

Newsletter



TOWARDS CLIMATE RESILIENT AGRICULTURE NICRA NEWS

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Introduction

radiation, temperature Oprecipitation are the main drivers of crop growth; therefore agriculture has always been highly dependent on climate patterns and variations. Since the industrial revolution, humans have been changing the global climate by emitting high amounts of greenhouse gases into the atmosphere, resulting in higher global temperatures, hydrological regimes affecting increasing climatic variability. Climate change is projected to have significant impacts on agricultural conditions, food supply, and food security.

Climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (FCCC).

Overall, climate change could result in a variety of impacts on agriculture. Some of these effects are biophysical, some are ecological, and some are economic, including: A shift in climate and agricultural zones towards the poles, changes in production patterns due to higher temperatures, a boost in agricultural productivity due to increased carbon dioxide in the atmosphere, changing precipitation patterns and increased vulnerability of the landless and the poor.

National Innovations on Climate Resilient Agriculture (NICRA) is a network project of ICAR launched in February, 2011 aims - at enhancing resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration.

NICRA is a step towards climate-smart agriculture that includes application of proven practical techniques in major areas of water management, crop husbandry, livestock management, farm implements and others. Getting existing technologies into the hands of small and marginal farmers and developing new technologies like drought or flood tolerant crops to meet the demands of a changing climate also come under the purview of NICRA programme.

Technology Demonstration Component is one of the programmes of the network project, 'National Innovations on Climate Resilient Agriculture (NICRA)' through which demonstrations are conducted with site specific technology packages on farmers' fields for adapting to current climate vulnerability. Both short and long term output is expected from the project pertaining to new and improved varieties of crops, livestock breeds, management practices that help in adaptation and mitigation and inputs for policy making to mainstream climate resilient agriculture in the developmental planning. The overall expected outcome is enhanced resilience of agricultural production to climate variability in vulnerable regions. Under Technology Demonstration Component, districts of West Bengal, nine of Odisha and one of A & N Islands were selected. Enhancing resilience is the key to achieve sustainability in agriculture especially in the context of climate vulnerability. The village in the respective KVK represents the dominant cropping system of the district. The multidisciplinary team of KVK analyzed the constraints related to climatic variability based on secondary weather data, resource situation, farming systems and agricultural yields in the past few years. The major constraints resulting from climatic variability includes; water scarcity, recurrent droughts, cold wave, heat wave, flood, pest and diseases of crop and livestock, fodder scarcity, poor access to appropriate seeds/planting material and critical inputs and farm machinery. Focus group interactions were organized with the community and finalized the interventions were implemented under four technological modules viz., Natural Resources, Crop Production, Livestock and Fisheries and institutional Interventions.





Doubling of income from bitter gourd cultivation by poly-mulching and innovative trellis design in South 24 Parganas

Sri Sanat Naskar is a well-educated (graduate) and enthusiastic rural youth, who is always busy in experimentation and improvisation of agricultural technologies in his farm. As a resource conservationist, he has already been recognized by the ICAR-CRIDA Hyderabad for adopting



rainwater harvesting and microirrigation. Now he experimenting with poly-mulching in his bittergourd plot through an innovative trellis design. He started growing bittergourd (var. US-6207) in his 0.053 ha landshaping plot in the 4th week of April 2022. By that time he had very less amount of water for optimum irrigation. The poly-mulching helped him to reduce the water requirement by 30%. As there was no weed infestation, he could save the entire labour cost towards manual weeding. Less weed infestation increased fertilizer use efficiency. According to Sri Naskar he applied 20% less fertilizers in his plot. At the same time infestation of thrips was less in his plot. The silver coloured poly-mulch surface helped to reflect the sunshine which in turn reduced the thrips population in his plot. The innovative trellis design (triangular/ zigzag roof) helped to increase the canopy area by 2.5 times over normal trellis (flat roof). Thus the overall production increased by 36% and net income increased by 114%.

(Drs. C. K. Mondal and Prabir Garain RA Krishi Vigyan Kendra, Nimpith, S 24 Pgs, WB)

Performance of Swarna-Sub1 cultivation in NICRA adopted villages of flood prone Malda district

Among the cereal food crops, rice is the major crop in India. With the largest rain-fed lowland area in the world, flooding is considered as the most important abiotic stress to rice production in India. The frequency and severity of the floods will increase years after years with the climatic change.



These changes will have a severe impact on the rain-fed agriculture production management and livelihoods of millions of marginal farmers in the flood affected region of all over the India.

Before introduction of NICRA project at village(s) of Brozolaltola, Meherchandtola, Jairamtola and Mahendratola under Panchayat of Dakshin Chandipur, Manikchak block of Malda district, the peoples used to cultivate varieties of rice which are not tolerant to water stagnation condition. The adopted villages under NICRA project are situated in flood prone area and adjoining to the river Ganges. Recurring incidence of severe flood and

accordingly incoming of huge water damages the standing crop of rice.

