



Newsletter



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INTRODUCTION

The prospect of global warming resulting from accumulation of greenhouse gases is causing major concern, especially in connection with its potential effect on natural resources, crop production and livestock/fisheries. Climate change has become an important area of concern for India to ensure food and nutritional security for growing population. The impacts of climate changes are global, but countries like India are more vulnerable in view of the high population depending on agriculture. National Innovations in Climate Resilient Agriculture (NICRA) - A National Network Project of Indian Council of Agricultural Research (ICAR) with the objectives to enhance the resilience of Indian agriculture to climate change and climatic vulnerability through the components viz. 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 and capacity building of different stakeholders. The rationale for Technology Demonstration Component (TDC) is based on the premise that an array of technologies is available to cope with different types of climate related vulnerabilities in National Agricultural Research System. The TDC component has been implemented through

Krishi Vigyan Kendras at district level regionally coordinated by ICAR-Agricultural Technology Application Research Institutes (ATARIs).

ICAR-ATARI Kolkata having nine KVKs where different activities under TDC of NICRA programme in various modules are carried out. The overall focus of NICRA is on adaption to climate variability which entails appropriate response to contingency situations. The central objective of technology demonstrations in such regions is not on enhancing productivity but on interventions related to coping with vulnerability as well as improvement in natural resource use efficiency for sustaining the productivity gains.

Enhancing the adaptive capacity and building resilience of the farming communities is important in the context of climate variability and to cope with these extreme events effectively. The NICRA village was selected based on vulnerability of agriculture to climatic variability. The constraints were analyzed 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 have not only enabled the farmers to cope up with climatic vulnerability as well as it plays a key role in farmers' adaptive capacity along with sustainable agricultural production.

KVK COOCHBEHAR

Fish cultivation in renovated ponds makes additional income

Since inception of NICRA Project, total 27 ponds were renovated with an objective to convert seasonal ponds to annual ponds. It was found that an additional area of 37.30 ha was brought under irrigation utilizing renovated ponds as source of water benefitting 160 farmers. The scope of irrigation lifted production of potato, wheat, boro paddy etc. by 6987 q. It was found that farmers of the village are using the water as critical life saving irrigation as well as 15 farmers is doing fish cultivation throughout the year on the renovated ponds in a systematically scientific way. Information collected from 15 farmers has revealed that, their net

income has increased by Rs. 10,000/- - 15,000/- per unit through fish production. These farmers are facing problem of quality fingerling at right time. So, the farmers of the village have



placed a demand for fish fingerling production to Coochbehar Krishi Vigyan Kendra. Considering the above, Coochbehar Krishi Vigyan Kendra initiated demonstration programme

on fingerling production at one of the renovated ponds involving Adarsha Krishak Kalyan Samity Farmers' Club. This intervention will not only make fingerling easily available but will also generate additional income to the members of VCRMC who are directly involved in fish cultivation.



KVK NIMPITH

Best farmer award through land shaping technology

Sri Sanat Naskar is a graduate, young and energetic rural youth of Bongheri village. After the devastating cyclone in 2009, when the farming of the entire village (Bongheri) stood still for next three years, he thought of leaving the village permanently in search of job. However, the introduction of the NICRA project in Bongheri village in 2011, motivated many farmers and rural youths like Sri Naskar to stick to the farming with a new zeal. He was moved by seeing the land shaping demonstration unit at the KVK Farm and immediately convinced his father to implement it in their land. After successfully implementing and harvesting the benefits of land shaping, he adopted sprinkler irrigation for judicious use of irrigation water. Now he has 2 acres of cultivated land and 0.5 acre of pond.

