Newsletter

TOWARDS CLIMATE RESILIENT AGRICULTURE

NICRA NEWS

ICAR-Agricultural Technology Application Research Institute Kolkata

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Introduction

National Innovations in Climate Resilient Agriculture (NICRA), was launched in 2011 to address the challenges of climate variability and climate change along with farmers need to adopt quickly increasing frequency of drought, flood and other extreme events by application of science and technology. Technology Demonstration Component (TDC) of NICRA offers great opportunity to work with farmers and apply such technology under field conditions with the background of current climate hostility. The emphasis has been capturing and improving the understanding on performance of technologies in different agro-ecologies and farming systems. This also facilitates quantification of various components of climate resiliency in different biophysical and socio-economic context.

In this way NICRA-KVKs play an important role in preparing village level contingency crop planning and different climate resilient measurements. ICAR-Agricultural Technology Application Research Institute Kolkata having nine KVKs where different activities under Technology Demonstration Components of National Innovations in Climate Resilient Agriculture (NICRA) programme in various modules are carried out. Climate change has become an important area of concern for India to ensure food and nutritional security for growing population. The impacts of climate change are global, but countries like India are more vulnerable in view of the high population depending on agriculture. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The overall focus of technology demonstrations under NICRA is to enhance resilience of farms and the farming community to climate risks so as to ensure sustainability over a period of time. Thus the emphasis is on adaption to climate variability which entails appropriate response to contingency situations. Sustainability is the immediate goal in highly intensive production systems facing natural resource degradation. Therefore, 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. As part of the Technology Demonstration Component (TDC) of NICRA, proven technologies are being demonstrated in climatically vulnerable districts of the country. The objective is to impart resilience under variable climates and consequently enhance the pace of adoption of these resilient technologies by stakeholders. On-farm participatory demonstrations were taken up in climatically vulnerable districts across the country through KVKs. Enhancing resilience is the key to achieve sustainability in agriculture especially in the context of climate vulnerability. The NICRA village was selected based on vulnerability of agriculture to climatic variability. 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.

Having seen the success of the climate resilient technologies for sustainable production of agriculture and allied sectors Indian Council of Agricultural Research has decided the NICR-TDC Project will be implemented in ten additional districts of the Zone besides the existing seven districts from 2021-22. The additional ten KVKs have also initiated the activities from December 2021.

"One thing leads to the other. Deforestation leads to climate change, which leads to ecosystem losses, which negatively impacts our livelihoods – it's a vicious cycle."
- Gisele Bundchen, UN Goodwill Ambassador

Optimization of horticultural production through land embankment development in Bongheri Village of South 24 Parganas

Shri Nepal Naskar is an enthusiastic and progressive farmer of Bongheri village of South 24 Parganas district. A series of natural calamities in the form of cyclone *Fani, Bulbul, Amphan* and *Yaas* since the last three years as well as the COVID 19 pandemic could not deter Shri Naskar from continuing his farming activities when most of the farmers in the district suffered heavy losses.

Shri Naskar had 0.25 ha of low land, only fit for cultivation of long duration traditional rice varieties like *Marishal, Kalomota,* etc. in Kharif. He was motivated by seeing the benefits of land embankment cultivation in the demonstration plots of NICRA project. In this technology, a peripheral narrow canal was dug around the low land. With the dug-out soil, the land embankment, called *"Ail"* locally, was raised by 3 ft. The bottom and top width of the *Ail* was maintained at 5 ft and 3 ft, respectively. On an average, 5-10% of the total land thus could be brought under additional cultivation. Simultaneously with rice in the low lying main field, vegetables were grown over this modified embankment that could easily escape submergence during continuous rainfall.

After successful implementation of land embankment by the financial and technical guidance under the NICRA project (in 2020-21) he was able to cultivate bittergourd in kharif and chilli in rabi season on 0.04 ha of land embankment and medium duration rice in rest of the land and got three times more income even in Pandemic situation.