However, almost all the rice growing cultivated lands of NICRA adopted villages comes under rain-fed lowlands which suffer from frequent floods due to unpredictable rainfall. Under these circumstances cultivation of non-submergence varieties of paddy which are not tolerant to waterlogged conditions often leads to drastic reduction in yield and productivity. Thus, under these constraints and high incidence and severity of floods, small and poor farmers incur heavy economic losses.

To overcome this major problem of adopted villages under NICRA



project the Malda KVK has introduced submergences-tolerant rice variety (Swarna-Sub1) which can play an important role in minimizing the effect of flood on rice production. This rice variety was demonstrated in an area of 15 hectare land and have benefited 100 farmers. The average yield of this



variety of rice was 31.50 q per hectare with an average cost of cultivation of rice in farmer's field was Rs. 36375 per hectare, average gross income was Rs. 61425 per hectare and average net income was Rs. 25050 which was having BC ratio of 1.68. From the result



itself, it is very much pertinent that the farmers had significant income by adopting this rice variety else the other variety were mostly damaged due to severe flood and water logging condition in the area. The villagers were very happy and have adopted this variety and have thanked Malda KVK.

(Drs. Rakesh Roy and Victor Sarkar Malda Krishi Vigyan Kendra, WB)



Using plastic mulches in bitter gourd production during kharif season in Coochbehar

One of the most popular cucurbitaceous vegetables growing in the Cooch Behar district of West Bengal is the bitter gourd. In North Bengal, bitter gourd seeds are typically sown by farmers from the last week of March to the third week of April. Heavy rains during the crop's growing season, particularly in May and June, had an impact on the yield. This prolonged period of



severe rain decreased the yield of this crop by causing soil erosion, fertilizer and nutrient leaching, disease pest infestation, and weed infestation. As a result, growers occasionally may not recoup their production costs. In order to solve this issue and observe how plastic mulching affects bitter gourd growth and yield during the kharif season, plastic mulching technology was employed. This crop is now a highly essential vegetable due to the continual rise in diabetes cases among humans. The farmers of NICRA village were adopted the technology and Cooch Behar KVK supported them with seeds and mulching materials. For this technology the farmers were prepared

seedling in another raised bed. In the main field, the raised hip were prepared at a distance of 1 meter. After mixing the manures and the fertilizers with soil covered the hip with transparent plastic (30 micron thickness one side black and another side silver colour). After that thirty days old seedlings of bitter gourd (var. Mahyco MBTH 101) were transplanted in the raised hip. About 2 seedlings were transplanted in each hip. The plastic mulched crop of bitter gourd was not only advanced by 15 days over the control (non-mulched crop) but 55.0 percent yield increase was also recorded in the plastic mulched crop. The total fruit yield of 133.0 q/ha was obtained from the plastic mulched crop as compared to the control (non-mulched) crop which produced only 86.0 q/ha fruit yield in bitter gourd. The costbenefit ratio of bitter gourd production under plastic mulched crop was worked out as 1:2.74 with a net profit of Rs. 134075/- per hectare, whereas the costbenefit ratio under non-mulched crop was 1:1.46 along with a net profit of only Rs. 39500/- per hectare.

Therefore, this technology is highly suitable and economical for growing the crop of bitter gourd for taking high yield and high profit of the produce. Hand weeding was done only without mulch once at 25 days after planting. All the plots were uniformly irrigated as and when required based on crop

growth. Recommended plant protection measures were adopted as and when needed. The bitter gourd fruits were harvested in 4-5 pickings. Harvesting started after 45 days after planting. The vine length, number of leaves per plant, number of fruits per plant, fruit length, fruit weight and fruit yields were better than non-mulched.

The application of black polyethylene mulch in the cultivation of bitter gourds served to reduce nutrient losses, control weed incidence, and enhance soil hydrothermal cycles. Additionally, polyethylene mulches effectively buffer soil pH and exchangeable Mg and Ca as compared to unprotected soil. The use of black polyethylene mulch in vegetable production has been reported to control the weed incidence, reduces nutrient losses and improves the hydrothermal regimes of soil. Polyethylene mulches also buffer soil pH and exchangeable Mg and Ca more efficiently than the uncovered soil. The use of black polyethylene mulch in vegetable production has been reported to control the weed incidence, reduces nutrient losses and improves the hydrothermal regimes of soil. Polyethylene mulches also buffer soil pH and exchangeable Mg and Ca more efficiently than the uncovered soil.

> (Drs. Bikas Roy and Samima Sultana Coochbehar Krishi Vigyan Kendra, WB)

Improving the productivity of Tsunami affected wastelands through water harvesting structures in Port Blair

The farmers of Port Mout, Gopal Nagar, Lalpahar and Creekabad are affected by Tsunami and larger areas of these farmers along the coastline are submerged with ingress brackish sea water. This makes the land unsuitable



for crop cultivation. After 18 years of passing of Tsunami and involvement of NICRA project, the salinity of these areas are reduced and with various land reclamation interventions, a good amount of these wastelands are now used to store freshwater. The runoffs from the hilly land are allowed to store in the ponds constructed along the coast. These stored fresh water acts as a barrier for the brackish water for entering to the land mass. With continuous rainfall over the inundated



area, leaching occurs which helps in reduction of the salinity. During the year 2021-22, water harvesting structures in the form of fish culture ponds (2 nos.) of each size 33m X 20m X 2m, 15m X 7m X 2.5m respectively, fish fingerling



rearing nursery pond (1 no.) of size 10m X 5m X 1m and embankment raising of

existing pond (1 no.) for a length of 84m have been completed in the NICRA

adopted villages.

