



# Newsletter



## TOWARDS CLIMATE RESILIENT AGRICULTURE NICRA NEWS

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### Introduction

Climate change/variability impacts are evident in Indian Agriculture. The projected impacts are likely to further aggravate yield fluctuation of many crops with impact on food security and prices. Climate variability impacts are more pronounced in rainfed agriculture due to delayed onset of monsoon, deficit rainfall and long dry spells. In the XI Five Year Plan, ICAR launched the National Initiative on Climate Resilient Agriculture (NICRA). Under Technology Demonstration Component of NICRA, the climate risk resilient technologies are being demonstrated in farmers' field in a participatory mode in vulnerable districts in the country.

The Project aims 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 component TDC of the project has been implemented through Krishi Vigyan Kendras at district level regionally coordinated by ICAR-Agricultural Technology Application Research Institutes (ATARIs).

ICAR- Agricultural Technology Application Research Institute Kolkata having nine KVKs where different activities under Technology Demonstration Components of National Innovations on Climate Resilient Agriculture (NICRA) programme in various modules viz. Natural Resource management, Crop Production, Livestock & Fisheries and Institutional Interventions 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 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 have not only enabled the farmers to cope up climatic vulnerability as well as it plays a key role in farmers' adaptive capacity along with sustainable agricultural production.





## Roof Top Rain Water Harvesting – a solution to drinking water problems in Sundarban of South 24 Parganas

Sundarban is a vast tract of flat, densely forested, marshy islands enclosed by a network of saline tidal estuaries and creeks. Over the time, several of these islands have been inhabited by human beings through destruction of the mangrove forests, erecting dykes along the tidal streams and modifying the lands into cultivable ones. But one constraint, in the form of source of potable water, has remained the same or even worsened in many of these inhabited islands. Groundwater is presently seen as the only source of safe drinking water on Sundarban islands, which is dwindling day by day. The NICRA village *Bongheri* is no exception to this reality where the depth of fresh ground water aquifer has reached to 1200 ft depth. Only two such drinking water bore wells are available in the village for more than 400 families.

To address the scarcity of drinking water in the village an innovative approach was taken up where the rainwater, collected through the roof top catchment area, is used for drinking and cooking purpose. This system is composed of the following five components.

- Catchment: Roof top of the mud houses and pucca houses
- Conveyance: The rainwater pipes (PVC) are fitted to the outlet of roof surface. In case of corrugated asbestos roof of huts, a half slit PVC pipe is inserted horizontally along the surface and connected to another vertical collection pipe.
- First flush: The first shower falling on the roof surface carries all the dust and dirt with it and hence is flushed out through a “first flush” device. This device remains in an open position. After few minutes of the start of a shower, when the dirty water flows out and clean water starts to come out, the
- Filter: After first flush, the clean rain water is then channelized through a sand-gravel-charcoal filter to further remove the suspended particles in water and harvest potable water.
- Storage tank: 1000 L capacity PVC tank is used for storing the filtered rain water.



device is closed. This device thus ensures passage of clean water in the storage tank devoid of silts and other materials deposited on the roof surface.

In NICRA village 10 roof top rain water harvesting structures have been constructed during this year. The family members enjoyed the potable water for drinking and cooking from these structures throughout the rainy months. After the last shower, during *Bulbul cyclone* on 9<sup>th</sup> November 2019, all the tanks got filled up to the full capacity. Now the family members are using the water only for drinking water purpose. It is expected to support 100 days of drinking water to a family of 5 members with 10 litre water per day. During rainy season also the women members need not to go out, fetching potable water from outside of their houses.

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

## Rain water harvesting – a source of irrigation for vegetable cultivation in dry spell in Port Blair

The Andaman and Nicobar Islands receive an average annual rainfall of about 3100 mm of which about 95 percent is received during May-December. Nearly 75 percent of the rainfall received in the islands is lost due to undulated terrains, steep slopes, porous soil stratum and its proximity to the sea. As rainwater is the only source of the fresh water availability in these Islands, its

harvesting, storage and recycling is the most important strategy for water resource management. Due to the erratic nature of rainfall, the intermittent dry spells during the monsoon and summer result in moisture stress and poor crop harvest in the NICRA adopted villages. The topography of both the NICRA adopted villages is rolling with low range hills to narrow valleys at the

foothills resulting in an undulating terrain ranging from steep slopes to coastal plains. Thus the actual water availability is much less and the villagers face severe problem of water scarcity. Keeping in view the water scarcity problem, most of the farmers of the villages do not prefer to cultivate vegetables and other crops during summer months. The KVK, Port Blair has taken initiative to





overcome the situation by introducing tank cum well system of irrigation under the NICRA project.