Table: Economics of farming before and after NICRA intervention in 2020-21

Technology demonstrated:		Area (ha)		Crop yields (q/ha)		Economics of farming after NICRA (Rs./ha)				Economics of farming before NICRA (Rs./ha)			
Crop Name	Name of variety	After NICRA	Before NICRA	After NICRA	Before NICRA	Gross Cost	Gross Return	Net return	BCR	Gross Cost	Gross Return	Net return	BCR
Rice, Bittergourd Chilli	Rice-Santoshi, Bittergourd-US6207, Chilli- Eagle	Rice-0.10, Bitter-gourd-0.04, Chilli-0.04	Rice-0.15	Rice-30, Bittergourd -210, Chilli -105	Rice-26	477195	1022000	544805	2.14	28000	45500	17500	1.63

(Drs. P. Chatterjee, P. Garain and S. Jana
RA Krishi Vigyan Kendra, Nimpith, S 24 Pgs, WB)

"By polluting the oceans, not mitigating CO_2 emissions and destroying our biodiversity, we are killing our planet. Let us face it, there is no planet B." - *Emmanuel Macron, President of France*

Medium duration Rice variety *MTU-1156*- Resilient variety for terminal moisture stress area in Ganjam

Terminal Moisture Stress is considered to be major abiotic stress in rainfed area of Ganjam district. To reduce the adverse impact of climate change in medium land condition it is pertinent to popularise newly developed stress tolerant rice varieties. Krishi Vigyan Kendra, Ganjam-I carried out a demonstration programme on medium duration rice variety *MTU-1156* in NICRA cluster villages- *Lepa, Chikili, Nada* and *Chopara* in 08 ha area involving 23 famers during Kharif, 2021. *MTU-1156* is a medium duration (115-120 days) Rice variety tolerant to moisture stress for 7-8 days. Traditionally farmers were growing *MTU-1001* which is a medium duration (125-130 days) rice variety with average productivity of 32 q/ ha. and prone to disease and pest and cannot withstand terminal moisture stress. Nursery raising was done during 4th week of June and transplanting was done during 4th week of July. All the package of practices of rice were followed and harvested during 4th week of October. A significantly higher production of 14.3% (36.6 q /ha) was achieved by growing *MTU-1156* as compared to traditional Rice variety MTU-1001.The net profit in MTU-1156 variety was Rs 31200/ha with BC ratio of 2.01 as compared to net profit of Rs. 24400/ha and BC ratio of 1.8 in *MTU-1001* variety of rice. The crop was harvested before terminal moisture stress (October 21 to October 31, 2021) and facilitated for early greengram sowing with better soil moisture availability. Farmers were satisfied with the new variety and farmers of nearby villages are procuring the seeds from the farmers. It is really a promising rice variety in terminal moisture stress area for higher yield.

(Drs. S. Satpathy and P. Panda, Ganjam I Krishi Vigyan Kendra, Odisha)

Climate reisilent agricultural technology park under NICRA programme in Kendrapara

nder NICRA programme KVK, Kendrapara adopted two nos of new villages i.e. *Gajapitha* and *Bilindolo* of Marshaghai block during 2021-22. After the baseline survey it has been found that there are two small community unutilized ponds at Gajapitha. As per the discussion taken in the village meeting, a committee has been formed with 50 nos of farmers and a Climate Resilient Agricultural Technology Park has been established in 1.5 acre area including both the ponds.

In this park, committee members planted arecanut in the north and south side for income generation and reduce the risk during the cyclone as areacanut are resistance to cyclone, low cost poly house for raising vegetable seedling during heavy rain, cultivation of brinjal, tomato, cauliflower with mulching, cultivation of cucurbitaceous vegetable crops in grow bag to save the crop during flood condition, cultivation of sweet corn as crop diversification, sponge gourd, bitter gourd, cucumber and cowpea cultivation in trelly system in the pond dyke, ridge and furrow method of cowpea cultivation, composite pisciculture with stocking yearling in pond, rearing of ducks and poultry, mushroom cultivation, azolla cultivation, vermicomost/ vermiwash production etc. have been demonstrated with the support of farmers of Gajapitha village. KVK Kendrapara imparted training programme to taken up different activities and during the initiation of that park, KVK provide critical inputs like LLDP for poly house, grow bags, plastic mulching for vegetable cultivation, trellis net for creeper cultivation, well ring for vermicompost and azolla production, green shadenet and mushroom spawn for mushroom production etc. This park establish with an aim to create awareness among the farming community of that village and nearby villages on different climate resilient technologies. Now, farmers of that locality are visiting that park and learning different climate resilient practices demonstrated in the park and expressing their interest for replication of this technology in their villages.