One fifth of his land was dug out

to create a farm pond. The dug out soil was used for raising the height of the remaining land by 1.5 ft. The land and pond embankments were strengthened to give a top width of 3 ft and height of 3 ft. He introduced submergence tolerant rice variety (*Swarna sub-1*) to combat prolonged submergence. Along with rice, he could now also grow bitter gourd,



brinjal and chilli on the Ail (broad embankments). The pond water ensured irrigation during dry spell. After the rainy season, the pond water was used for taking up second and third crop of vegetables like

hybrid tomato, chilli and brinjal. The fish in pond assured added income to the family. The use of sprinkler irrigation helped in judicious use of the rainwater harvested in the pond. Before installation of the sprinkler



system, he could use the pond water upto the month of January to sustain the fish in the pond. After using sprinkler irrigation, he is now able to irrigate his vegetable plot upto May, without hampering fish production. The frequent watering of the soil during winter and summer and continuous crop cover throughout the year, helped to reduce the soil

salinity of his land. Cropping intensity was increased to 220% and the annual family income increased upto Rs. 1.60 lakh.

This technology also has environmental impact. Soil organic carbon increase from 0.29% in 2011 to 0.41% in 2017, soil salinity reduced from 5.5 dSm⁻¹ in 2011 to 1.17 dSm⁻¹ in 2017 in winter season, alternate

irrigation and drying in rainy season is possible due to assured irrigation and improved drying and paddy stubbles are used as mulching in vegetables.

By seeing the climate resilient agricultural practices and thereby increasing farm income, maximum farmers adopted the same in their plot and are now reaping the benefits. They have now stopped migrating out

of their village. More than 15 crores of rupees have been invested to replicate the climate resilient agriculture model of NICRA project in South 24 Parganas district in the past 5 years by the Krishi Vigyan Kendra, through convergence of various Government sponsored schemes, like RKVY, IWMP, BGREI, NWDPPRA, ATMA etc. He was awarded as the best Innovative Farmer from ICAR-CRIDA, Hyderabad in 2017-18.

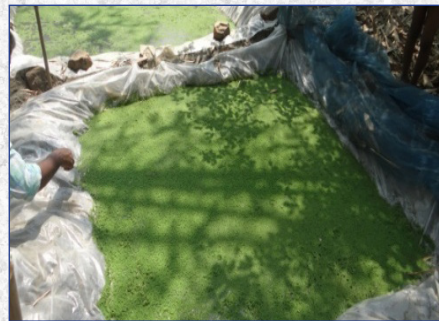
KVK MALDA

Azolla: A protein supplementary for livestock farming

Azolla, a free floating aquatic fern is a common bio-fertilizer in rice crop. The blue green algae (*Anabaena azolla*) grow in symbiotic association in this fern and responsible for Nitrogen fixation. It has higher protein content, essential amino acids, vitamins (vitamin A, vitamin B₁₂, Beta Carotene), growth promoter intermediaries and minerals like calcium, phosphorous, potassium, ferrous, copper, magnesium, zinc etc. On a dry weight basis, azolla consists of 25-35% protein, 10-15% mineral which made relevant to livestock, poultry, fish and farmers. Profitable livestock farming depends largely on increasing production without escalation in feeding cost. In dairy cattle, azolla feeding can increase both quantity and quality of milk. It has been reported that feeding 2-3 kg of azolla along with daily animal ration can increase milk yield up to 20%. It can replace commercial feed

and saves money. It is a very good source of all round the year green fodder supply to livestock.

Malda Krishi Vigyan Kendra, UBKV has been putting its utmost efforts to develop azolla pit as livestock feed



and popularize azolla cultivation in NICRA villages of Malda district. Azolla pit of 30 nos with 6 ft x 3 ft x 2.5 ft have been developed and its cultivation cost is almost negligible.

Use of azolla supplement increase income by Rs. 4000/- per animal / lactation is obtained 3.6 L/ lactation/ animal/day fodder (i.e. 35% increases in milk productivity per lactation per animal). Livestock during the flood

period as green fodder for cattle and poultry birds lactation. In case of milching animals productivity whereas it is 2.95 L/ lactation/ animal/ day considering recommended to as protein feeding only dry. Azolla also increased body weight in animals and birds. It increases egg laying period and quality of eggs in poultry birds.



Demonstration on azolla cultivation as feed for dairy cattle and poultry birds were done in the farmers' plots and it has been receiving good responses from farmers about azolla and its demand among farmers is increasing gradually.

