in 5 years. The erratic rainfall with intermittent prolonged dry spell during the crop season always influences the productivity from rainfed crops.
- Soils of the selected village are red lateritic, acidic in nature, low in organic carbon with sandy to sandy-loam texture.
- Large exploitation of tribal farmers by traders and middle men.
- There is vast scope for increasing the productivity through real time contingency plan, rain water conservation technology, efficient energy use through farm mechanization and provide better livelihood support through farming system approach.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Promoting drought tolerant short duration rice varieties among resource poor farmers in direct-sown rainfed uplands

Objective:

- Popularisation of drought tolerant short duration varieties for withstanding intermittent dryspells and escaping terminal drought

Technology:

- **Varieties:** Vandana / ZHU 11-26 (direct sown); Khandagiri (transplanted)

Area and number of farmers to be demonstrated: 8 ha and 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, G.Udayagiri; Department of Agriculture, Kandhamal

Programme 2: Promotion of high yielding and curcumin-rich varieties of turmeric
Technology:
Varieties: Lakdong, Roma, Rajendra Sonia
Objective:

- Popularization of curcumin-rich high yielding turmeric cultivars among farmers of Kandhamal district for getting higher price in international market and improving the standard of living of illiterate tribal farmers

Area and number of farmers to be demonstrated: 2 ha & 10 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, G.Udayagiri; Department of Agriculture, Kandhamal; KASAM, Phulbani, International Development Enterprise (I), Phulbani; District horticulture department

Programme 3: Promotion of maize-based intercropping systems
Objectives:

- Better negotiation with drought in rainfed uplands and minimization of risk
- Increasing cropping intensity

Technology:

- Maize + cowpea, Maize + runner bean, Maize + cucumber, Maize + ridge gourd

Area and number of farmers to be demonstrated: 2 ha & 10 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
District horticulture department KVK, G.Udayagiri; Department of Agriculture, Kandhamal

Programme 4: Contingent crop planning under aberrant weather conditions
Objective:

- Monitoring the effect of drought / fluctuating weather on growth and yield of major crops over years both under on-station and on-farm conditions

Technology: Main crop: Rice
Contingent crops:

- For early season drought: Short duration rice, greengram, black gram
- For mid- season drought: Niger, mustard
- For terminal drought: Mustard, horsegram

Area and number of farmers to be demonstrated: 8 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, G.Udayagiri; Department of Agriculture, Kandhamal

On-station:
Programme 1: Contingent crop planning under aberrant weather conditions
Objective:

- Monitoring the effect of drought / fluctuating weather on growth and yield of major crops over years

Technology:
Main crop: Rice
Contingent crops:

- For early season drought: Short duration rice, greengram, black gram
- For mid- season drought: Niger, mustard
- For terminal drought: Mustard, horsegram

Area and number of farmers to be demonstrated: 0.4 ha each & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, G.Udayagiri; Department of Agriculture, Kandhamal

Theme 2. Rainwater harvesting (*In-situ* and *ex-situ*) and efficient use

Programme 1: Promotion of *in-situ* rainwater conservation practices for different rainfed crops
Objective:

- Better *in-situ* conservation of rain water for minimizing the effect of intermittent dryspells leading to higher crop productivity.

Technology:

- Raising of bund heights in rainfed uplands for ensuring better *in-situ* conservation of rain water.
- Deep tillage during summer for increasing infiltration capacity of soil
- Surface mulching for restricting evaporation loss and ensuring better *in-situ* conservation of moisture

Area and number of farmers to be demonstrated: 8 ha &20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
International Development Enterprise (I), Phulbani; Department of Soil conservation, Kandhamal; and Department of Agriculture, Kandhamal

On-farm:
Programme 2: Catchment-storage-command relationship of farm ponds for judicious and profitable use of harvested water.
Objectives:

- Minimizing the effect of dryspells during *kharif*
- Exploring the possibility of taking second crop for increasing cropping intensity and raising farm income

Technology:

- Excavation of farm pond
- Lining of farm pond for restricting the seepage and percolation loss
- Judicious utilization of harvested water through improved methods of irrigation

Area and number of farmers to be demonstrated: 2 farmers (farm pond); 8 farmers (dug well)
Cooperation of Agricultural research station of KVK/state department/NGO:
International Development Enterprise (I), Phulbani; Department of Soil conservation, Kandhamal Department of Agriculture, Kandhamal.

Theme 3. Efficient energy use and management

Programme 1: Custom hiring center for improved implements
Objectives:

- Exploring the possibility of farm mechanization through provision of improved farm implements at lower hiring charges
- Timely and precise agricultural operation within the short span of favourable weather in rainfed land

Technology:

- Establishment of custom hiring centre for efficient use of energy in agriculture

Area and number of farmers to be demonstrated: 25 farmers
Cooperation of Agricultural Research Station of KVK/state department/NGO:
Department of agriculture & Department of Agril. Engg. International development enterprises (I), Phulbani; and AGM, NABARD, Phulbani

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-farm:
Programme 1: Encouraging on-farm generation of organic manures and their use for sustainability in agriculture
Objective:

- Increasing the possibility of availability of good quality compost at the farmers' door steps for taking care of crop and soil for higher productivity

Technology:

- Construction of NADEP compost pits and vermicompost pits in farms of interested farmers
- Demonstration of suitable composting method and the effect of such composts in crop fields

Area and number of farmers to be demonstrated: 5 units each of vermicompost and NADEP units

Cooperation of Agricultural research station of KVK/state department/NGO:

Deputy Director of Agriculture, Kandhamal; Deputy Director of Horticulture, Kandhamal; Divisional forest officer, Phulbani; and AGM, NABARD, Phulbani

On-station and On-farm:

Programme 1: Livelihood improvement of farmers with farming systems

Objectives:

- Development of suitable farming system models for different categories of farmers
- Safeguarding of natural resources with adoption of eco-friendly, sustainable and sound farming practices

Technology:

- Promotion of farming system approach for increasing water productivity and sustainable livelihood security of rural poor farmers

Area and number of farmers to be demonstrated: 1 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Deputy Director of Agriculture, Kandhamal; Deputy Director of Horticulture, Kandhamal; Divisional forest officer, Phulbani; AGM, NABARD, Phulbani; Assistant Director, Fisheries; and Chief District Veterinary Officer, Phulbani.

1.6 Varanasi

1.6.1 Agro-climatic Zone: 4.3 (Semi-arid to Sub-humid)
1.6.2 Agro-ecological sub-region: 9.2
1.6.3 Action Research Area: Technology demonstration
1.6.4 Village details: Village - Tedha , Block – Padari, Distict – Mirzapur
1.6.5 Climatic vulnerabilities:

- The selected village is vulnerable to drought and there is a greater scope for new technologies. The following criteria were considered for selection of new watershed
- More than 80% area is under dryland agriculture
- Soil and water conservation was completed by Department of Soil conservation, Uttar Pradesh
- Near to National Highway
- Scope for development in agricultural activities
- Moisture stress during the early stages in monsoon season is seldom experienced in the region (twice or thrice during 10 years). Rainfall breaks resulting in dry spell during later stages (reproductive phase) are common features (7 times in 10 years) affecting the crop production leading to very poor harvest

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Evaluation of short duration and drought tolerant varieties

Objective:

- To evaluate different short duration and drought tolerant varieties of crops

Technology:

Shallow alfisols & vertisols

Uplands –Rice varieties (NDR-97, NDR-118, Shuskh Samrat and Varanai Deep
Area and number of farmers to be demonstrated: 11.2 ha & 28 famers
Maize (Malviya hybrid Makka-2, Jaunpuri and Naveen)
Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers
Pearlmillet (WCC-75, Raj-171 and Pusa 23)
Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers
Greengram (HUM-12, HUM-16 & Samrat)
Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers
Pigeonpea (Bahar, Malviya Vikas, Malviya Chamatkar & NDR Arhar-1)
Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers
Sesame (T4, T12 and Shekhar)
Area and number of farmers to be demonstrated: 4 ha & 10 farmers
Barley (Azad, DL-3 and Jyoti)
Area and number of farmers to be demonstrated: 2 ha & 5 farmers
Chickpea (T6, BG-256 and Avarodhi)
Area and number of farmers to be demonstrated: 3.2 ha & 8 farmers
Lentil (Malviya Vishwanath, KLS-218, PL-406 and PL-639)
Area and number of farmers to be demonstrated: 2.4 ha & 6 farmers
Mustard (Varuna, Ashirbad and Vardan)
Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO: AICRP, Varanasi Centre; NSP, BHU, Varanasi

Programme 2: Adaptation of efficient crop and cropping system

Objective:

- To evaluate adaptation of efficient crop and cropping system

Technology:

- Pigenopea + rice

Area and number of farmers to be demonstrated: 16.8 ha & 42 farmers

- Sesame + greengram

Area and number of farmers to be demonstrated: 0.8 ha & 2 farmers

- Rice-chickpea

Area and number of farmers to be demonstrated: 10.4 ha & 26 farmers

- Rice-mustard

Area and number of farmers to be demonstrated: 3.6 ha & 9 farmers

- Rice- linseed

Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers

- Rice- lentil

Area and number of farmers to be demonstrated: 2.4 ha & 6 farmers

- Maize- linseed

Area and number of farmers to be demonstrated: 0.8 ha & 2 farmers

- Maize- Lentil

Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers

- Wheat

Area and number of farmers to be demonstrated: 0.8 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP, Varanasi Centre; NSP, BHU, Varanasi

On-station:

Programme 1: Evaluation of drought tolerant varieties of rainfed crops

Objective:

- To evaluate different drought tolerant varieties

Technology:

Shallow alfisols & vertisols

- Uplands – Evaluation of short duration and drought tolerant rice varieties (NDR-97, NDR-118, Shuskh Samrat) and Varanai Deep)

Area and number of farmers to be demonstrated: 0.4 ha

- Maize (Malviya hybrid Makka-2, Jaunpuri and Naveen)

Area and number of farmers to be demonstrated: 0.1 ha

- Pearlmillet (WCC-75, Raj-171 and Pusa 23)

Area and number of farmers to be demonstrated: 0.1ha

- Sesame (T4, T12 and Shekhar)

Area and number of farmers to be demonstrated: 0.1 ha

- Lentil (Malviya Vishwanath, KLS-218, PL-406 and PL-639)

Area and number of farmers to be demonstrated: 0.2 ha

- Mustard (Varuna, Ashirbad and Vardan)

Area and number of farmers to be demonstrated: 0.2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP, Varanasi Centre; NSP, BHU, Varanasi

Programme 2: Adaptation of efficient crop and cropping system

Objective:

- To evaluate adaptation of efficient crop and cropping systems

Technology:

- Pigenopea + rice

Area and number of farmers to be demonstrated: 0.4 ha

- Rice-mustard

Area and number of farmers to be demonstrated: 0.1 ha

- Rice- linseed

Area and number of farmers to be demonstrated: 0.1 ha

- Rice- lentil

Area and number of farmers to be demonstrated: 0.2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP, Varanasi Centre; NSP, BHU, Varanasi

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: Catchment-storage-command relationships for rain water harvesting structures and reuse

Objective:

- To find out catchment-storage-command relationships for rain water harvesting structures and use

Technology:

- Supplemental irrigation to rainfed crops from harvested water through farm ponds (Catchment-storage-command relationships of farm ponds) with efficient use of water through micro irrigation systems

Area and number of farmers to be demonstrated:

Two farm ponds sizes are 42 x 60.5 x 5 m^3 and 69 x 80 x 2.25 m^3

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP, Varanasi Centre; NSP, BHU, Varanasi

Programme 2: *In-situ* moisture conservation to overcome short dry spells

Objective:

- To demonstrate efficent *in-situ* moisture conservation practices to overcome short dryspell

Technology:

- Ridge furrow planting of pigeonpea + rice

Area and number of farmers to be demonstrated: 2.4 ha & 6 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP, Varanasi Centre; NSP, BHU, Varanasi

Programme 3: Supplemental irrigation to rainfed crops from harvested water through farm pond

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

Supplementary irrigation for

- Vegetable crops
- Fruit orchard

Adaptation of micro irrigation system for horticulture crops

- Anola

Area and number of farmers to be demonstrated: 0.8 ha & 2 farmers

- Ber

Area and number of farmers to be demonstrated: 0.8 ha & 2 farmers

- Bel

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

- Guava

Area and number of farmers to be demonstrated: 0.4 ha & 2 farmers

- Karonda

Area and number of farmers to be demonstrated: 0.4 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP, Varanasi Centre; NSP, BHU, Varanasi

Theme 3. Efficient energy use and management

Programme 1: Establishement of custom hiring centers with package of improved and relevant impliments system

Objective:

- To promote efficient mechanical system for desired crop stand and reduced drudgery

Technology:

- Tractor drawn improved implements and hand operated tools

Area and number of farmers to be demonstrated:

One custom hiring center has been established for use of implements on hire basis

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP, Varanasi Centre; NSP, BHU, Varanasi

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station

Programme 1:

Studies on aonla, ber and custard-apple under on-station condition

Objective:

- To strengthen traditional farming sytem with scientific interventions

Technology:

- Aonla + sesame

Area and number of farmers to be demonstrated: 0.2 ha

- Ber + sesame

Area and number of farmers to be demonstrated: 0.2 ha

- Custard apple + sesame

Area and number of farmers to be demonstrated: 0.4 ha

- Guava + pearlmillet

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP & State Forest Dept.

On-farm:

Programme 1: Studies on aonla, ber and custard-apple under on-station condition

Objective:

- To strengthen traditional farming sytem with scientific interventions

Technology:

- Aonla + sesame

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

- Ber + sesame

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

- Custard apple + sesame

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

- Guava + pearlmillet

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP & State Forest Dept.

2. Maize Based Production System

2.1 Arjia

2.1.1 Agro-climatic Zone: Southern zone IV in Rajasthan
2.1.2 Agro-ecological sub-region: 4.2
2.1.3 Action Research Area: Technology demonstration
2.1.4 Village details: Kocharia, Mandpiya, Sola ka kheda, Lapsiy, Tara ka Kheda of Bhilwara district, Rajasthan State

2.1.5 Climatic vulnerabilities:

Kocharia village:
Frequency of drought in village is twice in 5 years. Water table is continuously declining and there is problem of drinking water in summer. In most of the areas, only one crop is grown. Mid-season and terminal droughts are prevalent.

Mandpiya village:
Frequency of drought in mid-season and terminal drought are prevalent. Poor fertility of soil also result in low yield.

Sola ka kheda village:
Frequency of drought in village is twice in 5 years. Water table is continuously declining and there is problem of drinking water in summer. In most of the areas, only one crop is grown. Mid-season and terminal drought is prevalent.

Lapsiya village:
Frequency of drought in village is 5 time in the last 10 years (2000-2009). On an average, 10% of farmers sold animals during medium drought conditions. In village, about 20% area is saline and sodic. Terminal drought is prevalent.

Tara ka Kheda village:
Frequency of drought in village is 5 time in the last 10 years (2000-2009). Soils are shallow. Lack of water harvesting structures and continuous erosion are responsible for low yield of crops.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On farm:

Programme 1: Evaluation of drought tolerant varieties

Objective:

- To identify drought tolerant varieties suitable for different soils

Technology:

***Kharif* season**

Shallow brown soils

- Maize: PEHM-2, PM-3, Navjot and Local
- Sorghum: CSV-15 CSV-17, Pratap jowar and Local
- Sesame: RT-46
- Blackgram: T-9 and RBU-38

Medium to deep brown to black soils

- Maize: PEHM-2, PM-3, Navjot and Local
- Sorghum: CSV-15, CSV-17, Pratap jowar and Local
- Sesame: RT-46

***Rabi* season**

Shallow brown soils

- Taramira: RTM-314
- Mustard: Laxmi

Medium to deep brown to black soils

Wheat: Raj-3765, Raj-1515, Raj-4037, Mustard and Laxmi

Area and number of farmers to be demonstrated: 9.2 ha & 46 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture Deputy, Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 2: The most efficient intercropping systems which provide resilience to climate variability
Objective:

- To demonstrate the performance of potential intercropping systems for stability under varied rainfall situation

Technology:

- Maize + blackgram (2:2)
- Groundnut + sesame (6:2)
- Sorghum + greengram (1:1)

Area and number of farmers to be demonstrated: 18 ha & 45 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State agriculture department, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan.

Programme 3: Mid-season correction and dryspell management in maize
Objectives:

- To demonstrate resilience of crop production techniques to mitigate drought.
- To reduce risk of crop failure under short and long dryspells.
- To enhance resource use efficiency.

Technology:

- Soil stirring by Arjia wheel hoe, Spray of thiourea (0.05%), Spray of 2% urea in maize after rains, spray of kaolin @ 5%, removal of alternate plants in rows

Area and number of farmers to be demonstrated: 5 ha & 28 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 4: Implementation of crop management technologies as per agro-advisories issued by IMD/SAU (linkage with AICRPAM)
Objectives:

- To enhance predictive capabilities for extreme weather events.
- To document and popularize Community Weather Based Alternative Risk Transfer Techniques (CWART)

Technology:

***Kharif* season**

- Maize
  Farmers' practice
  Improved agro-advisories
- Sorghum
  Farmers' practice
  Improved agro-advisories

***Rabi* season**

- Wheat
  Farmers' practice
  Improved agro-advisories
- Mustard
  Farmers' practice
  Improved agro-advisories
- Taramira
  Farmers' practice
  Improved agro-advisories

Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan.

Programme 5: Capacity building of farmers for better utilization of agro-advisories

Technology:

- Training of three weather watch groups (30 members) (2 days)
- Training of five youths as climate facilitator (2 days)
- Interaction training of villagers with DLO's
- Visit to AICRPAM centre
- Documentation of ITK related to climate management (meetings & literature)

Area and number of farmers to be demonstrated: 1050 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

On-station:

Programme 1: Evaluation of drought tolerant varieties of crops

Objective:

- To identify drought tolerant varieties suitable for zone IV-a.

Technology:

***Kharif* season**

- Maize (PEHM-2 & PM-3)
- Sorghum (CSV-15 & CSV-17)
- Sesame (RT-46 & RT-127)
- Blackgram (T-9 & RBU-38)
- Horsegram (AK-21 & AK-42)
- Clusterbean (RGC-936 & 986)

***Rabi* season**

- Taramira (RTM-314)
- Mustard (Laxmi)

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 2: Efficient intercropping systems resilient to climate variability

Objective:

- To demonstrate the performance of potential intercropping systems for stability under varied rainfall situation

Technology:

- Maize + blackgram (2:2)
- Groundnut + sesame (6:2)
- Sorghum + greengram (1:1)

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 3: Mid-season correction and dryspell management in maize

Objectives:

- To demonstrate resilience of crop production techniques to mitigate drought.
- To reduce risk of crop failure under short and long dryspells
- To enhance resource use efficiency.

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: *In-situ* moisture conservation in maize

Objective:

- To demonstrate efficent *in-situ* moisture conservation practices to overcome short dryspells

Technology:

- Compartmental bunding + dead furrows + ridging at 30 days after sowing
- Straw mulching
- Tied ridges
- Tank silt application

Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment–storage-command relationship of farm pond with efficient use of water through micro irrigation systems)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

- Maize + blackgram (2:2)
- Groundnut + sesame
- Mustard
- Farm pond/nadi
- Adoption of micro irrigation system for horticulture crops
- Lifting the farm pond water through pump/non-conventional energy system
- Aloevera, ber and karonda plantation

Area and number of farmers to be demonstrated: 2 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 3: Adoption of groundwater recharge (opens and bore wells) and sharing practices at whole village level (linkages with watershed programmes)

Objective:

- Evaluation and identification of feasible groundwater augmentation techniques for enhanced water yield and crop productivity

Technology:

- Recharge of defunct open wells/bore wells

Area and number of farmers to be demonstrated: 2 open wells & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

On-station:

Programme 1: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment–storage-command relationship of farm pond with efficient use of water through micro irrigation systems)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

- Maize + blackgram (2:2)
- Groundnut + sesame
- Mustard
- Aloevera, ber and karonda plantation
- Farm pond/nadi
- Adoption of micro irrigation system for horticulture crops
- Lifting the farm pond water through pump/non-conventional energy system

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Theme 3. Efficient energy use and management

Programme 1: Establishment of custom hiring centre and provide services to farmers

Objective:

- Establishment of custom hiring centre to create awareness among the farming community about use of implements in different crops

Technology:

- Implements: Intercropping seed drill (2 nos.), rotavator (1 no.), ridger (5 nos.), bund former (5 nos.), tractor drawn furrow openers (1no.), bullock drawn two row seed drill (5 nos.), Arjia wheel hoe (5 nos.), cycle weeders (1 no.), sprayers (5 nos.), duster (3 nos.)

