



# Newsletter



## TOWARDS CLIMATE RESILIENT AGRICULTURE NICRA NEWS

ICAR-Agricultural Technology Application Research Institute Kolkata

Volume VI No. 2

July 2020

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### Introduction

Climate change has become an important area of concern for India to ensure food and nutritional security for growing population. Indian farmers have evolved various coping mechanisms over time, but these mechanisms are not enough to cope with the extreme weather aberrations witnessed in the recent years. Therefore, there is a need to use modern science combined with indigenous knowledge of farmers to enhance the resilience of Indian agriculture to climate change. In order to deal with climate change and its impacts, the Indian Council of Agricultural Research (ICAR) initiated National Innovations on Climate Resilient Agriculture (NICRA), a multi-institutional, multi-disciplinary network project in 2011. 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). 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. In the context of climate variability, farmers need to adapt quickly to increasing

frequency of drought, flood and other extreme events to stabilize crop yields and farm income. Over the years, the National Agricultural Research System has developed an array of practices and technologies to foster stability in agriculture production against the onslaught of seasonal variations.

Climatic vulnerability of selected 9 KVK districts of West Bengal, Odisha and Union Territory of A & N Islands at district level regionally coordinated by ICAR-Agricultural Technology Application Research Institute Kolkata forward definite requirement in terms of technological support, human resource development and overall empowerment of farming community to enable them to cope up with climate vulnerabilities like droughts, erratic rainfall, heat wave, flood, cyclonic storm. 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 through the intervention like Natural Resource Management, Crop Production, Livestock, Institutional Intervention, Capacity Building and Extension Activities 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.





### Eco hatchery for carp breeding in Bongheri village of Sundarbans of S 24 Parganas

A small backward eco hatchery comprising of one reservoir, one breeding pool, one hatching pool and one spawn collection chamber was set up in the NICRA village *Bongheri* for facilitating carp breeding with the aim to supply quantity carp seeds to the fish farmers. The hatchery unit has been established by Shri Sunil Banik, a marginal farmer having 0.13

hatchery operation started, farmers from all corners of the village and also from neighbouring village, started placing orders for procuring carp seeds. So far, Shri Banik could Produce 5.2 million spawn from four breeding operations, of which he sold 2.4 million spawn to fellow farmers worth of Rs. 9000/- and rest of the spawn was stocked in a nursery pond

stage by culturing for another 8-10 months. Thus the establishment of the carp hatchery not only assured the supply of quantity fish seeds to the local farmers but has also opened up avenues for earning from different stages of the fish like spawn, fry, fingerling and table fish. The enterprise has also been successfully



ha of farm land and a pond of 0.13 ha. Previously, most of the seeds used to come from far-away places like Naihati (200 km) and Gobardanga (215 km) and the quality of the seeds could not be ascertained. The price was also found to be exceptionally high. But the farmers had no other alternatives. This year, as soon as the

for growing successively to fry and fingerling stages. He has already sold 200 kg fry worth Rs. 50000/-. Now he is expected to produce 76q fingerlings within next 3 months, from the left over stock of fry. He has also plans to sale 30q of fingerlings to the fellow farmers and has decided to stock 20q of fingerling to grow upto table fish

to attract the migrant rural youth and farmers to stay in the village during the Covid-19 lockdown period. His son and nephew has already returned to the village from Kolkata to assist him in the breeding operations and promised to stay back with him.

