

वार्षिक प्रतिवेदन 2012-13
ANNUAL PROGRESS REPORT 2012-13



जलवायु समुत्थानशील कृषि पर राष्ट्रीय पहल
National Initiative on Climate Resilient Agriculture

क्षेत्रीय परियोजना निदेशालय, क्षेत्र - 2
Zonal Project Directorate, Zone-II

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भूमि विहार कॉम्प्लेक्स, साल्ट लेक, कोलकाता 700097 Bhumi Vihar Complex, Salt lake, Kolkata - 700097



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Dr. A. K. Singh
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Compiled by:

F. H. Rahman, N. C. Banik, P. P. Pal and A. K. Singh

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Preface

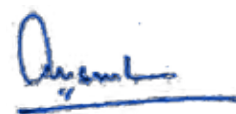


National Initiative on Climate Resilient Agriculture (NICRA) launched by Indian Council of Agricultural Research is a step towards climate-smart agriculture that includes application of proven practical techniques in major areas of water management, crop husbandry, livestock management, farm implements and others. Getting existing technologies into the hands of small and marginal farmers and developing new technologies like drought or flood tolerant crops to meet the demands of a changing climate also come under the purview of NICRA programme. Climatic vulnerability of selected 15 KVK districts of Bihar, Jharkhand, West Bengal and union Territory of A & N Islands assessed during implementation of NICRA programme brought forward definite requirement in terms of technological support, human resource development and overall empowerment of farming community to enable them to cope up with climate vulnerabilities like droughts, erratic rainfall, heat wave, flood, cyclonic storm. Plan of action, accordingly, was prepared for its implementation through executing technological interventions to initiate crop production, resource conservation, livestock and fish rearing, water harvesting etc. in the vulnerable villages of KVK districts. Formation of VCRMC and setting up of custom hiring centres under NICRA in all the adopted villages added to the grass-root level monitoring of the project followed by initiating farm mechanization as per suitability of small and marginal holdings.

Compilation of NICRA Annual Progress Report of Zone II for 2012-13 depicts an assessment of endeavour put forth by the selected 15 NICRA

KVKs in the climatic vulnerable districts under close supervision and guidance of Zonal Project Directorate and simultaneous attainment in the arena of technology demonstration, Village Climate Risk Management Committee, institutional interventions, human resource development, seed production, extension activities, review workshop and others. The compilation of Annual Progress Report 2012-13 of NICRA has incorporated all the relevant and required information pertaining to accomplishment of Zonal Project Directorate, Zone II and achievement of selected 15 NICRA implementing KVKs in combating the challenges due to climatic vulnerabilities in farming practices as well as livelihood pattern for the betterment of farmers, rural youths and other concerned.

I wish to express my sincere gratitude to Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR, Dr. K. D. Kokate, Deputy Director General (Agricultural Extension), Dr. B. Venkateswarlu, Director, CRIDA and other officials of Division of Agricultural Extension, ICAR for providing guidance and help in compiling the Annual Progress Report 2012-13 of NICRA. I acknowledge the assistance received from the Directors of Extension Education of State Agricultural Universities of this zone and cooperation of all the selected 15 NICRA implementing KVKs in providing information in time. The support and help rendered by all the staff of ZPD, Zone II are duly acknowledged.



(A. K. SINGH)

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Executive Summary

Fifteen KVKs of Zone II carried out the different activities under Technology Demonstration Components in various module benefitting 44855 farmers (NRM - 5811, crop production - 2895, livestock and fisheries - 5840, institutional interventions - 2201, capacity building - 9877 and extension activities - 18231).

- Under Natural Resource Management module improved drainage in flood prone areas through renovation of drainage channels, in-situ moisture conservation (Organic mulching in vegetables, Banana Poly-mulching, Land shaping and rain water harvesting in paddy, Growing bitter gourd in land embankment around deep water paddy field, Green manuring (dhaincha) in potato, 5% model of irrigation, Crop residue (Var. Lok- 1) management through Happy Seeder, Aerial Vegetable cultivation in sloppy land, bunding of field, broad bed furrow etc.), soil conservation and reclamation, soil test based nutrient application, micro irrigation technique, compost pits, soil reclamation with green manuring, construction of new (water harvesting and recycling structures) farm ponds/ checks dams/tank, renovation of old (water harvesting and recycling structures) farm ponds/ check dams, roof water harvesting tank and installation of water conditioner etc. covered 574.41 ha area which benefitted 5811 practicing farmers in Zone-II.
- Under Crop Production module different area specific intervention were taken by the KVKs viz; Introducing drought resistant varieties, Introducing salt tolerant paddy varieties, Introducing flood tolerant varieties, advancement of planting dates of crops in areas with terminal heat stress, water saving paddy cultivation methods, community nurseries for delayed monsoon, Location specific intercropping systems with high sustainable yield index, Introduction of new crops/ crop diversification and other demonstrations like Low temperature tolerance – cultural practice - Banana bunch cover (Var. Malbhog & Dwarf Cavendish), Promotion of Pulses utilizing post-monsoon rainfall, Promotion of stem rot resistant Jute, Integrated crop management of mustard, Integrated crop management of lentil, Integrated disease management in vegetables, Vegetables as contingency crop, covering 758 ha area which benefitted 2895 farmers.
- Similarly under Livestock and Fisheries module various livestock centric interventions were carried out including breed up-gradation (AI and through high pedigree animals of cattle, pig, buffalo etc.); balanced feed and fodder management (through mineral mixture, feed blocks and silage making, azolla feeding etc); introducing improved breed animal health management (through deworming and vaccination for area specific animal diseases); improved shelters for poultry, goat, cattle and buffalo; fish pond cleaning and fish farming; pig farming; clean milk production etc. covered 5949 animals, produced fodder in 65.5 ha area benefitted 5840 livestock owner in Zone-II.
- Institutional Interventions including seed bank, fodder bank, commodity groups, custom hiring for timely operations, community nursery raising, irrigation, collective marketing climate literacy through a village level weather station and awareness developed 221 units covering of 365.8 ha area of 2201 number of farmers in the Zone. Jay

Prakash Village Climate Risk Management Committee constituted under NICRA implemented KVK Nawada, Bihar generated Rs. 96972.00 in the bank account of VCRMC and got recognition of best performing Village Climate Risk Management Committee from Zone-II and they have been honoured by the Director General, ICAR during Second Annual NICRA Workshop held at IARI, New Delhi on 17th June, 2013.

- A total of 429 courses were conducted under Capacity Building on various thematic areas benefitting 9877 farmers and farm women (8401 males and 1476 females) during 2012-13. Thematic areas covered on crop management, natural resource management, nutrient management, integrated crop management, crop diversification, resource conservation technology, pest and disease management, livestock and

fishery management, nursery raising, employment generation, nutrition garden, repair & maintenance of farm machinery & implements, integrated farming system, fodder and feed management, lac cultivation, farm implements and machineries, drudgery reduction with farm implements for woman, value addition, human nutrition and child care, rodent control etc.

- Fifteen NICRA KVKs conducted a total of 1609 Extension Activities on various thematic areas benefitting 18231 practicing farmers (13975 males and 4256 females) during the reporting period. The extension activities were conducted on Method demonstrations agro advisory services, awareness animal health camp, Kisan Chaupal, kishan gosthi, resource conservation technologies, celebration field and farmers' days, diagnostic visits, group discussion, technology week, kisan mela etc.



Introduction

National Initiative on Climate Resilient Agriculture (NICRA) is a network project of Indian Council of Agricultural Research (ICAR) launched in February, 2011. The project aims at enhancing resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The objectives of this network project are:

- To enhance the resilience of Indian agriculture covering crops, livestock and fisheries
- to climatic variability and climate change through development and application of improved production and risk management technologies
- To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks
- To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application

Both short and long term output is expected from the project pertaining to new and improved varieties of crops, livestock breeds, management practices that help in adaptation and mitigation and inputs for policy making to mainstream climate resilient

List of districts and KVKs with Climate vulnerability

S. N.	State	NARP Zone	Districts	Climate vulnerability
1	A&N Islands	Coastal Zone	Port Blair	Cyclone
2	Bihar	North West Alluvial Plain Zone (B1-1)	Saran	Flood/Drought
3	Bihar	North West Alluvial Plain Zone (B1-2)	Supaul	Flood/Drought
4	Bihar	South Bihar Alluvial Plain Zone (B1-3)	Buxar	Flood/Drought
5	Bihar	South Bihar Alluvial Plain Zone (B1-3)	Nawadah	Drought
6	Bihar	South Bihar Alluvial Plain Zone (B1-3)	Aurangabad	Drought
7	Bihar	South Bihar Alluvial Plain Zone (B1-3)	Jehanabad	Drought
8	Jharkhand	Central and North Eastern Plateau Zone (B1-4)	Koderma	Drought

agriculture in the developmental planning. The overall expected outcome is enhanced resilience of agricultural production to climate variability in vulnerable regions. Initially, 100 KVKs all over India were selected for implementation of the project. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project is comprised of four components.

- Strategic research on adaptation and mitigation
- Technology demonstration on farmers' fields to cope up with current climate variability
- Sponsored and competitive research grants to fill critical research gaps
- Capacity building of different stakeholders

Under Technology Demonstration Component, six districts of Bihar (Aurangabad, Buxar, Jehanabad, Nawada, Saran and Supaul), five of Jharkhand (Chatra, East Singhbhum, Gumla, Koderma and Palamu), three of West Bengal (Coochbehar, Malda and South 24 Parganas) and one of Andaman & Nicobar Islands (Port Blair) were selected for below mentioned vulnerabilities:



9	Jharkhand	Western Plateau Zone (B1-4)	Palamu	Drought/Heat wave
10	Jharkhand	South Eastern Plateau Zone (B1-4)	East Singhbhum	Drought/Heat wave
11	Jharkhand	Western Plateau Zone (B1-4)	Gumla	Drought
12	Jharkhand	Western Plateau Zone (B1-4)	Chatra	Drought/Heat wave
13	West Bengal	Terai Zone (WB-2)	Coochbehar	Heavy rainfall
14	West Bengal	Old Alluvial Zone (WB-3)	Malda	Flood
15	West Bengal	Coastal Saline Zone (WB-6)	South 24 Parganas	Cyclonic storm/heavy rainfall within short period

Villages adopted by NICRA implementing KVKs of Zone II where the various technologies have been demonstrated are mentioned hereunder:

Name of KVK	Name of village
Aurangabad	Harigaon
Buxar	Kukurha
Chatra	Urali
Cooch Behar	Khagribari
East Singhbhum	Lowkeshra, Barunia and Pathargora
Gumla	Gunia
Jehanabad	Sakrorha
Koderma	Chopanadih
Malda	Brozolaltola, Meherchandtola, Jayramtola and Mahendrotola
Nawada	Majhila
Palamu	Dulsulma and Murma
Port Blair	Badmaspahar and Port Mount
Saran	Affaur and Darihara
Supaul	Sadanandpur
South 24 Parganas	Bongheri

The interventions covered with the following modules:

Module I: Natural Resource Management

In-situ moisture conservation, water harvesting and recycling for supplemental irrigation, improved

drainage in flood prone areas, conservation tillage where appropriate, artificial ground water recharge and water saving irrigation methods.