Area and number of farmers to be demonstrated: 1 unit

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Efficient land use through improved farming systems

Objective:

- To improve soil health and maximize the carbon productivity

Technology:

- Traditional farming system
- Improved farming system
- Agri-Horti-pastoral systems
- (Karonda+ Ber + [Groundnut (6:2) / maize + blackgram (2:2)] /sorghum +greengram (2:1)
- *Kharif* Blackgram / Greengram / Cowpea - *Rabi* taramira/mustard
- Fodder crops: Black anjan /Maize/Sorghum fodder
- Kitchen garden
- Livestock: Cow (1 no.) + Goats (10+1) + Poultry birds (50)
- Border plantation: (Deshi babool + Custard apple + Karonda + ber)
- Improved compost making
- Jal kund (250 m^3)

Area and number of farmers to be demonstrated: 2 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

Programme 2: Rehabilitation of shallow and marginal soils (linkage with local department/Gram panchayat)

Objective:

- To improve soil health and maximize the carbon productivity

Technology:

- Silvi pasture system: Babool + karonda + dhaman grass
- Aloevera + dhaman grass + karonda

Area and number of farmers to be demonstrated: 1 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

KVK, Bhilwara; National livelihood, Bhilwara; ATMA; State department of agriculture, Deputy Director, Bhilwara`and foundation for ecological security, Rajasthan

2.2 Ballowal Saunkhri

2.2.1 Agro-climatic Zone: Kandi region in Punjab
2.2.2 Agro-ecological sub-region: 9.1
2.2.3 Action Research Area: Technology demonstration
2.2.4 Village details: Villages Achalpur and Nainwan, Thesil Garhshankar, District Hoshiarpur
2.2.5 Climatic vulnerabilities:

- Drought, frequency & intensity occurs once in every 5 years during *rabi* season
- Dry spells once in every 5 years during *Kharif*
- Untimely high intense rains occurred twice in last 5 years
- Heat wave was observed in last 2-3 years
- Cold wave was observed twice in last 5 years
- Frost/hail storm occurs once in every 3 years
- Flash flood occurred twice during last 5 years
- Farmers are diverting to oilseeds and pulses due to drought and heat stress to wheat
- Receding rains affecting water infiltration and storage. Short duration heavy storms leading to soil erosion/breaching of bunds
- Phylloidy disease in sesame and blister beetle in greengram and blackgram are on higher trend
- Heat and extreme cold events affected milk yield/animal health
- Extreme events affected the fodder yields
- Migration of male population to cities for livelihood resulted with more involvement of women in agriculture

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-Station:

Programme 1: Demonstration of real time crop contingency under aberrant weather conditions

Objective:

- Intervention of technologies to improve the performance of crops under aberrant weather conditions

Technology:

- Crop substitution under aberrant weather conditions as per crop contingency plan

Area and number of farmers to be demonstrated: 0.9 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
Dept. of Plant Breeding & Genetics (PAU, Ludhiana), State Dept. of Agriculture

Programme 2: Efficient intercropping systems/cropping sequence which provides resilience to climate variability

Objective:

- To demonstrate the performance of potential intercropping systems/cropping sequence for stability under varied rainfall situation

Technology:

Intercropping:

- *Kharif:* maize + blackgram/ greengram
- *Rabi*: Toria + gobhi sarson
- Wheat/chickpea/lentil + raya

Cropping sequence:

- Traditional (maize-wheat)
- Blackgram-raya
- Blackgram-chickpea
- Maize-raya
- Ashgourd-taramira

Area and number of farmers to be demonstrated: 0.7 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
Dept. of Plant Breeding & Genetics (PAU, Ludhiana)

Programme 3: Evaluation of drought tolerant varieties

Objective:

- To demonstrate the performance of varieties for stability under varied rainfall situation

Technology:

- Maize: Local, PMH-2, JH-3459, Parkash, PMH-1
- Blackgram: Mash-338, local
- Greengram: ML-613, local
- Wheat: PBW-175, PBW-527, local
- Raya: RLM-619, PBR-97, local
- Taramira: TLMC-2, local
- Chickpea: PBG-1, PBG-5, local
- Lentil; LL-699

Area and number of farmers to be demonstrated: 0.35 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Dept. of Plant Breeding & Genetics (PAU, Ludhiana); State department of agriculture

On-farm:

Programme 1: Demonstration of real time crop contingency plan under aberrant weather conditions

Objective:

- Intervention of technologies to improve the performance of crops under aberrant weather conditions

Technology:

- Crop substitution under aberrant weather conditions as per crop contingency plan

Area and number of farmers to be demonstrated: 6 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Dept. of Plant Breeding & Genetics (PAU, Ludhiana); ATMA; State department of agriculture; NGO; KVKs

Programme 2: Efficient intercropping systems/cropping sequence which provides resilience to climate variability

Objective:

- To demonstrate the performance of potential intercropping systems/cropping sequence for stability under varied rainfall situation

Technology:

Intercropping:

- *Kharif:* maize + blackgram/ greengram
- *Rabi*: Toria + gobhi sarson
- Wheat/chickpea/lentil + raya

Cropping sequence:

- Traditional (maize-wheat)
- Blackgram-raya
- Blackgram-chickpea
- Maize-raya
- Ashgourd-taramira

Area and number of farmers to be demonstrated: 4 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Dept. of Plant Breeding & Genetics (PAU, Ludhiana); ATMA; State department of agriculture; NGO; KVKs

Programme 3: Evaluation of drought tolerant varieties of crops

Objective:

- To demonstrate the performance of varieties for stability under varied rainfall situation

Technology:

- Maize: Local, PMH-2, JH-3459, Parkash, PMH-1
- Blackgram: Mash-338, local
- Greengram: ML-613, local
- Wheat: PBW-175, PBW-527, local
- Raya: RLM-619, PBR-97, local
- Taramira: TLMC-2, local
- Chickpea: PBG-1, PBG-5, local

- Lentil; LL-699

Area and number of farmers to be demonstrated: 4 ha and 15 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Dept. of Plant Breeding & Genetics (PAU, Ludhiana); State department of agriculture

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-station:

Programme 1: Catchment – storage – command relationship of farm ponds/water harvesting structure
Objective:

- To demonstrate usefulness of farm pond/ water harvesting structure and its lining for *ex-situ* runoff collection and efficient use

Technology:

- Life saving/supplemental irrigation to rainfed crops from harvested water

Area and number of farmers to be demonstrated: 0.8 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
State department of Soil Conservation

Programme 2: *In-situ* rain water harvesting
Objective:

- To demonstrate effect of proven *In-situ* rainwater conservation technology in dryland crops

Technology:

- Summer ploughing, compartmental bunding
- Sowing across the slope, earthing-up/haloding in maize 25-30 DAS.

Area and number of farmers to be demonstrated: 0.6 ha
Cooperation of Agricultural research station of KVK/state department/NGO: Nil
Department of Soil & Water Engineering (PAU, Ludhiana)

Programme 3: Rain water harvesting
Objective:

- To demonstrate effect of roof top rain water harvesting on groundwater recharge

Technology:

- Harvesting rainwater from roof top

Area and number of farmers to be demonstrated: 0.1845 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
Department of Soil & Water Engineering (PAU, Ludhiana)

On-farm:

Programme 1: Catchment – storage – command relationship of farm ponds/ water harvesting structure

Objective:

- To demonstrate usefulness of farm pond/ water harvesting structure and its lining for *ex-situ* runoff collection and efficient use.

Technology:

- Life saving/supplemental irrigation to rainfed crops from harvested water

Area and number of farmers to be demonstrated:
Renovation of existing pond and other possibilities of water harvesting
Cooperation of Agricultural research station of KVK/state department/NGO:
State department of Soil Conservation
Programme 2: *In-situ* rain water harvesting
Technology:
Summer ploughing, compartmental bunding, sowing across the slope, earthing-up/haloding in maize
Objective:

- To demonstrate effect of proven *in-situ* rainwater conservation technology in dryland crops

Area and number of farmers to be demonstrated: 4 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
ATMA; Dept. of Agri.; NGO; KVKs

Programme 3: Rain water harvesting
Objective:

- To demonstrate the effect of roof top rain water harvesting on groundwater recharge

Technology:

- Harvesting rain water from roof top

Area and number of farmers to be demonstrated: Area and farmers will depend on school building /Panchayat building
Cooperation of Agricultural research station of KVK/state department/NGO:
Department of Soil & Water Engineering (PAU, Ludhiana); State dept. Soil Conservation

Theme 3. Efficient energy use and management

On-station:

Programme 1: Effect of reduced tillage on crop productivity in maize-wheat cropping sequence under dryland conditions
Objectives:

- To study the effect of tillage on productivity of rainfed maize and wheat
- To study the long-term effect of tillage on the physico-chemical properties of soil and carbon sequestration

Technology:

- Conventional tillage (CT)
- Reduced tillage (50% of CT)

Area and number of farmers to be demonstrated: 0.2 ha
Cooperation of Agricultural research station of KVK/state department/NGO: No involvement

On-farm:

Programme 1: Popularization of improved farm implements (tractor/ bullock drawn/manual)
Objectives:

- To minimize climatic risk through efficient use of machinery to enhanced resource conservation and use efficiency
- To increase energy use efficiency in crop production through mechanization
- To ensure timely agriculture operations for effective management of weather situations

Technology:

- To make availability of farm implements to the farmers by developing custom hiring service

Area and number of farmers to be demonstrated: 4 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Department FPM (PAU, Ludhiana), ATMA, Dept. of Agri., NGO, KVKs

Programme 2: Effect of reduced tillage on crop productivity in maize-wheat cropping sequence under dryland conditions
Objectives:

- To study the effect of tillage on productivity of rainfed maize and wheat
- To study the long-term effect of tillage on the physico-chemical properties of soil and carbon sequestration

Technology:
Conventional Tillage (CT)
Reduced tillage (50% of CT)

Area and number of farmers to be demonstrated: 0.4 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/NGO: No involvement

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-farm:

Programme 1. Agri-horticulture system

Objectives:

- Rehabilitation of land to meet needs of local inhabitants for fruit, fodder, fuel & timber
- Carbon sequestration and carbon crediting benefits to poor farmers

Technology:

- Recommended fruit trees (guava and amla)
- Seasonal crops (blackgram, sesame, lentil, taramira, raya)

Area and number of farmers to be demonstrated: 2 ha & 6 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Department of Horticulture (PAU, Ludhiana)

Programme 2: Silvi-pastoral system

Objectives:

- To make available fodder & fuel besides rehabilitating marginal land
- To enhance income of farmers and make base lands more productive

Technology:

- Multi-purpose trees
- Fodder Grasses (Guinea grass, *Cenchrus sp. Napier Bajra Hybrid*)

Area and number of farmers to be demonstrated: 0.5ha and 5 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Punjab State Forest Department

On-station:

Programme 1: Agri-horticulture system

Technology:

- Recommended fruit trees (guava and amla)
- Seasonal crops (blackgram, sesame, lentil, taramira, raya)

Objectives:

- Rehabilitation of land to meet needs of local inhabitants for fruit, fodder, fuel & timber
- Carbon sequestration and carbon crediting benefits to poor farmers

Area and number of farmers to be demonstrated: 1.05 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
Department of Horticulture (PAU, Ludhiana)

Programme 2: Silvi-pastoral system

Objectives:

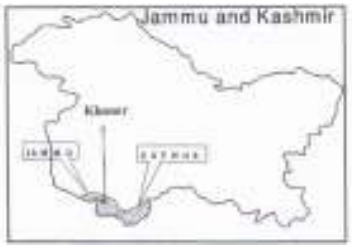
- To make available fodder & fuel besides rehabilitating marginal land
- To enhance income of farmers and make base lands more productive

Technology:

- Multi-purpose trees
- Fodder Grasses (Guinea grass, *Cenchrus sp. Napier Bajra Hybrid*)

Area and number of farmers to be demonstrated: 1 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
Punjab State Forest department

2.3 Rakh Dhiansar



2.3.1 Agro-climatic Zone: Low altitude sub-tropical zone in Jammu and Kashmir

2.3.2 Agroecoogical subregion: 14.2

2.3.3 Action Research Area: Technology demonstration

2.3.4 Village details: Khaner villages, Purmundal Block, Samba District

2.3.5 Climatic vulnerabilities:

- The selected village is vulnerable to drought and there is scope for introduction of new technologies.
- The most pre-dominant cropping system is maize-wheat, maize-mustard, mash/til-wheat, *etc*.
- The average rainfall (1987-2010) of the area is 1129.5 mm, while it is 1059.4 mm (2005-2010) in the area.
- Out of 24 years of rainfall data of the area (1987-2010); 14 years received deficit rainfall varying from -4.5 to 33.2%
- In almost every alternate year, there is a deficit rainfall.
- Three, four and three consecutive deficit rainfall in the area was received during 1991-1993, 1999-2002 and 2004-2006, respectively; which clearly indicates that agriculture is vulnerable to climate change.
- The area receives 76.8% of total rainfall during S-W *monsoon* period and 13.1% during western disturbances and the remaining during hot weather period (average of last 10 years).
- The rainfall in the area varies from 754.1 to 1818.9 mm, indicating high degree of variability.
- Frequent droughts, low and erratic rainfall, prolonged dry spells during the crop season always decrease the productivity of rainfed crops.
- The economy of this area depends mainly on rainfed agriculture, followed by animal husbandry component consisting of cattle, milch animals and small ruminants.
- Fodder shortage in these villages exists from December-June.
- Lands are undulating and farmers are still using local traditional bullock drawn tillage implements/broadcasting method. Under such topographic situations, adaptation of modern technology/mechanization not only saves labour and money but also saves time

Theme 1. Real time contingency plans implementation both on-station and on-farm in a participatory mode

On farm:

Programme 1: To demonstrate performance of drought tolerant varieties of maize

Objective:

- To promote and encourage awareness about drought tolerant varieties

Technology:

- Drought tolerant varieties of maize like K-99, K-9451, Shaktiman, K-517 will be promoted in domain area

Area and numbers of farmers to be demonstrated: 6.6 ha & 46 farmers

Cooperation of Agricultural research station of KVK/state department NGO:

Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba, RRSS, Raya, Line Dept. (J&K Govt.), ATMA (J&K Govt.)

Programme 2: Performance of pulses blckgram (Mash-114), cowpea (intercropping) under rainfed condtion
Objective:

- To promote pulse cultivation in dryland areas

Technology:

- Introduction of pulses as sole and intercrops

Area and number of farmers to be demonstrated: 1.7 ha & 26 farmers
Cooperation of Agricultural research station of KVK/state department NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba, RRSS, Raya, Line Dept. (J&K Govt.), ATMA (J&K Govt.)

Programme 3: Performance of oilseed sesame (PB-1) under rainfed conditions
Objective:

- To promote oilseeds cultivation in dryland areas

Technology:

- Introduction of oilseeds in traditional cereal system

Area and numbers of farmers to be demonstrated: 1.5 ha & 23farmers
Cooperation of Agricultural research station of KVK/state department NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba, RRSS, Raya, Line Dept. (J&K Govt.), ATMA (J&K Govt.)

On-station:
Programme 1: Performance of cowpea in intercropping with maize (maize + cowpea (2:1-additive series)
Objective:

- To improve soil health/quality in dryland areas

Technology:

- Introduction of intercropping system in traditional cereal system (maize-wheat)

Area and number of farmers to be demonstrated: 0.3 ha
Cooperation of Agricultural research station of KVK/state department NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt); ATMA (J&K Govt)

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:
Programme 1: Construction of different water harvesting structures (Pacca as well as poly tanks) with efficient method of irrigation and study of its impact
Objective:

- To collect rain water and its judicious use during dry spell through micro irrigation system

Technology:

- Construction of farm pond

Area and number of farmers to be demonstrated:
2 nos. of *Pacca* farm ponds of size 10 X 10 x 3 m

On-station:
Programme 1: Construction/repair of farm pond
Construction/repair of 1 no. of farm pond of size 15 X 15 x 3 m
Objective:

- To collect rain water and its judicious use during dry spells through micro irrigation system

Technology:

- Construction of farm pond

Command Area: About 2-3 ha for critical irrigation during dry spells
Area and number of farmers to be demonstrated:
Cooperation of Agricultural research station of KVK/state department NGO:

Division of Agricultural Engg, SKUAST-Jammu

Programme 2: Construction of different *in-situ* moisture measures for enhancing the soil moisture of the area and study of its impact

Objectives:

- To increase *in-situ* moisture available for the crops

Technology:

- Construction of different moisture conservation measures

Area and number of farmers to be demonstrated: 0.15 ha

Cooperation of Agricultural research station of KVK/state department NGO:

Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba, RRSS, Raya, Line Dept. (J&K Govt.), ATMA (J&K Govt.)

Theme 3. Efficient energy use and management

On-farm:

Programme-1: Evaluation of sowing equipments for maize–wheat cropping system in dryland situation

Objective:

- Mechanization of sowing operation to save time and energy

Technology:

- Promotion of line sowing with proper seed and fertilizer placement

Area and number of farmers to be demonstrated: 3 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba, RRSS, Raya, Line Dept. (J&K Govt.), ATMA (J&K Govt.)

Programme-2: Custom hiring centre for agricultural operation in maize-wheat cropping system

Objective:

- Mechanization of sowing operation to save time and energy

Technology:

- A custom hiring center will be established in the selected village for completion of different operations in crop production. The following equipment/implement will be procured to establish custom hiring centre.

Area and number of farmers to be demonstrated: All the farmers of the village

Cooperation of Agricultural research station of KVK/state department/NGO:

Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt.); ATMA (J&K Govt.)

On-station:

Programme-1: Evaluation of sowing equipments for maize–wheat cropping system in dryland situation

Objective:

- Mechanization of sowing operation to save time and energy

Technology:

- Promotion of line sowing with proper seed and fertilizer placement

Area and number of farmers to be demonstrated: 0.2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu; AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt.); ATMA (J&K Govt.)

Programme-2: Custom hiring centre for agricultural operation in maize-wheat cropping system

Objective:

- To demonstrate usefulness of implements for different agricultural operations

Technology:

- A custom hiring center will be established in the selected village for completion of different operations in crop production. The following equipment/implement will be procured to establish custom hiring centre

Area and number of farmers to be demonstrated: All the farmers in the village
Cooperation of Agricultural research station of KVK/state department/NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu, AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt.); ATMA (J&K Govt.)

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Study on aonla based agri-horti system in Inceptisols

Objective:

- Introduction of intercrops in alleys of horticultural crops

Technology:

- Promotion of agri-horti system in dryland conditions

Area and number of farmers to be demonstrated: 0.4 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu, AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt.); ATMA (J&K Govt.)

