



# Newsletter

TOWARDS CLIMATE RESILIENT AGRICULTURE

**NICRA News**

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## INTRODUCTION

The concept of climate resilient villages (CRVs) consists of implementing the resilient practices at a scale to cover the entire village in saturation mode depending on the resource endowments of the farmers with one or several interventions for imparting resilience to the production systems. The CRVs adopt a portfolio of interventions that cover the full spectrum of farm activities consisting of adaptation, mitigation, natural resource management



(NRM), crop management, livestock production, etc. ICAR- Agricultural Technology Application Research Institute Kolkata has seventeen NICRA implementing KVKs which carried out different activities under Technology Demonstration Components.

Technology Demonstration Component is one of the most important components of this project through which demonstrations are conducted with site specific technology packages on farmers' fields, encouraging the farmers to adopt new technologies to cope up the emerging threat of climate change as well as current climate vulnerability. Both short and long term

output are expected from the project pertaining to new and improved varieties of crops, livestock breeds, management practices that help in the development of policy making to



mainstream climate resilient agriculture in the path of developmental planning.

The NICRA-villages are selected based on vulnerability of agriculture to climatic variability. The climatic vulnerability of the village (droughts, floods, heat wave, cold wave etc.) represents that of the district. The multidisciplinary team of KVK analyzed the constraints related to climatic variability based on secondary weather data, resource situation, farming systems and agricultural yields in the past few years. Thus



the interventions executed in NICRA villages by the NICRA-KVKs has not only enabled the farmers to cope up climatic vulnerability as well as it plays a key role in farmers' empowerment along with sustainable livelihood.



## KVK PORT BLAIR

### Crab Fattening in Andaman may be a Livelihood Option for poor fish farmers

Andaman and Nicobar Islands is blessed with bounty of untouched natural resources for exploitation through new scientific technological interventions. Under the fisheries sector, crab fattening is identified as better resource for adoption through technological intervention for the unemployed youth of Andaman for self employment and judicious use of the untouched resource adopting culture practices. In Andaman mud crab is available in mangrove and adjacent sea areas, which will support the venture. The demand of mud crab in domestic and international market is very high and in Andaman itself, it fetches quite high remunerations i.e. 1200/- to 1600/- for a kg size. It can be exported in live condition for high returns and ready market is available in Andaman due to flow of domestic

and foreign tourist. Keeping in view the high potential of Crab Fattening, training programmes on *Crab Fattening and Culture* have been conducted in March, 2017 followed by exposure visits in South Andaman. Ten trainees from the NICRA villages were selected for the training as about 6.0 - 8.0 ha



paddy land affected with ingress of sea water during the Tsunami -2004 is readily available for adoption of the technology. Technical knowledge was imparted to the trainees for success of the activity and motivated them to take up the activity with technical support

from KVK and CIARI, Port Blair. However, the initial cost is high for construction of ponds, sluice gates and other required infrastructures to start the activity but in long run it is a beneficial venture. For Crab Fattening, water crab weighing more than a kg is collected from the crab catcher @ Rs. 200/- to Rs. 250/- kg and are reared in earthen ponds and cages for a period ranging from 25 to 45 days with regular feeding with low cost fish etc and harvest for marketing in live condition.



## KVK JEHANABAD

### Promotion of Spices cultivation

During rabi season there is scarcity of surface water and farmers of the village depend mainly on ground water for irrigation of wheat and other crops. Farmers were motivated to orient towards diversification in agriculture and adopt improved varieties of such crops which need less water. Demonstration on low water requiring crops like various spices crop such as Coriander (var. *Pant*

*Haritima*), Fenugreek (*R. Kanti*), Nigella (*R. Shyama*) and omum (*R. Abha*), turmeric (*R. Sonia*) in 4.2 ha as well as elephant foot yam (*Gajendra*) in 6.25 ha has been conducted among the farmers of NICRA village Sakrorha as



alternate crops in drought situation. The cultivation of spices and elephant foot yam crops were found beneficial by the farmers in terms of yield data as 15.7, 18.1, 17.1, 12.2, 382 and 352 q/ha and B: C ratio for Coriander (var. *Pant Haritima*), Fenugreek (*R. Kanti*), Nigella (*R. Shyama*) and omum (*R. Abha*), turmeric (*R. Sonia*), elephant foot yam (*Gajendra*) was found as 5.23, 4.0, 4.29, 3.55, 8.68 and 5.50,

respectively.