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

### Empowerment of farm women through backyard poultry rearing at Jharsuguda

Apart from being engaged in vegetable cultivation Smt. Maithili Meher was in rearing of poultry in backyard as a subsidiary source of income. She owned 5 desi birds. Large number of the birds died during the monsoon suffering from *Ranikhet* disease. Higher rate of mortality was also observed during summer. Previously, she was engaged in rearing of desi birds in backyard system, the profit was negligible due to slow growth rate, higher mortality of birds. The lack of scientific knowledge and proper managerial practices were also the contributing factors towards the non receipt of profit

from the practice. Under the NICRA programme of KVK Jharsuguda, she was provided with 15 nos of 21 day old *Kadakhnath* poultry. She was imparted with training on scientific poultry production, supplementary feeding, health management and marketing. The interventions of NICRA gave her confidence to maintain the birds and to succeed in the practice. The poultry birds are allowed to free range during the day, and confined in a small shed during the night. A handful of grain (broken rice) was given as feed supplement daily. Lately, cultivation and feeding of *Azolla* was practiced. The birds

started laying eggs upon attaining sexual maturity by 140 days. At initial laying period the egg size was small (40-45 g) but within a months period the eggs attained marketable size (55-60 g). The eggs with brownish colour of *Kadakhnath* resembled that of local poultry egg and the birds attained body weight of an average of 1.8 kg and 2.2 kg for female and male birds, respectively. The annual egg production was an average of 80 eggs per bird. The birds were sold @ Rs. 500/kg live body weight and eggs were sold @ Rs.10/egg. From 15 birds he was been able to get an amount of Rs 12,000/-. Looking at the demand



and performance of birds along with profit of Smt. Meher, other farmers and farm women of the village got interested, and started poultry rearing. After introduction of *Kadakhnath* mortality rate reduced along with higher body weight and more remunerative value due to higher demand of meat. Introduction of more number of the stress tolerant poultry breed along with community brooding of birds in the village.



Treatment	Body wt (kg/6 months)	% change in body wt	Net Return (Rs/bird/6months)	B:C Ratio
(Local bird)	1.7	-	300/-	3.4
(Kadakhnath)	2.2	29	800/-	5

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

### Community rice nursery - a profitable technique to combat climate vulnerability at Subarnapur

In Badaml and Dipapali village of Subarnapur district, under NICRA project owing to its climatic



vulnerability of low rainfall with a span of four month i.e, from June to September. These villages experienced uneven distribution of rainfall. Due to high variability in the rainfall pattern the crop cultivation get severely affected. So to overcome this situation community nursery is the right approach for this area to meet the requirement during the dryspell

and unavailability of rice seedlings. The staggered community nursery of rice seedling was developed by



the farmers. This approach was explored as a local adaptation strategy suggested by KVK, Subarnapur at the village level to overcome the problem experienced by farmers during deficit rainfall seasons in lowlands. In the anticipation of a two weeks delay in monsoon the first nursery is taken up as a contingency measure by 20 June with the long duration variety (>140

days) in order to transplant 3-4 weeks old seedlings by first fortnight of July. If the monsoon delay extends by 4 weeks, the second nursery is raised with medium duration varieties (125-135 days) by 1st July to supply 3-4 weeks old seedlings for transplanting in the 3rd or 4th week of July. In case of anticipation of further delay or deficit rainfall conditions, the 3rd nursery is raised by mid July 8 with short duration varieties (<110 days) to take up transplanting of 3-4 week seedlings in the first fortnight of August. Farmers adopted this technique and jointly produced seedlings to ensure timely transplanting of correct age seedlings for higher productivity and reduce the risk associated with deficit/delayed onset of monsoon.

(Drs. Jibanjeet Sen and Geetanjali Pradhan  
Subarnapur Krishi Vigyan Kendra, Odisha)

### Introduction of Kadakhnath breed – an ideal enterprise to augment the income of rural youth at Ganjam- 1

Increasing demand of meat and eggs as source of protein in the rural and semi-urban areas has made backyard poultry farming most remunerative component. The market value of colour bird meat and egg has been always on the higher side than that of its commercial broiler and layer counterparts. Introduction of *Kadakhnath* breed in the backyard system of Odisha has increased the

market aspiration of the farmers. Higher demand of black meat in the market has made the breed one of the most desiring among poultry farmers. KVK Ganjam-1 also demonstrated the performance of *Kadakhnath* breed in the year 2019-20 for its adaptability and profitability in the hot and humid climates of north eastern ghat zone mostly prevailing in its operational area under NICRA

project. Four villages viz. Chopara, Chikili, Lepa and Nada of Jagannath Prasad block of Ganjam district were selected for the purpose. A total of 200 brooded chicks (21 days old) were distributed among 20 farmers of the villages. The birds were observed for their adaptability and production parameters in the said region. The birds adapted to the climatic condition substantially.