Programme 2: Study on citrus based agri-horti system in Inceptisols

Objective:

- Introduction of intercrops in alleys of horticultural crops

Technology:

- Promotion of agri-horti system in dryland conditions

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer
Cooperation of Agricultural research station of KVK/state department/NGO:
Division of Agronomy, Soil-science, Agricultural Engg., AICRPAM, AMFU (MES) SKUAST-Jammu, AICRP on Pulses, Samba; RRSS, Raya; Line Dept. (J&K Govt.); ATMA (J&K Govt.)

3. Fingermillet based production system

3.1 Bangalore

3.1.1 Agro-climatic Zone: Central, eastern and southern zone in Karnataka

3.1.2 Agro-ecological sub-region: 8.2

3.1.3 Action Research Area: Technology demonstration

3.1.4 Village details: Chikkamaranahalli and cluster villages, Nelamangala taluk in Bangalore rural district

3.1.5 Climatic vulnerabilities:

Chikkamaranahalli village, Nelamangala taluk, Bangalore rural district has been selected for NICRA activities. The Chikkamaranahalli main village consists of Chikkaputtaayyanapalya, Mudala playa and Hosapalya as cluster villages. The village Chikkamaranahalli and cluster villages are having diversified community with 70 SC/ST families, land holdings ranged from 1 to 15 acres, 12 tractors and 10 bore wells. The finger millet, pigeonpea, cowpea, field bean, castor and groundnut are the major crops in this area. Rainfall analysis indicated hard ship to farmers. It is not uniform throughout the crop period affecting the productivity of the crop. Failures of crop, non availability of labour and bullocks are the major constraints. Therefore, an intervention of dryland technologies is possible to mitigate drought and improve the production potential of the crop.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-station:

Programme 1: To demonstrate performance of short, medium and long duration varieties of finger millet, cowpea, sesame, horsegram, pigeonpea, maize and groundnut for different rainfall situations.

Objective:

- Introduction of suitable varieties of crops depending up on the rainfall

Technology:

- Drought tolerant high yielding varieties of finger millet like MR-1, GPU-28 and GPU-48 will be promoted in the area

Area and number of farmers to be demonstrated: 1 ha

Co-operation of Agricultural research station of KVK/ state department/NGO:

AICRPDA Main centre; Department of Agriculture, Nelamangala

Programme 2: *In-situ* moisture conservation practices like fall ploughing, contour ploughing/sowing, conservation furrow, dead furrow, mid season corrections

Objective:

- To conserve rain water *in-situ*

Technology:

- Conservation furrows will be formed with a country plough at regular interval in between crop rows to minimize the velocity of runoff flow and to create more opportunity for rain water to infiltrate.

Area and number of farmers to be demonstrated: 1 ha

Co-operation of Agricultural research station of KVK/ state department/NGO:

AICRPDA Main centre; Department of Agriculture, Nelamangala

Programme 3: To demonstrate performance of potential intercrop and double cropping system for stability under varied rainfall situation

Objective:

- To increase the efficient use of natural resources and enhance the net returns per unit area and minimize the risk of crop failure

Technology:

Pulses like pigeonpea, cowpea and field bean will be intercropped with fingermillet & groundnut and sown in definite row proportion.

Area and number of farmers to be demonstrated: 1 ha

Co-operation of Agricultural research station of KVK/ state department/NGO:

AICRPDA Main centre, Department of Agriculture, Nelamangala.

Programme 4: Establishment of dryland agri-tech park for demonstration

Objective:

- To demonstrate various dryland technologies to the visiting farmers and dignitaries under on-station condition

Technology:

Dryland technologies viz. real time contingent crop planning, fingermillet, groundnut, pigeonpea and maize based cropping systems, integrated nutrient management, cropping systems, crops and varieties for late sown situations, rain water harvesting are being demonstrated.

Area and number of farmers to be demonstrated: 1 ha

Co-operation of Agricultural research station of KVK/ state department/NGO:

AICRPDA Main centre, ORP, other AICRP'S at GKVK, Bangalore

On-farm:

Programme 1: Demonstration of fingermillet varieties in alfisols of zone 4, 5 and 6

Objective:

- To demonstrate performance of short, medium and long duration varieties of fingermillet

Technology:

Short duration	**:**	GPU 48
Medium	**:**	GPU 66, ML 365, GPU 28
Long	**:**	MR 1

Area and number of farmers to be demonstrated: 5 ha & 5 farmers

Horse gram: PHG 9

Late *Kharif*

Area and number of farmers to be demonstrated: 3 ha & 10 farmers

Pigeonpea:

Early *Kharif*: TTB 7

Kharif: BRG, BRG 2

Area and number of farmers to be demonstrated: 2 ha & 5 farmers

Maize: Nityashree/Hema

Area and number of farmers to be demonstrated: 2 ha & 4 farmers

Groundnut: (TMV-2/JL-24)

Area and number of farmers to be demonstrated: 4 ha & 6 farmers

Objective:

- Introduction of suitable varieties of crops depending up on the rainfall

Technology:

Drought tolerant high yielding varieties of fingermillet (MR-1, GPU-28 and GPU-48) and pigeonpea (TTB-7, BRG-1) will be promoted in the area.

Cooperation of Agricultural research station of KVK/state department /NGO:

State department of Agriculture and National seeds project, GKVK, Bangalore

Programme 2: Demonstration of improved intercropping systems

Cropping systems

Pigeonpea + cowpea (1:1)

Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers

Pigeonpea + fieldbean (1:1)

Area and number of farmers to be demonstrated: 1.6 ha & 4 farmers

Finger millet + pigeonpea (8:2)

Area and number of farmers to be demonstrated: 5.0 ha & 15 farmers

Groundnut + pigeonpea (8/10:2) / Groundnut + castor (8:1)

Area and number of farmers to be demonstrated: 3 ha & 8 farmers

Objective:

- To increase the efficient use of natural resources and enhance the net returns per unit area and minimize the risk of crop failure

Technology:

Pulses like pigeonpea, cowpea and fieldbean will be intercropped with fingermillet & groundnut and sown in definite row proportion.

Cooperation of Agricultural research station of KVK/state department/NGO:

State department of Agriculture

Programme 3: Use of micronutrients in fingermillet + pigeonpea (8:2) and groundnut + pigeonpea (8:2).

Objective:

- To improve crop productivity and income per unit area

Technology:

- To demonstrate the essentiality of micronutrients in fingermillet + pigeonpea (8:2) and groundnut + pigeonpea (8:2) cropping system.

Area and number of farmers to be demonstrated: 4 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

State Department of Agriculture

Programme 4: Agro-Advisory combining the village level weather data linked to district advisory issued by the IMD/SAU

Objective:

- To reduce the impact of aberrant weather and losses due to climatic extremities

Technology:

- Crop weather reports received from IMD/Agro-meteorology department will be disseminated to the NICRA project

Area and number of farmers to be demonstrated: 50 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPAM, Neladhani local radio

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: Measurement of rainfall-amount, intensity amount and peak rate of runoff (rainfall-runoff relationships)

Objective:

- To find out catchment storage-command relationship for rain water harvesting structures and reuse

Technology:

- *In-situ* rain water harvesting with cultural operations across the slope including sowing and intercultivation

Area and number of farmers to be demonstrated: 2 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:

State department of Agriculture and Watershed development department

Programme 2: Design of storage volume of farm pond (individual farmer)

Objective:

- To design of storage volume of farm pond under on-farm condition

Technology:

Excavation of 250 m^3 per hectare and lining with soil + cement (8:1) for storing excess runoff water
Farm pond dimensions:
Top width of the farm pond -12 m x 12 m
Bottom width of farm pond- 6 m x 6 m
Depth of farm pond -3 m
Slope: 1:1
Capacity of farm pond: 250 m^3
Lining materials – Brick + cement overlaid on 300 micron low density polythene sheet
Area and number of farmers to be demonstrated: 2 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/ NGO:
State department of Agriculture and Watershed development department

Programme 3: Seepage study and recommendation for lining

Objective:

- To assess the seepage loss and determine suitable lining for effective storage of runoff

Technology:

Storing of excess runoff water in the farm pond for effective use for high value crops
Brick: Cement
Brick overlaid on plastic cover
Lowering of water depth is recorded
Area and number of farmers to be demonstrated: 2 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/ NGO:
State department of Agriculture and Watershed development department

Programme 4: Use of efficient, low cost portable pump for lifting water from farm pond

Objective:

- To demonstrate the usefulness of low cost portable pump for lifting water from pond

Technology:

To minimize the cost of operation, portable pump kept in the custom hiring centre.
Petrol start-diesel runs 1.5 hp centrifugal pump of cost Rs 10000/unit
Area and number of farmers to be demonstrated: Demonstration to all farmers in the village
Cooperation of Agricultural research station of KVK/state department/ NGO:
State department of Agriculture and Watershed development department

Programme 5: Water use in single use-agriculture: multiple use agriculture, livestock, pesticide application, fisheries etc.

Objective:

- Efficient use of collected runoff water for high value crop production

Technology:

- To harvest and use the water as a protective irrigation & nourishing vegetable crops grown around the farm pond

Area and number of farmers to be demonstrated: 2 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/ NGO:
State department of Agriculture and Watershed development department

Programme 6: Proven location specific *in-situ* moisture conservation practices along with the use of harvested water as supplemental irrigation wherever applicable to be demonstrated along with farmers' practices.

Objective:

- To demonstrate efficient *in-situ* moisture conservation practices to overcome short dry spells

Technology:

- Conservation furrows of 60 cm width will be formed with a country plough at regular interval in between crop rows to minimize the velocity of runoff flow and to create more opportunity for rain water to infiltrate

Area and number of farmers to be demonstrated: 4 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/ NGO:

State department of Agriculture

Programme 7: Recycle farm pond silt for agriculture and horticulture purposes. Tank silt applicator programme can be used for this purpose

Objective:

- To recycle the silt from farm pond to crop lands for enhancing water productivity and soil health.

Technology:

- Farm pond farmers will use silt for agriculture purpose

Area and number of farmers to be demonstrated: 2 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:

State department of Agriculture

Programme 8: Budgeting of ground water use

Design and execution of ground water recharge structures/percolation pond etc.

Participatory ground water monitoring for reducing the use of water by land use diversification

Objective:

- Adoptions of ground water recharge (open and wells) and sharing practices at whole village level.

Technology:

- Excavation of pit around the bore well (10ft x 10ft x 10ft) making holes at the bottom and covering with mesh, filling with boulders (1.2 m), 40 mm pebbles (0.4 m), 20 mm pebbles (0.4 m), covered with mesh and charcoal (0.1 m) overlaid with sand

Area and number of farmers to be demonstrated: 2 ha & 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

State department of Agriculture

Theme 3. Efficient energy use and management

Progamme 1: Popularizing of suitable manual tools and implements bullock/tractor drawn implements for various operations through custom hiring

Objectives:

- Identification of suitable farm implements/machinery for farm operations like tillage operation, harvesting, post harvest operation etc
- One custom hiring centre in the Chikkamaranahalli hamlet villages will be established with essential implements/equipments and operationalised

Technology:

To perform timely and precise field operations

Primary tillage implements:

- Disc plough (tractor drawn)
- MB plough (tractor drawn)
- Cultivator (tractor drawn
- Post hole digger (tractor drawn)
- Rotavator (tractor drawn)
- Leveller (tractor drawn)
- Kolar iron plough (bullock drawn)

- **Secondary tillage implements**
  - Spike tooth harrow (tractor drawn)
- **Sowing equipments**
  - Seed-cum-fertilizer drill for fingermillet (bullock drawn)
  - Multi furrow opener (bullock drawn)
  - Hand ridger/furrow opener (manual)
- **Weeding and Interculture**
  - Hand weeders (hand operated)
- **Plant protection equipment**
  - Knapsack sprayer (hand operated)
- **Harvesting Equipments**
  - Improved sickles (hand operated)
- **Threshing, Cleaning and Value addition**
  - Groundnut decorticator (manual)
  - Hand operated maize Sheller (manual)
  - Winnower (electric motor/ tractor)
  - Dal Mill (electric)

Area and number of farmers to be demonstrated: 36 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
State Department of Agriculture

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station:

Programme 1: Amla based cropping system
Objective:

- To get higher net returns per unit area

Technology:
Alternate land use / Farming systems for carbon sequestration and ecosystem services

- Amla + fingermillet
- Amla + fodder maize
- Amla + grain amaranthus
- Amla + cowpea
- Amla + horsegram
- Amla + fieldbean
- Amla only
- Fingermillet only
- Fodder maize only
- Grain amaranthus only
- Cowpea only
- Horse gram only
- Field bean only

Area and number of farmers to be demonstrated: 2 ha
Co-operation of Agricultural research station of KVK/ state department/NGO:
State Department of Horticulture and other AICRPs

Programme 2: Custard apple based cropping system
Objective:

- To get higher net returns per unit area

Technology:
Alternate land use /Farming systems for studying Agri- horti system in dry farming
Assessment of staggered income

- Custard apple + finger millet
- Custard apple + field bean (vegetable purpose)
- Custard apple + cow pea (grain purpose)
- Custard apple + niger
- Custard apple + fodder maize
- Custard apple + green chilli
- Custard apple alone
- Finger millet alone
- Field bean alone
- Cow pea alone
- Niger alone
- Fodder maize alone
- Green chilly alone

Area and number of farmers to be demonstrated: 1 ha

On-farm:

Programme 1: Mango + finger millet/horse gram system and inclusion of *Stylosanthes hamata,* grasses on the bunds pongamia and glyricidia on the bunds

Objective:

- To demonstrate the efficient use of natural resources and generation of biomass and fodder for the improvement of soil health and livestock production.

Technology:

- Mango + fingermillet/horse gram system and inclusion of *Stylosanthes hamata,* Grasses on the bunds

Area and number of farmers to be demonstrated: 2 ha & 5 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:

State department of Agriculture

4. Pearlmillet based production system

4.1 Agra

4.1.1 Agro-climatic zone: South western semi-arid plains and central high lands including Aravalies

4.1.2 Agro-ecological sub-region: 4.1

4.1.3 Action Research Area: Technology demonstration

4.1.4 Village details: Nagla Duleh khan village, Kheragarh block, Agra district

4.1.5 Climatic vulnerabilities: Delayed onset of monsoon, long break and dry spells during crop growth period. Drought mitigating strategy adopted by the farmers.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: To identify the performance of drought tolerance varieties

Objective:

- To assess the superiority of *kharif*/ *rabi* crops varieties

Technology:

***Kharif*:**

Pearlmillet: Pro-agro 9444, JKBH-26, JK 778

Sesame: RT-46, TKG-55, TKG-306

Clusterbean: RGC-1002, RGC-936, RGC-1025

***Rabi*:**

Mustard – Bio-902, Rohni, Urwashi, Vasundhara, NRCDR-HB-101

Chickpea: K-850, Avrodhi, H-3

Wheat: PBW - 550, HD 2687, Raj 3765, DBW-17

Area and number of farmers to be demonstrated:

kharif: 14.4 ha & 36 farmers ***Rabi***: 19.6 ha & 49 farmers

Cooperation of Agricultural Research Station of KVK/State Department/NGO:

AICRPDA, RBS College, Bichpuri; KVK, Agra

Programme 2: To demonstrate the productivity and profitability of intercropping/ strip cropping which provide resilience to climate variability

Objectives:

- To minimize the impact of climatic variability on the productivity of crops
- To meet out the domestic need of vegetable oil through mustard

Technology:

- Base crop (pearlmillet) will be sown in definite rows in *kharif* season

Kharif:

- Pearlmillet + clusterbean (4:4)
- Pearlmillet + sesame (4:4)

***Rabi*:**

- Chickpea + mustard (5:1)

Technology:

Chickpea crop is sown in 5 rows with 1 row of mustard instead of sole mustard

Area and number of farmers to be demonstrated: 4.8 ha & 12 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:

AICRPDA, RBS College, Bichpuri; KVK, Agra

Programme 3: To demonstrate the benefits of green manuring on mustard
Objectives:

- To reduce the nutrient requirement of mustard
- To protect the soil loss through double cropping system
- To work out the economic benefits of the system

Technology:

- Greengram-mustard
- Sesbania-mustard

Area and number of farmers to be demonstrated:
Kharif*:* 1.6 ha & 4 farmers; ***Rabi:*** 1.6 ha, & 4 farmers; **Total:** Area: 3.2 ha & 8 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, RBS College, Bichpuri; KVK, Agra

Programme 4: To maximize income of farmers through integrated nutrient management and *in-situ* moisture conservation practices
Objectives:

- To improve the indigenous cropping system with introduction of integrated nutrient management practices
- To workout the economic benefit of the system
- To workout water balance, nutrient balance and energy balance

Technology:
Kharif**:** Pearlmillet: Split of nitrogen 3 times; ***Rabi:*** Mustard 50 kg K with RDF
Area and number of farmers to be demonstrated:
12 ha and 30 farmers (*kharif*: 15 farmers and *Rabi*: 15 farmers)
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, RBS College, Bichpuri; KVK, Agra; AICRP on Use of Saline Water

Programme 5: Agro advisories combining the village level weather data lined to district advisory issue by IMD/AICRPDA centre, RBS College, Bichpuri, Agra. Efforts will be made in installing manually operated rain gauges and internet facilities at Panchayat level with the help of AICRPDA, RBS College Bichpuri Agra. The agro-advisories for each of the crops and cropping systems will be developed with the help of Agronomist and Scientist of RBS College, Bichpuri, Agra and will be put on line use.
Objectives:

- To create awareness among the farmers regarding monsoon situation
- To minimize the risk through advance knowledge of climatic situation
- To prepare a plan in advance for avoiding losses by insects & pests

Technology:

- Pass on the latest climatic information collected from IMD to the farmers through telephonic and individual interactions.

Area and number of farmers to be demonstrated: To village farmers
Cooperation of Agricultural research station of KVK/state department/ NGO:
Agricultural research stations of KVK/ IMD/ State Department, AICRPDA centre Agra; RBS collge Bichpuri, Agra

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: Impact of individual *in-situ* moisture conservation practices
Objective:

- Evaluation and identification of efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

- Deep ploughing once in three years (mustard)
- Open furrow by ridge across the slope/ridge and furrow system of planting

- Compartmental bunding
- Tillage after each effective rainfall (mustard)

Area and number of farmers to be demonstrated: 16 ha & 40 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:
AICRPDA, RBS College, Bichpuri, Agra; KVK/ State deparment, Agra

Programme 2: Supplemental irrigation at critical crop growth stages of rainfed crops from harvested water in farm ponds (catchment storage-command relationships of farm ponds, with efficient use of water (micro irrigation systems etc.)

Objective:

- To enhance cropping intensity and crop yield by efficient utilization of water

Technology:

- Vegetables
- Mustard
- Wheat

Area and number of farmers to be demonstrated: 16 ha & 40 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:
AICRPDA, RBS College, Bichpuri, Agra

Programme 3: Adoption of ground water recharge (opens and bore wells) and sharing practices at whole village level

Objective:

- Evaluation and identification of feasibility of ground water augmentation techniques for enhanced water table, yield and crop productivity

Technology:

- Recharge of defunct open wells/bore wells, directing runoff water and catchment area to defunct open wells/bore wells with appropriate filters. In the entire village, number of defunct open wells and bore wells will be identified. Different recharging techniques suited to the site conditions will be demonstrated.

Area and number of farmers to be demonstrated: 10 farmers, 10 bore wells/ defunct wells will be recharged for up-lifting of ground water table and improving quality of ground water

Cooperation of Agricultural research station of KVK/state department/ NGO:
AICRPDA, RBS College, Bichpuri, Agra

Programme 4: To demonstrate the influence of tank silt for enhancing crop yield

Objective:

- To assess the effect of tank silt on soil moisture and crop productivity

Technology:

- Application of tank silt for enhanced mustard productivity

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, RBS College, Bichpuri, Agra

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon and make agricultural operations easier

Objectives:

- Popularization of proven implements through custom hiring centre
- To reduce the cost of agricultural operations by proven implements

Technology:
A custom hiring centre will be established in the selected village. The following implements viz., Ridger seeder (2), Rotavator, Raised bed planter, Mould board plough, Power sprayer (2),

Hand sprayer (2), Hand hoe (2) etc. will be purchased and kept in the custom hiring centre for further use by the farmers.