### Use of Power Reaper for Wheat Harvesting

A custom hiring centre is continuously run by VCRMC of NICRA village Sakrorha for timely field operation. Self propelled power reaper has been used by villagers for timely paddy and wheat harvesting respectively in *kharif* and *rabi* season. It minimizes existing labour problem, operational cost and make available straw for dry feed of animals. On the other hand, it is helpful in coping up with possible crop damage in bad weather condition like uncertain rain, storm etc. During this period, farmers of NICRA village used power reaper on hiring basis for harvesting of wheat and a total of amount Rs. 2700/- has been deposited by the farmers as hiring charges on it.





## KVK COOCHBEHAR

### Rain water harvesting for life saving irrigation during winter

In spite of heavy rainfall during *kharif* season, Cooch Behar district receives scanty or no rainfall during *rabi* season. In order to harvest rainwater during *kharif* months and storing them to use as life saving irrigation water during

*rabi* months, total six (6) nos. of existing ponds were renovated by deepening 3 to 4 ft depth. 0.8 ha of total pond area were renovated by excavating 1, 43,300 cu.ft. soil. This total process of existing pond renovation will store additional 16,231 cu.m. water which will bring about 10 ha of land under irrigation for mustard, raddish, brinjal, cole crops



etc. during *rabi* season in NICRA village, Khargibari of Cooch Behar district.

## KVK NAWADA

### Enhancement of milk production in lactating cow through mineral mixture supplementation

In order to demonstrate the benefits of mineral mixture for improving the health and milk production in lactating cows in NICRA village, the mixture was distributed among 30 farmers having lactating cows were given a packet of 9.0 kg mineral mixture on contributory basis. It was observed that healths of the lactating cow were very poor and their milk yield was only 2-3kg/day. Dairy animals with low levels of productivity utilize a large fraction of their feed intake for maintenance and consequently the emission are spared over a relatively small output resulting high level of emission per unit of product in addition low quality feeds such as straw, forage etc have low level of digestibility and contribute to higher emission per unit of feed intake under such circumstances, the feeding

strategies viz., nutrient balanced ration improve milk productivity by reducing feed cost and there was



reducing methane ( $\text{CH}_4$ ) emission per unit of product. Farmers were giving inadequate balance diet to their cows. They were not aware about the proper feeding management. KVK Nawada provided them training on feeding management and made them aware about benefits of mineral mixture with important elements Ca, P, Mn, Mg, Se, Co, Zn etc. In the month of January 2017 one packet to one farmer was given, dose of mineral mixture was 100-150 g/day/animal. After two months it was

found that the milk yield increased up to 25-30% and health of lactating cow also improved. On the basis of the theory the cattle who are fed balanced ration with minerals mixture supplementation reduces emission of methane ( $\text{CH}_4$ ) gas as compared to the cattle do not get balanced ration and mineral mixture supplementation. If balance ration is given to dairy cow it reduces the methane gas ( $\text{CH}_4$ ) emission and milk yield by 10.1 ( $P < 0.01$ ) and 13.5% ( $P < 0.05$ ), respectively and during intestinal flow microbial nitrogen increase. So,



'Lesser the release of methane gas emission better will be the climate.'