The adaption, predators escape and scavenging was found to be at par with native indigenous poultry birds. Mortality of the *Kadaknath* bird was found to be substantially low (12%) as compared to their native counterparts (31%) for the first three months. At the end of six months total mortality of *Kadaknath* birds were 20% as compared to 40% in native



birds. The average body weight of *Kadaknath* was also found to be 1.2 kg at 06 month stage as compared to 0.8 kg of native birds. Average egg production was estimated to be 130-140 / annum as compared to 50-60 in native birds. The meat alone fetched higher price for the farmers considerably increasing the benefit cost (BC) ratio of the



enterprise to be 4.11 as compared to 2.05 in native birds. The net profit for *Kadaknath* is Rs. 270/- per bird as compared to Rs. 125/- in native bird. Backyard rearing of *Kadaknath* breed will boost the income of the rural farm family.

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

### Deep trench bund structure- a source of supplemental irrigation in mango orchard at Kalahandi

A continuous deep trench bund was dogged with a dimension of 50 ft length, 2 ft width and 3 ft depth in a mango orchard of NICRA adopted village Kinipadar, under M. Rampur block in Kalahandi district of Odisha.



The bund was aimed to be 90 degrees to the peat slope to ensure best water retention. The excavated soil was piled up in the down side of slope and the final height of the peat bund was an average height of 250-300mm above



the peat surface. The deep trench restricts the water loss by creating an underground 'wall' of wet 'putty' peat which slows water movement. This improves hydrological connectivity and re-hydrates the entire peat resource with improved general water table conditions. The long-term improvement in peat surface wetness promotes improved vegetation. The rain water was harvested and stored in the bund during rainy season. The mango trees utilized the stored water afterwards for its growth and fruiting.

Technology demonstrated	No. of farmers	Area (ha)/Unit	Output (q/ha)	Economics of demonstration		
				Gross Cost (Rs/ha)	Net Return (Rs/ha)	BCR
Trench bund method in mango orchard	15	2.5	105	40000	1,17,500	3.93

(Drs. Amitabh Panda and H N Malik  
Kalahandi Krishi Vigyan Kendra, Odisha)

### Improvement of livelihood through different vegetables cultivation round the year following ridge and furrow method in Port Blair

Vegetable production in Badmas Pahad, Port Mout under NICRA adopted villages were hampered because of limited cultivable land and excess rainfall during rainy

season (May – December) and also unpredictable rains in summer. The other major problem for vegetable production is extensive damage (by Giant African Snail, Bacterial

wilt, water storage in post monsoon period and less sun shine). A total of 16.23 ha area covered under rice and permanently in water logged condition, where no other crop is



grown during rainy period. Rice cultivation is becoming highly uneconomical and it was thought that vegetables can fetch high price due to short supply in rainy months. Ridge and furrow is a technology identified to grow vegetable right in the midst of low lying rice field. It involves making of ridges (width 50 cm, height 30-40cm) and furrow (width 100 cm) to provide drainage of excess and standing water from the fields.