Area and number of farmers to be demonstrated: To the village farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:
AICRPDA, RBS College, Bichpuri, Agra

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Studies on Ber and Bel based agri-silvi-horti system

Objectives:

- To stabilize the income of farmers under aberrant weather situation
- To find out the impact of Ber/ Bel based horti-system on the performance of green fodder of pearlmillet and seed yield of mustard

Technology:

- Ber + green fodder (pearlmillet)
- Ber + mustard
- Bel + green fodder (pearlmillet)
- Bel + mustard

Area and number of farmers to be demonstrated: 1.6 ha and 4 farmers

Cooperation of Agricultural research station of KVK/state department/ NGO:
AICRPDA, RBS College, Bichpuri, Agra

Programme 2: Up-scaling of awareness regarding animal health

Objective:

- To improve the health and productivity of livestock

Technology:

- Balance feeding (mineral mixture)
- Vaccination

Area and number of farmers to be demonstrated: 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, RBS College, Bichpuri, Agra

4.2 Hisar

4.2.1 Agro-climatic Zone: South western zone in Haryana

4.2.2 Agro-ecological sub-region: 2.3

4.2.3 Action Research Area: Technology demonstration

4.2.4 Village details: Budhshelli village, Siwani block, Bhivani district; Chanond and Balawas of Hisar Block, Hisar district of Haryana

4.2.5 Climatic vulnerabilities:

- The annual average rainfall of the district is about 320-350 mm with high degree of variability (CV = 32.5%).
- The south-west monsoon contributes about 80% to the total rainfall.
- The probability of occurrence of normal rainfall is 35%.
- The south-west monsoon starts from 4th week of June and extends up to end of September. In past four decades (1971-2010), 10 drought years occurred.
- The ground water is deep and of poor quality. Further, the scarcity of food, fodder and fuel wood particularly during drought periods is very acute.
- Pests and diseases of crops & livestock- Aphid in raya and pod borer of chickpea are major insects. For cattle, Foot and mouth disease (FMD), Anestrus and Mastitis are most prevalent diseases.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding, severe P and Zn deficiency and poor genetic potential
- Migration from the region due to undulating topography, meager employment opportunity, frequent droughts, poor crop and livestock productivity.
- Poor access to improved seed and agricultural inputs, farm machinery leads to delayed sowing, reduced and uneven germination.

Theme 1. Real time contingency plans implementation both on-station and on-farm in a participatory mode

Programme 1: Introduction of drought tolerant high yielding varieties of *kharif* and *rabi* crops

Objectives:

- To sustain the productivity of pearl millet under moderate drought situations
- To introduce castor as a substitute of pearl millet on selective basis
- To stabilize the productivity of chickpea under rainfed situations
- To improve the productivity mustard under rainfed situations

Technology:

Cropping systems

For early and delayed onset:

Only mono cropping is possible.

- Drought tolerant, short duration and high yielding pearlmillet varieties
- Introduction of high yielding chickpea varieties suitable for rainfed areas
- Introduction of high yielding mustard varieties suitable for rainfed areas
- Intercropping/strip cropping of pearl millet + green gram (8:4/6:3)

Area and number of farmers to be demonstrated: 4 ha & 10 farmers for each crop and system

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Hisar with line departments and KVK, Bhiwani and Hisar; DDA Bhiwani and Hisar, IFFCO/KHRIBHCO/Soil Conservation Officer/National Horticulture Mission

Programme 2: Testing of management practices for different crops

Objective:

- Evaluation and identification of efficient and farmer friendly *in-situ* moisture conservation practices

Technology:

- **Farmers' (conventional knowledge) practices**
- **Soil moisture conservation practices**
- Deep summer ploughing in alternate year
- *In-situ* water harvesting
- Ridge and furrow sowing

The program will be implemented as per the contingency plans already made by the centre. With the onset of monsoon, the crops will be sown as listed under crop-wise management strategies prepared for different crops under different on-set and stress conditions.

Area and number of farmers to be demonstrated: 4 ha & 10 farmers in each of the NICRA Villages

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Hisar with line departments and KVK, Bhiwani and Hisar; DDA Bhiwani and Hisar, IFFCO/KHRIBHCO/Soil Conservation Officer/National Horticulture Mission

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: *In-situ* /*Ex- situ* rain water conservation and mid season corrections to overcome short dry spells:

- Discing after every significant rainfall
- Adoption of ridger seeder for sowing
- To harvest every possible rain drop and its efficient use in crop production

Objectives:

- To ensure enough moisture conservation for successful rabi crop of mustard or gram
- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for light textured undulating topography

Technology:

- Sowing across the slope
- Deep ploughing every year with residue incorporation
- Sowing with ridger seeder
- Moisture conservation and weed control with wheel hand hoe

Area and number of farmers to be demonstrated: 4 ha & 10 farmers for *in-situ* in each adopted NICRA, Village. One site foe *ex-situ* water harvesting

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Hisar with line departments and KVK, Bhiwani and Hisar; DDA Bhiwani and Hisar, IFFCO/KHRIBHCO/Soil Conservation Officer/National Horticulture Mission

On-station:

Programme 1: Catchment–storage-command area relationship for increasing water productivity in micro watersheds

Objective:

- To enhance the economic returns and minimize the risk in case of droughts

Technology:

- Development of catchment –storage- command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving techniques

Production systems:

- Alternate land use planning

Area and number of farmers to be demonstrated: 2 ha at Hisar and 2 ha at Balsmand
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Hisar with line departments and KVK, Bhiwani and Hisar

Theme 3. Efficient energy use and management

Programme 1: Introduction of improved farm machines for reducing the drudgery and timely completion of farm operations

Objectives:

- Introduction of modern machines and to create awareness in the farming community about their use for different crops
- Sensitizing the farmers on the basic concept of custom hiring

Technology:

- The improved farm machines e.g. ridger seeder, wheel hand hoe and seed-cum-fertilizer drills shall be provided to the adopted farmers in selected villages. These machines will be purchased from NICRA funds and kept in the villages for further use by the farmers at nominal costs.

List of equipments purchased:

- Ridger seeders- 3 Nos
- Seed-cum-fertilizer drills-3 Nos
- Wheel hand hoes-40 Nos
- Spray pumps-3 Nos

Area and number of farmers to be demonstrated: It shall be available to all the willing farmers in the NICRA villages

Cooperation of Agricultural research station of KVK/State Department/NGO
AICRPDA center, Hisar with line departments and KVK, Bhiwani and Hisar

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: On-farm demonstration of rain water harvesting and establishment of arid fruits and trees including fodder, fuel and vegetable component. Use of CPRs suited to the type and availability for animal feed and fuel wood needs of rural households (Linkage with local departments etc.)

Objectives:

- Rehabilitation of dunal sands and denuded soil with organic carbon for resilient agriculture.
- To find out the impact of tree based agri-silvi- horti systems on soil fertility, productivity and carbon sequestration

Technology:

- Khejri based tree plantation and maintenance + *Cenchrus* + silvi-pastoral systems
- Ber + guava + fodder and vegetable in interspaces

Area and number of farmers to be demonstrated: 1 ha area for on-station (Hisar) and 0.3 ha & 1 farmer field in Shamlat/common land

Cooperation of Agricultural research station of KVK/state department/NGO: AICRP on Dryland Agriculture, Hisar; Dept. of Hort. CCS HAU, Hisar; State Dept. of Agri/Horticulture

4.3 S.K. Nagar

4.3.1 Agro-climatic Zone: Northern Gujarat in Gujarat State

4.3.2 Agro-ecological sub-region: 2.3

4.3.3 Action Research Area: Technology demonstration

4.3.4 Village details: Village: Kalimati and Dholiya, Taluka:Amirgadh, District:Banaskantha

4.3.5 Climatic Vulnerabilities:

Village 1: Kalimati and Dholiya, Taluka: Amirgadh, Banaskantha district

- Selected village is very near to AICRPDA centre for easy and frequent accessibility.
- The selected village soils are of sandy loam to sandy and loamy sand textured classes . The organic carbon, nitrogen and heat soluble sulphur content in the soil was found to be low. The soils are highly deficient in available N and medium in available P and medium to high K status of the soils, having low in water holding capacity.
- The rainfall being adequate is uncertain and erratic in nature. The average annual rainfall varies from 550 to 650 mm. The mean annual temperature ranges between 25^{o} C and 30^{o} C. The mean relative humidity is generally high during June to September (60 to 80 %). The PET ranged between 1600 mm to 2000 mm.
- The ground water level of the village varies from 300 to 400 ft.
- The poor access to improved seeds, farm machinery and labour shortage, make difficult timely sowing/planting.
- Pest and diseases of the crops and livestock are common.
- Low productivity of the animal account of fodder scarcity, imbalance feeding and poor genetic potential.

Village 2: Chandanki, Taluka: Becharaji, Mehsana district

- Selected village is 130 km away from AICRPDA centre. The village has potential for water harvesting structure (i.e. 3 natural farm ponds.) It has 100% dry land agriculture.
- The selected watershed of the village has medium black sodic soils having low organic carbon and N, low to medium in P and medium to high in available K and medium in water holding capacity.
- The average annual rainfall is about 560 mm from June to September. Besides spatial variation, wide fluctuation of rainfall and drought in 2 out of five years was observed. The mean annual temperature ranges between 25 and 30^{0}C. The mean relative humidity is generally high during June to September (60 to 80%). The PET ranged between 1600 to 2000 mm.
- The ground water level of the village varied from 800 to 1000 ft.
- The poor access to improved seeds, farm machinery and labour shortage, make difficult timely planting difficult.
- Pest and diseases of the crops are common.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Evaluation of drought tolerant varieties and different crop management strategies to cope up weather aberrations

A) Varieties / hybrids

Objective:

- To evaluate adaptation of drought tolerant short duration varieties

Technology:

- Hybrid /improved varieties of Pearlmillet, Maize, Cotton, Green gram, Clusterbean, Blackgram, Castor

B) Cropping System

Objective:

- To evaluate adaptation of the efficient crop and cropping systems with suitable practices

Technology: Intercropping technolgy

- Castor + greengram
- Cotton + blackgram

Management practices

- **Farmers' (Conventional knowledge) practices**
- **Soil moisture conservation practices**

- Deep summer ploughing alternate year
- Minimum tillage/zero till seeding for *rabi*
- Nutrient management
- Line sowing with wider spacing for *rabi*
- Improved/ local varieties
- Weed control

Either or combination of above contingency interventions will be applied subject to situation and Farmers' preference.

Area and number of farmers to be demonstrated: 8 ha & 59 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, SK Nagar

On-station:

Programme 1: Evaluation of drought tolerant varieties and different crop management strategies to cope up weather aberrations

Objective:

- To evaluate adaptation of drought tolerant short duration varieties

Technology:

Hybrid /improved varieties of Pearlmillet, Maize, Cotton, Green gram, Clusterbean, Blackgram,

Area and number of farmers to be demonstrated: 0.2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, SK Nagar

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: foliar spray of 2% urea on standing crops and additional N application of 10-15 kg/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

In-situ

- Demonstration of compartmental bunding in pearlmillet, castor crop and ridges and furrow methods of sowing for castor to increase *in-situ* moisture conservation for higher productivity

Ex-situ

- Demonstration on rain water harvesting for supplement irrigation for higher production

Area and number of farmers to be demonstrated: 8 ha & 20 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, SK Nagar

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment-storage-command relationships of farm ponds, with efficient use of water micro irrigation systems)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

Adoption of micro-irrigation system for castor, cotton and cumin crops

Area and number of farmers to be demonstrated:

8 ha & 20 farmers fields as well as on-station

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, SK Nagar

On-station:

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: foliar spray of 2% urea on standing crops and additional N application of 10-15 kg/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

In-situ

- Demonstration of compartmental bunding in pearlmillet, castor crop and ridges and furrow methods of sowing for castor to increase *in-situ* moisture conservation for higher productivity

Ex-situ

- Demonstration on rain water harvesting for supplement irrigation for higher production

Area and number of farmers to be demonstrated: 0.2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, SK Nagar

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon.

Objectives:

- Establishment of custom hiring centre to create awareness amount the farming community about their use at different growth stages of crops.
- Custom hiring services for the following implements

Technology:

- Demonstration of different sowing machine (Roto till drill, Strip till Drill, Zero till Drill, Numatic Planter and Raised bed Planter) for reduce the time, cost and management of natural resources for higher productivity

Area and number of farmers to be demonstrated: 5.2 ha & 13 farmers field

Cooperation of Agricultural research station of KVK/state department/NGO:

CWMPR & RE, AICRPDA and S.D. Agricultural University, Sardarkrushinagar

On-station:

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon.

Objectives:

- Establishment of custom hiring centre to create awareness among the farming community about their use at different growth stages of crops
- Custom hiring services for the different implements

Technology:

- Demonstration of different sowing machines (Roto till drill, Strip till Drill, Zero till Drill, Numatic Planter and Raised bed Planter) to reduce the time, cost and management of natural resources for higher productivity

Area to be demonstrated: 0.2 ha

5. Sorghum Based Production System

5.1 Bijapur

5.1.1 Agro-climatic Zone: Northern Dry Zone of Karnataka
5.1.2 Agro-ecological sub-region: 6.1
5.1.3 Action Research Area: Technology demonstration
5.1.4 Village details: Kaulagi Micro Watershed, Bijapur taluk, Bijapur district
5.1.5 Climatic vulnerabilities:

- The mean annual rainfall is 584 mm. The south-west monsoon contributes 63.8%, while north-east monsoon contributes 23.9% and 12.3% occursduring summer. The probability of occurrence of normal rainfall is 60%. The south-west monsoon starts from first of June and extends up to end of August followed by North-east monsoon from September to December.
- The coefficient of variation of rainfall is about 39%. Agriculture drought of minimum of 30 days between July and August months is quite common, hence crops which will be at critical growth period are frequently subjected to moisture stress and insect attack particularly leaf minor and bud necrosis are also quite common.
- The ground water potential is very low. Further the scarcity of fodder to livestock particularly during drought period is very acute.
- Pests and diseases of crops & livestock is common.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: Evaluation of drought tolerant varieties of crops

Objective:

- To identify suitable drought tolerant varieties for different soils

Technology:

➢ ***Shallow black and red soils***

Evaluation of varieties of pearlmillet (ICMV-221, ICTP-8203, R-8808), pigeonpea (Maruti, WRP-1, ICPL-87, Pragati), groundnut (TMV-2, JL-24), castor (4-1, GCH-4), sesame (E-8, DS-1), horsegram (GPM-6), mothbean local and sunflower (KBSH-53)

➢ ***Medium to deep black soil***

Evaluation of varieties

➢ ***Kharif* season**

Greengram (Sel-4, China mung/ Pusa baisaki), pigeonpea (TS-3R, BSMR-736 and ICP-8863)

➢ ***Biseasonal***

Cotton (Jayadhar, DLSA-17, DDHC-11 and DB3-1), castor (GCH-4, 48-1)

➢ ***Rabi season***

Sesame (DS-1, E-8 and Local), sunflower (KBSH-53), chickpea (BGD-103, ICCV-10 and JG-11), *Rabi* sorghum (M35-1, DSV-4 and DSH-4) and safflower (A-1, NARI, A-2)

Area and number of farmers to be demonstrated: 6.8 ha and 17 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA, Bijapur with watershed development department and watershed associations

Programme 2: Most efficient intercropping which provides resilience to climate variability (evaluated and disseminated by AICRPDA).

Objective:

- Evaluation and identification of sustainable intercropping, rotational sequence cropping systems for different soils

Technology:

Shallow black and red soils

- Pearlmillet + pigeonpea (2:1)
- Groundnut + pigeonpea (4:2)
- Pearl millet + groundnut (1:2) or (2:4)
- Pigeonpea + sesame (2:4)

Medium to deep black soils

- *Rabi* sorghum + chickpea (2:1), (1:4), (2:4)
- Safflower + chickpea (2:4)
- Pigeonpea + greengram (2:4)
- Chilli + onion (2:4), (1:4)
- Onion-chickpea/*rabi* sorghum
- Sunflower + castor (4:2)
- Sunflower (widerows)-chickpea/ *rabi* sorghum + chickpea (2:4 or 1:4 or 2:1)
- Safflower + chickpea (2:4)
- Pearlmillet (widerows)-chickpea / *rabi* sorghum + chickpea (1:4 or 2:4 or 2:1)
- Chilli + onion + cotton (1:4, 2:4)
- Pearl millet (widerows)-sunflower (widerows)

Area and number of farmers to be demonstrated: 14 ha & 35 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, Bijapur with watershed development department and watershed associations

Programme 3: Agro-advisories combining the village level weather data lined to district advisory issue by IMD/SAU (Linkage with AICRPAM): Efforts will be made in installing automatic and manually operated rain gauges and internet facilities at panchayat level with the help of watershed development department. The agro-advisories for each of the crops and cropping systems will be developed with the help of Agronomist and Scientist of AICRPM and they will be put on-line use.
Area and number of farmers to be demonstrated: 14 ha & 35 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA, Bijapur with watershed development department and watershed associations

On-station:

Crop and cropping systems:

Programme 1: Pigeonpea + greengram - greengram - *rabi* sorghum + chickpea yearly rotational cropping system with different row ratios under set furrow cultivation in medium to deep black soil.

Objectives:

- To study the suitable planting geometry
- To mitigate the mid season drought
- To maintain the fertility of the soil by incorporation the crop residue
- T workout the water balance and the economics of the system

Technology:

First year

Normal on set of rains

Pigeonpea + greengram

- Pigeonpea + greengram (1:2) (90 cm X 20 cm)
- Pigeonpea + greengram (1:2) (135 cm X 20 cm)
- Pigeonpea + greengram (2:2) (135 cm X 30 cm)
- Sole pigeonpea (135 cm X 45 cm)
- Pigeonpea + greengram (2:1) (120 cm X 20 cm)
- Pigeonpea + greengram (2:4) (75 - 225 - 75 X 30 cm)
- Pigeonpea + greengram (2:2) (45 - 135 - 45 X 30 cm)
- Sole green gram (135 cm X 45 cm)

- **Delayed on set of monsoon**

Pigeonpea + chickpea (Late *Kharif* /*rabi* situation)

- Pigeonpea + chickpea (1:2) (90 cm X 20 cm)

- Pigeonpea + chickpea (1:2) (135 cm X 20 cm)
- Pigeonpea + chickpea (2:2) (135 cm X 30 cm)
- Sole Pigeon pea (135 cm X 45 cm)
- Pigeonpea + chickpea (2:1) (120 cm X 20 cm)
- Pigeonpea + chickpea (2:4) (75 - 225 - 75 X 30 cm)
- Pigeonpea + chickpea (2:2) (45 - 135 - 45 X 30 cm)
- Sole chickpea (135 cm X 45 cm)

Second year

Normal on set of rains (During *Kharif*) Sole Green gram

***Rabi* season**

***Rabi* Sorghum + chickpea**

- *Rabi* Sorghum + chickpea (1:2) (90 cm X 20 cm)
- *Rabi* Sorghum + chickpea (1:2) (135 cm X 20 cm)
- *Rabi* Sorghum + chickpea (2:2) (135 cm X 30 cm)
- Sole Sorghum (45-135-45cm)
- *Rabi* Sorghum + chickpea (2:1) (120 cm X 20 cm)
- *Rabi* Sorghum + chickpea (2:4) (75 - 225 - 75 X 30 cm)
- *Rabi* Sorghum + chickpea (2:2) (45 - 135 - 45 X 30 cm)
- Sole chickpea (45-135-45cm)

Area and number of farmers to be demonstrated: 0.3 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP on Dryland Regional Agricultural Research Station, Bijapur, UAS, Dharwad

Programme 2: Optimization of plant population and planting geometry for pigeonpea under set furrow cultivation in medium deep black soil.