In this system, five irrigation ponds were renovated with the involvement of farmers to store runoff water. These ponds were able to provide irrigation to transplanted rice in kharif and low duty vegetable crops in full command or heavy duty vegetable crops in partial command during summer.

The seepage loss from this pond as well as percolation loss from the rice fields can be re-harvested back

from an open dug well downstream to the pond. This well serves for providing water for nursery rising of rice and vegetables in pre monsoon period and to irrigate additional area of vegetable cultivation during summer.



This system has been found very effective in providing reliable irrigation as all the ponds are situated in higher slopes and two well is located in downhill within the recharge zone of the tank on the valley areas. The harvested seepage

water from the pond is stored in the well and subsequently pumped out and irrigated the vegetable crops like brinjal, okra, chilli, beans, ridge gourd, bitter gourds and bottle gourds during the dry spells. Total of about 8.0 ha area brought under vegetable cultivation



in summer which was only 1.0 ha before adoption. The intervention indicates 87.5% increase in cultivation areas.

(Dr. L. B. Singh  
Port Blair Krishi Vigyan Kendra, A & N  
Islands)

## Enhancing economic and social security through crop diversification of Rice fallow to Rice- Blackgram system in Kendrapara

Rice is the major crop of the district Kendrapara. Most of the farmers able to grow only single rice crop due to lack of enough moisture in the soil under rainfed situation. NICRA Project newly adopted village Ratanpur, Block: Marshaghai, Dist. Kendrapara which is mainly a rainfed situation and only long duration low yielding rice is grown. In the next season the land is remaining vacant due to lack of enough moisture. Looking into the above problem KVK, Kendrapara introduced rice fallow to rice- blackgram cropping system in this flood prone area. In the medium land situation, the long to medium duration rice e.g. *Swarna*, *Pooja* is being replaced by the short duration rice *DRR -44*, *Swarna Shreya*. As a result the rice crop is harvested 20-

25 days earlier than the stipulated time period of harvest. In the field rice-blackgram paira cropping is practiced. Before 10 days harvest of the rice crop, blackgram seeds of the variety *PU-31* is being broadcasted. As a result we are getting almost 30 days extra with enough soil moisture status due to change in variety and sowing window of blackgram. Rice-Blackgram cropping is a profitable system from economic as well as soil health management point of view. In addition to this it improves soil fertility by following crop rotation principle. This cropping system efficiently utilizes the residual moisture.

Steps in implementing this technology:

- The existing rice var. *Swarna* (145 days) which is replaced by an early variety *DRR-44* (125 days). As a result soil moisture can be saved for the second crop that is Blackgram.
- The blackgram is broadcasted in rice crop 10 days before harvest of the rice.
- Total recommended fertilizer of blackgram (20-40-40) is applied to rice after panicle emergence as DAP and MOP.
- Two foliar spray of NPK (19-19-19) @ 1.5% at preflowering and pod development stage of blackgram for nutrient and moisture supplementation.





### Impact of the technology:

Before the implementation of this cropping system under post flood situation farmers were growing only rice as *kharif* crop followed by fallow land due to lack of the soil moisture for *rabi* crop. By adopting this technology the following impacts were recorded:

- i. Additional revenue generation by taking blackgram as second crop under post flood situation.
- ii. The residual moisture in the rice fallow is utilized by the blackgram

resulting in higher resource use efficiency.

- iii. The existing cropping intensity is doubled due to introduction of double crop instead of sole cropping of rice and fallow.



- iv. As a legume crop is introduced into the system it restores soil fertility through biological nitrogen fixation.

- v. An extra net income of Rs.10,200/- out of 3.5 q/ha yield of black gram PU-31

The rice-black gram pair cropping system is now gaining popular and farmers are adopting this technology as they getting more benefits from this cropping system than the existing one.