Module II : Crop Production

Introducing drought, salt and flood tolerant/resistant varieties, advancement of planting dates of rabi crops in areas with terminal heat stress, water saving paddy cultivation methods (SRI, aerobic, direct seedling), community nurseries for delayed monsoon, location specific intercropping systems with high sustainable yield index, introduction of new crops/ crop diversification, custom hiring centres for timely planting.

Module III : Livestock and Fisheries

Use of community lands for fodder production during drought/flood, improved fodder/feed storage methods, preventive vaccination, improved shelters for reducing heat stress in livestock, management of fish ponds/tanks during water scarcity and excess water.

Module IV : Institutional Interventions

Strengthening the existing institutional interventions or initiating new ones relating to seed bank, fodder bank, commodity groups, custom hiring centre, collective marketing group, introduction of weather index based insurance and climate literacy through a village weather station are part of this module.

MODULE - I

Natural Resource Management (NRM)

Natural resource management activities such as rainwater harvesting through site specific measures formed the flagship intervention of the project, as it was believed that efficient management of natural resources like rainwater and its access to the poor is the key to secure livelihoods. One of the major emphases of the project was on augmenting rainwater availability through its efficient use by adopting site-specific rainwater harvesting strategies. Similarly, soil types varied too from deep Vertisols (Seethagondi, Adilabad) to medium and shallow Alfisols (Pampanur, Anantapur). Hence, the runoff and infiltration capacity; therefore the water harvesting potential also varied. In high rainfall Vertisol areas (Adilabad) runoff was harvested in farm ponds for tiding over mid season droughts. In low rainfall shallow Alfisols (Anantapur and Mahbubnagar), the runoff was harvested in percolation ponds, trench cum bunds and CCTs for facilitating infiltration and re-charging of groundwater. Major interventions under this theme included digging of farm ponds, repair and renovation of existing rainwater harvesting infrastructure such as de-siltation of tanks, repairing of sluice gates etc; networking of bore wells to promote sustainable use of groundwater; participatory soil health management through identification and correction of major and micronutrients. Efforts were also made to put in place efficient water lifting and application systems

to ensure better use efficiency. This included introduction of low lift pumps and micro irrigation systems on custom hiring basis. Besides, defunct and dilapidated rainwater harvesting infrastructure was revived to function to their full capacity. The impact of interventions aimed at enhancing rainwater harvesting and utilization capacity was very significant across the clusters. The efforts in this area resulted in the creation of an additional rainwater harvesting capacity of over 4.3 lakh cu m leading to increased cropping intensity by bringing over 420 ha of area under protective irrigation regime (details in Annexure I). More importantly some of the technical and institutional interventions on optimizing pond size and groundwater sharing have drawn the attention of the State Government for mainstreaming in regular programmes. These initiatives paved way to better crop productivity and higher profits due to augmented rainwater availability and its improved management. Thus, NRM interventions rightly played the role of flagship interventions.

A) In-situ Moisture Conservation – Resource Conservation Technology: In-situ moisture conservation through resource conservation technology demonstrated in 15 NICRA adopted villages covering 304 farmers in 79.21 ha area. The performance of different technologies by the various KVKs is presented in the following table.



Renovation of defunct Pond



Table. Performances of demonstration of in-situ moisture conservation technologies

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)	Economics of demonstration (Rs/ha)		
				Gross Cost	Net Return	BCR
Organic mulching in vegetables (Tomato var. Rakhi)	10	0.66	261.5	55240	70260	2.26
Banana Poly-mulching (Var. Malbhog)	3	0.53	471.7	115393	339607	3.94
Land shaping and rain water harvesting in paddy	7	1.74	44	81750	143105	2.75
Growing bitter gourd in land embankment around deep water paddy fields	8	2	74	52914	62439	2.18
Tomato cultivation on Ridge and furrow	1	0.08	429	105854	120674	2.14
Renovation of derelict / defunct water bodies to irrigate bottle gourd	12	1.54	232	94827	76265	1.96
Maize (Var.Jaunpuri Makka) sowing through Multi crop planter	2	0.8	28.35	19560	14460	1.73
Maize (Var.HQPM) sowing through Multi crop planter	2	2.2	34.54	20240	21208	2.07
Green manuring (dhaincha) in potato	2	1	189.62	48500	84234	2.73
Wheat (Var. HD-2733) sowing through Zero till machine	4	2.4	31.8	17430	20730	2.18
Wheat (Var.-Halna) sowing through Zero till machine	1	0.4	28.65	16230	81150	2.12
Mulching with paddy straw in ginger	9	3	98.6	72400	272700	4.76
Summer ploughing in paddy	11	8	32.58	21890	17206	1.78
5% model of irrigation	20	1	-	2000	4400	2.2
Paddy straw mulching in ginger (Suruchi).	25	6	198.86	120000	277720	3.3
RCT in wheat (Var. PBW-343)	65	8.66	55.5	22250	17227	1.85
Zero Tillage in Chickpea (Var. JG-11)	30	6.5	13	23540	28460	2.2
Zero Tillage in Lentil (Var. Arun)	9	2	11.6	20265	21495	2.06
Crop residue (Var. Lok- 1) management through Happy Seeder	10	5	35.5	25300	22625	1.89
FIRBS in wheat (Var. PBW-502)	5	2.5	36.25	24820	24117	1.97
Drum Seeding of paddy (Sahbhagi)	12	5	45.5	21975	36265	2.65
In- situ moisture conservation with paddy straw	4	1	262	42974	118225	3.85
Sowing by Zero Tillage Technology	30	12	42.7	19400	35980	2.85
Straw mulching in cucumber	15	4	175	22500	82500	4.6
Aerial Vegetable cultivation in sloppy land (Bitter gourd)	8	1.2	175	52200	140485	3.69
Total	305	79.21				



Mulching with paddy straw in ginger demonstrated with 9 farmers in 3 ha area recorded highest benefit :cost ratio (4.76). Banana polythene mulching also recorded maximum net return (B:C ratio 3.94). Maize and wheat sowing done by zero tillage machine for in-situ moisture conservation recorded better yield. Demonstration on Drum Seeding of paddy Variety Sahbhagi recorded yield of 45.5 q/ ha. Due to declining trend in rainfall pattern and its erratic nature, there is always a scarcity of quality irrigation water during and after the kharif season in South 24 Parganas of West Bengal. Land shaping and rain water harvesting intervention was taken up for provision of freshwater for multiple cropping

including vegetable cultivation in rabi season and pisciculture round the year. The excavated earth is utilized for raising the rest of the low land upto a 1.5 feet height. The land embankment around the entire land is strengthened to 3 feet height and 5 feet wide. With the rest of the soil, a 5-feet wide and 4-feet high pond embankment is created. Here the low yielding traditional deep water paddy varieties in the kharif season are replaced by short duration HYV paddy and vegetables are introduced in the same land in rabi season. Both the widened pond embankment and the land embankment are used for vegetable cultivation throughout the year.



Aerial vegetable cultivation



Banana polythene mulching



Land shaping technology for multiple cropping



Irrigation through 5% model

B) Water harvesting and recycling for supplemental irrigation: Water harvesting and recycling for supplemental irrigation were demonstrated in 12 NICRA adopted villages by the different KVKs involving 299 numbers of farmers. The performances of different indicators in the demonstrations are presented in following table.

Table. Performances of different demonstrated technologies of water harvesting and recycling for supplemental irrigation

Technology demonstrated	No. of farmers	Area (ha)/Unit	Output (q/ha)	Economics of demonstration (Rs/ha)		
				Gross Cost	Net Return	BCR
Pond renovation	27	35 nos.	-	1348500	-	-
Clay mud + dung lining & chemicals (NaCl + Na ₂ CO ₃) for checking seepage loss of water in village pond.	20	5 nos.	Water saving 12%	9000	37860	5.20
Life saving irrigation in wheat	45	5 ha	32	24670	15330	1.62
Bora bandi for paddy	35	20 nos.	24.86	18000	11832	1.65
Canal renovated (1600m), Wheat irrigation	60	20 ha	27.32	17700	15084	1.85
Renovation of old Pond and cleaning (NYC)	26	5 nos.	Increases water durability and holding capacity of pond			
Tank cum well irrigation system	2	1.6 ha	-	122000	163480	2.34
Renovation of pyne	80	2772 ft L	Saving water losses by 40%	31311	-	-
Construction of a new dug out pond (size: 30m X 22m X 2.5m)	1	0.07 ha	-	163200	-	-
Construction of Broad Bed Furrow system (each area: 33m X 25m) in fresh water logging areas.	3	0.99 ha	-	129600	-	-
Total	299					



Mulching in vegetables with paddy straw



Sixty five numbers of ponds and 2772 ft pyne were renovated under these technologies. Clay mud + dung lining & chemicals ($\text{NaCl} + \text{Na}_2\text{CO}_3$) for checking seepage loss of water in village pond saved 12% water and showed the highest

benefit (BC ratio: 5.20) among all technologies. Construction of broad bed furrow system were followed in saline water logging areas (0.99 ha) for utilization of low lying brackish area for fish and vegetable cultivation.



Canal Before NICRA



Old pyne before renovation



Canal excavated



Old pyne after renovation



Water in Canal After NICRA

C) Conservation tillage: Conservation tillage in wheat, paddy, lentil, linseed, pea and chickpea demonstrated in 7 NICRA adopted villages in an area of 101.3 ha of 272 numbers of farmers. The technologies followed mainly by zero tillage operation. The results of the ZTD in various crops are presented in below table. Wheat with var. HUW243 cultivation through ZTD showed maximum yield of 37.7 q/ha. Zero tillage technology showed very promising results in pulse and oilseed cultivation. Lentil (Var. Arun) gave highest economic return (B:C ratio:: 3.97) among the pulse demonstration through ZTD.

Table: performance of ZTD in various crops

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Sowing of wheat (Var. HD 2733) with ZTD machine	25	8	36.7	21877	23997	2.10
Sowing of Wheat (Var. HD 2985) with ZTD machine	15	5	30.5	21755	16370	1.75
Zero-tillage in wheat (Var. PBW-343)	60	8.5	33.2	20100	19740	1.98
Zero-tillage in wheat (Var. HUW243)	33	6.8	37.7	26200	24627	1.93
Sowing wheat (Var. K9107) through zero till drill.	13	12	32	22000	16400	1.74
Paddy (Var. Sweta) sowing with ZTD Machine	12	5	52	22255	55745	3.50
Field preparation in chickpea (Var. GNG 663) through rotavator	4	2	14.8	24340	34660	2.42
Sowing Pea (Var. Arkel) through Zero till drill.	17	8	22	2100	45000	3.14
Sowing Linseed (Var. T397) through Zero till drill.	24	22	07	7000	14000	3.01
Sowing Lentil (Var. KLS218) (NPK) through Zero till drill.	27	14	17	19000	18400	3.60
Sowing of lentil (Var. Arun) with ZTD machine	42	10	10.5	10575	31425	3.97
Total	272	101.3				



Zero tillage in wheat



Zero tillage in chick pea

D. Artificial ground water recharge : Artificial ground water recharge done by field bunding, water management and ground water recharge through SRI by sub soiler in paddy in 3 NICRA

adopted villages covering 48 ha area in 59 farmers fields. Ground water recharge through SRI by sub-soiler recorded highest paddy yield (52 q/ha) and benefit : cost ratio (2.20).