Objectives:

- To optimize the plant population and planting geometry
- To enhance the productivity of pigeon pea with green leaf manures and crop residue incorporation
- under set-furrow cultivation
- To workout water balance and nutrient balanc
- To workout the economics

Technology:

- **Normal onset of monsoon**

Pigeonpea + greengram with planting geometry of (i) 75-225-75 cm X 10 cm; (ii)75-225-75 cm X 20 cm; (iii) 75-225-75 cm X 30 cm; (iv) 75-225-75 cm X 45 cm; (v) 75-225-75 cm X 60 cm; (vi)75-225-75 cm X 90 cm; (vii)135 cm X 10 cm; (viii) 135 cm X 20 cm; (ix) 135 cm X 30 cm; (x) 135 cm X 45 cm; (xi) 135 cm X 60 cm; (xii) 135 cm X 90 cm; (xiii) 90 x 20 cm With furrow; (xiv) 90 x 20 cm Without furrow

- **Delayed onset of monsoon**

Pigeonpea + chickpea (2:4, 1:2, 1:1)

Area and number of farmers to be demonstrated: 0.6 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP on Dryland Regional Agricultural Research Station, Bijapur, UAS, Dharwad

Programme 3: Evaluation and improvement of ITK cropping system in rotation with pigeonpea + greengram (2:4)

Objectives:

- To improve the indigenous cropping system with introduction of integrated nutrient management practices
- To workout the economic benefit of the system
- To workout water balance, nutrient balance and energy balance

Technology:

Kharif	***Rabi***
Greengram	Sorghum + chickpea (2:1)
Pearlmillet + greengram (1:2)	Sorghum + chickpea (2:1)
Onion – sorghum relay cropping	
Chilli + cotton (1:1)	
Pearlmillet + greengram (1:2)	Chickpea
Sunflower (135 cm wider row)	Sorghum
Sunflower (135 cm wider row)	Chickpea
Pearlmillet (135 cm wider row)	Sunflower wider row
Fallow	Sorghum
Chilli + cotton (intra row planting)	-

Area and number of farmers to be demonstrated: 0.4 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP on Dryland Regional Agricultural Research Station, Bijapur, UAS, Dharwad

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: foliar spray of 2% urea on standing crops and additional N application of 10-15 kg/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

Shallow black and red soils

- Set furrow cultivation – horse gram green manure/glyricidia green manure
- Conservation furrow
- Deep ploughing every year with residue incorporation

Medium to deep black soils

- Compartment bunding
- Tied ridges
- Gravel sand
- Pebble mulching
- Set furrow cultivation- sunhemp/glyricidia green leaf manure + residue

Area and number of farmers to be demonstrated: 2.9 ha and 8 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP on Dryland Regional Agricultural Research Station, Bijapur, UAS, Dharwad

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment-storage-command relationships of farm ponds, with efficient use of water micro irrigation systems)

Objective :

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

Production systems:

- Mulberry for silk rearing
- Dryland horticulture component-sapota+ Jasmine

Supplementary irrigation for arable cash crops:

- Cucumber
- Greengram

- Pigeonpea + greengram
- Chickpea + sorghum

- Adoption of micro-irrigation system for horticulture crops
- Lifting the farm pond water with non-conventional energy system

Area and number of farmers to be demonstrated: 2.0 ha and 2 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP on Dryland Regional Agricultural Research Station, Bijapur, UAS, Dharwad

Programme 3: Catchment-storage-command area relationship for increasing water productivity in micro-watersheds
Objectives:

- Develop catchment-storage-command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving technique.
- To promote double cropping system and techniques enhance cropping intensity and crop yield by efficient utilization of water**.**

Area and number of farmers to be demonstrated: 1.2 ha & 1 farmer
Cooperation of Agricultural research station of KVK/state department/NGO:
Watershed development department, State Government

Programme 4: Adoption of ground water recharge (open and bore wells) and sharing practices at whole village level (Linkages with watershed programmes etc.)
Objective:

- Evaluation and identification of feasible ground water augmentation techniques for enhanced water yield and crop productivity

Technology:
Recharge of defunct open wells / bore wells:
Directing nala water to defunct open wells/bore wells with appropriate filter: In the entire micro watershed, the number of defunct open wells and bore wells will be identified and different recharging techniques suiting to the site conditions will be demonstrated with the help of watershed development department.
Area and number of farmers to be demonstrated: 1 open well, 1 borwell & 1 farmer
Cooperation of Agricultural research station of KVK/state department/NGO:
Watershed development department, State Government

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon.
Objectives:

- Establishment of custom hiring centre to create awareness among the farming community about their use at different growth stages of crops.
- Custom hiring services for different implements

Technology:
A custom hiring center will be established in the identified micro-watershed. The following automatic and conventional implements viz., bullock drawn automatic seed drill (2) tractor drawn automatic seed drill (2), cycle weeders (5), Ridger (5), Bund former (5) and tractor drawn furrow openers (1) will be purchased and kept in the custom hiring centre for further use by the farmers.

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Use of CPRs depending on the type and availability for fodder cultivation for meeting fodder needs during droughts and low crop residue availability (linkage with local departments)

Objective:

- Rehabilitation of shallow, marginal and denuded soil with organic carbon for resilient agriculture

Technology:

- ***Shallow black and red soils***

Tamarind + custard apple + Jamun based Agri-horti systems

- ***Medium to Deep black soil***

Sapota+ Aonla based Agri-horti systems

- ***Denuded soils***

Tamarind and wood apple

Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP on dryland regional Agricultural Station, UAS, Dharwad

On-station:

Programme 1: Studies on Aonla based agri-silvi- horti system in medium black soils.

Objectives:

- To increase the productivity of land
- To findout the impact of aonla based horti system on the performance of safflower + chickpea (2:4) intercropping system

Technology:

Horticulture/Tree species

- Aonla + custard apple + henna
- Aonla + custard apple
- Aonla + henna
- Aonla only

Arable crops

- No crop
- Chickpea only
- Chickpea + safflower (4:2)

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP on Dryland Agriculture, Regional Agricultural Research Station, Bijapur.

Programme 2: Studies on sapota based agri-horti system in shallow to medium black soils.

Objectives:

- To increase productivity and profitability of land
- To evaluate the impact of different sapota based horti systems on chickpea

Technology:

Intra-row planting

- Sapota alone
- Sapota + guava
- Sapota + fig
- Sapota + drumstick

Inter-row planting

- No plantation
- Guava
- Fig
- Drumstick

Area and number of farmers to be demonstrated: 0.6 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Dept. of Agriculture; Dept. of Horticulture and other line departments

Programme 3: Studies on simaruba based agri-horti system in shallow to medium black soils

Objectives:

- To increase the productivity and profitability of the of land
- To findout the possible impact of simaruba based horticulture system on the performance of chickpea

Technology:

Intra-row planting	**Inter-row planting**
➢ Simaruba alone	➢ No plantation
➢ Simaruba + guava	➢ Guava
➢ Simaruba + fig	➢ Fig
➢ Simaruba + drumstick	➢ Drumstick

Area and number of farmers to be demonstrated: 0.6 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Dept. of Agriculture; Dept. of Horticulture and other line departments.

Programme 4: Evaluation of different crops in various planting geometry of tamarind in shallow soils

Objectives:

- To increase the productivity and profitability of the land with diversified cropping system
- To screen the crops to identify suitable field crop for intercropping in tamarind plantation

Technology:

- ➢ 10 m X 3 m
- ➢ 10 m X 6 m
- ➢ 10 m X 9 m

Arable crops

- ➢ Pearl millet
- ➢ Sunflower

Area and number of farmers to be demonstrated: 1 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP for Dryland Agriculture, Regional Agricultural Research Station, Bijapur

5.2 Solapur

5.2.1 Agro-climatic Zone: Scarcity Zone – IV of Maharashtra
5.2.2 Agro-ecological sub-region: 6.1
5.2.3 Action Research Area: Technology demonstration
5.2.4 Village details: Raleras, Tehsil- North Solapur District: Solapur
5.2.5 Climatic vulnerabilities:

- The annual average rainfall is about 637 mm. The south-west monsoon contributes 78%, north-east monsoon contributes 10 and 12 % occurs during summer. The probability of occurrence of normal rainfall is 50%. The south-west monsoon starts from first of June and extends up to end of August followed by North-east monsoon from September to October.
- The coefficient of variation in rainfall is about 39% and agriculture drought of minimum of 15 - 60 days between July and August months is quite common. Hence, crops which will be at critical growth period are frequently subjected to moisture stress and insect attack particularly leaf minor is common.
- The ground water potential is very low. Further the scarcity of fodder to livestock's particularly during drought periods is very acute.
- Pests and diseases of crops & livestock is common.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential.
- There are three broad types of parent rock for the formation of soils on the watershed. One is the basalt rock that has resulted in the formation of shrink-swell deep black soils with slickensides and accumulations of lime nodules and ferro-manganese concretions.
- Poor access to improved seeds, farm machinery and labour shortage, are making difficulty in timely planting, when rains are delayed.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-station:

Programme 1: Demonstration of drought management practices under climate change situation

Objective:

- To demonstrate the performance of crops under contingent situation

Technology:

Contingent crop plan for

- Pearlmillet (Shraddha, Saburi)
- Pigeonpea (Vipula)
- Greengram (Phule Vaibhav)
- Blackgram (TPU-4)
- *Rabi* sorghum (M 35-1),
- Chickpea (Vijay, Digvijay)

Area and number of farmers to be demonstrated: 0.6 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

NGO, ATMA, Department of Agriculture Maharashtra

Theme 2. Efficient intercropping systems which provide resilience to the climate variability

Objective:

- To demonstrate the performance of potential intercropping systems for stability under varied rainfall situation

Technology:

Efficient intercropping systems for maximum profitability

Pearlmillet + pigeonpea (2:1) and Sunflower + pigeonpea (2:1)

Area and number of farmers to be demonstrated: 0.4 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

On-farm:

Programme 1: Demonstration of drought management practices under climate change situation
Objective:

- To demonstrate the performance of crops under contingent situation

Technology:
Contingent crop plan for

- Pearlmillet (Shraddha, Saburi)
- Pigeonpea (Vipula)
- Greengram (Phule Vaibhav)
- Blackgram (TPU-4)
- *Rabi* sorghum (M 35-1),
- Chickpea (Vijay, Digvijay)

Area and number of farmers to be demonstrated: 48 ha & 120 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

Programme 2: Efficient intercropping systems which provide resilience to the climate variability
Objective:

- To demonstrate the performance of potential intercropping systems for stability under varied rainfall situation

Technology:
Efficient intercropping systems for maximum profitability
Pearlmillet + pigeonpea (2:1) and Sunflower + pigeonpea (2:1)
Area and number of farmers to be demonstrated: 8 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

Programme 3: Agro-Advisory combining the village level weather data
Objective:

- To provide medium range crop weather linked Agro-Advisory services to the farmers of demonstration domain area

Technology:
The control measures will be undertaken if Agro-Advisory warrants the outbreak of pest and diseases for pigeonpea and chickpea
Area and number of farmers to be demonstrated:
Kharif: pigeonpea - 8 ha & 20 farmers
Rabi: chickpea -8 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPAM, Solapur Centre -Tahsil weather data

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-station:

Programme 1: Catchment-storage-command relationship of farm ponds
Objective:

- To find out catchment-storage-command relationship for rain water harvesting structures and reuse

Technology:
Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment-storage-command relationships of farm ponds) with efficient use of water micro-irrigation systems etc.
Area and number of farmers to be demonstrated: Repairs of 3 existing farm ponds
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

On-farm:

Programme 1: *In-situ* moisture conservation to over come the short dry spells
Objective:

- To demonstrate efficient *in-situ* moisture conservation practices to overcome the short dry spells

Technology:

- Opening of ridges and furrows at 30 DAS for pigeonpea
- *In-situ* rainwater conservation *viz.,* ridges and furrows on medium deep to deep soil and compartment bands on shallow to medium soil during *kharif* followed by *rabi*.

Activities:
Proven location specific *in-situ* moisture conservation practices.
Area and number of farmers to be demonstrated:
Kharif: pigeonpea - 8 ha & 20 farmers and
Rabi: chickpea -8 ha & 20 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture, Maharashtra

Programme 2: Catchment-storage-command relationship of farm ponds
Objective:

- To find out catchment-storage-command relationship for rain water harvesting structures and reuse

Technology:
Supplemental irrigation to rainfed crops from harvested water through farm ponds (Catchment-storage-command relationships of farm ponds with efficient use of water micro irrigation systems)
Area and number of farmers to be demonstrated:
5 farm ponds; 5 farmers; Pond capacity = 500 m^3
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

Programme 3: Adoption of ground water recharge (open and bore wells) and sharing practices at whole village level
Objective:

- Evaluation and identification of feasible groundwater augmentation techniques for enhancing water yield and crop productivity

Technology:
Use of standardized filters for recharging of open wells and bore wells

Area and number of farmers to be demonstrated: 5 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

Theme 3. Efficient energy use and management

Programme 1:
Custom hiring centers for completion of the sowing, inter cultivation, weeding and harvesting.
Objectives:

- Energy auditing in all interventions
- Popularizing of suitable manual tools and implements, bullock/ tractor drawn implements for various operations through custom hiring at village level

Technology:

- For creation of awareness among the farming community about bullock / tractor drawn implements and hand operated tools at different growth stages of the crop.

Area and number of farmers to be demonstrated: 1 custom hiring center in the village.
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station:

Programme -1: Demonstration of Agri-Horti System in combination with livestock componenets
Objective:

- To demonstrate the superiority of agri-horti + livestock system for maximum profitability

Technology:
Agri-horti System
Crop: Food production
Livestock :

- Buffalo: milk production
- Goat: meat & milk production
- Poultry: meat and egg production
- Multipurpose trees: Fuel and Fodder production

Area and number of farmers to be demonstrated: 1 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

On-farm:

Programme -1: Demonstration of Silvi-pasture system
Objective:

- To demonstrate the superiority of silvi-pasture + livestock system for maximum profitability

Technology:
Silvi-pasture system
Trees - *Acacia,* Subabul Grasses - Madras anjan Marvel, Stylo Livestock – Goat (10+1)

Area and number of farmers to be demonstrated: 0.2 ha & 2 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
NGO, ATMA, Department of Agriculture Maharashtra

5.3 Jhansi

5.3.1 Agro-climatic Zone: Zone VIII: Central Plateau and hill region

5.3.2 Agro-ecological sub-region: 4.4

5.3.3 Action Research Area: Technology demonstration

5.3.4 Village details: Kadesara, Tehsil – Talbehat, District, Lalitpur, U.P

5.3.5 Climatic vulnerabilities:

- The annual average rainfall of the district is about 700 mm with high degree of variability (CV = 38.3%). The south-west monsoon contributes about 80% to the total rainfall. The probability of occurrence of normal rainfall is 33.3%. The south-west monsoon starts from 3rd week of June and extends up to end of September. In past two decades (1990-2010), the mean annual rainfall had decreased by 145.7 mm from the long period average.
- The ground water potential is very low. Further the scarcity of fodder to livestock's particularly during drought periods is very acute.
- Pests and diseases of crops & livestock are common
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential
- Migration from the region due to undulating topography, meager employment opportunity, frequent droughts, poor crop and livestock productivity has attracted the attention of the country.
- Poor access to improved seeds and agricultural inputs, farm machinery leads to delayed sowing, reduced and uneven germination when under abnormal monsoon.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: Evaluation of drought tolerant varieties and different crop management strategies for to cope up the weather aberration

Objective:

- To demonstrate the performance of crops under contingent situation

Technology:

For arable lands

Cropping Systems

For early onset

- Blackgram + sesame –fallow
- Sorghum (fodder) – chickpea
- Sorghum + clusterbean (fodder) – toria
- Groundnut – wheat
- (short duration)
- Pigeonpea (short duration) + blackgram – toria
- Subabul + (sesame + blackgram -lentil + linseed)

For delayed onset

- Sesame + blackgram – fallow
- Sorghum (fodder) – chickpea
- Fallow - chickpea+ mustard
- Maize (cob) – toria
- Arhar + sorghum (grain)
- Subabul + (sesame + blackgram –*vicia sativa*)

Vegetables

- Suitable vegetable crops

Note: Between the above two sets of cropping sequences, only one cropping sequence will be tested in a year which will depend on monsoon conditions during the year.

For CPRs/ PPRs

Establishing horti-pasture/ silvi-pasture systems for Alternate land use

Management Practices

Farmers' (conventional knowledge) practices

Soil moisture conservation practices (1-8)

- Deep summer ploughing alternate year
- Minimum tillage/zero till seeding for *rabi*
- Nutrient management through integrated plant nutrient system
- Preparation of ridges and furrows
- Line sowing with wider spacing for *rabi*
- *In-situ* water harvesting
- Improved varieties
- Prompt weed control

Note: Either or combination of above contingency interventions will be applied subject to situation and farmers preference.

Area and number of farmers to be demonstrated:

On-farm and on-station: 10 ha & 50 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre Jhansi with line departments and KVK, Lalitpur

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: Foliar spray of 2% urea on standing crops and additional N application of 10-15 kg/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

- Conservation furrow
- Deep ploughing every year with residue incorporation
- Compartmental bunding
- Tied ridges
- Set furrow cultivation-leucaena green leaf manure + residue

Area and number of farmers to be demonstrated: 2.43 ha & 12 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA, Jhansi; IGFRI, Jhansi

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment-storage-command relationships of farm ponds, with efficient use of water micro-irrigation systems etc.)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

- Adoption of micro-irrigation system for horticulture crops

Production systems:

Arable crops	**Non-arable lable**
As above (mentioned under cropping systems)	Aonla based horti-pasture
	Guava based horti-pasture
	Subabul based Silvi-pasture

Area and number of farmers to be demonstrated: 2.0 ha and 2 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Programme 3: Catchment – storage-command area relationship for increasing water productivity in micro-watersheds

Objectives:

- Develop catchment –storage- command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving technique.
- To promote double cropping system and techniques enhance cropping intensity and crop yield by efficient utilization of water**.**

Technology:

Use of water from farm pond to crops / cropping systems for higher water use efficiency

Area and number of farmers to be demonstrated:

On-farm and On-station: 2.5- 5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Centre, Jhansi; IGFRI, Jhansi

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon.

Objectives:

- Establishment of custom hiring centre to create awareness among the farming community about their use at different growth stages of crops.
- Custom hiring services for the following implements

Technology:

A custom hiring center will be established in the identified micro-watershed. The following automatic and conventional implements viz., bullock drawn automatic seed drill (2), tractor drawn automatic seed drill (2), rotavator (1), weeders cum mulchers (5), ridger (5), bund former (5) and tractor drawn furrow openers (1) will be purchased and kept in the custom hiring centre for further use by the farmers

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Use of CPRs depending on the type and availability for fodder cultivation for meeting fodder needs during droughts and low crop residue availability (linkage with local departments)

Objective:

- Rehabilitation of shallow, marginal and denuded soil with organic carbon for resilient agriculture

Technology:

- Citrus + guava + *Leucaena* + *Cenchrus* + *S. seabrana/ hamata* based horti-silvi-pastoral systems
- Aonla based agri-horti systems
- Aonla, Tamarind + *C. ciliaris*

Area and number of farmers to be demonstrated: 1.2 ha & 3 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA, Jhansi; IGFRI, Jhansi

Programme 2: Demonstration of Aonla/citrus/guava/ *Leucaena* based agri-silvi- horti systems.