## Swarna sub 1 – A remunerative rice variety under flood situation at Kendrapara

**S**warna sub -1 acts as a boon for the flood affected area where the total crop is damaged due to continuous water stagnation. The newly adopted village under NICRA Programme nearby previous village Dasmankul of KVK, Kendrapara is Ratanpur, Block: Marshaghai, Dist. Kendrapara which is most vulnerable to flood condition during *kharif* season (Aug., Sept. and Oct.) as the village is located beside the river Paika (a subsidiary of the giant Mahanadi River). The main crop of the locality is rice which is mostly damaged by usual flood. Flood is the regular phenomenon of this area, so entire crop get damaged, leading to total or major yield loss. As the rice crop damaged in the main crop season, farmer have no option to grow rice again, under rainfed situation. Keeping these problems in view, KVK, Kendrapara has started a trial on cultivation of *Swarna sub-1* rice variety. This variety has the ability to tolerate water submergence. *Swarna sub 1* is developed by introducing Sub-1 gene into the rulling variety Swarna which imparted flood tolerance potential to the crop. The duration of this variety

is 142-145 days. It can tolerate upto 15-17 days of complete submergence. Under this flooded condition average yield is upto 3.5 t/ha. The package of growing *Swarna sub-1* is similar to any normal rice variety, except we have to apply 20 kg N/ha, just 7-10 days of receding of water for better yield. All the farmers had grown the community nursery of this variety and transplanted the rice variety before flood.

Before introduction of *Swarna sub-1* variety there was average 50-70 % yield loss due to the flood in particular area of the experimentation. Some year has witnessed complete damage of the crop due to prolonged water stagnation because of the flood.



Introduction of the *Swarna sub-1* has become boon for the farmers of the flood affected area as it has tolerated

12-15 days of water submergence during the flash flood of the river Paika. In flood condition the yield obtained from this variety was in range of 3.2 -3.8 t/ha where as there is complete loss of yield in other variety. Whatever the resources and energy utilized was going in vein due to the complete failure of the crop due to occurrence of flood and where as this technology given output, after adopting. Farmers are getting return of at least a sum of Rs.30,000 /ha income by adopting *Swarna Sub-1*. The variety is gaining popular day by day in the flood affected area and is likely to expand in all over the district in coming 2-3 years.



(Drs. S. N. Mishra and Namita Mahapatra  
Kendrapara Krishi Vigyan Kendra, Odisha)



## Capacity building on farm machineries and NRM activities organized at NICRA Village in Coochbehar

Capacity building programme on Application of Zero tillage technology and rice transplanting through transplanter machine were conducted on Sep 2-3, 2019 at NICRA adopted village Khagribari and nearby village Singimari Pachunirpar. Total 60 number of SC farmers where 25 were female. Zero tillage operation for cultivation of maize crop and rice transplanter were demonstrated for the farmers. Farmers were given hands-on training for the said machineries and the implements were kept in the custom hiring centre of Village Climate Risk Management Committee of NICRA village Khagribari and farmers are using the implements. Another programme on Waste Management for Sustainable Environment was conducted on Sep 6, 2019 at Singimari Pachunirpar, where 30 ST farmers and farm women participated. Further one more programme on Sep 11 and 20, 2019, training on Water Harvesting and Management of Field Crops was conducted at Khagribari village and Singimari Pachunirpar village where a total of 55 tribal farmers and farm women participated.

There was an exposure visit of students of various schools and colleges of Coochbehar at NICRA adopted village, Khagribari on Sep 22, 2019 where various technology demonstration units like IFS Model, Mushroom Unit, Rice production unit, Vermicompost and Water Harvesting



structure etc were demonstrated in front of them.

Some farmers/ farm women of NICRA village of Coochbehar were recognized for carrying out various NICRA activities during Kisan Mela (Sept 23, 2019) and Mahila Kisan Diwas (Oct 15, 2019).



- Smt Marjina Bibi has been awarded with Best Woman Farmer for Community farming practices and group mobilization
- Sri Ajit Sarkar has been awarded with Best Lead Farmers Award
- Sri Chhalaudhin Miya has been awarded with Best Innovative Farmers Award
- Sri Bikramjit Sarkar has been awarded with Best Progressive Farmers Award



(Dr. Bikash Roy  
Coochbehar Krishi Vigyan Kendra, WB)

## Exposure visit of School and college students to NICRA villages of Krishi Vigyan Kendras in different districts of Odisha