Table. Performance of artificial ground water recharge technologies demonstrated

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Field bunding for paddy	15	8	28.19	21200	12628	1.59
Water management through bunding of paddy fields (2.5 fit height and width 9 inch width)	35	35	42.5	16000	10400	1.6:5
Ground water recharge through SRI by sub-soiler	9	5	52	31644	39417	2.20
Total	59	48				



Bund making for paddy cultivation



Bunding in paddy field

E) Water saving irrigation methods: Water saving irrigation methods like sprinkler irrigation, LEWA in rice, RBF in brinjal, micro lift irrigation in paddy demonstrated

in 8 NICRA adopted villages covering an area of 57.5 ha in 208 farmers fields

Table: Performance of different water saving irrigation method

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Irrigation system (micro lift Irrigation system) for paddy	15	10.0	32.46	22100	16852	1.76
Application of biofertilizer in rice (Var. MTU 7029)	77	30.8	66.25	29640	53172	2.79
Vermi-compost from biodegradable wastes	26	-	12.75	3900	3650	1.93
Production of pigeon pea (Var. PRG-158) on farm bund	11	0.3	14.3	21847	35353	2.61
RBF in Brinjal	20	1.0	251	57710	60040	2.05
LEWA in rice (Var. Rajendra sweta)	5	3.0	53.25	28970	37592	2.29
Sprinkler irrigation in rai (Var. Bio-902)	10	2.0	13	15000	37000	3.4
Sprinkler irrigation in green gram(Var. HUM-16)	4	1.5	14	11500	31500	3.6
Sprinkler irrigation in lentil (Var. Arun)	10	3.0	16.6	13000	36800	3.8
Sprinkler irrigation in chickpea (Var. PG-186)	20	5.0	8.5	12450	20050	3.41
RBF in cucumber (Var. Malini)	10	0.5	301	88525	109675	2.23
Total	208	57.1				

F) Other Demonstrations: Demonstrations like oyster mushroom cultivation, effective utilization moisture through seed production of blackgram, In-situ vermicomposting in orchards, soil test based nutrient application, cleaning & renovation of old farm pond, renovation of well, planting forest trees, plant for biodiversity, forestation, soil test based

nutrient application, bio pesticides in tomato, dolomite in gora paddy and cultivation of high yielding grass on farm bund were carried out in 759 farmers' fields. Out of these demonstrations on in-situ vermicomposting in orchards showed highest economic return (BC ratio: 8.06).



LEWA in rice



RBF in cucumber



RBF in brinjal



Table: Performance of other demonstration

Technology demonstrated	No. of farmers	Area (ha)	Output (q/ha)	Economics of demonstration (Rs./ha)		
				Gross Cost	Net Return	BCR
Effective utilization moisture through seed production of blackgram (Var. WBU-108 & PU-30) after flood	150	20	12.5	10500	43500	5.14
In-situ vermicomposting in orchards	10	4	105	26839	183160	8.06
Soil test based nutrient application	300	200	40	29778	21221	1.71
Cleaning & renovation of old farm pond	72	2	-	40000	11000	2.75
Renovation of old water harvesting structure (Well)	21	2	-	10000	25000	2.5
Planting forest trees (700 Bel) plant for biodiversity, forestation	30	4	-	-	-	-
Soil test based nutrient application (FYM/ inorganic fertilizer)	142	20	-	4000	9000	2.25
Bio pesticides in tomato	12	3	157.25	45500	111750	3.45
Dolomite in gora paddy	18	6	21.62	11400	8058	1.7
Cultivation of high yielding grass on farm bund	2	1	-	2500	5000	2.6
Total	757	262				

G) Rainwater harvesting structures developed : There were 384 number of rainwater harvesting structures have been developed which could store 1120239 cu m of water. This intervention increased the cropping intensity to the maximum extent upto 400%. KVK wise these structures along with storage capacity and increase in cropping intensity are given in the following table.

Table: KVK wise rainwater harvesting structures developed

KVK	RWH structures	No.	Storage capacity (cu m)	No. of farmers benefited		Protective irrigation potential (ha)*		Increase in cropping intensity (%)
				Before	After	Before	After	
Port Blair	New Pond	1	1194	0	3	0	0.40	Constructed in Feb., 2013 only
	New Broad bed and furrow system	3	1107	0	3	0	0.15	
Aurangabad	Pond	5	7055	0	18	0	7	125
	Renovated Well	2	50	0	2	0	2	110
Buxar	Farm pond	6	6954.3	0	12	0	3.55	100
Jehanabad	Pond	10	5000	0	210	0	95	150
Nawada	Renovation of existing Ahar (Water Reservoir)	3	31990	0	193	14.3	31.99	4.39
	Pond	9	12600	0	45	0	12.6	0

Saran	Pond (55m*35m*3.65m)	1	5875	1	24	2	5	8
	Pond (55m*45m*3.5m)	1	7809	1	25	2	6	23
	Pond (60m*40m*3.5m)	1	7218	1	23	1	5.5	8
	Pond (60.9m*52.1m*3.5m)	1	9355	1	45	3	7	11
	Pond (62m*53m*3.5m)	1	9702	1	42	2	7.5	23
	Inlet Channel (2000m*1.2m*1.2m)	1	2880	0	23	1	2	13
	Inlet Channel (1500m*1.2m*1.2m)	1	2160	0	24	0.5	1.5	53
	1800m*1.2m*1.2m)	1	2592	0	20	0.6	2	57
	Leveling of land eroded due to flood	2	0	0	226	0	0	29
	Leveling	20	0	0	10	0	0	22
	Bund Making	30	0	0	25	0	0	25
Supaul	Drainage channel	1	150	0	50	0	0	-
Chatra	Pond		420000	30	120	40	120	120
	Well	32	0	0	46	0	16	102
East Singhbhum	5% Model	30	405	0	30	1	5	400
	Pond Renovation	1	135	5	30	2	8	300
Gumla	Renovation of Pond	2	29836	10	15	14	21	157
	Bora bandh (Temporary check dam)	4		0	56	0	90	200
	Cleaning of Pond	1	530	0	01	0.7	01	142
Koderma	Defunct pond	2	20000	20	70	8	12	30
	Repaired well	10	400	24	36	6	9	20
Palamu	Well	21		420	650	15.0	20.0	50
	Pond	4		1600	2000	4.0	7.0	50
	5% model	50		0	1000	0	3	50
Cooch Behar	Farm Ponds	19	41220	36	67	10.1	18.0	1.5
Malda	Small ditches for jute retting	55	1960	0	165	0	15	-
S. 24 Pgs.	Landshaping and rain water harvesting structure	20	24044	0	20	0	8	120
	Renovated defunct water bodies	32	102258	0	32	16.974	34	100
	Renovated 4 Km long canal	1	365760	0	450	0	121.92	100
Total		384	1120239	2150	5811	144.174	698.11	



Renovation of defunct well



MODULE - II

Crop Production

A) Introducing drought resistant varieties: Under crop production module introduction of drought resistant varieties of paddy, brinjal, niger, maize pigeon pea, and ragi were demonstrated in 15 NICRA adopted villages involving 683 number of farmers in 232.0 ha area. Performance of the different drought resistant varieties of various crops is presented in the following table.

Table. Performance of different drought tolerant varieties

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Drought tolerant paddy (Var. Sahbhagi)	86	23.0	31.8	23.3	36.5	23000	27000	2.17
Drought resistant paddy (Var. Anjali)	52	47.0	26.0	18.0	44.4	14500	12800	1.88
Sowing of drought tolerant paddy (Var. Sahbhagi) with ZTD machine	25	5.0	42.0	30.0	40.0	19750	32750	2.65
Sowing of drought tolerant paddy (Var. Sahbhagi) with Drum seeder machine	20	5.0	45.5	30.0	51.6	21975	36265	2.65
Drought tolerant paddy varieties (Var. Naveen)	8	0.8	46.0	40.25	14.3	27600	29900	2.08
DSR Transplanting (Var. Sahbhagi)	20	15.0	30.47	21.92	39.0	20200	23200	2.24
DSR Transplanting (Var. Abhishek)	29	21.0	38.92	31.2	24.4	23500	29700	2.26
Tolerant Varieties to submergence	10	36.0	38.0	30.0	26.7	22928	27572	2.27
Maize (Var. Jaunpuri Makka)	25	4.2	25.7	20.3	26.6	16200	14640	1.90
Drought tolerant ragi (Var. A – 404)	156	11.5	25.0	11.0	127.3	8850	21650	3.15
Drought tolerant pigeon pea (Var. ICPL 88039 ,MAL-13, PRG153)	88	19.0	16.8	12.4	35.5	14850	43950	3.95
Drought tolerant pigeon pea (Var. ICPL- 858063)	15	1.3	10.0	7.0	42.8	13000	27000	3.07
Niger (Var. Birsa Niger -1)	5	1.5	3.2	2.6	21.2	6260	3660	1.58
Niger (Var. Birsa Niger -3)	5	1.5	3.1	2.5	20.5	6150	3336	1.54
Red gram (Var.-PGR-158)	4	1.0	10.2	8.2	24.6	14350	16160	2.12
Horse gram (Var. Birsa kulthi-1)	22	3.5	11.3	8.3	36.1	10400	11560	2.11
Contingent Crops Horse gram	25	5.0	18.0	12.0	50	31167	32833	2.12
Drought resistant brinjal (Var. CARI- Brinjal -1)	9	2.0	17.0	7.5	126	110000	145000	2.30
Drought tolerant variety DBU -14	40	16.0	34.0	30.0	13.3	30240	15759	1.52
Short duration variety (Var. Pukkhraj)	35	12.5	255.0	1215	18.6	45000	108000	3.40
Drought resistant Dhania (Var. CARI broad Dhania-1)	4	0.2	0.5	0.2	150	12500	22500	2.80
Total	683	232.0						

Drought tolerant paddy varieties like Sahbhagi, Anjali, A-404, Naveen, Abhishek were demonstrated in 152.8 ha areas of 250 number of farmers' field. Among all these varieties cultivation of Sahbhagi variety with drum seeded showed highest yield potential (45.5 q/ha) and economic return (B:C ::2.65) with maximum increase (51.6%) as compared to local check. In the demonstrations under pulse and oilseeds, ICPL- 858063, Mal- 13 and PRG 153 varieties of pigeon pea gave the

Table. Performance of different salt tolerant paddy varieties

Technology demonstrated (Salt tolerant varieties)	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
CARI Dhan-5	8	2.5	38.0	30.0	26.6	20250	14850	1.80
Usar Dhan-3	48	56.0	33.0	28.0	17.8	31734	12265	1.38
SR-26B	10	2.0	35.0	30.0	16.7	21095	25404	2.20
Jarava, Geetanjali, Amalmona	15	2.0	45.0	33.7	33.5	27400	40100	2.46
Total	81	62.5						



Demonstration on Sahbhagi

maximum economic return (B:C:: 3.95)

B) Introducing salt tolerant paddy varieties : Salt tolerant varieties of paddy like CARI Dhan-5, Usar Dhan-5, Jarava, Geetanjali, SR-26B, Amalmona were introduced in 62.5 ha area in 81 farmers' fields. Javarva, Geetanjali and Amalmona varieties proved maximum salt tolerant potential by giving highest yield of 45.0 q/ha and more economic return (BC ratio of 2.46).