(Drs. S. N. Misra, P. Mishra and A. Phonglosa
Kendrapara Krishi Vigyan Kendra, Odisha)

Modern Jute Retting Technology- A cost effective and farmers friendly practice in Malda

Shri. Sukumar Mandal is a progressive and innovative farmer from *Deherutala* village, West Narayanpur, an adopted village of Malda Krishi Vigyan Kendra, Malda, West Bengal. Most of the people of this village is engaged with farming and farming is their main source of income. They cultivate crops like rice, jute as a major crop. Now jute is one of the most important cash crops in that region.

Like every year Sukumar Mandal grows jute crop on about 2 acres of land. Due to the poor quality of jute fibre through tradition retting method his return was low.

Malda KVK intervened there with a demonstration and awareness program about "NINFET SATHI Powder". NINFET SATHI Powder is very efficient for jute fibres retting and expression of golden colour of jute. 5 kg of powder is enough for the retting of one acre jute. During 2019-2020 crop season, average price of jute fibre he received was Rs. 3500/quintal. But this year, he has got higher product value of about Rs. 4500/quintal. Therefore, the increase in income as compare to traditional method was about Rs. 5000. Through this modern technique his income increases about Rs. 2500/bigha with this improved method.

In that awareness program *Sukumar* Mandal also learned about the proper techniques of jute retting using of NINFET SATHI powder. After using this powder, he has got the satisfying results like improved fibre quality, better yield and improve colour as well. This technology also helps to increase interest to others farmers who do not want to grow jute. NINFET SATHI Powder contains nutrients without any microbial consortia and it can enhance the microbial growth at suitable pH so that it accelerates the rate of retting. It also effects by lowering of root content, diminishing of defects in fibres, improvement in strength, fitness and colour of fibre.

With this interference of Malda KVK, he felt motivated that Malda KVK did that kind of demonstration which help them to boost their economic conditions.

This technique helps to increase microorganism content which is essential for retting and express the golden colour which has higher demand for export in foreign countries. This NINFET SATHI powder is made the jute fibre looks alike Bangladesh growing jute as compare to golden colour traits.



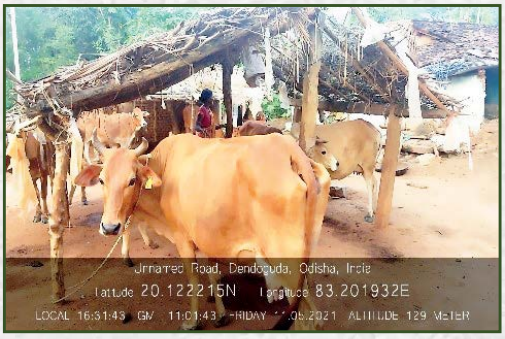

(Drs. R. Roy, V. Sarkar and S. Sarkar
Malda Krishi Vigyan Kendra,WB)

Oil Cakes as feed supplement in dairy cow practiced in Kalahandi

Scarcity of fodder and grasses during summer and high feed cost causes serious economic losses in dairy farming. The average temperature of NICRA adopted villages Indramal and Khairabadi remain above 420C during the month of March-June. Due to high temperature and scarcity of green fodder, the milk production of dairy cow decreased significantly. To mitigate these problem farmers in both villages fed different oil cakes to cattle. Previously farmers were used to fed their cattle with 2.5 kg concentrate feed and ad lib ton straw per cow (Farmers practice; FP). But under NICRA project the farmers were advised to feed the cow @ 2.5 kg of concentrate feed with 1 kg cotton oil cake (T1). Some farmers were also fed their cows at 2.5 kg of concentrate feed with 1 kg ground nut oil cake (T2). Feeding of cow with oil cake significantly increased the milk production and improved the milk quality and it is summarised below. Feeding of cow with cotton oil cake helps to mitigate the feeding problem of dairy cow during summer and it can be spread to other area of the district.

Demonstration	Mean Milk Production (L/day)	Mean Body weight gain of lactating cow during 60 days (Kg)	Mean Body Condition Score (BCS)	Mean Fat%	Mean SNF%	Gross Return / Cow	Net return/ Cow	B:C
FP	4.19±0.19^{a}	5.07±2.27^{a}	4.03±0.31^{a}	3.63±0.31^{a}	7.43±0.65^{a}	6285	3975	1.72
T1	6.05± 0.27^{b}	6.43±4.88^{b}	5.18±0.24^{b}	4.88±0.18^{b}	8.32±0.31^{B}	12705	8346	1.91
T2	5.59±0.21^{c}	6.29±4.84^{b}	4.96±0.18^{b}	4.45±0.27^{C}	7.93±0.11^{C}	11068	7237	1.88