## KVK KODERMA

### Case study on Zero Tillage on wheat

Shri Sahdev Yadav a progressive farmer of village and post Chopnadih, Block Markachho, District Koderma, Jharkhand having about 10 acre agricultural land, his main occupation is agriculture. The major crop he grown in *Kharif* is rice and in *Rabi* wheat in 2.0 ha and 0.5 ha each gram and linseed. He participated in an on campus training conducted by Krishi

Vigyan Kendra, Koderma on Zero tillage (ZT) technique. In the training course, scientists of the Kendra demonstrated the technique in details as it reduces the cost of cultivation and increases the crop yield. Being a traditional mind set up, after a lot query and suspicion Shri Sahdev Yadav was ready to sow rice with zero tillage technique (DSR) during *kharif* 2015. He sown wheat cv. K 307 in 1.5 ha land with zero tillage machine under supervision of KVK scientists. Shri

Yadav reported that by adopting this technology it could save about Rs. 2940 in cost of cultivation (ploughing –Rs. 2400, seed – Rs. 300 & labour – Rs. 240). He also observed that this technology saved irrigation water as it took less time for water to flow across the field in no-till compared to normal tilled plots for the first irrigation. He also observed that sowing was advanced 8 days as compared to conventional method, this was due to saving in land



preparation and sowing, which was also a reason for the additional yield obtained under zero tillage in late condition is predominantly due to late

harvesting of *Swarna Mahsoori* (MTU 7029). Success of this technology in the field of Shri Sahdev Yadav, village Chopnadhi not only proved a boom

for farmers of the same village but also served as an example to trigger the ongoing efforts of scientists of KVK, and other extension workers in the district.

## KVK SUPAUL

### ***Poultry and Fish based IFS Model: A new hope for farmers of Supaul***

The fish and poultry based IFS model has been successfully demonstrated here in which Indian major carp species like, *Rohu*, *Katla* and *Mrigal* grown in the pond. The pond was constructed under NICRA project. A poultry hut made from locally available materials like bamboo, thatched materials, and concrete pillars

etc. and placed over the pond. The hut size is 15'x10' in which 100 (hundred) poultry birds are kept. Poultry hut has



been constructed in such a manner that all the faecal matter and left over feed goes directly into the pond. The poultry

birds fed with feed supplement like pre starter, starter, finisher etc. The poultry birds show normal growth. The fish in the ponds shows excellent growth and it is about 30 percent higher than the normal fish reared in other non IFS pond. The fish and poultry based integrated farming system gave a profit of Rs. 6500/- in 45 days. The overall B:C ratio achieved in this IFS model is 1.45 over the period of one year.

## KVK GUMLA

### ***Vegetable cultivation improved livelihood of the farmers of Gumla***

Baneshwar Oraon has an experience of farming since 2006. He has a total holding of 4 acres. Out of this he uses to grow vegetables in 0.50 acre during summer and in 1.50 acre during winter season apart from cereals, Pulses and Oilseeds. On the basis of



the experience in vegetable cultivation he realized that small farmers can enhance their income and livelihood through vegetable cultivation. Which he finds quite profitable provided the sale of the produce is managed by the farmers themselves in the markets and also adopt best management practices (BMPs) to get maximum economic

yield. Keeping all the things he came in contact with the scientists involved in NICRA Project of KVK and narrated his idea for big way cultivation of commercial vegetable cultivation. Shri Oraon reported that he planned to grow vegetables in more than 40 acre of land for which he has formed a group of ten tribal youth farmer and accordingly he wanted to train them for best management practices by the KVK and also somewhat support in selection of suitable crop varieties and plant propagation measures with his felt need. KVK provided training, Bio fertilizer and need based pesticides. As per his plan and technology interventions viz fertilizer management including quality compost, Biozyme and NPK (12:32:16), Zinc sulphate using he cultivated Tomato (*var.-laxmi*) in 30 acre and Chilli (*var.-Surayamukhi*) in 10 acre. Need based irrigation and plant protection measures were undertaken.

Sound market strategies were established with VEGFED for improved post harvest management. By this way Shri Oraon and his group have succeeded to harvest 240 t of tomato and 60 t of chilli and earned a gross income of Rs. 2160000 in tomato and Rs. 900000 in chilli with a Gross investment of Rs. 1050000 in tomato and Rs 420000 in chilli. The B: C ratio was found in 2.05 and 2.14, respectively. Shri Oraon's initiative of collective Group farming is an example for small and marginal



farmers especially of tribal farmers, how he succeeded in managing the production as well as market linkage by forming an enterprise group..