Field day on CARI Dhan-5

C) Introducing flood tolerant varieties: Flood tolerant varieties of paddy like Swarna sub 1 and Sabita were introduced through demonstration in 62.5 ha area in 81 farmers' fields. Javarva, Geetanjali and Amalmona varieties proved maximum salt tolerant potential by giving highest yield of 45.0 q/ha and more economic return (BC ratio of 2.46).

Table. Performance of different flood tolerant varieties

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Temporary submergence rice variety (Var. Swarna Sub-1)	68	21.4	36.7	27.5	33.5	16200	26700	2.65
Flood tolerant paddy (Var. Sabita)	15	2.0	41.25	33.75	22	26800	35075	2.30



Demonstration on flood tolerant paddy (Var. Sabita)

D) Advancement of planting dates of rabi crops in areas with terminal heat: To avoid terminal heat stress in crops like rice, wheat, lentil, mustard, potato, rajmash etc. were sown in 12 days advance (avg) during rabi season. These demonstrations were carried out in seven NICRA adopted villages involving 245 number of farmers' fields.

Table. Performance of advancement of planting dates in different crops

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Short duration rice (Var. GB-1)	20	2.9	47.0	36.0	30.6	19550	32150	2.64
Wheat (Var. K - 9107)	20	5.0	26.5	14.0	231.0	18000	13800	1.76
Wheat (Var. Helna)	10	2.5	36.0	24.0	50.0	18800	20800	2.10
Wheat (HD2985)	40	15.0	44.0	30.0	46.7	25254	32741	2.29
Maize (Var. DHM 117)	34	3.0	65.0	58.0	12.0	20500	51000	3.48
Lentil (Var. Arun)	49	4.0	16.0	12.0	33.3	13000	35000	3.70
Mustard (Var. Shiwani)	22	10.0	8.5	5.6	51.8	12800	12700	1.99
Mustard (Var. Pusa Mahak)	20	10.0	12.0	9.0	33.3	12000	24000	3.00
Raimash (Var. PT303)	25	10.0	4.5	3.2	40.6	5700	7800	2.36
Potato (Var. K. Ashoka)	25	1.0	210.0	160.0	31.0	65000	40000	1.61
Total	245	53.4						

E) Water saving paddy cultivation methods : Water saving paddy cultivation through SRI, short duration varieties, direct seeded rice, brown manuring etc. have been demonstrated in 196.1 ha area of 499 number of farmers' fields. These interventions were carried out in 9 NICRA adopted villages. Among all

the interventions paddy cultivation with Sahbhagi variety showed highest increase in yield whereas paddy cultivation with variety Rajendra Sweta with ZTD gave maximum economic return in the tune of BC ratio of 3.50.

Table. Performances of water saving technologies for paddy cultivation

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Water saving technology through SRI	193	61.6	52.0	30.0	73.3	32288	39712	2.23
SRI (Var. MTU -7029)	40	2.53	48.0	39.0	23.0	20000	37600	2.88
Paddy Seed (Var. Sahbhagi)	118	57.0	48.0	26.5	81.1	8000	27000	3.40
Aerobic Rice (Var. Anjali) cultivation	59	30.5	24.5	17.6	39.2	12000	11275	1.94
Direct seeded brown manured rice	16	7.0	38.0	30.0	26.7	22928	27572	2.27
DSR (Var. Anjali)	31	25.5	34.0	26.0	30.0	13300	24100	2.81
SRI system in paddy (Var. Rajendra subhasini)	15	5.0	52.4	38.7	35.4	28450	48934	2.72
Sowing of paddy (Var. Rajendar sweta) with ZTD machine	15	5.0	52.0	41.0	26.8	22255	55745	3.50
Zero tilled rice	12	2.0	42.0	30.0	40.0	20554	36445	2.77
Total	499	196.1						



Demonstration on SRI

F) Staggered community nurseries for delayed monsoon: Delayed monsoon is now a common phenomenon in Bihar and Jharkhand districts of this Zone. To combat the situation one intervention of staggered community nursery for various crops of different crop duration and varieties has been promoted. Community nursery development of rice,

cauliflower, brinjal, and tomato were demonstrated in 17.3 ha area of 75 numbers of farmers. These interventions were carried out in 5 NICRA adopted villages. Among all the demonstration the community nursery for cauliflower was the most promising one which showed highest increase in yield as well as economic return.

Table: Performance of staggered community nurseries of different crops

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Raised Community nursery of paddy (Var. Naveen)	8	0.8	46.0	40.25	14.3	27600	29900	2.08
Nursery Management of paddy (Var. Rajendra sweta)	13	1.5	50.0	42.5	17.6	25480	49520	2.94
Paddy (Var. Induri sambha)	3	0.5	45.3	40.25	12.4	27300	29262	2.07
Community nursery of paddy (Var. Lalat)	15	5.0	31.6	28.4	11.3	19600	12020	1.61
Community nursery of paddy (Var. Jaldi dhan 3)	24	5.5	34.0	30	13.3	30240	15759	1.52
Community nursery of cauliflower	4	2.0	400.0	335	19.4	37200	162800	5.38
Community nursery of brinjal	4	1.0	600.0	530	13.2	37400	142600	4.81
Community nursery of tomato	4	1.0	380.0	330	15.2	34800	41200	2.18
Total	75	17.3						



Community nursery of brinjal



Staggered nursery of paddy for delayed monsoon

G) Location specific intercropping systems with high sustainable yield index: Intervention on location specific intercropping was demonstrated in 10 NICRA adopted villages. The demonstrations were carried out in 129.8 ha area of 689 number of farmers'

fields. Of all these intercropping intercropping of maize + ladies finger was found most popular which was undertaken in 130 number of farmers fields although maximum return (B:C:: 6.80) was found in redgram + millet intercropping.

Table: Performance of different location specific intercropping systems

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Maize (Var.X92 as main crop) + Ladies finger (HYV)	130	17.3	Maize: 90.0 Ladies Finger:0.5	-	-	145500	127000	1.59
Chili (Var. Bullet as main crop) + Ladies finger (HYV)	20	2.0	Chili:45.0 Ladies Finger:0.5	-	-	240500	2197000	5.86
Maize + Redgram	2	2.0	23.5	12.6	98.9	13550	45100	4.32
Maize + Groundnut (1:3)	3	0.4	19.2	12.6	52.4	21500	36100	2.67
Sorghum (Var. CSV – 20)	74	20.0	25.0	9.4	166.0	2600	5400	2.10
Potato (Var. Pukhraj) + Maize (Var. Laxhmi)	35	3.0	Potato:86.0 Maize:128.0	-	-	48000	101600	3.11
Redgram (Var. Bahar) + Millet (Var. GPU-28)	5	2.0	Redgram: 20.0 Millet: 10.5	-	-	13000	75520	6.80
Potato (Var. Pukhraj) + Radish (Var. Pusa chetki)	4	2.0	Potato:193.5 Radish:38.4	-	-	13900	61850	5.44
Arhar + Blackgram	15	2.0	16.9 (Arhar eq.)	10.2	57.6	15500	35500	3.29
Cucumber + Beans	5	2.5						
Wheat + Mustard	20	3.0	37.75 (Wheat eq.)	30.3	24.8	21000	21500	2.02
Okra (Mahyco 959) + Chilli (Surya)	4	0.1	7.5	3.2	134.0	130000	170000	2.30
Total	297	54.3						



Intercropping with maize and okra



Intercropping with cucumber and beans



H) Introduction of new crops/ crop diversification: Crop diversification through introducing new crops in prevailing cropping pattern was demonstrated in the different NICRA adopted villages. These demonstration were carried out in 96.4 ha area of

531 number of farmers’ fields. Introduction of ol (var. Gajendra) in the cropping pattern of District is the most promising one which gave maximum economic return (B:C:: 14.81).

Table. Performance of different crop diversification in NICRA villages

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Introduction of crop diversification mustard (Var. Pusa bold)	56	25.0	8.5	6	41.7	11000	23000	3.09
Gram (Var. Pusa 362)	76	28.0	11	7	57.1	13000	31000	3.38
Onion (Var. N-53)	12	2.5	250	180	38.9	55000	445000	9.09
Tomato (Var. Param F1)	30	4.6	200	150	33.3	62000	138000	3.22
Chilli (Var. Surajmukhi)	21	4.6	75	50	50.0	60000	165000	3.75
Cabbage (Var. OM-3)	18	3.1	320	250	28.0	60000	420000	8.00
Radish (Var. Suhra-32)	21	2.3	120	80	50.0	50000	70000	2.40
French Bean (Var. FE-51 ANUPMA)	17	0.8	60	40	50.0	58000	92000	2.58
Cauliflower (Var. MSN-16)	20	3.5	200	120	66.7	60000	180000	4.00
Brinjal (Var. F1-Hybride Long)	19	4.5	220	150	46.7	62000	158000	3.54
Turmeric (Var. Rajendra soniya)	10	2.0	210	150	40.0	60000	570000	10.56
Ginger (Var. Nadiya)	9	1.5	200	160	25.0	70000	730000	11.40
Lentil (Short duration variety PL – 406)	12	5.0	8	4.5	78.0	6000	18000	3.01
Linseed (Short duration variety T 397)	10	4.0	3.5	2.4	46.0	2200	9592	5.36
OI (HYV. Gajendra)	20	1.0	780	250	212.0	74000	1021940	14.81
Nutritional garden- Veg. seed Seem (dol-icus lablab)	150	2.0	10	7	43.0	1000	3000	4.00
Tomato under mulching	30	2.0	70	30	57.0	3000	11000	3.6:1
Total	531	96.4						



Demonstration on mulching in tomato



Introduction of low water requiring crop- Urd



Introduction of new crop- Turmeric



Crop diversification with Elephant Foot Yam

I) Other Demonstrations: There are some other demonstrations in various aspects mentioned in the following table which was carried out in different NICRA adopted villages involving 401 number of

farmers. Among all the demonstration cultivating contingency crops like brinjal, cauliflower and short duration tomato and banana bunch cover, integrated fish farming were remunerative.