A field experiment was conducted in farmers' field during the month of October-November, 2012 at low lying area of Badmaspahar and Lal Pahad covering with an area of 2.5 ha under National Innovation on Climate Resilient Agriculture (NICRA). The adopted villages are geographically situated between 11°38.452' N latitude and 92° 39.844' E longitude at an altitude of 5.7 m. The soil was sandy clay with medium organic carbon (0.58%), low in available nitrogen (263.3 kg ha<sup>-1</sup>), low in available phosphorus (7.4 kg ha<sup>-1</sup>) and medium in available potassium (224. kg ha<sup>-1</sup>). Vegetable growing farmers were very less due to loss in cultivation of vegetables during rains and unpredictable rains during summer months because of low lying fields. A total of six farmers with an area of 2.5 ha (2011-13) are covered from both the villages of Lal Pahad and Bad mash Pahad. With the meager investment of Rs 4500 per season, the families get



the seasonal vegetables throughout the season also sold the surplus vegetables to the local market and get handsome income. The result showed that earlier the beneficiaries were growing only one crop (paddy) now they are able to grow more than five crops (vegetables) in their land. The most impressive and effective impact is that, through the intervention of the technology, cultivation of vegetables, reduction in seed rate, integrated pest management approaches are more popular in the NICRA villages. In the project area, cropping seasons are clearly demarcated as per occurrence of rainfall viz. rainy season and dry season. Rainy season categorized with plentiful rains (400-600 mm/month) and comparatively higher monthly minimum and maximum average temperature 23-25°C and 28-30°C respectively. These parameters also influence relative humidity that remains much higher (80% or above) during rainy season. Dry season i.e. December to April, is categorized as rain free period and comparatively lower temperature (minimum monthly average temperature 21-22°C up to February but rises in March to April 22-24°C); monthly maximum average temperature also follows same trend and rises from 29-32°C. These parameters also influence relative humidity which remains nearly 65-75%. Most of the vegetables are very sensitive to water logging and heavy rains. As rains during flowering and fruiting stages



affects pollination and fertilization of solanaceous vegetables. Besides, it also creates congenial climate for pathogens and different insects and pests. But other vegetable crops like Okra, cow pea, amaranthus, Indian spinach and other local vegetables are performing well in ridge and furrow system under heavy rainy period.

Adoption rate is reaching 62 percent in the adjoining villages of NICRA and Production rate of vegetable are also increased. The system has been popularized and promoted in many parts of the islands for production of vegetable during rains as the system provides good drainage for excess water. From an area of 0.4 ha, higher gross return with the BC ratio of 3:1 was recorded in ridge and furrow vegetable production as compared to paddy cultivation. The system also resulted in higher yields, weeds free, increased soil health and reduced labor costs compared to the traditional cultivation. In respect of enterprise development for alternate livelihood generation, gender aspect to be highlighted i.e. benefits gained by women folk. The study confirmed that the ridge and furrow system with mulches is an efficient, simple and economical method enhanced better vegetable production during unpredictable rains in summer and also in rainy months. As a livelihood diversification option vegetable cultivation on ridge and furrow has enormous scope to improve food security and income generation, which in turn can help boost rural and urban economic growth. More females than male obtain information on weather from the Radio. Further, study suggests increasing women's participation in decision making at all level in climate change mitigation and adaptation.

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





### Enhancing economic and social security through community nursery of *Swarna sub-1* in Kendrapara

The concept of community nursery is to supply quality planting material on the larger basis to the entire community. Under NICRA programme, KVK Kendrapara has done a demonstration on community nursery at Ratanpur village of Marshaghai Block, Kendrapara.

Generally farmers prepare small nurseries of rice solely for personal usage. At early stages the seedlings are damaged due to incidence of pest and disease and natural calamities like heavy rainfall or flood or may



be due to long dry spell during few years. Under these situations farmers are prone to lose a complete season. To avoid such situations community nurseries are developed by a group of farmers near the readily available water source and in a well drained suitable topography land.