## KVK CHATRA

### ***Pea Cultivation through utilization of residual moisture***

Shri Arnish Kujur, a marginal farmer of village Mardanpur in Chatra

was a worried farmer, unable to fulfil his family's requirement due to monocropping. A transformation happened when his village was selected as a NICRA village by Krishi Vigyan

Kendra, Chatra. He interacted with KVK scientists and came to know about technologies suitable for utilization of land after harvesting of the paddy crop. He initiated pea cultivation under



supervision of the scientists of KVK. After the land preparation pea (*Arkel*) with balanced dose of nutrients ( $N_{40}P_{40}K_{20}$ ) was sown in last week of November, 2016. *Arkel* variety was harvested which was relatively available earlier in the market. Shri. Kujur started picking of pods in the month of January on five days interval and sold in the market @ Rs. 30 to 35/kg. earned about Rs. 1, 35,000 lakh/ha with a net income of Rs.73, 000/- per ha in a short span of time by cultivation of vegetable peas through utilization of residual moisture. Now he is in touch with the KVK scientists for getting more information related to moisture conservation technique.

### **Climate resilient rice variety proved to be a boon**

Jharkhand falls under rainfed rice-based agro ecosystem. Rice is the main stay of the households. Tribal people have given it an important place in



their food habit. Local people celebrate their socio and spiritual function and

festivals with various preparations of rice. But the productivity of rice is very low in upland and medium land due to early arrival and early excision of rainfall and intermediate drought like situation which affect the growth stage of crops.

Mardanpur village adopted under NICRA in 2012. After adoption of the village participatory rural appraisal (PRA) was conducted by a multidisciplinary team of KVK. During PRA, it was revealed that



majority of the farmers was facing the problem of low productivity in rice due to several factors like drought tolerant varieties imbalanced use to nutrients, moistures stress in growth stage and incidence of pests and diseases. After farmers participatory planning it was decided to demonstrate. Such varieties which are 90-100 days duration and having 10-15 days dry spell tolerant capacity along with balance dose of nutrients.

Keeping this in view intervention was planned with the varieties viz. *Anjali* and *Bandana* with 80:40:20 kg NPK/ha



under adopted NICRA village. Prior to implementing intervention the selected farmers were imparted training at KVK Chatra. The average productivity was recorded to be 26 q/ha, an increase of 85 percent over the existing varieties and management i.e. 14 q/ha. The return per rupee spent was found to be 3.0 in *Anjali* and 1.75 in *Bandana* over existing farmers' varieties and management. This brought a spectacular change in rice production scenario. As a result about 350 ha are covered with these varieties in the village, and presently about 6000 ha area of the district covered with these varieties.



## **KVK BANKA**

### **Urea treated wheat straw improved milk productivity**

Urea treatment of wheat straw increases milk production by 1-1.5 kg milk animal/day and also reduces the amount of compounded cattle feed by 1.5-2 kg. It is because of that urea treatment of wheat straw increased the protein content of wheat straw by 3 times from 1.5-2.0 % to 6-7 % and digestibility of protein increased 60-70%. It converts wheat straw more palatable. Hence by feeding urea treated

straw one can save Rs. 30-40/day/ animals. As farmers face space problem



for urea treatment job, KVK provided UST bags in NICRA village. This bag

having capacity of 5 quintals and it is water proof. So with the help of this bag wheat straw can be treated in open area.





## KVK NIMPITH

### Crop Planning in Kharif Season

A farmers meeting was organized by KVK scientists on 17<sup>th</sup> June 2017 regarding crop planning for the *kharif* season. Paddy is the major crop, cultivated in approximately 150 ha of area in the village. 75% of the cultivated area is low lying, supporting long duration traditional paddy varieties like *Morishal*. Considering this year's monsoon forecast by the IMD, the farmers were told to be prepared to receive normal rainfall and start paddy nursery. However, the particular village, Bongheri, has bad experience of receiving lesser precipitation compared to other parts of the district, even in normal monsoon years. So the farmers were suggested

to go for staggered nursery to counter any erratic rainfall distribution. Farmers were suggested grow *Swarna Sub-1* variety of paddy in areas where there is chance of 1-1.5 ft submergence for 10-12 days, continuously. Approximately 3.5 q seeds of *Swarna*



*Sub-1* variety are available in the seed bank maintained by the VCRMC in the village itself. For Land shaping plots, HYV paddy varieties, like *Pratiksha*, was advocated. Certified seeds are available at KVK at reasonable price. Before sowing, farmers were suggested to treat

the seeds with *Trichoderma viride* and *Pseudomonas fluorescens*.