Table. Performance of other demonstration in NICRA villages

Technology demonstrated	No. of farmers	Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Low temperature tolerance - cultural practice - Banana bunch cover (Var. Malbhog & Dwarf Cavendish)	3	0.3	481.6	454.5	5.96	141500	368750	3.61
Promotion of Pulses utilizing post-monsoon rainfall: Blackgram (WBU-108) in jute AZO-PSB fallows with INM	11	1.3	10.7	7.5	43.33	16500	29725	2.80
Promotion of stem rot resistant Jute (var. JBO-2003H)	12	1.9	31.5	23.0	36.95	21200	35500	2.67
Integrated crop management of mustard (NC-1)	15	2.0	14.1	10.3	37.56	19450	25670	2.32
Integrated crop management of lentil (Maitri)	17	1.8	12.5	9.0	38.88	18100	31900	2.76
Integrated disease management in vegetables	20	2.0	240.0	210.0	14.28	83500	24500	1.29
Demonstration short duration vegetables as contingent crop Tomato (Var. PUSA Gaurav)	20	0.4	350.0	290.0	20.60	43500	166500	4.82
Contingency crop Brinjal (Var. PUSA Uttam)	8	0.3	375.0	310.0	20.96	44050	255950	6.81



Contingency crop Cauliflower (Var .PUSA Sharad)	8	0.4	240.0	200.0	20.00	42500	197500	5.64
Contingency crop Radish (Var. PUSA Chetki)	15	0.3	140.0	110.0	27.20	40500	43500	2.07
Soil reclamation : Levelling / bunding and flooring for leaching of salt	12	5.0	35.0	30.0	16.67	21095	25404	2.20
Scaping Levelar	10	5.0	38.0	30.0	26.67	22928	27541	2.27
Integrated fish farming	15	2.0	1.5	0.7	71.00	39000	111000	3.80
Social forestry :Sonajhuri, Neem, Mahogany	110	2500 plant						
Planting Forest trees: Mangrove Sundari, Goran, Bain	125	1250 plant						
Total	401							



Banana bunch cover



Plantation of sundari trees



Plantation of forest trees

MODULE - III

Livestock & Fisheries

A) Use of community lands for fodder production during droughts / floods: Community lands of an area of 65.5 ha involving 744 number of farmers utilized for different fodder production were demonstrated in eight different NICRA adopted villages. Berseem,

oat, sudan chari, maize, hybrid napier were the major fodder produced in the programme. Of all these demonstration quality legume Sudan grass demonstrated in 20 number of farmers fields showed maximum benefit return (B:C:: 6.5).

Table. Performance of different fodder demonstration in community lands

Technology demonstrated	No. of farmers	Unit/ Area (ha)	Output (q/ha)		% increase	Economics of demonstration (Rs/ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Berseem (Var. Wardan)	48	3.3	750	620	20.9	17200	61500	4.5
JHB-146	20	2.	730	620	17.7	17200	59450	4.4
Quality legume fodder Berseem (Var. Muskavi)	26	1.3	960	750	28.0	28800	67200	3.3
Quality legume fodder Oat (Var. JHO-822)	20	1.4	500	400	25.0	16000	31500	2.9
Quality legume fodder Sudan chari	3	1.0	35	25	40.0	8550	26450	4.1
Quality legume fodder Sudan Grass	20	5.0	520	160	225.0	40000	220000	6.5
Fodder production of Maize/Sudan	600	50.0	500	400	25.0	22890	77109	4.5
Fodder cultivation with improved varieties Hybrid Napier,	7	1.5	80	40	100.0	5500	6500	2.1
Total	744	65.5						



Demonstration on fodder crop



B) Improved fodder/feed storage methods: Improved fodder of rice bean and silage making were demonstrated in four different NICRA villages involving 27 number

of farmers fields. Silage making for 10 number of units showed very promising results.

Table: Performance of improved fodder and silage demonstration

Technology demonstrated	No. of farmers	Unit/ Area (ha)	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Fodder grass on farm bund (Rice bean Var. Bidhan-1)	12	0.21	193	-	-	8100	11200	2.38
Silage Making	25	10 nos	6.5	4	62.5	15	160	11.66

C) Preventive vaccination: Various vaccination camps were organized against FMD of cattle, PPR against goat, Ranikhet of poultry, BQ vaccine, deworming etc. in 12 different NICRA adopted villages. Mortality

rate reduce up to the extent of 100% and average increase in cattle milk yield upto 20% have been recorded after the vaccination camps organized.

Table. Performance of various vaccination camps organized in NICRA villages

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Vaccination camp against FMD Cattle & PPR against goat	479	704	Mortality (70-80%) reduced	Mortality (40-50%) reduced	-			
Vaccination HS,BQ & FMD	2722	1321	100 % Mortality reduced, Increase Milk yield (1.4 -1.8 lit/day/cow)	2.2% Mortality reduced, Av. Milk yield 1.4 lit/day/cow	28.6	5590	7010	2.25
Vaccination for PPR in goat and Ranikhet in Poultry.	40	550	No occurrence of disease	Sporadic out break	-	-	-	-
HS+BQ Vaccine	500	500	7	1	600	20	155	8.75
Animal health camp (HS+BQ), Dewormer (febendazole)	120	360	5 % mortality	65 % mortality	60% survival	30059	86581	3.8
Vaccination in Goat (PPR),dewormer(Febendazole) & Mineral mixture	35	250	10% mortality	100% Mortality	90% survival	553000	122000	1.2
Vaccination against Foot and Mouth disease	135	350	2% mortality	15% mortality	-			
Animal Treatment Camp Butox, Prajana,Sulpha Dimadin ,Oxytetra cycle	77	260 nos	Reduced occurrence of diseases 92%	Occurrence of diseases 35%	61.95	-	-	-
Proper De-worming	500	500	7	5	40	22	153	7.95
FMD Vaccine	500	500	7	1	600	20	155	8.75
Total	4629	5295						



Vaccination against FMD in cattle



Vaccination against PPR in goat

D) Management of ponds / tanks for fish and duck rearing:

Composite and cat fish rearing in the existing pond or in renovated pond were demonstrated in

78 farmers fields of NICAR adopted villages. Khaki Campbell duck was also introduced through this intervention.

Table. Performance of composite and cat fish, and khaki Campbell in the renovated ponds

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Composite Fish Farming	58	13.6 ha	740	190	289.5	17100	49500	3.89
Cat fish culture	15	1.6 ha	0.2	0.1	100.0	11500	58500	6.08
Renovation of defunct fish ponds and tilapia, singhi, magur, annabus & lata species cultivation	3	0.2 ha	0.2	0.1	100.0	10000	40000	5.00
Duck Khakhi chambal	2	20 nos	-	-	-	7000	3500	1.50
Total	78							



Management of fish pond

E) Livestock demonstration: Demonstration of rural backyard poultry (kuroiler, Nicobari fowl), khaki Campbell duck, T X D breed of pig, mineral mixture and azolla as cattle feed were carried out in 312 number of farmers fields. Improved Nicobari fowl of backyard poultry was introduced through this intervention which showed very promising results (B:C :: 2.53).

Table. Performance of livestock demonstration in NICRA adopted villages

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)		
			Demo	Local		Gross Cost	Net Return	BCR
Rural backyard poultry Kuroiler Birds	15	90 nos	1 kg at 10 weeks	0.75 kg at 10 weeks	33	80/ bird	20/ bird	1.25
Backyard poultry (Improved Nicobari fowl)	7	140 nos	140 egg	75 egg	86	2214	3386	2.53
Replacement of local breed with Khaki Cambell	13	104 no.	Prodn : 21/ duck/month	Prodn : 15/duck/ month	40	Rs. 50 / duck/ month	Rs. 66/ duck/ month	2.32
Improved breed of Pig (T & D)	17	24 nos	0.9 q/pig	0.5q/pig	80	26000	38350	2.47
Addition of mineral mixture	240	560 nos	1.5 kg	1	30	1000	1600	1.60
Low cost Azolla production as supplementary cattle feed	20	60 Unit	Prodn:8.55 q/ pit/yr; Milk : 46.8 l/ cow/month	- Milk :39.6 l/cow/ month	-	723/ pit	681/cow/ month	1.94
Total	312							



Introduction of Nicobari fowl



Azolla cultivation

F) Improved shelters for reducing heat stress in livestock:

Improved Poultry shed recorded low mortality rate and in shady area reduced heat stress. Standard spacing in improved shed resulted better performance in poultry and dairy animals.

Interventions to reduce heat stress for higher survivability of backyard poultry and dairy animals were demonstrated by making 40 unit of improved shelter.

Table. Performance of improved shelters for poultry and dairy animals

Technology demonstrated	No. of farmers	Unit/ No. / Area (ha)	Measurable indicators of output* (q/ha)		% increase	Economics of demonstration (Rs./ha)			
			Demo	Local		Gross Cost	Gross Return	Net Return	BCR
Mud based Shelter Bamboo+Paddy straw+mud	25	25	Mortality 10%	Mortality 80%	Survival 70%				
Hut making	10	10	7	4	75	10	175	165	17.5
Improved shelters for poultry and livestock	5	5							



Cost effective improved shelter for poultry



MODULE - IV

Institutional Interventions

Institutional interventions including seed bank, fodder bank, commodity groups, custom hiring for timely operations, community nursery raising, irrigation, collective marketing climate literacy through a village level weather station and awareness developed 221 units covering of 365.8 ha area of 2351 number of farmers in the Zone.

Table. Details of the various institutional interventions

Interventions	No. of KVKs	Details of activity			No. of farmers	Unit / No. / Area (ha)
		Name of crops / Commodity groups / Implements	Quantity (q) / Number / Rent / Charges	Technology used in seed / fodder bank & function of groups		
Seed bank	7	Rice- Drought tolerant/ Short Duration Var. Rajendra Sweta,Naveen,Jaldi Dhan 13,Madhuri	1.05	Quality seed	15	5.5
		Paddy Var. Lalat	34.5	Participatory approach market linkage	2	1.2
		Wheat Var.-HUW-468	37.44	Participatory approach market linkage		
		Paddy Var. Anjali	-	Multiplication of seeds	28	5.0
		Paddy Var. Sahbhagi	-	Multiplication of seeds	3	1.0
		Paddy (Variety – Anjali)	120	i. Registration of Seed done by farmers.	13	5.0
		Foundation seed Paddy	12	Seed production and storage	2	5.0
		Foundation seed Rapeseed and mustard	5	Seed production and storage	10	5.0
		Foundation seed Wheat	10	Seed production and storage	20	10.0
		Paddy Sahbhagi	50	Seed	2	2.0
		Paddy Rajendra Sweta	92	Seed	2	2.0
		Pigeon pea	2	Seed production	10	6.0
		Paddy	3		31	5.0
		Gram	1.5		8	2.0
		Blackgram	22.0	Variety: WBU-108 & PU-30	22	3.0
Fodder bank	5	Oat JHO-851	5kg	-	2	0.1
		oat JHO-99-2	5kg	-	2	0.1
		oat JHO-822	140kg	-	20	1.4
		Berseem Wardan	10kg	-	5	0.4
		Berseem JHB-146	10kg	-	5	0.4
		Jowar	31.5	Fodder use in drought spill/heavy rain	12	1
		Wheat straw	-	Urea treatment	5	5 Unit
		Maize	1		20	2.0
		Sudan Grass	1		10	2.0
Paddy Straw & Wheat Straw		VCRMC is maintaining this	15	1.5		