KVK JHARSUGUDA

Crop diversification through hybrid maize

Most of the rice upland in NICRA adopted villages were lying waste due to

unavailability of suitable technology, cropping pattern and low yield of rice due to moisture stress condition. From NICRA project, working under KVK Jharsuguda, these lands were covered by Hybrid Maize instead of rice which

gave a high return. During 2017-18, demonstration on crop diversification was intervened by taking hybrid maize alternate to the rice. Previously maize was cultivated in a small area as backyard. Now with advent of

NICRA a suitable crop diversification was intervened by hybrid maize in a large scale. The area under Maize has been increased from 4.2 ha to 21.0 ha within 5 years of maize intervention as crop diversification of upland rice. Sri Santosh Meher, Sri Jitendra Meher and Sri Lalindra Meher are the progressive farmers getting more than 40 q/ha of yield.

During the year 2017-18, the coverage area of Hybrid maize was 5 ha covering 27 farmers. The performance of Hybrid maize variety 30-R-77 was good with an average yield of 37.0 q/



ha having good market demand of green cob with B:C ratio 3.9 compared to farmers practice (B:C ratio 2.9). This crop diversification technology is well accepted by the farmers of the

NICRA village along with six villages of nearby area. The farmers are able to get a good income with a short period from the upland instead of rice.



KVK KENDRAPARA

Low cost poultry tunnel improves livelihood

Krishi Vigyan Kendra, Kendrapara horticulture extension programme plays an important role in development of sustainable protected vegetable nurseries in farmer's field especially at Dasamanakul village, Marshaghai block, Kendrapara district of Odisha. Since Year 2016 till date Krishi Vigyan Kendra, Kendrapara adopted this village to promote NICRA programme. Scientifically it was observed that this village has no alternative during the monsoon season and cultivation of rice by broadcasting method



is the only option that hampers the economic upliftment of farm families. Moreover due to heavy rain

with average of 1507 mm during monsoon season vegetable seedling is difficult to raise in open condition. If raised in open condition then seedlings get damaged up to 69% due to heavy rain, biotic and abiotic stresses. Keeping the above problem in mind Horticulture specialist of KVK selected a technology of IARI i.e. raising of vegetable seedlings under low cost walk in poly tunnel structure, which aims to raise healthy seedlings with optimum (90 %) survival rate for sustainable vegetable farming in unfavourable ambience condition. Inputs such as linear low density polythene (LLDPE) along with field workshop on construction of a feasible model i.e. 8 m X 3 m X 2 m size poly tunnel structure and method of preparation of raised bed with dimensions of size 8 ft X 4 ft along with nutrient management with vermicompost, fungicide (Carbendazim 75 % @ 2 g/L of water) with application of termite control i.e. (Chloropyriphos @ 2 ml/L of water) as soil drenching are demonstrated in farmers field having community nursery by five members/

user group. By scientific technology demonstration farmers/user group members of community nursery are able to raise and transplant hybrid cauliflower, brinjal, tomato, cabbage



and drumstick seedlings with 87 % survival rate and healthy seedlings were transplanted with benefit cost ratio of 1:5 .

As per farmers view low cost poly tunnel method of vegetable seedling raising, supports Dasamankul vegetable grower to harvest off season vegetables which are sold out in a optimum market price in nearby local market and regulated market. This technology is now increasingly adopted by 70 farm families of Dasmankula and nearby villages as Tikhiri and Ramchandrapur.

KVK KALAHANDI

Food and nutritional security through vegetable cultivation

Kalahandi a tribal dominated district of Odisha, majority of the population depend on agriculture as their primary source of livelihood. NICRA adopted village Pipalpada is situated at 50 km away from Bhawanipatna. Paddy is the only crop grown during *Kharif* on both low land and up land and no crops were grown during *Rabi* season. Open wells were dug in Pipalpada village under NICRA intervention during 2015-16. Demonstrations were carried out for cultivation of vegetable utilizing open well water using KB Pump and other small pumps. Sri Manchan Patra one of the farmers of the village was earning his livelihood from 6 acres of land. Due to traditional method

of rice cultivation and poor crop productivity, he was not satisfied with the lower income. He used to cultivate only rice both in the upland and low land during *kharif* season and lands were remained barren during *Rabi* season. After consulting with the KVK Scientists, he was convinced



to cultivate vegetables. He cultivated vegetables in 1 acre of upland in his backyard during 2016-17 *Rabi* season using water from open well. The

variety like *Utkal Kumari* (tomato), *Utkal anushree* (Brinjal), *Snow Ball* (Cauliflower), and *Pusa Drum head*