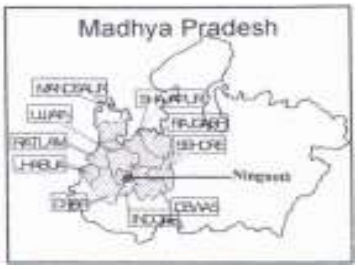
Objectives:

- To increase the productivity of the land
- To find out the impact of aonla/citrus/guava / *Leucaena* based agri-silvi- horti systems on soil fertility and productivity and carbon sequestration.

Technology:
Aonla, citrus, guava and *Leucaena* based agri-silvi- horti systems for maximum profitability
Area and number of farmers to be demonstrated: 0.4 ha & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRP of Dryland Agriculture center, Jhansi; IGFRI, Jhansi

6. Soybean Based Production System

6.1 Indore



6.1.1 Agro-climatic Zone: ACZ X – Malwa Plateau
6.1.2 Agro-ecological sub-region: AESR 5.1
6.1.3 Action Research Area: Technology demonstration
6.1.4 Village details: Village: Ningnoti, District: Indore
6.1.5 Climatic vulnerabilities:

- The annual average rainfall is about 954 mm and is contributed by the south-west monsoon. It starts from second fortnight of June and extends up to first fortnight of September.
- The coefficient of variation in rainfall is about 31% and agriculture drought ranges from 10 to 30 days between July and August months is quite common. Hence crops which will be at critical growth period are subjected to moisture stress and insect attack etc.
- The ground water potential is very low. Further, the scarcity of fodder to livestock's particularly during summer is very acute.
- Pests and diseases of crops & livestock is a common problem.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential.
- Poor access to improved seeds, farm machinery and labour shortage, are making difficulty timely planting when rains are delayed.
- Village is very nearer to the AICRPDA center for easy and frequent accessibility.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Evaluation of drought tolerant varieties of crops

Objective:

- To evaluate the suitability with regard to drought tolerant, farmers' preference and enhanced seed replacement of soybean, chickpea, and pigeonpea varieties.

Technology:

***Kharif* season:**

Evaluation of varieties of soybean (JS 93-05, JS 95-60, JS-335); maize (HKI-16 and others); pigeonpea (UPAS-120 and others)

***Rabi* season:**

Evaluation of varieties of chickpea: (JG 412, IG-16,IG-593etc); wheat:Poshan, Purna, GW-366 etc

Area and number of farmers to be demonstrated: 4 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Indore

Programme 2:

Adaptation of the need based crop management practices for soybean

Objective:

- To find out the best bet practices which provide resilience to climatic variability

Technology:

- Need based interventions and improved practices *viz.,* interculture, mulching, *in-situ* moisture conservation practices INM, IWM etc will be done. Even the re-sowing with changed crop/varieties will also be carried out depending on the weather situation.

Area and number of farmers to be demonstrated: 4 ha & 10 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Programme 3: To develop and disseminate agro –advisories through ICTs (information kiosks) combining the village level weather data linked to district advisory issued by the IMD/SAU
Objective:

- To create awareness among the farmers for adoption of agro advisories

Area and number of farmers to be demonstrated:
All adapted farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

On-station:
Programme 1: Catchment-storage-command relationship for enhancing water productivity in micro –watershed
Objectives:

- Rainfall – runoff relationship.
- Threshold storage and design of pond.
- Water use strategy based on optimization technique, losses.
- Seepage / evaporation studies in farm pond.
- Selection of efficient water lifting and distribution devices.
- Efficient use of stored water to increase water productivity of the diversified farming systems.
- Development of appropriate pond based model for demonstration and upscaling.
- To assesses the economics of the experiment.

Technology:
Rainfed cropping system

- Soybean – chickpea

Stored water recycle using drip irrigation

- Sweet corn maize – linoleum flower/Sweet corn – vegetables (drip irrigation)
- Soybean – Potato
- On the boundary of the experiments the napier grass will be planted for feeding animal.

The recommended doses of nutrients will be given to each crop through fertilizers and organic manures.

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: Catchment –storage-command area relationship for increasing water productivity in micro watersheds
Objectives:

- Develop catchment –storage- command relationship for the ponds
- Development of appropriate pond based model for demonstration and upscaling

Technology:
Observations will be recorded at farmers pond and suggestions will be made accordingly
Area and number of farmers to be demonstrated: 5 ponds of 1500 m^3 each
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Programme 2: Efficient use of stored water to increase water productivity of the diversified farming systems

Objectives:

- To promote double cropping system and techniques enhance cropping intensity and crop yield by efficient utilization of water
- To enable the farmers to use farm pond water for getting enhanced profit

Technology:

- Supplementary irrigation for arable *rabi* crops: wheat and chickpea, potato and vegetable crops

Area and number of farmers to be demonstrated: 5 ha & 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Programme 3: Ground water recharging and water sharing practices at whole village level

Objective:

- Make aware and execute the ground water recharging practices

Technology:

- Recharging of bore wells and open wells in village of standardized filters for recharging of bore wells.

Area and number of farmers to be demonstrated: 10 tube wells/open well

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Theme 3. Efficient energy use and management

Programme 1: Low till farming strategies for resource conservation and improving soil quality for wheat and chickpea

Objectives:

- To work out appropriate e practices for the success of minimum till system
- To assess the impact of low till system on crop yields

Technology:

- One field operation immediately after harvest of soybean, planking followed by sowing temperature tolerant crop/ varieties of crop on same day i.e. sowing of crop with minimum tillage.

Area and number of farmers to be demonstrated: 4 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Fruit plant plantation on bunds of the fields or adopting Agro- horticulture system

Objective:

- To demonstrate Alternate land use system for more profitability and risk coverage with respect to weather aberrations

Technology:

- Plantation of fruit plant *viz.,* aonla, drumstick, guava, mango and others on bunds of farmers field

Area and number of farmers to be demonstrated: 2.5 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Programme 2: Improved forage crop cultivation for enhancing milk production of milch animals

Objective:

- Good quality forage crop cultivation on farmers field for increase of milk yield

Technology:

- Improved forage crops in *kharif* and *rabi* will be taken at farmers field

Area and number of farmers to be demonstrated: 2.5 ha and 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

Programme 3: Efficient farming system demonstration

Objective:

- To strengthening the traditional farming systems and demonstrate the efficient farming systems

Technology:

- Soybean + maize (20:2 rows) will be taken and compared with the farmers farming system.

Area and number of farmers to be demonstrated: 4 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Indore

On-station:

Programme 1: Study the effectiveness and compatibility of different agro-chemicals on yield of soybean-chickpea sequence

Objectives:

- To increase the productivity of soybean-chickpea sequence
- To enhance the nutrient use efficiency

Technology:

Agro-chemical treatements:

Crops: Soybean, chickpea

Absolute control; RDF (20:60:20 NPK/ha); RDF + seed treatment with Rhizobium & PSB culture; Trizophos + 19: 19: 19 NPK at 30 DAS; Trizophos + 19: 19: 19 NPK at 60 DAS; Trizophos + 2 sprays of 19: 19: 19 NPK at 30 & 60 DAS; Cypermethrin + 19: 19: 19 NP at 30 DAS: Cypermethrin + 19: 19: 19 NPK at 60 DAS; Cypermethrin + 2 sprays of 19: 19: 19 NPK at 30 & 60 DAS;

Area and number of the farmers to be demonstrated: 0.1054 ha

Cooperation of Agriculture research station/KVK/state department /NGOs:
State Department of Agriculture and farmers' welfare, Directorate of Soybean Research, Indore, PG Students, College of Agriculture, Indore

Progamme 2:

Contingent crop practices under aberrant monsoon condition in Malwa region

Objectives:

- To evaluate performance of various crops to combat aberrant monsoon conditions
- To evaluate the performance of different corrective measures to mitigate aberrant monsoon conditions
- To evaluate the economic viability of different treatments

Technology:

Crops: Soybean, Maize, Black gram, Horse gram, Cluster bean

Chemical spray:

Spray of VAM-C50; Spray of 2 % potassium solution; Spray of Thiourea; Control (No Spray);

Area and number of the farmers to be demonstrated: 0.1289 ha

Cooperation of Agriculture research station/KVK/state department /NGOs: State Department of Agriculture and farmers' welfare, PG Students, College of Agriculture, Indore

Progamme 3: Evaluation of contingent crops, under much delayed monsoon condition/ aberrant weather condition in Malwa region

Objective:

- To find out the most appropriate crop under initial dry spell delayed monsoon

Technology:

- **Crops & cropping system:** Maize; Sunflower; Green gram; Sunflower + Green gram (2:4); Maize + green gram (2:4);
- **Seed rate:** Recommended seed rate; 20% higher than recommendedseed rate; 20% reduced from recommended seed rate**;**

Area and number of the farmers to be demonstrated: 0.1222 ha

Cooperation of Agriculture research station/KVK/state department /NGOs: State Department of Agriculture and farmers' welfare, PG Students, College of Agriculture, Indore

Participatory crop/varietal selection

Programme 1:

Evaluation of early maturing pigeonpea entries for dryland condition

Objective:

- To identify / isolate early maturing genotypes which are high yielding, bold seeded drought tolerant and have stable performance under rainfed condition

Technology: No. of varieties: 4-5

Area and number of the farmers to be demonstrated: 0.0686 ha

Cooperation of Agriculture reaserch station/KVK/state department /NGOs; State Department of Agriculture and farmers' welfare, RVSKVV-Regional Agricultural Research Station, Khargone

Programme 2: Evaluation of chickpea varieties for dryland conditions

Objective:

- To identify / isolate chickpea genotypes which are high yielding, bold seeded, stable performance and possessing tolerance against abiotic stress

Technology: No. of varieties: 4-5

Area and number of the farmers to be demonstrated: 0.06 ha

Cooperation of Agriculture research station/KVK/state department /NGOs:
State department of Agriculture and farmers' welfare, AICRP on Pulses, Sehore

Integrated weed management

Programme 1: Control of noxious *Alternanthera* in soybean under dryland condition in Vertisols of Malwa region

Objectives:

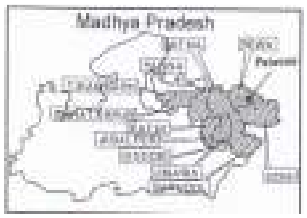
- To assess the effectiveness of herbicides against *Alternanthera* species of weed
- To assess the economics of the treatments

Technology: Test Crops: Soybean
Control; Weed free to 60 DAS ; Interculture by Dora 20 & 30DAS; Trifluralin 1.25 kg (PPI); Trifluralin 1.25 kg (Pre-em); Pendimethalin 1.00 Kg (Pre-em); Imazethapyr 100g (20DAS) (EPoE); Imazethapyr 100g (45 DAS) (PoE);T9- Imazethapyr + Imazamox 87.5 g (Odyssey 70%WG) 100g (PoE);T10-Chlorimuron ethyl 25% WP 37.5g (PoE);

Area and number of the farmers to be demonstrated: 0.0936 ha

Cooperation of Agriculture research station/KVK/state department /NGOs:
State Department of Agriculture and farmers' welfare, Pesticide companies

6.2 Rewa



6.2.1 Agro-climatic Zone: Kymore Plateau and Saptura Hills
6.2.2 Agro-ecological sub-region: 10.3
6.2.3 Action Research Area: Technological demonstration
6.2.4 Village details: Village Patauna and Raura, Block Raipur, Karchulian, Rewa district in Madhya Pradesh
6.2.5 Climatic vulnerabilities:

- The Villages selected for the project work are Raura and Patauna of Raipur Karchulian Block in Rewa district ($24^0$30'45" to $24^0$37'15" N Latitude and $81^0$24'00" to $81^0$31'00" E Longitude).
- Total cropped areas of both villages are 644 ha
- The annual average rainfall is about 1080 mm. The south-west monsoon contributes 85%, north-east monsoon 10 and 5% during summer. The probability of occurrence of normal rainfall is 75%. The south-west monsoon starts from second-third week of June extends up to end of August, followed by north-east monsoon from September to December.
- In both the villages put together, only 96 no. minor irrigation sources (wells and bore wells) are available, covering only 327.174 ha under irrigation
- The average rainfall (1985-2006) of the district is 1080 mm, while it is 900 mm (1999-2006) in Raipur Karchulian block
- Out of 52 years of available district rainfall data (1959-2009) 24 years received deficit rainfall
- From 2004-05 to 2009-10 every year received deficit rainfall.
- Thus frequent droughts, low and erratic rainfall, prolonged dryspells during the crop season always dictating the productivity from the rainfed crops.
- The economy of these villages depends mainly on rainfed agriculture followed by animal husbandry component consisting of cattle, milch animals and small ruminants.
- As lands are undulating (2-4% slope) farmers are using tractor drawn seed drill on hire basis for drilling the seeds. However, under such topographic situations, mechanization fits well which not only saves labour and money but also saves time.
- There is every scope to increase the productivity through real time contingency plans, rainwater conservation technology enhancing fodder, production and popularizing the improved tools and implements in these two villages. Hence, the selected villages are suitable for executing the proposed project work.
- The co-efficient of variation in rainfall is about 35 % and agriculture drought of minimum of 7 days between July and August months is quite common. Hence, crops which will be at critical growth period are frequently subjected to moisture stress and insect attack particularly leaf minor and girdle beetle.
- The ground water potential is low.
- Pests and diseases of crops & livestock are common.
- Low productivity of animals on account of imbalanced feeding and poor genetic potential.
- The major soil groups are veritisols and assorted soils and silty loan to silty caly loam in texture with sub-angular blocky structure and certain intergrades of montmorillonite, illite and kaolinite type of clay minerals,. These soils have medium moisture retention capacity.
- Poor access to improved seeds, farm machinery and labour shortage, are making difficulty in timely planting, when rains are delayed.
- Village is very nearer to the AICRPDA Center for easy and frequent accessibility.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participator mode

Programme 1: Evaluation of drought tolerant varieties of major crops of the region
Objective:

- To identify suitable drought tolerant varieties for different land situation

Technology:

Upland situation

- Evaluation of varieties of soybean - JS 93-05, JS 95-60, JS 335; blackgram- LBG 20, PU 30, PDU 1; pigeonpea – Asha , TJT -501, ICPL 88039 and sesame – TKG 22 , JT 7, TKG 306

Kharif

Soybean - JS 93-05, JS 95-60, JS 335
Blackgram- LBG 20, PU 30, PDU 1
Pigeonpea – Asha , TJT -501, ICPL 88039
Sesame – TKG 22 , JT 7, TKG 306
Rice - JR -201, Danteshwari , Shubangi.

Mid land situation

- Evaluation of varieties

Rabi season

Wheat - JW 17, HI 1500 JW 3020
Chickpea- (JG 130, JG 14, JG 11)
Lentil – JL 1, JL 2 , JL 3
Linseed – JL 523, JL 59, R 552
Mustard- Pusa bold, Varuna, Tarak

Area and No. of farmers to be demonstrated: 10.8 ha & 27 farmers
Cooperation of Agricultural Research station of KVK/State department NGO:
AICRPDA centre Rewa with association of Agriculture department

Programme 2: The most efficient intercropping which provide resilience to climate variability (evaluated and disseminated by AICRPDA).

Objective:

- Evaluation and identification of sustainable intercropping, rotational sequence cropping systems for different soils

Technology:

Upland situation:

- Blackgram + pigeonpea (4:2)
- Soybean + pigeonpea (4:2)
- Sesame + pigeonpea (4:2)

Mid land situation

- Blackgram + pigeonpea (4:2)
- Soybean + pigeonpea (4:2)
- Sesame + pigeonpea (4:2)
- Chilli + onion
- Soybean – chickpea
- Rice – lentil
- Soybean – lentil
- Rice – chickpea
- Soybean – chickpea + linseed (4:2)
- Rice- wheat + mustard (4:2)

Area and number of farmers to be demonstrated: 15.6 ha & 39 farmers
Cooperation of Agricultural Research station of KVK/State department NGO:
AICRPDA centre, Rewa with association of Agriculture department

Programme 3: Agro-advisories combining the village level weather data liked to district advisory issue by IMD/SAU (Linkage with AICRPAM): Efforts will be made in installing automatic and manually operated rain gauges and internet facilities at Panchayat level with the help of Agriculture department will be established. The agro-advisories for each of the crops and cropping systems will be developed with the help of Agronomist and Scientist of AICRPM and they will be put on line use.

Cropping System:

On-station:

Programme 1: Blackgram, Greengram, Soybean, Sesame, Pigeonpea, intercropping system (4:2) row ratios under set furrow cultivation in upland and medium land situation.

Objectives:

- To study the planting geometry
- To mitigate the mid season drought
- To maintain the fertility of the soil by incorporation the crop residue
- To workout the water balance and the economics of the system

Technology:

- Blackgram sole
- Greengram sole
- Soybean sole
- Sesame sole
- Pigeonpea sole
- Blackgram + pigeonpea (4:2)
- Greengram+pigeonpea (4:2)
- Soybean + pigeonpea (4:2)
- Sesame + pigeonpea (4:2)
- Delayed on set of monsoon

Programme 2:

Soyabean, Blackgram, Greengram, Sesame

Date of sowing

- Onset of monsoon (normal)
- 10 days after onset of monsoon
- 20 days after onset of monsoon

Crops

- soybean
- Blackgram
- Greengram
- Sesame

***Rabi* Season**

Chickpea, Linseed

- Chickpea sole
- Chickpea + linseed (1:1)
- Chickpea + linseed (2:1)
- Chickpea + linseed (2:2)
- Chickpea + linseed (4:2)
- Chickpea + linseed (6:2)
- Chickpea + linseed (6:4)
- Chickpea + linseed (8:4)
- Chickpea + linseed mixed

Area and numbers of farmers under demonstration: 0.4 ha

Cooperation of Agricultural Research station of KVK/State Department NGO:

AICRPDA centre, Rewa with association of Agriculture department

Programme 2: Optimization of plant population and planting method for soybean under set furrow cultivation in medium land situation.

Objectives:

- To optimize the plant population and planting geometry
- To enhance the productivity of soybean with green leaf manures and crop residue incorporation under set furrow cultivation
- To workout water balance and nutrient balance
- To workout the economics

Technology:
Demonstration of sowing method & seed rate of soybean

- **Sowing method**
- Dry sowing
- Raised bed
- Broad casting
- Seed drill
- **Seed rate:** 50, 60, 70, 80 & 100 kg/ha.

Technology:
Demonstration of seed rate & variety of soybean
Seed rate: 50, 60, 70, 80 & 100 kg/ha
Variety

- JS95-60
- JS93-05
- JS-335
- JS 97-52

Technology:
Demonstration of sowing time & variety of soybean
Soybean crop

Sowing Time

- Onset of monsoon (Normal)
- 7 days after onset of monsoon
- 15 days after onset of monsoon

Variety

- JS95-60
- JS93-05
- JS-335
- JS 97-52

Area and number of farmers under demonstration: 0.4 ha
Cooperation of Agricultural Research station of KVK/State department/NGO:
AICRPDA centre Rewa with association of Agriculture department

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: *In-situ* conservation and mid season corrections to over come short dry spells: foliar spray of 2% urea on standing crops and additional N application of 10-15 Kg/ha after relief of stress
Objective:

- Evaluation and identification of efficient and farmer friendly *in-situ* moisture conservation practices for different land situations

Technology:

Upland situation

- Set furrow cultivation – sunhemp green manure
- Conservation furrow
- Deep ploughing every year with residue incorporation

Medium land situation

- Compartment bunding
- Tied ridges
- Gravel sand
- Pebble mulching
- Set furrow cultivation- sunhemp green leaf manure + residue

Area and number of farmers to be demonstrated: 1.6 ha & 6 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rewa with association of Agriculture department

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds (catchment-storage-command relationships of farm ponds, with efficient use of water micro irrigation systems etc.)