Pest and disease management through application of bio-control agents in Port Blair

Climate change is quickly altering the dynamics of crop disease and pest invasion. Managing pests and diseases has remain a major problem and islands' lack of plant protection chemicals is also a major concern. Crops like brinjal, chilli, okra, and cucurbitaceous vegetables (Pumpkin, bitter gourd, ridge gourd,



snake gourd, Bottle gourd) are plagued by pests and diseases in NICRA-adopted villages of Gopal Nagar, Port Mout, Lalpahar and Baccharapahar villages. Trichodermaviride. Pseudomonas fluorescence, and pheromone traps have been provided by ICAR-KVK, Port Blair, under the NICRA Project for the effective management of disease viz., root rot, damping off, wilt, Sclerotinia rot, sheath blight, blossom end rot, red rot, leaf folder etc. Plant growth, root architecture, and nutrient absorption are all improved by bio-control agents in addition to disease control. Farmers



are used the bio-control agents for seed treatment, seed bio-priming, seedling dip, soil application and foliar spray. Fruit fly is one of the major insect pest in cucurbitaceous vegetables, demonstration on fruit fly trap using Methyl eugenol was conducted in the adopted villages under the project.

Demonstration of Vanaraja birds to improve the productivity under back yard production in Port Blair

Vanaraja is a dual-purpose chicken breed, it is well suited for backyard on natural, scavenged food with minimal supplementation. It produces eggs (110-



130 eggs per year) and meat (1.0 to 1.2 kilograms at age 6 months)based on rearing and feeding practices. Important features of this breed are multi-color



feather pattern, immunity to disease, perform with less nutrition, grow faster and produce more eggs, produce brown eggs like local hens. to improve the productivity of the farmers under climate condition, vanaraja breed was demonstrated among the 75 farmers.

(Dr.Y. Ramakrishna Port Blair Krishi Vigyan Kendra, A&N Islands)

Greengram cultivation as a catch crop to improve the productivity under post flood situation in Kendrapara

Occurrence of flood is a regular phenomenon in the village Gajapitha (NICRA adopted village) during Kharif season. There is little possibility to save the cultivated crop from the ill effects of water submergence. Under NICRA program, a short duration pulse, greengram, cultivation was demonstrated in the post flood situation to catch the season. The soil in the post flood area are rich in fertility due to deposition of alluvium. Harvesting this opportunity along with adjusting the cropping season due to failure of the previous crop during Kharif, a short duration pulse crop is a better option. The Green gram variety *virat* was sown in the field just after receding of the flood water. Proper seed treatment with both chemical and biofertilizer (Rhizobium) was done before sowing of the crop. Soil test based fertilizer



was applied. Two foliar spray of water soluble fertilizer NPK 18:18:18 @1.5% spray was given at preflowering and pod development stage in greengram. To control the YMV infestation and sucking pest spraying of thiomethoxam @ 0.3g/L was done. The greengram yield is 5.2q/ha. This successful intervention helps in utilizing the gap period between the two cropping season and improving the productivity per unit area and restoring the soil fertility by growing of pulse crop.

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

Enhancement of Yield of Greengram var. IPM -2-3 through application of Soluble Fertilizer NPK (19:19:19) in Kalahandi

The green gram (Vigna radiata L.) alternatively known as Mung bean is an important pulse crop after Bengal gram and red gram in India. It is an

annual herbaceous, short duration and drought tolerant crop and can grow well under irrigated and rain fed rice fallow areas. But the yield of greengram has not been improved at farmers filed due to improper nutrient management. Since greengram is cultivated in rainfed rice fallow areas, basal application



of fertilizer is not suitable. However foliar application of nutrition is one of the important methods as the spray of micronutrients and fertilizers facilitate easy and quick utilization of nutrients. Foliar application of soluble fertilizer NPK (19:19:19) @ 2% in greengram



variety IPM-2-3 was demonstrated in 10 ha of rainfed medium land at Village-Indramal and Khairbadi, Block- Narla, Dist- Kalahandi under NICRA Project

during 2021-22. Soluble fertilizer NPK (19:19:19) @ 2% was sprayed twice in greengram spray at the time of flower initiation and 2nd spray was done after 15 days of first spray. Greengram seeds were sown on first week of December, 2021. The geo-coordinate of demonstration site was 20.028144° N latitude and 83.346613° E longitude (Village- Indramal); 19.985812° N latitude and 83.271971° E longitude (Village- Khairabadi) with an average altitude of 180 m above mean sea level. The annual rainfall of the demonstration site was 1041 mm. The soils of the experimental sites were neutral (pH 6.23 and 7.32), sandy loam texture with medium organic carbon content (0.64 and 0.47%), medium in available



nitrogen (N) (316.8 kg/ha and 266.2 kg/ha), low in available phosphorus (P_2O_5) (35.5 kg/ha and 44.88 kg/ha) and low in available potassium (K_2O) (28.6 kg ha-1 and 30.76 kg/ha) respectively. The harvesting of green gram was done last week of February, 2022. The application of soluble fertilizer significantly improves the yield green gram var. IPM-2-3. The yield attributes and economics of the green gram was summarized below.