Means with different superscripts within rows are significantly different ($p<0.05$); Mean±SE



(Drs. A. Panda, H. N. Malik and C. Routrey
Kalahandi Krishi Vigyan Kendra, Odisha)

Water saving technology of okra with using poly mulch at Coochbehar

Okra is one of the demanding crop throughout the year in Coochbehar district. It is mainly grown during summer and rainy season. Farmers of NICRA villages mainly prefer to grow these crops during rabi season for higher market demand. The winter mulch provides better physiological growth of flowering and fruit setting of okra. Low temperature during winter months also causes chilling injury. The problem is that rainfall received during rabi season is very scanty and water table is very low. Number of irrigation required more on these crops which also increase the cost of cultivation.

The demonstration was conducted at NICRA villages of Coochbehar district. The crop grow in broad bed system and beds are raised at a height of 15 cm. Length of the bed at convention size with 1 meter wide leaving 15 cm wide drainage channel. After proper land preparation the recommended dose of fertilizer applied in the bed. The beds covered with black polythene mulch film 25 cm gauge. The okra sapling planted at a distance of 50 cm x 50 cm by making whole on the polythene.

Other intercultural operation followed as per recommendation.

Soil temperature under mulch condition is higher during day and night which increase the fruit setting and reduce the flower drop. Polythene mulch also reduces the weed growth and save irrigation water upto 40.9%. In this technology the soil temperature during growth period is higher than the atmospheric temperature under black polythene mulch condition (about 50 c). This is because of black polythene mulch promote large radiation of soil surface and soil heat flux. Black polythene mulch led to reduction of IWR and increase water use efficiency (WUE). The consumptive use of water gives better retention of soil moisture.

Higher yield under black polythene mulch about 32 quintal per acre where without mulch condition give 24 quintal per acre. The Gross cost is higher in without mulch condition (about 59 thousand per hectare) due to increase number of irrigation and weeding problem. In case of mulch condition the gross cost about 46 thousand per hectare.

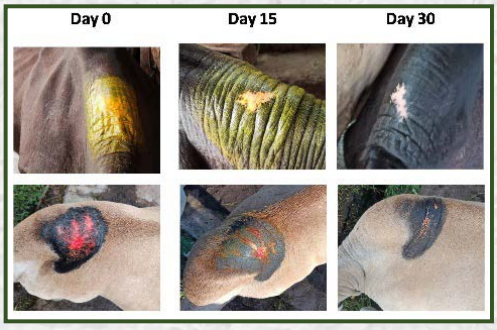
(Drs. B. Roy, S. Sultana and B. Ganguly, Coochbehar Krishi Vigyan Kendra, Coochbehar, WB)

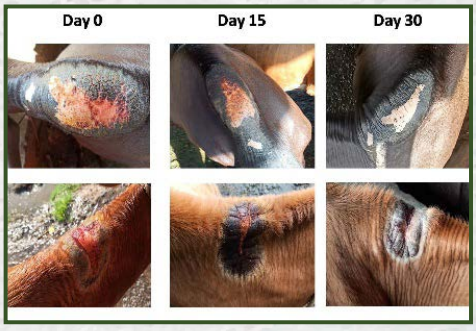
Tri-model Therapy Module (CIARI-Gau Maa Rakshak) to Treat Humpsore in cattle at South Andaman

This methodology is combination of different medicines and time of administration and which is cheaper, economic, effective, quick recovery, less recurrence, viable technology, sensitive and specific as well. The methodology is as follows. Cleaning of the wound with liquid soap to remove the dirt and application of green papaya mist on the wound surface (30 minutes) to digest the dead tissues are to be done daily for 3 days. Antiseptic and fly repellent ointment is to be applied daily for 45 days to check the bacterial infection and further deposition of larva of Stephano filaria. Parenteral administration of Avermectin 200µg/kg body weight on day 0, 15 and 30 is to be done to kill microfilaria. Oral administration of tablet Diethyl carbamazine citrate 6 mg/kg body weight daily for 45 days is to be done to kill macrofilaria. Clinical improvement is observed day 15 of the post treatment onwards; however the whole treatment protocol is to be followed.