The untimely precipitation (Western Disturbance or *Kal Boisakhi*) in the month of May was successfully harvested in the ponds of land shaping plots. With the help of that water, several farmers started growing early vegetables like, Bitter Gourd, Brinjal, etc. These farmers are expected to catch the vegetable market at least one month earlier than the fellow farmers. These vegetables on the land and pond embankment will also serve as insurance to any crop loss in the main field due to short intensive rainfall or prolonged drought spell.

The NICRA farmers of the village were very much confident of their well preparedness against any monsoon vagaries.

## KVK PALAMU

### Entrepreneurship development through mushroom cultivation

Sumt. Sumitra Devi started mushroom cultivation on an experimental basis. She started it in a small room with 10 mushroom beds. The mushroom started growing and became ready for harvest by the 20<sup>th</sup> day. Each bed yielded around 800g.

Some of the harvest was used for the family and rest was sold. The demand of mushroom increased day by day. Sumitra Devi is earning approximately Rs. 4, 000-5,000/- per month. Sumitra Devi has now become a known person among the successful entrepreneurs. Newspaper, radio and Doordarshan highlighted her achievements

which made a good impact on other unemployed rural youth.

Today, Sumitra Devi is not only a self reliant successful woman, but is also helping many youths in making their livelihood. She is a source of inspiration for many around her in Palamu district of Jharkhand.

## KVK GODDA

### Elephant foot yam based Multilayer Vegetable Cropping System (MLVCS)

Shri Amrit Lal Singh has been cultivating cucurbits like sponge gourd, ridge gourd, and bottle gourd since long back. They were also cultivating elephant foot yam but *desi* variety having high calcium oxylate content causing more acidity and less acceptability. Generally they sow elephant foot yam in the back yard of their houses. Both the crops were cultivated in separate land. No sincere and scientific efforts were carried out before the innovation made by KVK



under NICRA project. The improved variety of elephant foot yam (*Gajendra*), hybrid variety of bottle gourd (*Mahima*), ridge gourd (local) and bitter gourd (*US - 6214*) were grown simultaneously in the same piece of land with leafy vegetables. So, it has been named elephant foot yam based multilayer vegetable cropping system. A *machan* like structure was erected with the help

of bamboo, wire and threads over 6.5 feet height from the ground level over the main crop i.e. EFY to spread the vines of bottle gourd, ridge gourd and bitter gourd. Elephant foot yam (EFY) variety *Gajendra* was planted during the second fortnight of June at 75 cm x 75 cm spacing in the plot size of 1000m<sup>2</sup>. A pit Size of 30 cm x 30 cm x 30 cm was dug out and 2 kg well decomposed cow manure was filled 3/4<sup>th</sup> of pit. Five hundred g cut tubers of elephant foot yam were treated with cow dung slurry (one kg of fresh cow dug in one litre of water) one day before planting on the pit and then filled the pit with the



remaining soil and small mound was formed on the pit. The seeds (hybrid) of cucurbits bitter melon, ridge melon, and bottle melon were sown in between two

rows of main crop i.e. elephant foot yam at the recommended spacing for each crop. Thus the practical achievement of the innovation includes better utilization

of inputs, upliftment of livelihood along with social status, more return per unit area and crop intensification.