(cabbage) were grown. Intervention of open dig has helped him to cultivate vegetables crops during *Rabi* and has increased income significantly. From 1.0 acres of vegetable cultivation he sold 26 q of tomato, 18 q of brinjal, 16 q of cauliflower and 25 q of cabbage. Overall he had spent Rs 23,000/- for cultivation and gross return was Rs.74,800/-.

KVK SONEPUR

Fish cultivation for self employment

Bapuji Pathagar, a group of farmers of Badmal Village under Ullunda block of Subarnapur district were working on crop cultivation and allied activities but could not earn much profit. As the village comes under drought prone area the villagers mostly depend on rain fed crops in *kharif* and to some extent in *rabi* where irrigation facility is there. There were five nos. of community ponds of area 2.2 ha in the village which usually become dry in summer. As a result the villagers were facing problem for drinking water, crop cultivation and allied activities. Looking into the situation four nos. of farm ponds were excavated under NICRA programme which has brought a ray of hope among the farmers by bringing a perceptible change in crop production and fishery activity

in the village. As there is huge demand for fish in the local market, scientists of KVK Sonepur took the initiative to create interest among the villagers for pisciculture and scientific management of fish pond. The members of Bapuji Pathagar came forward and were undertaken training on pisciculture by KVK Sonepur under NICRA activities.



They have started fish production with the technical support and the fingerlings of *Catla*, *Rohu* and *Mrigal*

@ 5000 nos/ha at a ratio of 3:4:3 with proper water quality management and feeding with floating fish feed @ 1% of body weight daily are provided every year from the Government fish farm hatchery, Sonepur for their community pond from KVK. After six



months from the date of fingerling supply they started their selling with a sell price @Rs. 150/- per kg. So at the end of the rearing period they got a gross income of Rs. 2,68,200/- with the period of three months and with an

expenditure of Rs. 1,22,000/- including all costs (fingerling, feed, medicine, fertilizer). So overall they got a net profit of Rs. 1,46,200/- within a period

of six months. Steps are now being taken up for upscaling this enterprise for more efficient management towards better marketing as per the

consumer's demands. This enterprise is giving additional income and also bringing an economic stability in their social life.

KVK GANJAM-I

Poly mulching in tomato

Tomato is the second important vegetable crop next to brinjal with an area of more than 5500 ha and production of 90000 metric ton in Ganjam district. Shri Mochia Majhi is a progressive farmer from Chopara village of Ganjam district, Odisha. He grows high yielding varieties crops in the year 2017-18 in 1 acre area with the help of improved technologies of KVK. Farmers are facing problems due to the climate change which leads to outbreak of pest and diseases, depletion of ground water, decrease in water table of water bodies due to high evapo-transpiration etc. Besides, raised input cost, heavy expenditure in manual weeding and irrigation are also threats for farmers. To mitigate these problems KVK Ganjam-I had initiated a demonstration on Poly mulching in tomato crop during the year 2017-18 in his field. Earlier he used to grow only rice crops during *Kharif* and tomato in *Rabi*. The tomato crop was not remunerative due to

high expenses in manual weeding, water scarcity and distress sale. KVK Scientist advised him the improved production technology of tomato with *HYV Utkal Pragyan* with poly mulching technique.



Shri Majhi cultivated HYV tomato var. *Utkal Pragyan* in 0.5 acre. He transplanted tomato seedlings on

raised beds with poly mulch of 50 micron size as per suggestions of the scientists of KVK. He also participated in training programme organized by KVK. Besides regular field visits were also made by the scientists of KVK to the demonstration field.