### Ganjam I

An exposure visit of school students has been organized by KVK, Ganjam-1 on Sept 25, 2019 to NICRA village -Lepa to create awareness among students about different climate resilient practices. 50 students of Jirabadi, Jagannath Prasad Govt. High school and 3 teachers

participated in the programme. KVK scientists gave a brief idea about different NICRA activities and its impact on climate change and improving farmer's income in a sustainable manner. Students also asked various questions like green house gas, fodder cultivation, Azolla etc. After a vivid interaction students







along with teachers and Scientists visited different demonstration units of NICRA i.e. azolla, honey bee rearing, fodder cultivation, crop diversification from rice to pigeon pea in upland, short duration drought tolerant rice variety. Students were very keen to see the technologies and its implication and benefits. All the students were satisfied with the exposure visit and showed interest to disseminate the Climate Smart Technologies to other students.



(Drs. Swagatika Sahoo and P K Panda  
Ganjam I Krishi Vigyan Kendra, Odisha)

### Jharsuguda

A Programme of School students visit to NICRA adopted Village was organized on Sept 23, 2019 where 50 students of Nabapalli High School, Loisingh of Jharsuguda district visited to NICRA village Tharkaspur. The school students were accompanied by the Dr. Jyotirmayee Udgata Sr. Scientist & Head along with M.K Barik, Scientist (Agriculture Extension) and Dibyajyoti Parida, SRF (NICRA) and visited different demonstration fields in NICRA adopted village. In the beginning, a meeting was organized inside the



village involving VCRMC members and other farmers, students, teachers of school. The importance and benefits of climate resilient technologies demonstrated in village were described to the farmers and visiting students. The need of climate resilient technologies, climate change, and its impact and impact of adoption of these technologies in the drought prone district was the focus of the discussion. After the interaction meeting the students were visited to the azolla demonstration field, hybrid maize cultivation, vermicompost unit, rice var. *Sahabghadhan* and



ridge & furrow method in cowpea and radish where the students interacted with concerned farmers about its impact. The students were expressed satisfaction and rendered thanks to KVK Scientist for such an effort to make a visit to NICRA adopted village because they learn lot of things related to Climate change and its impact on agriculture and how to combat it.

(Drs. Jyotirmoyee Udgata and  
Monoj Barik Jharsuguda Krishi  
Vigyan Kendra, Odisha)

### Sonepur

The students of Agriculture and Horticulture college, Chipilima, Orissa University of Agriculture and



Technology visited NICRA village, Badmal on Sept 29, 2019 to Nov 29, 2019 see various technology demonstration units.



Krishi Vigyan Kendra, Sonepur has adopted Badmal village since the year 2011. Various climate resilient technologies based upon drought and effective utilization of water have been demonstrated in the village. In view of increasing knowledge the students of Agriculture and Horticulture college, Chipilima, OUAT have gone to the village to see the demonstration in field. Improved variety of Brinjal *Swarna Shyamali*,







*Pusa purple long*, tomato hybrid *Laxmi* and *Arka Rakshak*, Chilli variety *Utkal Ava* and *VNR-218*, drought resistant rice variety *Jogesh* and *Mandakini* have been demonstrated in the village. The

students also visited Integrated fish farming of *catla*, *rohu* and *mrigal* in 2 ha, area. Under the module of live stock management improved goatery house made up of bamboo has been

established in the village which was main attraction among the students.

## Organisation of *Kharif Krishi Mela-2019* at NICRA Village of Malda

**M**alda Krishi Vigyan Kendra, UBKV, Ratua organised one day *Kharif Krishi Mela-2019* at NICRA adopted village on October 23, 2019 with gracious presence of gracious presence of Sri Gour Chandra Mandal, Sabadhipati, Malda Zilla Parishad; Dr. Saikat Mookherjee, Deputy DEE, UBKV; Sri Satish Kumar Singh, DDM NABARD; Dr. Kinkar Maity, Asstt. Director of Agriculture, Manikchak Block; Head and other officials from Malda KVK.

Aims and objective of *Kharif Krishi Mela* include the huge coverage of farmers and farm women of NICRA adopted villages of Malda district to disseminate the latest proven



and economically viable climate resilient technologies to the farming community for boosting up production in agriculture and its allied sectors in short time. To cope with the growing population, farmers have to double their farm income by the year 2022 and for that the productivity



of both crop and livestock is to be given prime importance. Keeping view of farmer's income, *Kharif Krishi Mela* is designed not only to promote technology dissemination but also to provide an opportunity to exchange or sharing of views between farmers and scientists of various fields for further refinement of the technologies so that the farmers can raise their income by overcoming the climatic vulnerability of the area.