Commodity groups	5	Kitchen Gardening	-	Improved Variety Seed	26	0.6
		Veg Mustard Pusa sag 1			30	2.0
		5 group Fingerlings fish	115	Fish farming	35	5.0
		Fertilizer procurement/storage/Sale counter	1	Farmers through PACS and cooperative society	200	10 unit
		Vegetable production and marketing.	5 groups handle 2,000 green vegetable and potato, Onion	1. Production oriented training.2. Linkage with market.	80	5 unit
Custom hiring centre	9	Power tiller	2	-	259	1 unit
		Mould bold plough,	01/ Rs.33/hr	-	2	0.5
		Rotavator (4'),	01/ Rs. 50/hr	-	7	3.9
		Zero till seed drill,	01/ Rs. 75/hr	-	8	5.6
		Turbo seeder,	01/Rs. 150/ hr	-	5	1.8
		Power Duster,	01/Rs 13/ hr	-	2	1.3
		Power sprayer, Pumping Set,	01/Rs 13/hr	-	4	5.5
			01/Rs.75/hr	-	3	1.3
		Farm implements	1	Technology demonstration	110	46 unit
		Wheat Thresher, Zero Tillage Machine, Sprayer, Duster, Paddy Thresher etc	65	Implements is provided to the Group for hiring purpose	15	15 unit
		Wheat, Paddy, Lentil, Chick pea ZTD, Drum Seeder		ZTD, Drum Seeder	55	12 unit
		Water pump, thresher, power sprayer, weeder, SRI marker, Zero till drill	Pump @ Rs. 75/hr, Thresher @ Rs. 50/hr, Sprayer @ Rs. 20/hr, Weeder @Rs. 5/hr, SRI marker @ Rs. 2/hr, Zero till drill @ Rs. 50/hr		45	7 unit
		Zero-till ferti-seed, Leveler/bund maker/FIRB planter/Drum seeder/Sprayer/Sub-soiler/Disc harrow/Bucket laveler/Connoweeder/Marker/Reaper/Thresher	2	Technology demonstration	300	300 unit
		VCRMC Equipments purchased	1	Farm implements	193	5.2
		Collective marketing	3	Onion/ Vegetable	1	-
		Milk production and marketing	2 Groups handle 200ltr./day milk.	Introduce new green fodder like Sudan grass, market Linkage	17	2 unit
		Vegetables	1	Cooperative arrangement	50	25 unit
		Climate literacy through a village level weather station	6	Temperature, Relative humidity, Rain fall, Wind speed and direction		
		Weather station SMS/Voice SMS	1	Data interpretation of AWS and forecasting/Advisory	56	1 unit
		AWS	-	-	135	1 unit
		NICRA Pathsala			25	1 unit
		AWS	1	VCRMC is maintaining this		1 unit
		Wheat	5	-	30	38 unit
					2201	

Village Climate Risk Management Committee (VCRMC)

Village Climate Risk Management Committee (VCRMC) was constituted after in-depth discussion with the villagers about the mitigation of the climatic vulnerabilities of the villages and the strategies to be adopted under NICRA. The members of the committee were selected by the villagers under the facilitation of KVKs where NICRA was being implemented. VCRMC became operational with opening of a bank account in their name being jointly handled by the President of VCRMC and the Programme Coordinator of the KVK concerned. The custom hiring of various farm tools and implements was being supervised by VCRMC apart from taking important decisions on the technological interventions to be implemented at the village in consultation with the KVK.

Jay Prakash Village Climate Risk Management Committee constituted under NICRA being implemented at KVK Nawada, Bihar generated Rs. 96972.00 in the bank account of VCRMC and got recognition of best performing Village Climate

Risk Management Committee from Zone-II. The VCRMC created awareness among the farmers by frequent group meetings, trainings and exposure visits to collect every drop of water in the village. The VCRMC also decided for efficient utilization of the water harvested through renovated structures as a follow-up measure. For this purpose, the low water requiring crops like pigeon pea and urd were cultivated as alternate crops to paddy (high water requiring crop) in drought situation of kharif season. In the process of renovation of old pyne (water course in the village) for improving the irrigation facility, a total of 2772 ft long renovated pyne increased irrigation to an additional 25% of total cultivable area. Growing vegetables has been possible with the created irrigation facility. Similarly, the creation and renovation of water harvesting structures resulted in larger (1700 ft) embankment areas which were brought under plantation of 1100 trees (forest and fruit) like sisum, mehgoni, simul, jackfruit, ber, jamun, mango etc.



Custom Hiring of Farm Implements and Machinery at NICRA Adopted villages

Custom hiring initiated in the NICRA adopted village under the supervision of VCRMC has become immensely popular among the farmers and substantial amount has also been generated. Farm tools and implements, which were beyond the reach

of resource-poor farmers due to non-availability and cost factor, became available at an affordable price through custom hiring. Revenue generated through Custom hiring and under VCRMC in different KVKs were presented in the following table.

Table. Revenue generated through Custom hiring Centres and VCRMC in KVKs

Name of KVK	Revenue generated (Rs.)	
	From Custom Hiring Centres	Total under VCRMC
Aurangabad	13000.00	13000.00
Buxar	2730.00	9525.00
Chatra	5045.00	5306.00
Cooch Behar	5172.00	13770.00
East Singhbhum	6595.00	6595.00
Gumla	9600.00	23151.00
Jehanabad	4300.00	31916.00
Koderma	4645.00	6539.00
Malda	23362.00	23362.00
Nawada	16309.00	96972.00
Palamu	1318.00	3200.00
Port Blair	350.00	4477.00
Saran	44405.00	60000.00
Supaul	3370.00	15055.00
South 24 Parganas	9420.00	88359.00
Total	149621.00	401227.00



Custom hiring of manual paddy thresher



Custom hiring of wheat harvesting reaper

Details of VCRMC and amount generated in the bank account of VCRMC during 2012-13

Name of the KVK	Name of the village	No. of member	Name of Bank	Bank A/C No.	Amount (Rs.)	Action taken by VCRMC
Aurangabad	Harigaon and Goh	11	PNB, Goh	0676000100306236	13000.00	
Buxar	Kukurha	11	PNB, Kukurha	2370000100072361	9525.00	
Chatra	Uralli	4	UBI, Gudari Bazar, Chatra	1629010038951	5306.00	
Cooch Behar	Khagribari	85	Central Bank of India, Cooch Behar	3173505843	9062.00	
	Khagribari	55	Bank of India, Cooch Behar	435510110000538	4708.50	
East Singhbhum	Lawkeshra, Barunia, Pathergora	9	Bank of India, Mushabani	450810110007738	6595.00	
Gumla	Gunia	5	Bank of India	493510110006239	23151.00	
Jehanabad	Sakrorha	10	PNB	1089000100118328	31916.00	
Koderma	Chopanadih	9	United Bank of India, Parsabad	745010175500	6539.00	
Malda	Brojolaltola, Jayramtola, Meherchandtola, Mahendratola	10	SBI, Manik Chawk	32658474589	23362.00	

Nawada	Majhila	20	Madhay Bihar Gramin Bank, Bha-luahi	72900100048267	96972.00	
Palamu	Dulsulma & Murma	13	VGB Satbarwa	84002255555	3200.00	
Port Blair	Port Mout & Badmas Pahad	7	Andaman & Nicobar State Co-operative Bank		4477.00	
Saran	Affaur	6	Uttar Bihar Gramin Bank	1006151030000803	30000.00	
	Darihara	3	Uttar Bihar Gramin Bank	1006151030001015	30000.00	
Supaul	Sadanandpur	14	SBI, Simrahi Bazar, -supaul	32421051370	15055.00	
South 24 Parganas	Bongheri	7	SBI	32209830438	88359.00	
Total					401227.00	



Capacity Building (HRD) Programme

A total of 430 courses were conducted by all NICRA implementing KVKs under Capacity Building Programme on various thematic areas benefitting 9976 farmers and farm women (8401 male and 1476 female) during the year 2012-13. Thematic areas covered on SRI, scientific crop management, crop diversification, land shaping, green manuring, natural resource management,

resource conservation technology, animal feed management, nursery raising, pest and disease management, weed control, vermicompost, value addition, livestock management, oilseed and pulse demonstration, farm implements, drudgery reduction etc. The HRD programme conducted on the basis of priority area of farmers or farm women.

Table. Details of HRD programme conducted in NICRA adopted villages during 2012-13

Thematic area	No. of KVKs	Topic of the training	No. of Courses	No. of beneficiaries		
				Male	Female	Total
Livestock and Fishery Management	10	Duckery as an additional source of income	8	144	21	165
		Management schedule for dual purpose poultry birds	10	212	28	240
		Feed and health management of livestock	19	417	80	497
		Feeding breeding and management of Goat and Pig under drought like situation.	14	285	20	305
		Prevention and control of live-stock Disease	18	340	100	440
		Scientific rearing of IMC	12	284	10	294
		Composite fish culture	10	218	0	218
Natural Resource Management	12	Production of quality compost using local resources	5	85	12	97
		Integrated farming methods in landshaping plots	4	94	20	114
		Vegetable cultivation on raised land embankment	6	72	26	98
		Integrated weed management in rice through land management	4	52	20	72
		Management of salt affected soil	10	85	20	105
		Impact of bunding in water conservation	6	158	5	163
		Increase of water holding capacity of sandy soil of Diara land	6	21	0	21
		Mulching and its impact	15	251	50	301
Crop Management	10	Paddy cultivation through SRI	15	230	65	295
		Salt tolerant and deep water paddy cultivation	8	210	25	235
		Crop Management	6	152	24	176
		Water management	10	250	25	275
		Improved package of practices for pulse and oilseeds	6	125	12	137
		Quality seed production technology of cereals	5	120	12	132



Nutrient Management	7	Integrated Nutrient Management in pulses	5	124	10	134
		Application of sulphur in oil seed crop	4	110	0	110
		Green manuring of	10	224	16	240
Integrated Crop Management	12	Cultivation Practices of Kharif pulses	5	142	5	147
		Scientific cultivation of crop management.	12	241	30	271
		Scientific cultivation of oilseeds	12	254	18	272
		Kisan chaupal	5	38	5	43
		Cultivation of potato	5	140	5	145
Crop Diversification	9	Increase in cropping intensity through introduction of black gram in jute fallows	4	110	4	114
		Crop Diversification through lentil cultivation	4	86	10	96
		Training on intercropping	5	80	15	95
		Cultivation of Millets	4	77	5	82
		Fodder production.	11	188	50	238
Resource conservation Technology	11	Zero Tillage	12	212	18	230
		Operation & Maintenance of Zero Tillage Machine	4	104	5	109
		Skill/knowledge development on Resource conservation technology	4	80	35	115
		Summer ploughing	4	85	13	98
		Direct seeding method of Paddy	3	62	12	74
		Use & importance of multi crop planter in Maize & protected Nursery.	2	31	10	41
		Crop residue management by using happy seeder	3	63	0	63
Pest and disease management	10	Integrate Pest Management	22	480	25	505
		Storage pest of pulses and their management	5	120	0	120
		Judicious pesticide application in crops	6	125	25	150
		Integrated Disease Management	12	258	10	268
		Crop Diversification of sustainable crop production	2	35	0	35
Nursery raising	4	Nursery raising and Management of major vegetable crops.	8	181	39	220
Employment Generation	8	Poultry farming for employment generation	8	170	190	360
Nutrition garden	4	Selection of Suitable crops for nutrition garden	4	70	40	110
Repair & Maintenance of farm machinery & Implements	6	Operation and maintenance of sprayer, duster and small agril. Implements and tools	6	128	32	160

Integrated Farming System	4	Integrated Farming System	5	121	20	141
Fodder and feed management	5	Skill/knowledge development on Fodder and feed management	5	87	35	122
Lac cultivation	2	Skill/knowledge development on Lac cultivation	2	29	14	43
Farm implements and machineries	5	Skill/knowledge development on Farm implements and machineries	8	157	78	235
Drudgery reduction with farm implements for woman	2	Skill/knowledge development on Drudgery reduction with farm implements for woman	4	100	15	115
Value addition	4	Skill/knowledge development on Value addition	6	118	22	140
Human nutrition and child care	5	Skill/knowledge development on Human nutrition and child care	6	15	130	145
Rodent control	3	Skill/knowledge development on Rodent control	3	50	10	60
Total			429	8401	1476	9877



Soil health card given to the farmers at NICRA village



Capacity building programme on seed treatment



Capacity building of farmers in NICRA village



Capacity building programme on vermi compost

Extension Activities

NICRA implementing KVKs conducted a total of 1609 extension activities on various thematic areas benefitting 18231 practicing farmers and farm women (13975 males and 4256 females) during 2012-13. The extension activities were conducted on Method demonstrations Agro advisory services

Awareness Animal Health Camp Krishak Chaupal Kishan gosthi Resource conservation technologies, celebration field and farmers' days, diagnostic visits, group discussion, Technology week, Kisan mela etc.