Intervention		No. of pods/plant	No. of seeds /plant	Yield (q/ha)	Increase in yield over farmers practice (%)	Net returns (Rs./ha)	B:C Ratio
Demonstration	Foliar application of NPK (19:19:19) @2 % at flower initiation stage and 15 days after 1st spray along with N:P:K (20:40:20)	17.43	7.71	8.70	22.54	37100	2.71
Farmers practice	Application of DAP @ 20 kgha-1	12.14	4.86	7.10	1/4/5	28200	2.31

(Drs.A. Panda & H. H. Malik Kalahandi Krishi Vigyan Kendra, Odisha)

Perennial fodder integration with dairy farming for augmenting income in Ganjam I

Dairy farming has been the backbone of livestock farmers in the NICRA adapted villages of the Ganjam district. With the advent of technologies and artificial insemination (AI), population of CB cattle has increased by many folds in the area. With the increase in number of CB cattle and milk production the requirement for feed fodder has also increased exponentially. Increased in



the price of commercial concentrate feed the dairy farming has faced a road block in increasing profit margin for farmers. Feeding of concentrate during lean periods and dry period has been a non-profitable practice for dairy farmers. Moreover dependence on concentrate increased the cost of production in dairy farming.

By intervention of KVK perennial fodder hybrid napier (var. – CO4) was introduced in the operational villages – Chikili, Chopra, Lepa, Nada involving 16 dairy farmers. Root slips were provided from NICRA schemes and further linkage was made with Animal Resources Dept for fodder production activities in the said villages. With the

increased in production and feeding of perennial fodder, farmers has reduced the feed cost and cost of production by 25%. Milk production was improved by 10.4% (2210 to 2440 L/annum) with an economic gain of 53% (Rs. 30300 to 46200/-). Perennial fodder has ensured the availability of nutritional requirement to the dairy animals round the year and during the lean periods. Fodder bank was also established at the farmer's field and neighboring dairy farmers are now interested for adapting the fodder cultivation for increasing their income from dairy farming.

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

Demonstration of Stress tolerant rice variety Swarna Shreya in Dhenkanal

Farmers of the NICRA village Arachua cultivate rice as their main crop during kharif season from time immemorial.

Due to drought like situation happening as a recurring event in the village, the farmers were suffering due to huge crop loss. As a solution to their problem, stress tolerant rice variety *Swarna Shreya* has been introduced in the village with



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a demonstration of 20 ha area involving more than 100 farmers. As critical



input of the demonstration, 20q of rice foundation seed of var. Swarna Shreya has been provided to the farmers with support from NICRA project. farmers have prepared their land and gone for transplanting in most cases with direct seeding in few cases. As of now, the crop condition is good and the farmers expect to have a good harvest.

Cultivation of Kharif vegetables with irrigation from Farm Ponds in Dhenkanal

Eight farmers of the NICRA village Arachua have constructed one farm pond each in their farm land with support from the project during March



2022. They have started growing vegetables like cowpea, brinjal, bitter gourd and okra just before the onset of monsoon. During the initial crop period they used their farm ponds for



providing irrigation to their crops. After that monsoon came and they are not using their farm pond any more right now. There is a bumper crop this time with a crop coverage of more than 10 acres. Some other farmers whose land is close to farm ponds have also joined them and they have taken irrigation water from these farm ponds. After this crop becomes over, the farmers have

made of their mind to go for vegetable farming during winter season also as second crop.



Hopefully, the area under vegetable crops will increase and so also the cropping intensity with impacting more income to the lives of the farmers.

(Drs. Bimalendu Mohanty and Dibya S Kar Dhenkanal Krishi Vigyan Kendra, Odisha)

Use of Hermetic storage bags for black gram seeds in Bhadrak

Pulses like green gram and black gram are important pulse crops in irrigated medium and low lands of NICRA village Fatepur of KVK, Bhadrak. Seed and grains are damaged very fast during storage due to infestation of stored grain pests and loss of seed viability in



when stored by farmers in gunny bags. Looking at this prioritized issue of the farmers, a demonstration on safe storage of pulse seeds using hermetic storage



bags was conducted during 2021-22 involving 50 beneficiaries from among the blackgram growers. Hermetic bags as used are of 50kg capacity each costing Rs.60. It is made up of high strength poly ethylene with barrier layer in which grain/seed is stored. This hermetic poly bag is put inside another gunny/plastic storage bag and stored for future use. The outside air and moisture cannot enter inside the bag thereby saves the seeds from being losing viability. A method

demonstration was conducted to learn them the procedure of packaging the seeds in bags. Farmers were encouraged seeing the results where the incidence



of stored grain pest were not observed in hermitic bags against gunny bag in which incidence was 12%. Feedback of farmers as recorded is, "the hermetic bags are very useful for long term storing of seeds/grains for their future use without being damaged".