Advantage of the technology:

- Wound size (cm2) significantly reduced from 175 to 32 on day 15 and to 1.50 on day 30.
- Success rate of the treatment: 95%
- Milk yield increased in 76.47% of the treated animals
- Induction or bring to heat in 54.16% of the treated animals
- Milk yield increased @15-20%
- Reduced the stress level and nuisance due to humpsore: decreased Malondialdehyde: 15-20% and cortisol: 20-25% and increased total antioxidant: 5-10%, superoxide dismutase: 20-30% and catalase: 12-30%
- Lower recurrence rate





(Drs. L. B. Singh and B. K. Nanda Port Blair Krishi Vigyan Kendra, A & N Islands)

NICRA-TDC Project launched at cyclone affected Samsernagar village of Sundarbans of West Bengal

ICAR-ATARI Kolkata organized the launching programme of NICRA-TDC Project at Samsernagar Village of Sundarbans of West Bengal on December 30, 2021. The programme was arranged by North 24 Parganas Krishi Vigyan Kendra, Ashokenagar.

Dr. N. J. Maitra, Deputy Director of Reasearch, WBUAFS in his welcome note, thanked the NICRA-TDC team for selecting the cyclone devastated village. He also shared his valuable experience for proper functioning of the programme.

Dr. F. H. Rahman, Nodal Officer, NICRA-TDC Project elaborated the aims, objectives and modus operandi of the project. He explained the villagers about the benefits of the programme for overall livelihood improvement and asked their cooperation for the successful implementation of the project.

Dr. S. S. Singh, DEE, RLBCAU, Jhansi as resource person highlighted the participatory approach of women in agriculture in more number and raised various issues of innovative adaptation strategies for managing the agriculture of the coastal area.

Around 100 farmers and farm women participated in this NICRA-TDC Project launching programme and the interaction. Members of Local Panchayet, Line Department Officials, SHGs were also present in the programme.

Publication during July to December 2021

Research Paper

1. D. Ghorai, R. Bhattacharya and F. H. Rahman (2021). Impact of leadership vis-à-vis technology extension and livelihood: A Case study from Purba Bardhaman district of West Bengal. Indian Journal of Extension Education (Accepted for publication).
2. N.Bommayasamy, L. B. Singh , B K Nanda and F. H. Rahman (2021). Effect of split application of nitrogen on productivity, profitability and nitrogen use efficiency of drought tolerant rice. Indian Journal of Extension Education (Accepted for publication).

Book

L.B. Singh, B.K. Nanda, N. Bommayasamy, H. Nayek, V.K. Pandey, B.A. Jerard and F.H. Rahman (2021). Climate Resilient Technological Intervention for Sustainable Agriculture Production System for Andaman under TDC-NICRA. Published by ICAR-CIARI Port Blair, India. p. 1-186

Technical bulletins

F. H. Rahman, R. Bhattacharya and S. Nandi (2021). NICRA Newsletter: Towards Climate Smart Agriculture, Pub. by ICAR-ATARI Kolkata, Vol. 7 No. 2 pp 1 – 8.

Paper presented in national/ international seminars etc.

1. P. Majhi, R. Bhattacharya, S. Ghosh and F. H. Rahman (2021). Continuous Rice Cropping System with Integrated Use of Inorganic and Organic Sources of Nutrients for Soil Quality Improvement. Paper presented in the National seminar of 85th ISSS Annual Convention held at PSB, Sriniketan, Santiniketan, Nov 16-19, 2021.

"Agriculture, manufactures, commerce and navigation, the four pillars of our prosperity, are the most thriving when left most free to individual enterprise."
-Thomas Jefferson

2. S. Sarkar, G. Das, S. Sarkar, S. Saha and B. Roy, S. Biswas, R. Bhattacharya and F. H. Rahman (2021). Use of Black Polythene Mulch as a Climate Smart Technology on Performance of winter cucumber and Resource Conservation In Terai Agro-climatic Zone of West Bengal. Paper presented in the National seminar of 85th ISSS Annual Convention held at PSB, Sriniketan, Santiniketan, Nov 16-19, 2021.
3. R. Bhattacharya, S. Ghosh and F. H.Rahman (2021). Organic Carbon fractions show how rice cultivation may impact on soil carbon pools in Baruipur district of West Bengal. Paper presented in the National seminar of 85th ISSS Annual Convention held at PSB, Sriniketan, Santiniketan, Nov 16-19, 2021.

Awards/Recognition

"RESONATING RESILIENCE" – A Flim based on NICRA activities of Coochbehar KVK was awarded with FAO Award in the International Agro Film Festival-2021 at Bratislava, Slovakia.

Newspaper Coverage

A PDF version of the Newsletter is also available at: http://www.atarikolkata.org/publications

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