The community nursery of 2000 m<sup>2</sup> area where rice var. *Swarna Sub-1* (flood tolerant rice variety) is grown with due care under the technical guidance of experts from KVK, Kendrapara. Quality seed material



(rice var *Swarna Sub-1*) has been provided by KVK, Kendrapara. The seeds are sown on a well prepared seed bed of 5m X 1m X 0.15m dimension after duly treated with seed treating chemical. Enough moisture is ensured before sowing of the rice seed. The seedlings are very healthy having good growth. There was only incidence of some leech and snails which were controlled by application of granular Thimate surrounding the nursery bed. The seedlings are ready after 21 days of sowing.

By adopting community nursery, the farmers could able to overcome the loss due to unpredicted dry spell during July month of 2020 in which there is significant reduction in rainfall amount compared to the normal rainfall.

### Backyard Poultry Rearing - A profitable enterprise in adverse climatic situation in Kendrapara

Poultry farming plays an important role in every climate resilient agricultural operation directed towards the economic upliftment of the farming communities. However, the low productive qualities of the desi chicken have always been a hurdle for economic upliftment of the farm women.

To overcome this KVK, Kendrapara has organized various programmes at NICRA adopted Village *Dasmankul* under Marshaghai block since the beginning of the NICRA project in the village to encourage diversified agricultural activities for improving the economic status of the farm women.

Krishi Vigyan Kendra, Kendrapara introduced the *Vanaraja* and *Kadakhnath* breed of poultry in the

NICRA adopted village for upliftment of the backyard poultry sector through escalation of egg and meat production. Under this situation the women farmers of village *Dasmankul*, were imparted training on backyard poultry rearing under NICRA programme.

After being trained by KVK, Kendrapara Smt Pratibha Mallick of village *Dasmankul* showed keen interest in rearing backyard poultry. Being a housewife and mother of 4 kids, she did not wish to just be confined to her house only, she wanted to do something on her own which she can master and which will add an extra income to her family. So, she sought the help of KVK, scientists who provided her with 50 nos. of *Vanaraja* and *Kadakhnath* chicks and also extended technical advice from

time to time including preventive measures against prevalent poultry diseases. The growth performance of the chicks was periodically monitored.

The birds provided to her have the advantage in terms of colour and toughness like local bird, high egg laying capacity and higher weight gain than the local birds. Moreover, *Vanaraja* and *Kadakhnath* breed has better resistance against common poultry diseases and is highly adaptable to the climatic condition and free range rearing system with minimum supplementation of locally available feed ingredients.

After rearing for 3-4 months she sold the sold male birds after attaining marketable weight (1.6- 2.0 kg) at an attractive price of Rs. 200/- per/-



kg of *Vanaraja* male and Rs.500 per kg of *Kadakhnath* male owing to their distinctive colored plumage. She earned a good income of about Rs 10,000/- from sale of 20 cockerels. The egg production of female birds was around 10-12 eggs per day during peak production in winter months. During this period, she was able to

sell eggs at Rs.6-8 per egg making a total sale proceed of Rs 10000/-. At present, she is getting about 8-10 eggs daily giving him income of Rs. 50-80 per day. She is also trained by KVK, Scientists on supplementation practices with vitamins, minerals and calcium from time to time. A portion of eggs produced and cockerels were also consumed in the family to improve their nutritional quality. Realizing that the level of profit from small unit of 50 birds which she made, she has purchased another lot of 100 chicks during February, 2019 as replacement stock. Thus, with a small flock of around 50 birds, Smt Mallik earned substantial returns. This supported the fact that



backyard poultry farming along with other agricultural activities can be an economically viable agricultural diversification for livelihood and income generation.

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

### Activities undertaken during pandemic situation due to COVID-19 in adopted villages of different Krishi Vigyan Kendras

#### Malda KVK:

#### • Field visit of greengram at NICRA village - Narayanpur

Regular field visit of demonstration unit of greengram (*var. IPM-02-03*) field under seed production was done at adopted villages under NICRA project. Farmers (100 nos.) are under greengram seed production under NICRA project. Individual farmers were contacted and greengram demonstrated units were monitored and essential advices regarding the crop were made.