Practice of IPM in summer rice in Bhadrak

Summer rice is one of important summer crops of the NICRA village Fatepur of KVK, Bhadrak. Among

the problems of this crop yellow stem borer has been the most serious biotic stress causing significant yield losses. Farmers rely solely on use of insecticides when pest is seen in crop. Use of insecticides of higher



doses as practised by farmers leads to development of resistance in target pests to the pesticides. Therefore, a demonstration on Integrated Pest



management module for managing yellow stem borer in summer rice was conducted involving 10 farmers. The IPM module comprised of installation of pheromone trap, use of Bt, neem oil, Trichocards as organic components and chlorantraniliprole 0.4 G and Lambda cyhalothrin as chemical components. Farmers' were demonstrated about the method of installation of pheromone trap, placement of lure in it, fixation of tricho cards in rice plants, preparation of spray solutions of organic and chemical products etc. in this demonstration. It was observed that, the incidence of dead heart caused by yellow stem borer was reduced by 50%



due to IPM module over the farmers practice. Reduction in damage % led to increased grain yield by 6.8 q/ha and additional net income of Rs 8,300/ha

(Drs. Aurovinda Das and Jyotshnarani Moharana Bhadrak Krishi Vigyan Kendra, Odisha)

Cultivation of Dalley chilli under poly-muching condition in Kalimpong

Dalley chilli is one of the most important commercial cash crop in Darjeeling and Kalimpong hills. It is one of the hottest chilli due to its pungency (100,000 to 350 000 SHU) and is generally used as spices and making different value added products such as pickle, paste, powder and dry chilli. The farmers grow this crop in a traditional method during middle



of March to first week of July which is labour intensive and time consuming. During the time of cultivation, prevailing of unfavorable condition such as high rainfall, water stagnant, excess moisture content in soil, weed growth etc.,



hampers the growth of the crop which fails to produce optimal yield. To cope up with this constrains, KVK, Kalimpong demonstrate the novel method of dalley chilli cultivation using poly-mulching technology at NICRA adopted village, Paiyong. Poly-mulching restrains leaching out soil nutrients thereby enhance the nutrients status of soil, suppress excess weed growth and control the erosion losses. It also affects plant roots, typically stimulating root development and increasing root exudation. Training was given to raised the beds at a height of 18-20 cm with recommended dose of fertilizers (RDF) and poly-mulch sheet was set up with accurate manner. Pit - hole was made with proper spacing of planting distance and seedlings were transplanted during May. During the investigation, it was found that polymulching in *Dalley chilli* recorded higher yield (20.58 q/ha) with benefit cost ratio (BCR) 4.46 as compared to the open



field cultivation (14.27 q/ha). Thus, Polymulching in *Dalley chilli* perhaps a boon for enhancing production and generating maximum returns to the farmers.

(Drs. Mendel W Moktan and Pranab Barma Kalimpong Krishi Vigyan Kendra, WB)

Practices of INM and IPM in Greengram in Jagatsinghpur

Greengram is an important pulse crop in Odisha. It is cultivated in 47000 ha area in rabi season at Jagatsinghpur district after rice. However, the productivity is very low (4.15 q/ ha). The major problems for low productivity are YMV susceptible, existing low yielding, sucking pest, pod borers and improper nutrient

management. To mitigate these problems KVK Jagatsinghpur had conducted a demonstration programme on short duration greengram var. IPM 02-14 in 20 ha. in "National Innovations on Climate Resilient Agriculture cluster village Achyutadaspur (NICRA-TDC) during rabi'2021-22. Earlier farmers

are cultivating YMV susceptible variety without pest and nutrient management. After intervention of KVK Jagatsinghpur farmers were trained on seed treatment with Rhizobium culture @ 20g/kg of seed 3-4 hour before sowing. Foliar spraying of water soluble fertilizer-NPK (19:19:19) @ 2% along with installation



of yellow sticky traps @ 50 traps/ha and Acetamiprid @150g/ha for sucking pest and profenophos + cypermethrin



@ 1.0 L/ha for pod borer infestation were applied at 25 and 40 days after sowing. By adopting the technologies in greengram variety IPM 02-14 there was less YMV incidence as compared to local variety and also the yield increased from 5.76 q/ha. to 6.88 q/ha (19.52%). Farmers were satisfied with this variety and technologies intervened by KVK Jagatsinghpur. Nearby farmers follow up the technologies with YMV tolerant



variety (IPM 02-14) from NICRA villages.

(Drs. Biswa Ranjan Pattanaik and Pradipta Majhi Jagatsinghpur Krishi Vigyan Kendra, Odisha)

New Initiatives undertaken to address climatic aberration in agriculture and allied sectors in Keonjhar

Denua village of Patna Block was selected taking into consideration as the village is badly affected due to climate change i.e., uneven and erratic rainfall pattern which portray the prevalent farming situation of the district. Various demonstrations



have been conducted keeping the needs of the farmers and farming situation. Demonstration of in-situ moisture conservation technology like mulching and stacking in tomato to mitigate the water scarcity and renovation of Farm pond for water harvesting and recycling



for supplemental irrigation, low cost night shelter for poultry has been demonstrated to improve backyard poultry farming and safeguard of the birds from predatory attacks and different climatic conditions during night time which was widely accepted



by the farmers. Under this programme demonstration on Improved backyard poultry breed *Kadaknath* and improved duckling breed White *Peckin* has been



carried out for livelihood support to the SHGs. For easy accessibility of the farm implements and machineries to the farmers of the village, a custom hiring centre has been established under this programme.