Objective:

- To enable the farmers to use farm pond water for getting enhanced profit

Technology:

Production systems:

Dryland Horticulture component- guava and anola

Supplementary irrigation for arable cash crops:

- Cucumber
- Green gram
- Okra + greengram
- Onion
- Bottle guard
- Pumpkin
- Tomato
- Brinjal

- Adoption of micro-irrigation system for horticulture crops
- Lifting the farm pond water with non-conventional energy system

Area and number of farmers to be demonstrated: 2 ha & 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre Rewa with association of Agriculture department

On-station:

Programme 1: Catchment-storage-command area relationship for increasing water productivity in micro watersheds

Objectives:

- Develop catchment-storage-command relationship for the farm ponds
- To demonstrate and determine WUE of different water saving technique.
- To promote double cropping system and techniques to enhance cropping intensity and crop yield by efficient utilization of water**.**

Area and number of farmers to be demonstrated: 2 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Rewa with association of Agriculture department

Programme 4: Adoption of ground water recharge (opens and bore wells) and sharing practices at whole village level (linkages with watershed programmes)

Objective:

- Evaluation and identification of feasible ground water augmentation techniques for enhanced water yield and crop productivity

Technology:

Recharge of defunct open wells / bore wells:

Directing nala water to defunct open wells/bore wells with appropriate filtered: In the entire micro watershed the number of defunct open wells and bore wells will be identified and different recharging techniques suiting to the site conditions will be demonstrated with the help of Agriculture department / watershed development department.

Cooperation of Agricultural research station of KVK/State Department/NGO:

AICRPDA centre, Rewa with association of Agriculture department

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon.

Objectives:

- Establishment of custom hiring centre to create awareness among the farming community about their use at different growth stages of crops
- Custom hiring services for the following implements

Technology:

- A custom hiring center will be established in the identified micro-watershed. The following automatic and conventional implements viz. tractor drawn automatic seed-cum-fertilizer drill, hand wheel hoe, ridge seeder, raised bed seeder, ridger, bund former and tractor drawn furrow openers will be purchased and kept in the custom hiring centre for further use by the farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rewa with association of Agriculture department

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

Programme 1: Studies on anola based agri-silvi- horti system in upland situation

Objectives:

- To increase the productivity of the land
- To find out the impact of anola based horti system on the performance of chickpea + mustard (4:2) intercropping system

Technology:

Horticulture/tree species

- Aonla + custard apple + guava
- Aonla + custard apple
- Aonla + guava
- Aonla only

Arable crops

- No crop
- Soybean only
- Soybean-chickpea

Area and number of farmers to be demonstrated: 0.8 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rewa with association of Agriculture department

Programme 2:
Studies on guava based agri-horti system in shallow to medium land situation

Objectives:

- To increase the productivity and profitability of land
- To evaluate the impact of different guava based horti-systems on soybean- chickpea system

Technology:

Intra-row planting

- Guava
- Guava + lime
- Guava + drum stick

Inter-row planting

- No plantation
- Guava
- Lime
- Drumstick

Area and number of farmers to be demonstrated: 0.8 ha

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rewa with association of Agriculture department

Programme 3: Evaluation of different crops in various planting geometry of guava in upland situation

Objectives:

- To increase the productivity and profitability of the land with diversified cropping system
- To screen the crops to identify suitable field crop for intercropping in guava plantation

Technology:

Planting geometry:

5 m X 3 m
5 m X 4 m
5 m X 5 m

Arable crops

Soybean
Black gram

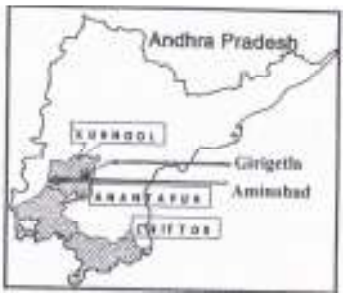
Area and number of farmers to be demonstrated: 0.8 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Rewa with association of Agriculture department

7. Groundnut Based Production System

7.1 Anantapur



7.1.1 Agro-climatic Zone: Scarce Rainfall Zone, Anantapur
7.1.2 Agro-ecological sub-region: 3.0
7.1.3 Action Research Area: Technology demonstration
7.1.4 Village details: Aminabad and Girigetla villages, Thuggali Mandal, Kurnool district, Andhra Pradesh
7.1.5 Climatic vulnerabilities:

- The villages selected for the project work are Aminabad and Girigetla (ORP village) of Tuggali mandal in Kurnool district (77^0 32^1 E longitude and 15^0 18^1 N Latitude).
- Total cropped area of the mandal is 59.8%, of which net sown area is 57.1% and area sown more than once is only 2.7%, clearly indicating the importance of rainfed agriculture
- The total cultivated area of both the selected adjacent villages (Aminabad and Girigetla) put together is 1322 ha and waste land occupies 214.4 ha.
- The most predominant farming situations are rainfed red soils, followed by rainfed black soils where groundnut/pigeonpea/castor/rainfed tomato and bengalgram/sunflower/cotton/ sorghum respectively are cultivated
- In both the villages put together, only 18 wells and borewells (minor irrigation sources) are available, covering only 60.4 ha under irrigation.
- The average rainfall (1985-2006) of the district is 670 mm, while it is 620 mm (1999-2006) in Tuggali mandal.
- Out of 22 years (1985-2006), 14 years received deficit rainfall varying from -6.5 to -57.0%.
- Every alternate year received deficit rainfall in the district.
- Three consecutive deficit rainfall occured during 1985-1987 and four consecutive deficit rainfall occured during 2001-2004 which clearly explains that agriculture is vulnerable to climate change.
- The selected mandal receives 69.4% of total rainfall during south-west monsoon period and 24.7% during north-east monsoon period and the remaining during hot weather period.
- The rainfall in the mandal varies from 329.4 to 878.4 mm, indicating high degree of variability.
- Thus frequent droughts, low and erratic rainfall, prolonged dryspells during the crop season always dictate the productivity from the rainfed crops.
- The economy of these villages depends mainly on rainfed agriculture, followed by animal husbandry component consisting of cattle, milch animals and small ruminants.
- Fodder shortage in these villages exists from December-June.
- As lands are undulating (2-4% slope), farmers are still using local traditional pora tubes attached to the bullock drawn fertilizer drill for drilling the seeds. However, under such topographic situations, mechanization fits well which not only saves labour and money but also saves time.
- There is every scope to increase the productivity through real time contingency plans, rainwater conservation technology enhancing fodder, production and popularizing the improved tools and implements in these two villages. Hence, the selected villages are suitable for executing the proposed project work.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Promoting drought tolerant high yielding groundnut varieties

Objective:

- To create awareness about drought tolerant high yielding varieties

Technology:

- Drought tolerant high yielding varieties of groundnut like Narayani, Kadiri-6 and Kadiri-9 will be promoted in the area.

Area and number of farmers to be demonstrated: 10.8 ha & 19 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA main center, Department of Agriculture, Kurnool and ATMA

Programme 2: Promotion of different varieties/hybrids of castor as an alternate crop to groundnut

Objective:

- To demonstrate the performance of different varieties/hybrids of castor

Technology:

- Castor is identified as a suitable crop in this area. Different varieties of castor (Kranthi, Haritha, and Jwala) and hybrids (PCH-111, DCH-177) will be demonstrated.

Area and number of farmers to be demonstrated: 16 ha & 40 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA main center, Department of Agriculture, Kurnool; Regional Agricultural Research Station, Palem (Mahaboobnagar dist)

Programme 3: Intercropping groundnut + pigeonpea mixed with pulses

Objective:

- To minimize the runoff losses
- To enhance the net returns per unit area

Technology:

- Pulses like cowpea and horsegram (erosion preventing crops) will be mixed with pigeonpea and sown as intercrop with groundnut in 15:1 row ratio.

Area and number of farmers to be demonstrated: 20 ha & 50 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Main center, Department of Agriculture, Kurnool; ATMA

Programme 4: Integrated weed/disease/pest management based on agro-advisories

Objective:

- To avoid indiscriminate use of pesticides

Technology:

- Whenever the agro-advisory warrants the outbreak of pest/disease, then only control measures will be taken. Suitable herbicides will be applied according to the situations.

Area and number of farmers to be demonstrated: 34.8 ha & 87 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA main center, Department of Agriculture, Kurnool

Programme 5: Contingent crops for late on set of monsoons (will be taken up only if the situation warrants)

Objective:

- To demonstrate the performance of contingent crops for delayed onset of sowing rains

Technology:

- If sowing rains are delayed, contingent crops will be promoted.

Area and number of farmers to be demonstrated: 4.2 ha & 17 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPAM; Center, Anantapur; Department of Agriculture, Kurnool

On-station:

Programme 1: Promotion of different varieties hybrids of castor as an alternate crop to groundnut

Objective:

- To demonstrate the performance of different varieties/hybrids of castor

Technology:

- Castor is identified as a suitable crop in this area. Different varieties (Kranthi, Haritha, Jwala) and hybrids (PCH-111, DCH-177) will be demonstrated.

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPAM; Center, Anantapur; State Plan Scheme, ARS, Anantapur

Programme 2: Contingent crops for late on set of monsoons (will be taken up only if the situation warrants)

Objective:

- To demonstrate the performance of contingent crops for delayed onset of sowing rains

Technology:

If sowing rains are delayed, contingent crops will be promoted.

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPAM; Center, Anantapur; State Plan Scheme, ARS, Anantapur

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme: Promoting conservation furrows in different rainfed crops for *in-situ* moisture conservation

Objective:

- To conserve rainwater *in-situ*

Technology:

- Conservation furrows will be formed with a country plough at regular interval in between crop rows to minimize the velocity of runoff flow and to create more opportunity for rainwater to infiltrate.

Area and number of farmers to be demonstrated: 6 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

Department of Agriculture, Kurnool; and ATMA

Programme 2: Catchment-storage-command relationship of farm ponds for efficient use of harvested water

Objective:

- To demonstrate the usefulness of farm ponds in alleviating the effects of dryspells and increasing productivity

Technology:

- Excavation of farm pond
- Lining with soil + cement (6:1)
- Lifting water and irrigation with micro – irrigation systems

Area and number of farmers to be demonstrated: 9 ha & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, DWMA; APMIP; and Department of Agriculture, Kurnool

Programme 3: Promoting tank silt as an organic amendment to conserve soil moisture
Objective:

- To conserve rain water *In-situ*

Technology:

- 10-12 tractor loads of silt (from check dams/tanks) will be added per ha area.

Area and number of farmers to be demonstrated: 1.6 & 4 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA main center; DWMA; Department of Agriculture, Kurnool

On-station:

Programme 1: Catchment-storage-command relationship of farm ponds for efficient use of harvested water
Objective:

- To demonstrate the usefulness of farm ponds in alleviating the effects of dryspells and increasing the productivity

Technology:

- Excavation of farm pond
- Lining with soil + cement (6:1)
- Lifting water and irrigation with micro – irrigation systems

Area and number of farmers to be demonstrated: 5 no. farm ponds
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, Anantapur; ATMA

Theme 3. Efficient energy use and management

Programme 1: Establishment of custom hiring centres with all improved bullock/tractor drawn tools and implements for timely and precise field operations
Objective:

- To perform timely and precise field operations

Technology:

- All improved bullock drawn/tractor drawn tools/implements and oil engines/pumps useful for rainfed agriculture will be made available on custom-hiring basis through SHGs.

Area and number of farmers to be demonstrated:
One custom hiring centre will be established in Aminabad village 132.4 ha & 129 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, Anantapur; Department of Agriculture, Kurnool; and ATMA

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On - farm:

Programme 1: Encouraging on-farm generation of organic manure
Objective:

- For on-farm generation of organic manure

Technology:

- Community/household based vermi-composting/ composting will be promoted

Area and number of farmers to be demonstrated: 4 units of Community/household based vermi-composting/composting

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, Anantapur; DWMA; and ATMA

Programme 2: Promoting groundnut based farming system.

Objective:

- To get higher net returns/unit area

Technology:

- A unit of 10 rams lambs/ha will be introduced after harvest of groundnut and fed with haulms + concentrates for 3-4 months and sold

Area and number of farmers to be demonstrated: 16 ha & 16 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, Anatapur; Department of Animal Husbandary; and ATMA

On-station:

Programme 1: Farming system research for livelihood improvement of farmers

Objectives:

- To improve farm productivity and income per unit area
- To assess opportunity of employment in the entire year in agricultural allied activity
- Assessment of staggered income

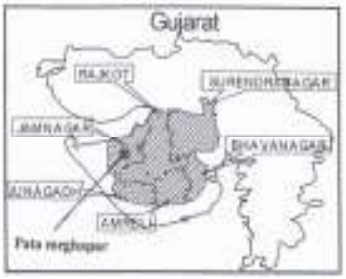
Technology:

- In groundnut + pigeonpea production system + 10 ewes + one ram + back yard poultry/groundnut + pigeonpea production system + dairy animal + back yard poultry will be studied for the sustained income.

Area and number of farmers to be demonstrated:
An area of 2 ha will be cultivated with groundnut + pigeonpea + livestock component will be introduced for the study

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main center, Anantapur; Department of Animal Husbandary; and ATMA

7.2 Rajkot



7.2.1 Agro-climatic Zone: North Saurashtra Agro-climatic Zone

7.2.2 Agro-ecological sub-region: 5.1

7.2.3 Action Research Area: Technology demonstration

7.2.4 Village details: Pata Meghpar Tehsil: Kalawad, Dist-Jamnagar

7.2.5 Climatic vulnerabilities:

- The annual average rainfall is about 633 mm distributed over 11 to 46 rainy days. The south-
- west monsoon contributes 100%. The south-west monsoon starts from 15th of June extends up to end of September.
- About 60 to 65% of total rainfall is being received only between the narrow span of July and
- August. Hence crops are subjected to moisture stress due to long span between successive rains.
- The ground water potential is very low. Further, the scarcity of fodder to livestock particularly during drought period is very acute.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential.
- Poor access to improved seed, farm machinery and labour shortage are making difficulty in timely planting, when rains are delayed.
- The soil of Pata Meghpar is medium black and texure is sandy clay loam to clayey and well drained with rapid permeability.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: Evaluation of drought tolerant varieties of different crops

Objective:

- To identify suitable drought tolerant varieties for different soils

Technology:

Medium black soils

Evaluation of varieties of Groundnut (GG-20), Cotton (BT NHH-44), Sesame (GTil-3), Greengram (GG-2), Groundnut - wheat (GW-366), Cotton - wheat (GW-366), Cumin (GC-4), Chickpea - (G Gram-2)

Cotton - Fenugreek (GM-1)

Area and number of farmers to be demonstrated: 32 ha & 80 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Rajkot; Watershed development department and watershed associations

Programme 2: Most efficient intercropping which provides resilience to climate variability (evaluated and disseminated by AICRPDA).

Objective:

- Evaluation and identification of sustainable intercropping system under rainfed condition

Technology:

Medium black soils

Intercropping system

- Groundnut + castor (3:1)
- Cotton + sesame (1:1)
- Cotton + groundnut (1:1)
- Cotton + balckgram (1:1)

Area and number of farmers to be demonstrated: 16 ha & 40 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rajkot; Wwatershed development department and watershed associations

Programme 3: Agro-advisories combining the village level weather data with district advisory issue by IMD/SAU (Linkage with AICRPAM): Efforts will be made in installing automatic and manually operated rain gauges and internet facilities at panchayat level will be established. The agro-advisories for each of the crops and cropping systems will be developed with the help of Agronomist and Scientist of AICRPAM and they will be put on line use.
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rajkot; Wwatershed development department and watershed associations

Crops and cropping Systems:

On- station:

Programme 1: Groundnut + castor (3:1) intercropping system with different row ratios in medium black soil

Objectives:

- To study suitable planting geometry
- To mitigate the mid season drought
- To maintain the fertility of soil by incorporation of the crop residue
- To workout the water balance and economics of the system
- To maximize the land equivalent ratio

Technology:

Normal onset of rain

- Sole groundnut 60x10 cm
- Sole castor 90x20 cm
- Sole sesame 60 x15 cm
- Groundnut + castor (3:1) 60-240 cm
- Groundnut + sesame (1:1) 120-120 cm

Delayed on set of monsoon

- Sole castor 90 x 20 cm
- Sole groundnut 60 x 10 cm
- Sole blackgram 60 x 10 cm
- Castor + groundnut (1:3)
- Castor + blackgram (1:2)

Area and number of farmers to be demonstrated: 0.4 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rajkot

Programme 2: Optimization of plant population and planting geometry for cotton + sesame intercropping system

Objectives:

- To optimize the plant population and planting geometry
- To enhance the productivity of pigeonpea with green leaf manure and crop residue incorporation under set-furrow cultivation
- To workout water balance and nutrient balance
- To workout the economics

Technology:

Normal onset of monsoon

- Cotton + seame (1:1)
- Spacing of cotton: 120 x 30, 120x 120 x 60, 90 x 30, 90 x 45, 90 x 60 cm
- Spacing of sesame: 60 x 10, 60 x 20, 45 x 10, 45 x 20 cm

Area and number of farmers to be demonstrated: 0.4 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA centre, Rajkot

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

Programme 1: *In-situ* conservation and mid season corrections to overcome short dry spells: foliar spray of 2% urea on standing crops and additional N application of 10-15 kg/ha after relief of stress

Objective:

- Evaluation and identification efficient and farmer friendly *in-situ* moisture conservation practices for different soils

Technology:

Medium black soils

- Set furrow cultivation – groundnut
- Conservation furrow
- Deep ploughing up to 20 cm in alternate year with FYM incorporation
- Compartment bunding
- Crop residue/plastic mulching

Area and number of farmers to be demonstrated: 4 ha & 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA center, Rajkot with watershed development department and watershed associations

Programme 2: Supplemental irrigation to rainfed crops from harvested water through farm ponds efficient use of harvested water)

Objective:

- To enable the farmers to use the farm pond water for getting enhanced profit

Technology:

Supplementary irrigation for arable cash crops:

- Groundnut
- Cotton
- Adoption of micro-irrigation system for horticulture crops
- Lifting the farm pond water by pump/engine (No. 2 for each)

Area and number of farmers to be demonstrated: 3.2 ha & 8 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA center, Rajkot with watershed development department and watershed associations

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the farm operation

Objectives:

- Establishment of custom hiring centre to create awareness among the farming community about their use at different growth stages of crops.
- Custom hiring services for the following implements

Technology:

- A custom hiring center will be established in the village. The following automatic and conventional implements viz., tractor drawn spike tooth harrow (1), Cultivator (1), Rotavator (1), Hand weeder (10), Hand riger (1), Groundnut decoticator (5), hiring winnower (2) Non-recording rain guage (2), cotton shedder (1) will be purchased and kept in the custom hire centre for further use by the farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA center, Rajkot with watershed development department and watershed associations

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station:

Programme 1: Fodder cultivation for meeting fodder needs during droughts and low crop residue availability (linkage with local departments)

Objective:

- Rehabilitation of shallow, marginal and denuded soils with organic carbon for resilient agriculture

Technology:

Medium black soils

- Guava based agri-horti system

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Rajkot

Programme 2: Evaluation of different crops in various planting geometry in medium black soils

Objectives:

- To increase the productivity and profitability of the land with diversified cropping system
- To screen the crops to identify a suitable field crop for intercropping in gauva plantation

Technology:

- No mulch
- Crop residue @ 5 t/ha
- Plastic mulch

Arable crops

- Groundnut (GG-20)
- Black gram (GU-1)

Area and number of farmers to be demonstrated: 0.4 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA centre, Rajkot

8. Cotton Based Production Systems

8.1 Akola

8.1.1 Agro-climatic Zone: ACZ Western Pleatue hill zone
8.1.2 Agro-ecological sub-region: 6.3
8.1.3 Action Research Area: Technology demonstration
8.1.4 Village details: Warkhed (Bk.), Ghusar and Belura (Bk.), Dt. Akola
8.1.5 Climatic vulnerabilities:

- The selected villages are nearer to AICRPDA center, Akola. In the region, about 97% of cultivable land is under rainfed farming. The region is renowned for large variations in monsoon rainfall and is uneven within-season distribution. Variation in the amount and timing of rainfall is a major challenge to crop management and the applicability of new technologies for yield improvements and competitiveness of rainfed crops. As such evidence is emerging globally that climate change is increasing rainfall variability and the frequency of extreme events. Decadal trend analysis of Akola location also showed consistent decrease in the annual (817, 832.2, 780.3 and 676.5 mm) and monsoonal (683.6, 682.3, 627.6 and 546.1 mm) rainfall across the past four decades (1971-2009), the decrease being more marked in the last decade. Similarly, monsoon and winter minimum temperatures showed rise. The high risk for water-related yield loss makes farmers risk averse, influencing their other investment decisions, including labour, improved seed, and fertilizers. In the first place, technological investments that reduce water-related risks can build more resilience to face occurrence of droughts and dry spells under a changing climate. Hence, improving upon water conservation, reducing run-off and erosion, increasing water productivity, suitable crops and crop varieties will contribute to building resilience to climate change and allow for a more balanced development and sustainability of rainfed farming in the region.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

Programme 1: Evaluation for drought tolerant varieties of crops
Objective:

- To identify suitable drought tolerant varieties of different crops

Technology:

- ***Kharif***
- **Soybean (**JS-335, TAMS-98-21)
- **Sorghum (**CSH-9, CSH-18)
- **Greengram (**PKV mug -8802, PKV AKM -4, PKV AKM -9911 (green gold))
- **Pigeonpea (**PKV- Tara, C-11, BSMR-736)
- **Chickpea: (**JAKI 9218, SAKI 9516 and Vijay)

Area and number of farmers to be demonstrated: Warkhed block: 4 ha & 10 farmers and Belura block: 2 ha & 5 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
State dept. of Agriculture; Maharashrata state seeds corporation; Cotton Research Unit of the University; Soyabean research unit of the University; Pulse research unit of the University and Sorghum research unit of the University

Programme 2: Efficient intercropping which provides resilience to climate variability (evaluated and disseminated by AICRPDA)

Objective:

- Evaluation and identification of sustainable intercropping, rotational and sequence cropping system for different soils

Technology:

- Green gram + pigeonpea (4:2 / 2:1)
- Sorghum+ greengram/ pigeonpea (3:3)
- Cotton+ pigeonpea (6:2 / 8:2)
- Cotton + greengram/ blackgram (1:1)
- Soybean- chickpea
- Greengram-safflower/ chickpea
- Greengram-safflower+ chickpea (6:3)
- Greengram- chickpea+ mustard (8:1)
- Soybean + pigeonpea (4:2/ 2:1)

Cotton: sorghum: pigeonpea: sorghum (6:1:2:1 or different row proportion of mention crops)

Area and number of farmers to be demonstrated: Warkhed block :20 ha & 50 farmers and Belura block: 16 ha & 40 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

State dept. of Agriculture; Maharashrata state seeds corporation; Cotton Research Unit of the University; Soyabean research unit of the University; Pulse research unit of the University and Sorghum research unit of the University.

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: *In-situ* moisture conservation practices

Objective:

- *In- situ* rain water conservation for overcoming the effect of intermittent dry spell

Technology:

- Opening of furrows

Area and number of farmers to be demonstrated: Warkhed block: 0.4 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/NGO:

State Dept. of Agriculture; Maharashrata state seeds corporation; University Department of Soil and Water Conservation; PC Unit; Soybean research unit of the University and ARS, Yavtmal

On-station:

Programme 1: Catchment – storage – command relationships for increasing water productivity

Objectives:

- Develop catchment – storage – command relationship for the farm ponds
- To promote double cropping system and techniques to enhance cropping intensity and crop yield by efficient utilization of water

Technology:

- Increasing water productivity of crops

Crop: Soybean

Area and number of farmers to be demonstrated: 0.8 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

State Dept. of Agriculture; Maharashrata state seeds corporation; University Department of Soil and Water Conservation; PC Unit; Soybean research unit of the University and ARS, Yavtmal

Theme 3. Efficient energy use and management

Programme 1: Custom hiring centre for completion of the sowing quickly in case of delayed monsoon

Technology:

A custom hiring centre will be established in the identified villages. The following implements viz., (1) Rotavator, (2) Seed drill (Bullock drawn and tractor drawn) (3) Adjustable ridger (4) Power sprayer (5) Foot sprayer (6) BBF marker

Area and number of farmers to be demonstrated: Farmers of the NICRa village

Cooperation of Agricultural research station of KVK/state department/NGO:

CIAE, Bhopal; CRIDA, Hyderabad; University Department of Farm Machinery and Power and Maharashrta Agriculture Industrial developing corporation.

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station:

Programme 1: Studies on *Annona squamosa* based agro-horti system

Objectives:

- To increase productivity of land.
- To find out suitable intercrops in *Annona squamosa* based agro-horti system

Technology:

- Custard apple
- Custard apple + greengram
- Custard apple + blackgram
- Custard apple + soybean
- Custard apple + pigeonpea
- Custard apple + greengram
- Custard apple + greengram + pigeonpea (2:1)
- Custard apple + blackgram + pigeonpea (2:1)
- Custard apple + soybean + pigeonpea (2:1)

Area and number of farmers to be demonstrated: 0.5 ha

Cooperation of Agricultural research station of KVK/State Department/NGO:

Maharashrata state seeds corporation; Soybean research unit of the University; Pulses research unit of the University and University Department of Horticulture.

Programme 2:

Studies on *Annona Spp. (Hanuman phal)* based agro-horti system

Objectives:

- To increase the productivity of land
- To find out suitable intercrops in *Annona* Spp. *(Hanuman phal)* based agro-horti system

Technology:

- Hanumanphal
- Hanumanphal + greengram
- Hanumanphal + blackgram
- Hanumanphal + soybean
- Hanumanphal + pigeonpea
- Hanumanphal + greengram
- Hanumanphal + greengram + pigeonpea (2:1)
- Hanumanphal + blackgram + pigeonpea (2:1)
- Hanumanphal + soybean + pigeonpea (2:1)

Area and number of farmers to be demonstrated: 0.38 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

Maharashrata state seeds corporation; Soybean research unit of the University; Pulses research unit of the University and University Department of Horticulture.

8.2 Kovilpatti

8.2.1 Agro-climatic Zone: Southern Agro climatic Zone (ACZ 5)

8.2.2 Agro-ecological sub-region: Tamil Nadu plain hot, semi-arid eco-region

8.2.3 Action Research Area: Terchnology demonstration

8.2.4 Village details: Nakkalamuthanpatti, Kovilpatti Block, Thoothukudi District and Kalugachalapuram, Ettayapuram Block, Tuticorin District in Tamil Nadu

8.2.5 Climatic vulnerabilities:

- There has been variation in the onset and withdrawal of rainfall. Sometimes the onset gets delayed up to last week of October and monsoon withdraws early in December. Dry spells are common during last week of November and up to second week of December. In general, this dry spell coincides with mostly the flowering and grain filling stage of the crops. In 2007, dry spells occurred from 46th and 49th SMW, in 2008 from 44th and 46th SMW and in 2009 during 48th to 50th SMW.
- After the onset of rainfall, only a short time is available for land preparation and sowing. During times of early onset, the length of the growing season gets reduced and at times of late onset, the crop growth stages coincide with unfavourable weather. Dry spells occurring immediately after the onset of monsoon lead to non-germination of seeds and resowing has to be done to get the required population.
- Weather based crop planning is not done by all the farmers which help in minimizing the impact of adverse weather conditions on crop growth.
- The mean annual maximum and minimum temperature is 34.7 ºC and 22.1ºC. There has been an increase in temperature of the region in the past. The increase in temperature favours, incidence of mealy bug in crops such as cotton, papaya etc.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Evaluation of drought tolerant varieties of different crops

Objective:

- To identify suitable drought tolerant varieties for different soils

Technology:

Deep black soils

Cotton (Bt cotton): Tulasi – 4, Tulasi – 9, RCH - 530 BG II and RCH 2 Bt
Maize: CoH (M) 5 and private hybrids
Pearlmillet: (ICMV -221, WCC – 75 and Co Cu 9)
Sunflower: TNSF - 1, CoSF - 5
Blackgram: VBN - 4, VBN – 5 and CO - 5
Greengram: CO - 6, VBN - 3 and Co – 7

Area and number of farmers to be demonstrated: 6.8 ha & 17 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA main Centre Kovilpatti, State Department of Agriculture

Programme 2:

Making the use of agromet advisories prepared based on the weather forecast issued by IMD and TNAU (linkage with IAAS and AICRPAM)

Objective:

- Minimising the impact of adverse weather on crops with the use of real time agromet advisories

Technology:

- Automatic and manually operated rain gauges will be installed and internet facilities created at panchayat level. Scientists of IAAS and AICRPAM will prepare agromet advisories for all the crops and cropping systems and planning of agricultural operations will be done based on these advisories.

Area and number of farmers to be demonstrated:
All farmers of NICRA villages
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti

Programme 3:

Most efficient intercropping system which provides resilience to climate variability
Objective:

- Evaluation of sustainable intercropping systems

Technology:
Medium to deep black soils

- Bt cotton + pigeonpea (1:1)
- Bt cotton + black gram (1:2)
- Bt cotton + green gram (1:2)
- Bt cotton + cowpea (1:2)
- Bt cotton (pure)

Area and number of farmers to be demonstrated: 4.8 ha & 12 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On- farm:

Programme 1: Field demonstration of *in-situ* moisture conservation practices
Objective:

- Evaluation and identification of efficient *in-situ* moisture conservation practices for rainfed vertisols

Technology:
Deep black soils

- Ridges and furrows and broad bed furrow - maize
- Ridges and furrows and broad bed furrow - cotton
- Broad bed and furrows – green gram
- Broad bed and furrows –black gram

Area and number of farmers to be demonstrated: 6.4 ha & 8 farmers
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

On- Station:

Programme 2: Catchment-storage-command relationship of farm ponds.
Objectives:

- To study the catchment-storage-command relationship in rainfed vertisols
- Recycling of stored water during dry spells at critical stage of crop growth

Technology
Dryland horticulture
Tamarind, cucumber, watermelon and periwinkle
Area and number of farmers to be demonstrated: 0.8 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Theme 3. Efficient energy use and management

Programme 1: Establishment of a custom hiring centre at Nakkalamuthanpatti village.

Objective:

- Establishment of custom hiring centre to create awareness on-farm mechanization
- To reduce the drudgery on-farm labour
- To cover large area in short time in sowing and weeding operations

Technology:

- A custom hiring center will be established in the identified village. Automatic and tractor drawn implements will be purchased and kept in the custom hiring centre for use by the farmers.

Area and number of farmers to be demonstrated: All farmers of the NICRA villages

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-farm:

Programme 1: Aonla based agri-horti systems for carbon sequestration

Objectives:

- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to the farmer with diversified cropping systems

Technology:

- Aonla
- Aonla + cluster bean
- Aonla + cowpea
- Aonla + greengram

Area and number of farmers to be demonstrated: 0.1 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Programme 2: Sapota based horticultural systems for carbon sequestration

Objectives:

- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to the farmer with diversified cropping systems

Technology:

- Sapota
- Sapota + coriander
- Sapota + gourds (bitter gourd)
- Sapota + pumpkin

Area and number of farmers to be demonstrated: 0.2 ha & 1 farmer

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Programme 3: Acid Lime based agri - horti systems for carbon sequestration

Objectives:

- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to the farmer with diversified cropping systems

Technology:

- Acid Lime
- Acid Lime + cowpea
- Acid Lime + blackgram
- Acid Lime + chiickpea

Area and number of farmers to be demonstrated: 0.4 ha & 1 farmer
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

On-station:

Programme 1: Custard apple based agri-horti systems for carbon sequestration
Objectives:

- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to the farmer with diversified cropping systems

Technology:

- Custard apple
- Custard apple + okra
- Custard apple + greengram
- Custard apple + horsegram

Area and number of farmers to be demonstrated: 0.4 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Programme 2: Aonla based agri-horti systems for carbon sequestration
Objectives:

- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to farmer with diversified cropping systems

Technology:

- Aonla
- Aonla + cluster bean
- Aonla + cowpea
- Aonla + greengram

Area and number of farmers to be demonstrated: 0.3 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

Programme 3:
Sapota based horticultural systems for carbon sequestration
Objectives:

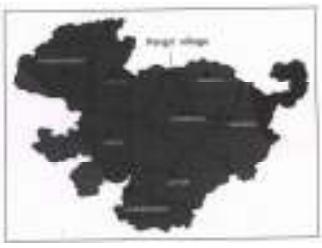
- Rehabilitation of marginal soils through carbon sequestration
- To increase the productivity of the land and profit to the farmer with diversified cropping systems

Technology:

- Sapota
- Sapota + coriander
- Sapota + gourds (bitter gourd)
- Sapota + pumpkin

Area and number of farmers to be demonstrated: 0.2 ha
Cooperation of Agricultural research station of KVK/state department/NGO:
AICRPDA Main centre, Kovilpatti and State dept. of Agriculture.

8.3 Parbhani



8.3.1 Agro-climatic zone: 9 (Assured rainfall zone)
8.3.2 Agro-ecological sub-region: 6.2
8.3.3 Action Research Area: Technology demonstration
8.3.4 Village details: Parbhani Pangri, Jintur Taluk, Parbhani district
8.3.5 Climatic vulnerabilities:

- The annual average rainfall is about 890 mm. The south-west monsoon contributes 76%, north-east monsoon 15 and 9 % during summer. The monthly coefficient of variation is about 58-70% during June to October and standard deviation is lowest 84 mm during September.
- Agriculture drought of minimum of 30 days between July and August months is quite common. Hence, crops which will be at critical growth period are frequently subjected to moisture stress and insect attack particularly leaf minor on soybean is observed.
- The ground water potential is very low. Further, the scarcity of fodder to livestock's particularly during drought periods is very acute.
- Pests and diseases of crops & livestock is common.
- Low productivity of animals on account of fodder scarcity, imbalanced feeding and poor genetic potential.

Theme 1. Real time contingency plans implementation under both on-station and on-farm in a participatory mode

On-farm:

Programme 1: Evaluation of drought tolerant varieties of crops

Objective:

- To identify suitable drought tolerant varieties suitable under rainfed condition

Technology:

- **Cotton Bt**
- **Soybean:** MAUS 7, MAUS 81
- **Sorghum:** PVK 400, PVK 800, Sainath
- **Pigeonpea:** BDN 708, BSMR 736,BSMR 853
- **Sunflower:** Hybrid
- **Green gram:** BPMR 45, BPMR 2002-1
- **Black gram:** BDU-1, TAU-1
- ***Rabi* sorghum:** Parbhani moti, Mal dandi, Safflower, PBNS 12, PBNS 40
- **Chickpea:** BDNG -3, BDNG -20

Area and number of farmer to be demonstrated: 70 ha & 175 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

ARS, AICRP on Cotton, Soybean, Sorghum, Pearl millet, Pluses, Soil and water Conservation Dept. ASO, Parbhani ATMA, and Collector Parbhani

Programme 2: Most efficient intercropping system which provides resilience to climate variability (evaluated and disseminated by AICRPDA)

Objective:

- Evaluation and identification of sustainable intercropping, rotational sequence cropping systems for different soils

Technology:

- Pearlmillet + pigeonpea (3:3)
- Soybean + pigeonpea (4:2)
- Sorghum + pigeonpea (4:2)
- Cotton + greengram (1:2)
- Cotton + pigeonpea (6:1)
- *Rabi* sorghum + chickpea (6:2)
- *Rabi* sorghum + safflower (6:2)

Area and number of farmer to be demonstrated: 24.4 ha & 61 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

ARS, AICRP on Cotton Soybean, Sorghum, Pearl millet, Pluses, Soil and water Conservation Dept. ASO, Parbhani ATMA, and Collector Parbhani

Crops and Cropping systems

Programme 1: To study the most efficient intercropping system under rainfed condition

Technology:

- Cotton + pigeonpea (6:2)
- Peralmilet + pigeonpea (3:3)
- Soybean + pigeonpea (4:2)
- Sorghum + pigeonpea (4:2)

Area and number of farmers to be demonstrated: 2.5 ha & 5 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP on Dryland Agriculture and Mega Demonstration Cum Seed production Farm, Parbhani

Theme 2. Rainwater harvesting (*in-situ* and *ex-situ*) and efficient use

On-farm:

Programme 1: *In-situ* moisture conservation and mid season corrections to overcome short dry spells

Objective:

- Evaluation and identification of efficient and farmer friendly *in-situ* moisture conservation practices for different cropping systems

Technology:

Conservation furrow in

- Soybean, Sorghum, Cotton, and Pigeonpea
- Intercropping systems

Area and number of farmers to be demonstrated: 28.4 ha & 71 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

ARS, AICRP on Cotton Soybean, Sorghum, Pearl millet, Pluses, Soil and water Conservation Dept. ASO, Parbhani ATMA, and Collector Parbhani

On-station:

Programme 2: Evaluation and identification of feasible ground water augmentation techniques for enhanced water yield and crop productivity

Objective:

- To evulate and identify feasible ground water augmentation technique for higher yield, water and crops

Technology:

- Recharge of open wells
- Recharge of bore wells

Recharging of open well (01) and bore well with suitable filteration material.

Area and number of farmers to be demonstrated: 8 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

AICRP on Dryland Agriculture and Mega Demonstration Cum Seed production Farm, Parbhani

Theme 3. Efficient energy use and management

On-farm:

Programme 1: Establishment of custom hiring centre to create awareness among the farming communication about their use at different growth stages of crops

Objectives:

- To create awareness among the farming community about use of different farm impliments
- To popularize implements for mechanisation of dryland agriculture

Technology:

Custom hiring services for the following implements

Bullock drawn Seed drill (5), Ridger (5), Bund former (5), Cycle weeders (10), Ferti hoes (20), Misc. implements, Tractor drawn with automatic seed drill (1), Tractor drawn furrow openers (1), Tractor drawn cultivator/panji and Tract drawn Slasher/rotavator

Area and number of farmers to be demonstrated: 10 farmers

Cooperation of Agricultural research station of KVK/state department/NGO:

ARS, AICRP on Cotton Soybean, Sorghum, Pearl millet, Pluses, Soil and water Conservation Dept. ASO, Parbhani ATMA, and Collector Parbhani

Theme 4. Alternate land use/ farming system for carbon sequestration and ecosystem services

On-station

Programme 1: Development of Alternate land use syetme for dryland farming

Objectives:

- To develop agriculture and dryland horticulture system suitable for medium and shallow soils
- To utilize land resources for development of alternate fodder resources

Technology:

- Development of agri-dryland horticulture ststem
- Evaluation of different intercrops in drum sticks
- Drumstick sole
- Drumstick + greengram
- Drumstick + blackgram
- Drumstick + soybean

Area and number of farmers to be demonstrated: 1 ha

Cooperation of Agricultural research station of KVK/state department/NGO:

ARS, AICRP on Cotton Soybean, Sorghum, Pearl millet, Pluses, Soil and water Conservation Dept. ASO, Parbhani ATMA, and Collector Parbhani

Dr. B. Venkateswarlu, Director, CRIDA visited Custom Hiring Centre at Solapur during 23rd Biennial Workshop at **AICRPDA centre, ZARS, MPKV, Solapur**

Pearlmillet + Pigeonpea based inter cropping system under NICRA at **Girigetla village, Thuggali, Kurnool, Andhra Pradesh**

Agri search with a human touch

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