The practice of mulching helped in moisture conservation and required 2 nos. of less irrigation as compared to conventional practice. There was also weed suppression to the tune of 100 %. Mulches also minimized the incidence of wilting incidence by 66%. He harvested 57.4 q of tomato from mulched plot as against 48.6 q in farmer's practice with additional income of Rs. 6800/- from 0.5 acre land. He realized that with adoption of mulching practices expenses on weeding and irrigation can be minimized. Farmers of his villages and neighboring villages are seeking advice from him for mulching in vegetables. Now he became a model farmer to others.

KVK PORT BLAIR

Milk production through mineral supplementation and probiotics in crossbreed cattle

Performance of livestock is governed by the quality and quantity of nutrient provided in the diet as well as absorbed into the system (body). The Dairy farming in Andaman and Nicobar Islands is commonly associated with low productivity in both indigenous and crossbred cattle. Besides climatic problems, feeds and fodders of these islands are either deficient or

in imbalanced of many important minerals such as Ca, P, Zn, Cu, Co etc. which may be a cause of lower



productivity in dairy animals. Ca and P are important structural elements of bone and teeth. Growth, faetal development and lactation are heavily dependent on the availability of Ca in diet. Phosphorus plays an important role in maintenance of normal appetite, productivity and reproductive functions. On an average, the milk yield of crossbred cow was recorded to the tune of 4.3 L/day/ animal which was quite low to their potential in these islands. This might be due to imbalance of minerals intake

as well as nutritional deficiency in the feeds fed to the animals. The ICAR-KVK, Port Blair has conducted trials by supplementing mineral mixture and probiotics in lactating animals to assess the impact of it on milk production. The supplementation of probiotics improves the rumen guts and the mineral mixture ensures availability of balanced minerals for optimum performance of the lactating animals. The result revealed that, the highest average milk yield

was in the group fed with normal feeding along with probiotics and mineral supplementation (5.1 L) followed by group fed with normal feeding and mineral supplementation (4.8 L), normal feeding with probiotics (4.7 L) and farmer's practice (4.3 L) with B:C ratio 2.66, 2.61, 2.45 and 2.48 respectively. Hence, exogenous source of feed additives in the form of mineral mixture and probiotics are very essential in lactating cows during the peak lactation phase for



improving the milk yield in crossbred cow.

REVIEW WORKSHOP OF NICRA-TDC OF ZONE IV AND ZONE V HELD AT NIMPITH KVK ON JANUARY 13-15, 2018

The Review Workshop of National Innovations in Climate Resilient Agriculture (Technology Demonstration Component) of ICAR-ATARI Kolkata and ICAR-ATARI Patna was held at Ramkrishna Ashram Nimpith KVK during January 13-15, 2018. Dr. A. K. Singh, Deputy Director General (Agricultural Extension), ICAR New Delhi was the Chief Guest of the programme. The workshop was attended by Swami Sadanand Maharaj, Secretary, Ramkrishna Ashram Nimpith; Dr. S. S. Singh, Director, ICAR-ATARI Kolkata; Dr. Anjani Kumar, Director, ICAR-ATARI Patna; Dr. J V N S Prasad, Coordinator, NICRA-TDC, CRIDA, Hyderabad; Dr. Prabhat Pal, DEE, UBKV; Dr. P. K. Roul, DEE, OUAT; Dr. B. Sahi, Dr RPCAU, Pusa; Dr. F. H. Rahman, Principal Scientist-cum- NICRA Nodal Officer, ICAR-ATARI Kolkata; Dr A. Haldar, Pr. Scientist, ICAR-ATARI Kolkata and all the Programme Coordinators of NICRA implementing KVKs of Zone IV and V.



Few publications like - CD on 'Climate Resilient Agriculture and Endeavour of KVK Nimpith', Bulletins - ATARI Kolkata News, Purbi Kiran, Kheti bari, Flood tolerant rice varieties, Insect Pest of Vegetable Crop etc. were released during the workshop.

The workshop started with the Vedic Chanting and welcome address by Swami Sadanand Maharaj, Secretary, Ramkrishna Ashram Nimpith.