(Drs. Sukanta Kumar Sahoo and Deepak Hembram Keonjhar Krishi Vigyan Kendra, Odisha)

Mushroom farming: Combating climate change in Puri

In the financial year 2021-22, NICRA-TDC project launched in Puri district. KVK, Puri is implementing the project in village Jatipura of block- Puri sadar. The village is prone to flood. As per the rainfall data of Puri district, mean annual rainfall of Jatipur village is recorded as 1541 mm. Owing to heavy rainfall during Kharif i.e. from June-July to December - January, whole cultivated area of Jatipur village is found submerged in water. During these seven months, poor villagers can't grow any crop or vegetables on muddy soil with high water table condition. So, the income status of farmers in that village as per the survey is very poor.

KVK is now headed towards the livelihood development in Jatipur village through demonstration of scientific paddy straw mushroom cultivation under shade net, which is one of the most beneficial farm enterprises with



low cost of cultivation and is relatively secured from climate change, since climate controlled environments largely protect mushroom from the vagaries



of rainfall. Mushroom as an income generating activity was totally new for the farmers of village. After successful technical guidance under NICRA Project, farmers enable themselves to get decent yield from mushroom in the month of March , 2022 when ambient temperature goes high i.e above 350C. The economics of mushroom cultivation is mentioned as follows.

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Along with Mushroom farming, poultry sector has also been given vital importance. Rearing of Kadaknath poultry birds and white pekin ducklings

are demonstrated in the village. Under Natural resource management, bund renovation work has been done to store water in Kharif season in order to take up fish farming in kharif and after kharif farmers can grow Rabi paddy in same land.

Table: Economics of mushroom farming under NICRA -TDC Project in 2021-22

Technology demonstrated		No. of Units	Prodn. (kg/ unit)	Gross cost (Rs/ unit)	Gross Return (Rs/ unit)	BCR
Name of Enterprise	Variety	10 (60 beds/	46	4500	8000	1.77
Mushroom	V. volvaceae	unit)				

(Drs. Sanjay Kumar Mohanty and Dipsika Paramjita Puri Krishi Vigyan Kendra, Odisha)

Demonstration of CRIJAF Sona plus, NINFET Sathi powder and Vizol Polyquat to overcome jute retting problem in rainfall scarcity and to improve fibre quality in Murshidabad

Jute is the most important agricultural cash crop in Murshidabad district, West Bengal covering 1, 01,800 Ha area. Farmers of the district are facing problem in scarcity of surface water due to nearly 60 % deficit in rainfall than normal rainfall. This



coupled with faulty retting procedure severely deteriorate jute fibre quality.



In this back drop Dhaanyaganga KVK introduced following technologies through training and demonstration in NICRA adopted village and other villages as well-

1. Jute retting with CRIJAF Sona and NINFET Sathi powder which helps in better retting of jute and hastens retting process; thus reducing retting time and defects in jute fibre.

- 2. Dipping the extracted fibre immediately after extraction from jute stick in 0.1% vizol polyquat solution for 1-2 minutes. This improves the colour of jute fibre.
- A combination of above two technologies improve jute fibre quality from Grade TD-4 / 5 to Grade TD-2/3 which increases sale price of jute fibre in the tune of Rs. 700.00 per quintal and as a result of which gross and net income of farmers increased by Rs. 21,000.00 and Rs, 16,500.00; respectively.

(Drs. Sujan Biswas and Uday Narayan Das Sargachi Krishi Vigyan Kendra, W B)

Pre-Kharif Campaign for effective implementation of NICRA-TDC Project at Purulia

The programme aimed at involving the entire village with the New initiatives after finalization of this village for NICRA-TDC programme and ensure their wholehearted participation.

As a part of the our Pre-kharif campaign we organise a Village level Exhibition where we arrange a farmers- scientist interaction on 16.05.2022, coinciding with the Most Popular Village level Fair at Siva Mandir Prangan to celebrate "Shiv Gajan", where we have highlighted



our possible technological interventions preparation, vermin-compost introduction and area expansion of drought tolerant and climate smart rice varieties, protected cultivation of vegetables, Azolla cultivation and its uses, Pheromone trap for pest control etc. and interacted with the farmers to solve their problem associated with farming. In this programme approx. 3500 villagers participated not from the entire village but also villagers adjoining and far off places and shared this platform as a problem solving mechanism. Leaflets on various location specific farm technologies have been distributed among 570 farmers and farm women.

Targeting 100 % seed treatment in Kharif Rice, we have organised a Massive



colourful Rally on 27.05.2022 involving about 300 farmers and farm women of Haramjanga Village "marching through the length and breadth of the village with Banners & Placards and shouting slogans highlighting the utilities and benefits of Seed treatment in production of Kharif Rice. After concluding the programme about 500 villagers assembled at the centre place of the village for a hands on training cum demonstration on 'Seed Treatment'.