The main theme of the mela was 'Climate Smart Agriculture under Climate Change Scenarios'. On the basis of theme several experts share their views/ experiences regarding modern agricultural practices including animal and fishery management practices. The main emphasis were given on 'Economization of space through multi-tier Horticulture, cultivation of remunerative crops like Elephant Foot Yam on relatively upland area, cultivation of azolla as a green fodder,

vermicompost preparation, pulse cultivation through in-situ moisture conservation, preparation of low cost goat house, community nursery bed preparation, pisciculture on derict water bodies or flood effected areas, vaccination of house hold animals,' etc. After that a farmers-scientists interaction, quiz competition were takes place. Farmers and dignitaries have visited exhibition stall which was filled with different climate resilient technologies and different suitable seed varieties which are suited



for that flood prone area. In the evening several cultural programmes were taken place. Altogether around 1000 farmers and farm women were participated in the programme and the programme was completed successfully.

(Drs. Bhabani Das and Adwaita Mondal  
Malda Krishi Vigyan Kendra, WB)

## Quinquennial Review Team of ICAR-ATARI Kolkata and Patna visited NICRA village at Jharsuguda

**Q**uinquennial Review Team of ICAR-ATARI Kolkata and Patna, comprising Dr. R. K. Samanta, Former

VC, BCKV, Mohanpur, as Chairman and the Members- Dr. C. Satapathy, Former DEAN, OUAT, Bhubaneswar;

Dr. Y.V. Singh, Former Director, ICAR-ATARI Jodhpur; Dr. R. B. Sharma, Former DEE, IGKV, Raipur and





Member Secretary Dr. F. H. Rahman and Dr. S. S. Singh, Director, ICAR-ATARI Kolkata visited the NICRA village *Bhoimunda* of Jharsuguda Krishi Vigyan Kendra, Odisha on Sep 5, 2019. The Team has visited the different activities under various modules like NRM, crop production, livestock & fisheries and outcome of the project. There was an interaction with farmers, farm women and VCRMC members of the village. The Team showed their satisfaction



after visiting the Resource Centre in the village and interacting with the farmers.

The salient recommendations emanating from the discussion



directly related to the project sites as follows:

- » Focus should be given on urbanization of Custom Hiring Centre for inflow of fund from other organization to NICRA village
- » Human resource development through women empowerment should be increased
- » Special focus to be given on selective breeding, upgradation of local breed, popularizing

technologies that could minimize adverse effect on animal and fish components

- » VCRMC is advised to organize more awareness meeting among the farmers for taking up the various interventions.

The Team appreciated the efforts of KVKs and active involvement of the farmers and suggested to scale-up the useable interventions in adjoining villages.



## Publications (July-December 2019)

### Book

Rahman, F. H., Singh, S.S. and Bhattacharya, Ria. (2019) Resilience in Agriculture Enhanced through Technology Demonstration-Experience of NICRA-TDC. Published by ICAR-ATARI Kolkata, pp: 1-115

### Book Chapter

S. S. Singh and F. H. Rahman (2019). Resource Conservation Technologies in the Eastern Region for Doubling Farmers Income. Lead paper published in the Compendium of National Conference on Resource Conservation in Eastern Region of India, Pub by Indian Association of Soil and Water Conservationists, Dehradun pp 119-130.

### Technical bulletin

Rahman F H, Singh S S. and Bhattacharya R. 2019. NICRA Annual Report 2018-19, Pub. by Director ICAR-ATARI Kolkata, pp: 1- 48.

### Papers presented in national/international seminars etc.

Rahman F H, Das Biplab and Singh S S. 2019. Fertilization and Vine Plantation for augmenting the Productivity Yield and Economics of Pointed Gourd in Terai Zone. Abstract in the proceedings of 84th Annual Convention and National Seminar of Indian Society of Soil Science at Banaras Hindu University, Varanasi during Nov. 15-17, 2019.

Rahman F H, Mukherjee S and Mukherjee K. 2019. Evaluation of a New Organic Farming Technology towards Crop Sustainability and Soil Quality Development. Abstract in the proceedings of 84th Annual Convention and National Seminar of Indian Society of Soil Science at Banaras Hindu University, Varanasi during Nov. 15-17, 2019.

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