Dr. F. H. Rahman, Principal Scientist-cum- NICRA Nodal Officer, ICAR-ATARI Kolkata presented the highlights of the salient achievements carried out by the 22 NICRA- KVKs of the zone IV and Zone V.



Dr. A. K. Singh, Deputy Director General (Agricultural Extension), ICAR New Delhi, Chief Guest of the programme, while addressing the inaugural speech he mentioned that the KVKs should give emphasis on documentation on the various climate resilient activities and transfer to the

block and district administration for further dissemination. KVKs need to organize for validation of research on local technology to address the climate vulnerability issues. Integrated Farming System models must be emphasized in the KVKs and farmers field. Dr. Singh has mentioned in his concluding remarks that the workshop is the platform to have vivid knowledge of different modules of technologies suitable to address climatic aberration. He solicited the effort made by different KVKs to cover all the population of the villages and to have better access to effective technologies to the people of the areas. He mentioned the PM's idea about "Journey of Transforming India" within 2020 and responsibilities of KVK to address poor education, health, food and nutrition security to achieve the goal of the said programme. He appealed to the authority of ATARI to organize farm innovator meet once in a year. He also suggested validating different farm innovations from different zones.

Dr. S. S. Singh, Director, ICAR-ATARI Kolkata 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. Agriculture Scientists have to frame resilience technologies by considering climatic condition like (temperature, CO₂ concentration, sea level, dry spell etc.)

Dr. Anjani Kumar, Director, ICAR-ATARI Patna 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. J V N S Prasad, Coordinator, NICRA-TDC, CRIDA, Hyderabad KVKs emphasized that intervention should be taken on farmers' field based on the variability of environmental condition and extent of climatic variability should be available in each of the NICRA-KVKs and NICRA



village should be model for R.W.H, I.F.S and doubling farmers income, zonal monitoring committees has been formed. He appreciated all the presentations of the different KVKs. In his remarks he stated that it was very pertinent to say that all the selected areas and identified technologies to address climate aberration are very appropriate. Implementation of the programme remarkably enhanced the water conservation.

In the technical session all the Programme Coordinators/PIs of the KVKs have presented one by one their salient achievements of out scaled technologies during the last six years and also placed the next plan of work.

The workshop ended with vote of thanks offered by Dr A. Halder, Pr. Scientist, ICAR-ATARI Kolkata.

Some of the General recommendation came out of the workshop:

1. Vulnerability index should be measured and accordingly intervention to be executed
2. Large scale dissemination of successful technologies to be undertaken
3. After saturation of farmers in present NICRA village with technology then those should be replicated in neighbouring villages
4. Farmers wise and intervention wise data to be provided by every KVK
5. Performance of CHC and VCRMC need to be improved particularly in Odisha KVKs
6. Contingency planning may be prepared to respond in time
7. Detail of proven technology needs to be documented
8. NICRA activities should not clubbed with KVKs normal activities
9. Topography situation of village data (Up, Mid & Low land) should be kept in each NICRA village
10. Socio-economic impact of the successful technology demonstration should be analysed
11. Intervention on livestock/fishery should be taken on proper climate resilient basis
12. Well performing NICRA KVKs exchange their knowledge with other NICRA KVKs
13. Documentation of the successful intervention to be prepared
14. Creation of water resources should be more in Odisha KVKs

15. Crop diversification intervention need to be undertaken in more numbers in Odisha KVKs particularly
16. Extension activities or training programme to be conducted on climate related issues
17. All the KVKs should prioritize their required equipments based on the budgetary provision.
18. The titles of the training under NICRA should be innovative with thrust on climate resilience.
19. Conducting Impact evaluation of KVK by ATARI and other external agency.
20. Effective utilization of fund must be followed
21. Emphasis must be given for convergence with different ongoing programmes in the district particularly for KVKs of Odisha
22. Demonstration of different units in KVK to showcase different technology
23. Identification of technology according to land pattern must be followed
24. Identify different climate resilient varieties and inclusion of those in the district plan in collaboration with district authority for horizontal spread.

The workshop was ended with a Field Trip to visit different land shaping interventions in the Sundarbans villages on 15.01.2018.

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