After that we distributed the seed treating chemical among 110 members of women SHGs targeting near about 20 ha. land under seed treatment. After this programme we found that near about 95 ha land is covered by the



farmers under seed treatment and the campaign get a massive success.

As a part of the continuing programme we arrange an Animal Health Camp on 25.04.2022 for scientific management of existing population of cow, goat, sheep and poultry birds. In this programme we vaccinate the cow against FMD disease, goat for PPR disease and poultry birds for Ranikhet disease. Also we supply Deworming medicine and Mineral mixture for cow, goat, sheep and poultry birds as a precautionary measure for controlling worm and proper balance diet. In this campaign



we vaccinate 120 cows, 150 goat, 50 sheep and 550 poultry birds apart from suppling Deworming medicine and mineral mixture for 250 animals.

(Drs. Manas Bhattacharjya and Sanjib Bhattacharya Kalyan Krishi Vigyan Kendra, Purulia, WB)

Floating Seedbed - A Climate Resilient technical initiative against shortfall of rain in North 24 Parganas

The recent shortfall of rainfall is a major concern for West Bengal as well as for the NICRA village of North 24 Parganans KVK. It is reported by IMD that 51 % rainfall is deficit during the month of July-August causing delayed seedbed preparation of rice as well as rice cultivation in this deltaic land is consummately resilient. Delayed



cultivation would lead to a series of disruptions in terms of yields and food security. Especially, its rural people have hardly bowed down to the onslaughts of climate aberration. As part of their resilience, they have faced disasters heroically and resumed their lives anew by piecing together whatever fallout they were left with. In the NICRA village, Samsernagar of Hingalgunj Block, 90% area under low land, saline prone, flood prone and single cropped. Rice is grown only in Kahrif season. Considering the fact of less rain fall during the rice seed bed preparation on time, Krishi Vigyan Kendra has introduced floating seed bed nursery for rice which is installed

in fresh water canal and rainwater harvesting structure at NICRA village.

The making of floating seedbeds follows a simple formula. The Structure of the floating seedbed is made up of bamboo for side wall. Thermocol and rice straw bunch are used under the bamboo structure for floating purposes. Transparent perforated (10%) polythene is used for seed bed substratum. For bed preparation, vermicomposting and soil has been used with a ratio of 3:1.5 and maintained the seed bed 6 inch height. The economic and resilient minimum model size of the structure is Length 9 ft x width 6 ft which will be produced seedling for 0.325 ha area rice cultivation. The rice



seed is required 500 gm and sprinkled rice seeds on the floating patches of 'croplands'. For management purpose only N:P:K (20:20:20) has been sprayed (200gm in 10 lit water) and Urea 100 gm after 8 days. In this floating seedbed the seedling has grown in 12 days duration. The seedlings grown from the seeds are then shifted to the



main rice fields for transplantation.



The timely and full use floating of seedbeds shortfall of rain is one of these instances. As farmers in many parts of the village are now eagerly

interested to turn into the floating seedbed technique during shortfall of rain as well small-scale floods, it appeared before them as the only remedy. While preparing makeshift floating seedbeds, the intrepid farmers are confident that their artificially grown rice seedlings will bail them out this time too. This is how a large number of rice growers are able to escape the dreaded crop loss about to strike them.

(Drs. Babulal Tudu and Anindya Nayak North 24 Parganas Krishi Vigyan Kendra, WB)





News Coverage













Dr. V.K. Singh, Director, ICAR-Central Research Institute for Dryland Agriculture, Hyderabad emphasized on the progress and documentation as per the farming system typology and component basis at the household level. Dr. S.K. Roy, Director, ICAR-ATARI, Kolkata stated that the intervention under the NICRA should read vulnerability with the existing cropping practices and preventing the vulnerability through NICRA intervention is to be a priority. Dr. F.H. Rahman, Principal Scientist-cum-NICRA Nodal Officer underlined the salient achievements carried out by the NICRA-KVKs during the last 10 Years. The interventions like mulching, soil moisture conservation and custom hiring centre, etc., that are making significant contributions in the resilience against the climate change were also highlighted by Dr. Rehman.

(Source: ICAR-Agricultural Technology Application Research Institute, Kolkata)

স্বাস্থ্য প্রশিক্ষণ শিবির

পৃথিবাড়ি, ২৩ ছম: কোবেরার কৃষিবিজ্ঞান কেন্তের উল্লোগে ও ছমি দক্তি কার্মার্গ প্রোডিউসার কিল্পানি দিটিটেডের বাবস্থাপনাম বৃহপাতিবার কোচবিহার ২ ব্লকের পাতসাখাওয়া প্রাম পঞ্চায়েতের ছাট সিধিমারি প্রামে ধরানিশন্তর