Table. Details of extension activities conducted in NICRA adopted villages during 2012-13

Name of the activity	Number of Programmes	No. of beneficiaries		
		Male	Female	Total
Method demonstrations	124	1031	291	1322
Agro advisory services	272	967	180	1147
Exposure Visit	131	1606	441	2047
Group Discussion	388	1137	802	1939
Awareness	101	1306	540	1846
Field days	259	2802	679	3481
Farmers day	36	726	127	853
Diagnostic visit	54	347	79	426
Commodity groups	18	146	48	194
Popular extension literature	44	873	240	1113
Animal Health Camp	13	1235	102	1337
World earth day	3	123	20	143
Krishak Chaupal	3	78	41	119
Kishan Gosthi	2	189	134	323
Sugarcane & Kisan Diwash	2	140	112	252
Woman health and nutrition	1	14	56	70
Community health check up for women	4	18	58	76
Technology week	1	550	160	710
NICRA Workshop at RAU,PUSA	1	100	30	130
Kissan Mela, Katihar	1	350	0	350
Soil test camp	1	100	0	100
Scientist visit to field	150	137	116	253
Total	1609	13975	4256	18231



Exposure visit



Field Day celebration on performance of 'Sahbhagi Dhan'



Krishak Chaupal programme at NICRA village



Environment Day celebration at NICRA village



NICRA Review Workshop Organized

The review workshop of National Initiative on Climate Resilient Agriculture, Zone-II was held at Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar during 4-5 July, 2013. The workshop was chaired by Dr. A. K. Singh, Zonal Project Director, Zone-II and attended by Dr. S. Dixit, Principal Scientist, CRIDA and Co-ordinator, Technology Demonstration Component (TDC), NICRA, Dr. R. P. Singh 'Ratan', DEE, BAU, Ranchi, Dr. Himadri Bhattacharya, DEE, UBKV, Cooch Behar and Dr. Jaishawal, ADEE, BAU, Sabour. Dr. A.K. Chowdhury, Dean, Faculty of Agriculture, UBKV and the officiating Vice-Chancellor of the University was the Chief Guest of the occasion. All 15 PIs of NICRA KVKs of Bihar, Jharkhand, West Bengal and A & N Islands from Zone-II participated in the workshop. The workshop started with welcome address by the Director of Extension Education (DEE), UBKV, Dr. Himadri Bhattacharya. He expressed his privilege to organize NICRA review workshop. Dr. S. Dixit outlines the purpose of the workshop and emphasised the need for midway correction to enable the project to achieve its objectives. He requested the PIs to visit better performing KVKs of NICRA project like Baramati, Tumkur, Namakkal, Gumla, South 24 Parganas and Nawada for cross learning. Dr. R. P. Singh 'Ratan' in addressing the house appreciated the good efforts of KVKs in implementing NICRA project. He stated that NICRA is a project which will benefit directly to the resource poor farmers. He mentioned that NICRA has been undertaken with a view to decreasing the vulnerabilities due to climate change. Dr. A. K. Singh in addressing the house presented a brief account of expectation from the KVKs of Zone-II in implementing NICRA project. He asked the KVKs to take up such technological interventions which have direct bearing with the climate change. He opined that group of PIs should

visit other KVKs and provision be made to visit foreign countries to have experience of abating climatic vulnerability through various interventions. He asked all the NICRA implementing KVKs to send report of NICRA work to ICAR News regularly. He also stated that as our country is 36% deficient in green fodder, fodder bank should be given priority by KVKs implementing NICRA Project. Dr. A.K. Chowdhury welcomed distinguished participants of the workshop and thanked ICAR for selecting UBKV for organizing the workshop. He mentioned that India has to double its food grain production within 2050 to feed her ever-growing population and a second successful green revolution is needed to meet this challenge. He informed the house that UBKV has identified as a co-operating centre for implementing a Project for development of rice genotypes for drought areas in collaboration with CIMMYT. Dr. Sujan Biswas, In-Charge of Cooch Behar KVK proposed formal vote of thanks.

A number of recommendations came out during the two-day workshop for improvement of NICRA project implementation. They are:

- A plan has to be chalked out for cross learning of NICRA experiences across the zone at the Zonal Project Directorate level.
- Need for exposure of PCs of NICRA KVKs to similar work abroad may be expressed by NICRA at appropriate forum. This will improve the confidence of PCs of NICRA-KVKs besides building their capacity.
- KVKs of Jehanabad, Supaul, East Singbhum, and Port Blair should write to Co-ordinator, TDC, NICRA for follow up for installation of Small Automatic Weather Stations at their centre.
- If RA/SRF is not available, then need based Skilled Assistant may be engaged with appropriate monthly remuneration

as admissible under the rules of the host organisation to facilitate NICRA activity.

- Outcome of interventions in NICRA villages should be worked out and reported to the ZPD.
- Revolving Fund of VCRMC – for enhancing belongingness of the villagers, their contribution to the revolving fund has to be ensured to the maximum extent possible which will be utilized by the villagers themselves after withdrawal of the project.
- In the case of urgent procurement of low cost small machinery, VCRMC may go ahead with a resolution in VCRMC meeting. The revolving fund may be utilized for such purpose.
- Every KVK should revise the action plan of NICRA project as per the suggestions put forward in the workshop and send to ZPD within 27th of July, 2013.
- Drought spell throughout the year in the NICRA village should be recorded and sent to ZPD by all KVKs.
- Not more than 05 crop related interventions should be included in the Action Plan.
- VCRMC must meet once in a month in which all the transactions and balance of bank account to be read out in presence of all members.
- Reasonable rate for custom hiring of all the machineries and implements should be fixed by the VCRMC and the resolutions should be

recorded in the meeting register.

- Rate chart of machineries should be demonstrated in prominent places of the village so that all the villagers are made aware of it.
- There is pressure from neighbouring villages to extend NICRA project interventions to their villages also. This is not possible now due to constraints of funds and manpower. However, if the VCRMC of the NICRA village agrees, the farmers of neighbouring villages may be allowed to hire custom hiring centre (CHC) implements at rental charges decided by the VCRMC.
- The VCRMC may be constituted with 15-20 members from the adopted village with at least two-three women members. The VCRMC will have a joint bank account with three signatories – President, Vice-President and Treasurer. A staff of KVK may be a member, but it is not mandatory.
- One Sub-Committee of 3-4 members for custom hiring centre should be there under VCRMC which will be responsible for effective functioning of the custom hiring centre.
- In each intervention, there must be some institutional arrangement from the KVKs.
- KVK wise highlight of NICRA activity as decided in the meeting should be prepared and sent to ZPD for its publication in ICAR News/Reporter.



Review Workshop of NICRA at UBKV, Cooch Behar, West Bengal on July 4-5, 2013



Expenditure Statement during 2012-13 (Amount in Rs.)

KVK/ZPD	RE for 2012-13			Expenditure from 1st April 2012 to 31st March, 2013			Closing Balance on 31.03.13 Total
	Contingencies	TA	Total	Contingencies	TA	Total	
Aurangabad	1145000	80000	1225000	1103110	74185	1177295	47705
Buxar	1000000	90000	1090000	1000000	22448	1022448	67552
Chatra	1130000	70000	1200000	1129377	50874	1180251	19749
Cooch Behar	700000	70000	770000	699820	45186	745006	24994
E.Singhbhum	700000	60000	760000	700000	30192	730192	29808
Gumla	1000000	90000	1090000	998949	88686	1087635	2365
Jehanabad	750000	75000	825000	750000	37230	787230	37770
Koderma	930000	70000	1000000	918851	70000	988851	11149
Malda	700000	75000	775000	700000	20099	720099	54901
Nawada	1000000	75000	1075000	999922	38574	1038496	36504
Palamu	700000	75000	775000	700000	30352	730352	44648
Port Blair	800000	150000	950000	800000	38567	838567	111433
Saran	900000	70000	970000	900000	70000	970000	0
Supaul	1050000	50000	1100000	1050000	36661	1086661	13339
South 24 Pgs.	2350000	150000	2500000	2350000	69984	2419984	80016
ZPD-II	400000	100000	500000	397618	57094	454712	45288
Total	15255000	1350000	16605000	15197647	780132	15977779	627221

Convergence by NICRA with Ongoing Development Programmes/ Schemes in NICRA implementing KVKs

Huge number of convergence programmes was carried out by each of the NICRA implementing KVK with ongoing development programmes or schemes during 2012-13. The prominent development schemes are NAIP, MGNREGA, National Micro and Minor Irrigation Scheme, Pradhan Mantri Gram Sadak Yojana, Chief Minister Sadak Yojna, Backward Rural Grant Fund, Silk

Board, Sunderban Development Board, NFSM, IWMP, IVRI, PDADMAS, Forest Department, MESO, IAP Yojana etc. NICRA implementing KVKs being part of the different convergence programmes generated a handsome amount of Rs. 1070.54 lakh during 2012-13. The details of the different convergence programmes carried out by the KVKs are mentioned in the following table.