#### • Seed distribution programme:

Seed distribution programme with maize seed (*var. Yubraj Gold*) was conducted at the villages. Maize seed was distributed to 80 farmers covering 30 hectares of land.



#### • Varietal replacement of Sugarcane in the adopted village:

Farmers in the region are showing higher interest in sugarcane farming due to its sustainability in prolonged flood. Further, the local variety with low production and less tolerant to prolong water logging was not satisfying their demand. Therefore, Malda KVK suggested the farmers of NICRA villages for a varietal replacement of sugarcane with higher water tolerant varieties i.e. *Swapan* (Co B99161) and *Birendra* (Co Lk 94184)



at adopted villages under NICRA project addressing the climate vulnerability of the region i.e., prolonged flood. Further, Malda KVK distributed sugarcane cut of these varieties to the farmers of the villages.

Regular field visit of sugarcane demonstration units were done by expert of KVK Malda. Individual farmers were contacted and sugarcane demonstrated units were monitored and time to time



essential advices regarding the crop were made. The crop is now at the growing stage with good growth rate and is expected to have comparatively higher production than the local variety previous grown by the farmers of the NICRA adopted villages.

(Drs. Rakesh Roy and Adwaita Mondal  
Malda Krishi Vigyan Kendra, WB)





### Jhasuguda KVK:

- Creating awareness camp on COVID-19 crisis and distributed mask among 100 numbers of farmers and farm women in NICRA adopted village Bhoimunda and Tharkaspur on May 18, 2020
- Distributed agro inputs in the adopted villages with mask and social distancing to sustain the Kharif crop planning
- Formed and maintained a farmer advisory group with 100 no. of farmers using Whatsapp to give advisories on Kharif planning, COVID awareness and issues
- The Custom hiring centres (CHCs) in NICRA adopted villages of Jhasuguda district successfully empowered the farmers during the lockdown situation due to

COVID-19 crisis. In Jhasuguda district the NICRA project is being operated in the villages of Bhoimunda and Tharkaspur of Jhasuguda block. These two villages are blessed with one custom hiring centre each. Due to lockdown, there is labour shortage as labours are not allowed from one village to other. The heavy implements are also not allowed for transport to other areas. In this situation the farmers are availing the benefit of CHCs in their own villages. The farmers are given advisories on crop production, plant protection measures, harvesting, marketing facilities made available during the lock down, weather forecast and proper use of implements through whatsapp group, personal telephonic contact and multi location audio conferences. They

are advised to continue their agricultural works and use of agri implements with mask and social distancing. Farmers are getting the proper advisories to take care of sanitation of farm implements in CHCs after every use. Through Village Climate Risk Management Committees (VCRMCs), the KVK scientists created awareness to sanitize the implements using soap water and hypochlorite solution. Farmers are using Power tillers for summer ploughing, power weeders for intercultural operations and power sprayers the most from CHCs during the lock down period continuing from March 22nd 2020. The CHCs helped the farmers during this labour shortage period. It enhanced their efficiency as well as income through custom hiring.

## Publications

### Research papers

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3. Samima Sultana, Rakesh Roy, Bhabani Das, Adwaita Mondal and F. H. Rahman (2020). Vegetable Based Multitier Cropping System: A Model for Higher Income for the Farmers in Old Alluvial Soils of West Bengal. *Advances in Research*, 2020, 21(6): 30-34
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6. H. N. Malik, A. Panda, S. Behera and F. H. Rahman (2020). A Comparative Study of Different Moisture Stress Tolerant Rice Varieties in Kalahandi District of Odisha. *International Journal of Plant & Soil Science*, 2020, 32(7): 1-6
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Compiled and Edited by F. H. Rahman, R. Bhattacharya and S. K. Roy

Published by Director, ICAR-ATARI Kolkata

Printed by Semaphore Technologies Pvt. Ltd. # +91-9830249800