## KVK SARAN

### Large Scale Organic Vegetable Production

**S**hri Narmadeshwar Giri is a farmer from Affaur village of Saran district. He is doing vegetable production since long time but he use to apply all sorts of chemicals in managing the pests and diseases as vegetable growers normally do. He started Organic Vegetable Production followed scientific crop rotation of vegetables to cope up diseases and insect pest infestation. He came to know that chemicals are not the only solutions to kill the insects and pests

but organic repellents may be used to manage the insect pest population to desired Economic Thresh Hold level. Composts and Vermicompost along with some other fertilizers are being used by him in managing the nutrient demand of the crop. He then evolved a relay cropping system of vegetables with paddy [Brinjal-Tomato-cucumber/ long melon-Paddy]. Sowing of brinjal in nursery was done by 15<sup>th</sup> August and transplanting in the main field by 15<sup>th</sup> September at 6 feet x 3 feet distance on permanent beds. Seedlings of tomato were raised in a separate nursery in last week of November and

transplanting was done in between the rows of brinjal at a distance of 4 feet. Then cucumber and long Melon were sown directly in between the plants of tomato at a distance of 2 feet by 25<sup>th</sup> February. Sesbania was grown in the field by 25-30<sup>th</sup> May and it was incorporated in the field at 45 days duration irrespective of monsoon break with supplemental irrigation through this intervention he earned about Rs. 1.5 lacs/season which made him an innovative farmer. He was honoured as a Member of Extension Education Council of Dr. RP CAU Pusa and awarded a certificate of Climate Smart Farmer.

## KVK AURANGABAD

### Water harvesting and recycling for supplemental irrigation through Ahar

**H**arigaon village belonging to Goh block of Aurangabad district, Bihar is adopted under NICRA project in 2011. Total cultivated area of Harigaon is 100 ha. Most of the farmers belong to small and marginal group. Which are fully depended on onset of monsoon, rice-wheat cropping system and rice-wheat mono cropping system of this village. Before NICRA there was no facility of irrigation. Irrigation

through water reservoir (Ahar) is also present from long time, but it is not in shape to use since long time. Farmers were not able to irrigate *rabi* crops in time. In month of April to June many hand pumps, wells and bore well were



dried due to depletion of water table. Animals and few people migrated due to insufficient drinking water. After

the starting of this project 9 ponds, 4 wells and 2.2 km irrigated reservoir (Ahar) were renovated. Ground water is fully recharged and water level increase up to 2-3' during month of May and June. So water level is also maintained. No other claim or problem



of drinking water as well as irrigation of crops have so far been reported.

## ANNUAL ZONAL WORKSHOP OF NICRA-TDC HELD AT UTTAR BANGA KRISHI VISHWAVIDYALAY, COOCHBEHAR ON MAY 30-31, 2017

**T**he Zonal Workshop of National Innovations on Climate Resilient Agriculture (Technology Demonstration Component) of ICAR-ATARI Kolkata was held at Uttar Banga Krishi Vishwavidyalaya, Coochbehar, West Bengal. The workshop was chaired by Dr. Chirantan Chattopadhyay, Vice Chancellor, Uttar Banga Krishi

Viswavidyalaya, Coochbehar, Co-Chaired by Dr. S. S. Singh, Director ICAR-ATARI Kolkata. The Chief Guest of the Workshop was Dr. Randhir Singh Poswal, Assistant Director General (AE), ICAR New Delhi. The workshop was attended by Dr. Anjani Kumar Singh, Director, ICAR-ATARI Patna, Dr. J V N S Prasad, Coordinator-NICRA TDC, ICAR-

CRIDA, Hyderabad, Dr. S. C. Sarkar, Director of Extension Education, Dr. Ashok Chowdhury, Director of Research, Registrar, Heads of Departments, Senior Faculties of UBKV Coochbehar, NICRA Nodal Officer of ICAR-ATARI Kolkata and all the Heads of NICRA-KVKs of the Zone.

One CD on 'Success Story of Sand Bag Check Dam of KVK Gumla' and two publications



on 'An Introduction of Edible Mushroom' and 'Green fodder cultivation' published by Coochbehar Krishi Vigyan Kendra were released during the workshop.

In the welcome address Dr. F. H. Rahman, NICRA Nodal Officer presented the highlights of the salient achievements carried out by the 17 NICRA- KVKs of the zone.