Table. Convergence of Ongoing Development Programmes/Schemes in NICRA implementing KVKs

KVK	Development Scheme/Programme	Nature of work
Port Blair	NAIP project under CARI, Port Blair	Broad Bed and Furrow System (BBF), Paddy cum Fish, Three-tier system in an area of 1.24 ha
		Renovation of farm pond of an area of 0.08 ha
		Drip irrigation for an area of 0.80 ha
	MGNREGA under Gram Panchayat, South Andaman	Drainage channel cleaning for a length of Length 1900 m, width 5m and depth 1m
		New drainage channel for a length 100m, width 1.5m and depth 0.5m
Aurangabad	National micro irrigation system Project	Sprinkler Irrigation in 51 numbers
	Adarsh Dairy Gram Yojana	Chilling plant
	Pradhan Mantri Gram Sadak Yojana	Construction of road of 4.0 km
	IAP Yojana	Go down
Buxar	Minor irrigation department Gov. of Bihar	Construction of Hume pipe outlet in Watershed
		Construction of 90 m permanent water retaining wall
		2320 m irrigation Cum drainage channel
		Developed 180 m high Bund to check the water flow
	Garamin Vikas Mantralay Gov. of India	Connecting road Sarenja Naraynpur to Kukurha of around 1 km
Gov. of India & Gov. of Bihar	Additional 6 class room construction in Kanya Madhay Vidyalay Kukurha	
Jehanabad	Dist. Agril. Deptt.	Establishment of 490 units Vermicompost pit



Nawada	Vaccination camps & Animal treatment Camps	Supply vaccines and Drugs in 1404 numbers
	Backward Rural Grant Fund	P.C.C Road (Vidyasagar) of 1250 m
	Pradhan Mantri Gram Sarak Yojna	Pakka Road (Bhaluyahi to Upper Majhila) of 2250 m
	Chief Minister Sadak Yojna	Pakka Road (Mathurapur to Vidyasagar) of 1300 m
	MANREGA	Brick Soiling Drainage 800 ft
	Backward Rural Grant Fund	P.C.C. Road (Gadi Majhila) of 120 ft
	MGNREGA	Pond (Gadi Manjhila) of 200 x150x10 ft
	MGNREGA	Irrigational Channel of 200 ft
	Govt. of India (through Gram Panchayt)	Aganwadi Building
	Backward Rural Grant Fund	P.C.C.(Amarpur) of 125 m
	Chief Minister Sadak Yojna	Pakka Road (Gadi Majhila to Bhaluyahi) of 1.5 km
	Backward Rural Grant Fund	P.C.C. (Upper Mjhila) of 250 ft
	Backward Rural Grant Fund	P.C.C. (Dudhiyatand) of 200 m
	Gram Panchayt	Community hall
Supaul	Renovation of field irrigation channel by irrigation department after seeing the affect of drainage channel by NICRA	Cleaning of channel, Earth work
	Silk Board Saharsa	Rearing of silkworm & selling of cocoon in 10 unit
Chatra	IAP	Renovation of defunct pond
	MGNREGA	Construction of 28 new well in village
	NFSM	1200 subsidies drought tolerant paddy varieties through NFSM programme
East Singhbhum	MANREGA	Construction of well 2 nos.
		Four new Pond excavated 100x100x8ft
	MESO	Lift Irrigation in 2 unit
	Forest Department	Plantation of 50000 nos.
	Gram Sadak Yojna	Link Road of 1 km
Gumla	MESO	7 Lift irrigation, 27 well, 7 wells, 2 ponds
	MGNREGA	Road of about 1 km
	Minor Irrigation	Check dam 2 nos.
Koderma	ATMA	Exposure visit
		Extension Farmers' Field School
Cooch Behar	Dept of Soil Conservation	Drainage Channel of 600 m
Malda	MGNREGA	Repairing of approach road of 1 km
	MGNREGA	Renovation of village pond
S. 24 Pgs.	Sundarban Development Board, Govt. of West Bengal	Landshaping and rainwater harvesting in 12 unit
	IWMP, Govt. of West Bengal	Maintenance of proper drainage by making of culvert over fresh water canal
	Project Directorate of Animal Disease Monitoring & Surveillance, Hebbal, Bengaluru & IVRI, Kolkata	Epidemiological studies of parasitological infestations in animals in relation to climate change in 20 villages



List of Dignitaries visited NICRA Villages during 2012-13

Name of KVK	Name of VIPs/Experts	Date of visit
Aurangabad	Sri Som prakash, MLA, Obra, Aurangabad, Bihar	16.06.12
	Sri Silajeet Singh, District Agriculture Officer, Aurangabad	16.06.12
	Dr. S V N Rao, RGCVS, Pondichery & QRT Member (PSP), Hyderabad	16.10.12
Buxar	Mr. Mohan Prasad, DDM, NABARD, Buxar	05.06.13
	Mr. Suresh Singh, Chairman, Kissan Club, Buxar	05.06.13
	Dr. S.P. Singh, IRRI Consultant, INDIA	27.07.13
Chatra	Dr. Ramesh Kumar, Chief Scientist AICRPAM, BAU, Ranchi	27.08.12
	Dr. D. N. Singh, Chief Scientist, Dryland Agriculture Zonal Research Station, Palamu, BAU, Ranchi	05.09.12
	Sri Manoj Kumar, DC, Chatra	25.08.12
Cooch Behar	Dr. Bharat Ch. Saha, DEE, UBKV	28.02.13
	Mr. Sandip Mitra, ADO, Cooch Behar II No Block, Cooch Behar	28.02.13
East Singhbhum	Sri A. K. Gupta, DAO, East Singhbhum	
	Sri Nikunj Kumar Das, Secretary, NGO, West Singhbhum	16.02.13
	Ms. Uma Shashi Chaterjee, Director, ITDA, East Singhbhum	01.05.13
Gumla	Mr. Dinesh Manjhi DAO, Gumla	16.05.13
	Mr. Aniruddh Choubey Chairman Kalyankari Manav Vikas Sansthan, Ghaghra, Gumla	
	Dr. K.D. Kokate, DDG (Extn.) ICAR, New Delhi	12.04.12
	Mr. Punai Oraon DDC, Gumla, Jharkhand	04.08.12
Jehanabad	Dr. M.L. Choudhary Vice Chancellor, B.A.U., Sabour	07.12.12
	Sri Sanjay Kumar D.A.O., Jehanabad	14.06.12
Koderma	Dr. R. Ramani, Director, IINRG, Ranchi	30.08.12
	Dr. T. Mahapatra, Director, CRRI, Cuttack	07.11.12
Malda	Smt. Nabanita Rudra, CRIDA, Hyderabad	06.05.12
	Mr. Anurag Dubey, CIAE, Bhopal	20.03.13

Nawada	Mr. Kamta Prasad, Project Director , ATMA, Nawada	23.03.13
	Dr. Sreenath Dixit, Principal Scientist & Coordinator TDC-NICRA	14.08.13
Palamu	Sri Naresh Kr. Choudhary, DAO, Palamu	15.06.12
	Sri Ravindra Singh, DDC, Palamu	8.12.12
	Sri K. N. Tripathi , MLA, Daltonganj	28.01.13
	Sri B. Linglijpal, WCDC Director cum Spl. Secretary Govt. of Jharkhand	14.03.13
Saran	Janardan Singh Segribal, Hon'ble Min. of Labour & Social Welfare, Govt. of Bihar	01.07.12
	Shri Jitendra Ray, Honourable MLA , Marhaura, Govt. of Bihar	01.08.12
	Dr. A.N Singh, Consultant, IRRI	01.08.12
	Dr. Deewakar Prasad, Director, Directorate of Rice Research, GOI	01.08.12
	Dr. M. L. Choudhary, VC, BAU, Bhagalpur	01.08.13
	Mr. L. S. Chauhan, DM, Supaul	14.08.13
	Mr. Ramprobodh Thakur, DAO, Supaul	14.08.13
South 24 Parganas	Dr. V.U.M. Rao, Project Coordinator (Ag. Met.), CRIDA	08.12.12
	Dr. S. Balasubramanian, MANAGE	20.12.12
	Dr. K.D. Kokate, DDG(AE), ICAR	13.01.13
	Dr. Tarun Naskar, MLA, Joynagar Assembly Constituency	03.02.13
	Dr. Tarun Mondal, MP, Joynagar Parliamentary Constituency	03.02.13



Dr. K.D. Kokate, DDG (Agril. Ext.), ICAR visits NICRA villages of S 24 Pgs. Dr. M. L. Chowdhury, Vice-Chancellor, BAU, Bhagalpur visits Jehanabad KVK

Publications

Research Publication

1. A. K. Singh, S. K. Roy, P. P. Pal and N. C. Banik (2012). Enhancing resilience in agriculture towards climate change. In: Souvenir of the International Workshop on Climate Change in Agriculture: Adaptation and Mitigation Strategies during 21-23 March, 2012 at Gandhigram Rural Institute-Deemed University, Gandhigram, Dindigul, Tamilnadu. pp. 51. Full paper accepted for the Proceedings of the International Workshop on Climate Change in Agriculture: Adaptation and Mitigation Strategies.
2. S. K. Roy, A. K. Singh, N. C. Banik and P. P. Pal (2012). Borabandi: A water conservation method in Jharkhand. In: Extended Summary of the third International Agronomy Congress on "Agriculture Diversification, Climate Change Management and Livelihoods", at IARI, Pusa Campus, New Delhi during November 26–30, 2012. pp. 859-860.
3. A. K. Singh, N. C. Banik, N. Ram and S. K. Roy (2012). Increasing resilience in agriculture to combat climate change in Coastal region of Port Blair. In: Abstract of the National Symposium on "Agriculture production and protection in context of climate change" at BAU, Ranchi, Jharkhand during November 03-05, 2012.
4. S. K. Roy, A. K. Singh, N. Ram, N. C. Banik and L. B. Singh (2013). Improvement of fodder production during drought under Island eco system. In: Proceedings of the Centenary Session of the Indian Science Congress, Kolkata during 3-7 January, 2013. Section I: Agriculture and Forestry Sciences. pp. 353.
5. S. K. Roy, A. K. Singh, N. C. Banik and N. Ram (2013). Ridge and furrow method of vegetable cultivation to cope excess rainfall In: Abstract of the National Symposium on "In Quest of a Second Green Revolution" organized by The Agricultural Society of India, Institute of Agricultural Science, University of Calcutta, Kolkata during February 26-28, 2013.

News Letter

6. P. P. Pal, P. Chatterjee, N. J. Maitra, R. K. Singh, S. K. Roy (2012). Towards enhancing climate resilient agriculture newsletter. In: NICRA News of Zonal Project Directorate, Zone-II, Indian Council of Agricultural Research, Vol. - 1, No. - 1.
7. P. P. Pal, P. Chatterjee, N. J. Maitra, R. K. Singh, S. K. Roy and N. C. Banik (2012). Towards enhancing climate resilient agriculture newsletter. In: NICRA News of Zonal Project Directorate, Zone-II, Indian Council of Agricultural Research, Vol. - 1, No. - 2.
8. P. P. Pal, P. Chatterjee, N. J. Maitra, R. K. Singh, S. K. Roy and N. C. Banik (2012). Towards enhancing climate resilient agriculture newsletter. In: NICRA News of Zonal Project Directorate, Zone-II, Indian Council of Agricultural Research, Vol. - 1, No. - 3.
9. P. P. Pal, P. Chatterjee, N. J. Maitra, S. K. Roy, S. K. Mondal and N. C. Banik (2012). Towards enhancing climate resilient agriculture newsletter. In: NICRA News of Zonal Project Directorate, Zone-II, Indian Council of Agricultural Research, Vol. - 1, No. - 4.
10. P. P. Pal, N. C. Banik, S. K. Roy and S. K. Mondal (2012). Towards enhancing climate resilient agriculture newsletter. In: NICRA News of Zonal Project Directorate, Zone-II, Indian Council of Agricultural Research, Vol. - 11, No. - 1.

Book/Book Chapter

11. Coping with Climate Variability: Technology Demonstration on Farmer's Fields in Vulnerable Districts Edited by B. Venkateswarlu, K.D. Kokate, K.A. Gopinath, Ch. Srinivasarao, B. Anuradha and Sreenath Dixit, Published by The Director, Central Research Institute for Dryland Agriculture, Hyderabad. Chapter Zone-II, Compiled by Dr. A.K. Singh and S.K. Roy ; p 19-37
12. P P Pal, Mondal S.K., Singh A. K., Rahaman F. H. and Roy S.K. 2013. Technology application – managing Climatic Variability Published by Zonal Project directorate Zone-II Kolkata