Dr. JVNS. Prasad, Coordinator, NICRA-TDC, CRIDA, Hyderabad mentioned in his presentation that each intervention should be planned in relation to the climatic vulnerability like drought, cyclone, salinity, heat stress, flood etc. Overall he showed his satisfaction about the performance of NICRA-KVKs of this zone.

Dr. Anjani Kumar Singh, Director, ICAR-ATARI Patna while addressing he asked all the NICRA-KVKs to prepare case studies/success stories based on the most successful and scalable technologies and those should be replicated in nearby areas.

Dr. S. S. Singh, Director ICAR-ATARI Kolkata in his speech he mentioned that the intervention under NICRA should read vulnerability with existing cropping practices and preventing this vulnerability through NICRA intervention is to be a priority. He emphasized to take up new interventions model which have direct bearing with the climate changes.

Dr. Randhir Singh Poswal, Assistant Director General (Agricultural Extension), ICAR New Delhi showed his satisfaction on the performances of KVKs' activities. He mentioned that the KVKs should focus on details of district on climate resilient information and suggested that if any modify is necessary.

Dr. Chirantan Chattopadhyay, Vice Chancellor, Uttar Banga Krishi Viswavidyalaya, Coochbehar, while addressing the inaugural speech he mentioned that the intervention under NICRA should read vulnerability with existing cropping practices and preventing this vulnerability through NICRA intervention is to be a priority. He spoke about the climatic issues exists in and problems of water crisis in the northern parts of West Bengal are being faced by the people there.

The following recommendations were come up during the deliberation:

» So far NICRA programme is concern, intervention must be correlated and focus in the specific climatic vulnerability

» For enhancing resilience in NICRA adopted village low cost suitable technologies already demonstrated needs to be expanded horizontally.

» Quantification of impact of already demonstrated successful technologies should be given prior importance.

» As far as possible holistic convergence with line dept. & other development agency in NICRA villages for better strengthening and impact of work

» Always latest variety should be taken for demonstration. In case of cereals not more than 05 years old and pulses not more than 10 years old variety. Varieties should have specific characteristic like hot or cold, flood resistant, short duration etc which will be quantify with specific climatic vulnerability.

» For better impact & dissemination of technology programme like Farmers to farmer's interaction, seminar, Exposure visit for Extension functionaries along with public representative should be organized in NICRA village. Assessment of shelf life of technology for sustainability should be done.

» Agricultural practices that reduce methane, nitrous oxide and carbon dioxide emission to be implemented.

» Special focus to be given on popularizing technologies that could minimize adverse effect on animal and fish components.

» Focus should be given on urbanization of custom hiring centre efforts for inflow of fund from other organization to NICRA village and listing of good technologies.

» Human resource development through women empowerment, women in agriculture, use of gender friendly tools in NICRA adopted villages.

» For doubling the farmer income specific role of NICRA programme should be addressed. Action plan may be prepared in such a way that maximum utilization of NRM could be possible.

» Crop planning should be done according to availability of water for maximum return with low cost climate resilient technology. Impact of technology to be assessed in terms of BC ratio.

» Farmer's innovation and ITK practices need to be scaling up. Community nursery is a very important component to be considered.

» Emphasis should be given on SHC for correction of nutrient deficient & make based used of soil health card.

» The entire programme should be documented and data based. NICRA programme and submitted to the concerned department for further replication and dissemination. Real time data should be collected.

» As far as possible to reach large no. of household in the NICRA village. If adoption by 80% house hold then it is climate smart village.

» Identification of village on the basis of upland, midland and low land i.e. on the basis of agro-ecological situation.

» Soil & water conservation work (NRM work) should be done in convergence mode.

» Weather based advisory service should be provided. IMD, Pune should be linked up with NICRA project.



**For details please contact:**

DR. F. H. Rahman  
Nodal Officer, NICRA - TDC  
ICAR-ATARI Kolkata  
Bhumi Vihar Complex, Sector III  
Salt Lake, Kolkata - 700097  
Email: nicrakolkata@gmail.com  
Ph. 9432955117