স্বাস্থ্যবন্ধার উপর একদিনের প্রশিক্ষণ শিবির হল। কোচবিধ্যর কৃমিবিজ্ঞান কেন্দ্রের প্রাণীবিজ্ঞানী ওঃ রাহুল দের দুখোপাযায় এবং পশু চিকিৎসব অঞ্চণাভ সাহা প্রশিক্ষণ দেন। এমি-দুশোর বেশি গোঞ্চ ও আড়াইশে ছাগলকে ভ্যাকসিন দেওয়া হয়েছে।

Publications during January to June, 2022

Research Papers

- Piu Basak, Dibyendu Sarkar, Biswapati Mandal, Sudipa Mal, Samrat Adhikary, Ritesh Kundu, Joy Dutta, Shovik Deb & F. H. Rahman (2022). Determination of Critical Concentrations of Boron in Soils and Plants of Cauliflower (Brassica oleracea var. botrytis L.) Using a Polynomial Equation. Communications in Soil Science and Plant Analysis.
- 2. B. K. Nanda, Y. Ramakrishna, R. Jay Kumaravardan, R. Bhattacharya and F. H. Rahman (2022). Adaptation potential of dyke vegetable cultivation to overcome the impact of climate change on Island Agriculture. Indian Agriculturist, 64 (1 & 2): 63-66
- 3. Ganesh Das and Sarthak Chowdhury

- (2022). E-resource Exposure of the Farm Women for Agricultural Information Network Output Development : A Study Indian Research Journal of Extension Education 22(2):109-113
- 4. Ganesh Das and Sarthak Chowdhury (2022). Information Seeking Behavior of The Farm Women for Agricultural information Network Output Development Journal of Extension Systems 38(1):11-15

Book Chapter

 S. Ghosh, M. Bhattacharya and F. H. Rahman (2022). Socioeconomic Study of Prospective of Probiotics, Prebiotics, and Synbiotics for Sustainable Development of Aquaculture in Indian Sundarbans. # The Book

- Chapter published by *Springer Nature Singapore* Pte Ltd. 2022. K. K. Behera et al. (eds.), Prebiotics, Probiotics and Nutraceuticals, https://doi.org/10.1007/978-981-16-8990-1_13
- 2. L. Dash, S. K. Sahoo, F. H. Rahman, S. Mohanty, P. K. Nanda, D. P. Kundu, S. N. Mishra and S. K. Dash (2022). Kendrapada Sheep: An Insight into Productivity and Genetic Potential of this Prolific Breed. Book Chapter published by *Springer Nature Singapore* Pte Ltd. 2022. pp. 1-14
- Ganesh Das (2022). Projective Techniques in Social Science. Pluralistic Approaches in Sustainable Agriculture: Past, Present and Future. Publisher: New Delhi Publishers



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4. Ganesh Das, Subrata Poddar, Bikash Roy, Prabhat Kumar Pal (2022). Agricultural e-commerce: A Case Study on Agricultural Start-ups in West Bengal. Advances in Agricultural Marketing & Value Chain Management. Publisher: Satish Serial Publishing House

Technical Bulletins

1. F. H. Rahman, R. Bhattacharya and S. Nandi (2022). NICRA Newsletter: Towards Climate Smart Agriculture, Pub. by ICAR-ATARI Kolkata, Vol. VIII, No.1, pp: 1-8.

presented in national/ Paper international seminars etc.

- 1. F. H. Rahman (2022) Climate resilient agricultural practices sustainable livelihood in Eastern India. Lead lecture delivered In 6th International Conference on 'Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development' (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, during June 11-13, 2022.
- 2. R. Bhattacharya, B. K. Nanda, Ramakrishna, R. Kumaravardan, S. Ghosh, S. and F. H. Rahman Murmu Adaptation (2022).potential

- of dyke vegetable cultivation to overcome the impact of climate change on island agriculture. Paper presented in 9th Annual Convention and A Webinar on "Managing Agro-chemicals for Crop and Environmental Health" of Society for fertilizers & Environment held on February 25 & 26, 2022
- 3. P. Mishra, A. Phonglosa, F. H. Rahman, N. Mahapatra, P.K. Sahoo and S. N. Mishra (2022). Quality vegetable planting material production under heavy rainfall Kedrapara district of Odisha. Paper presented in 9th Annual Convention and A Webinar on "Managing Agro-chemicals for Crop and Environmental Health" of Society for fertilizers & Environment held on February 25 & 26, 2022
- 4. P. K. Garain, C. K. Mondal, F. H. Rahman and S. Jana (2022). Climate resilient farming models for different Farming System **Typologies** Sundarbans. in Paper presented in 9th Annual Convention and A Webinar on "Managing Agro-chemicals for Crop and Environmental Health" of Society for fertilizers

- Environment held on February 25 & 26, 2022
- 5. T. R. Sahoo, H K Sahoo, F. H. Rahman, M.R. Behera, R.K. Mohapatra and S. N. Mishra (2022). Performance of flood tolerant rice variety CR -1009 sub 1 in Flood Prone Area of Coastal Odisha. Paper presented 9th Annual Convention and A Webinar on "Managing Agro-chemicals for Crop and Environmental Health" of Society for fertilizers & Environment held on February 25 & 26, 2022
- 6. Ganesh Das and Sarthak Chowdhury (2022). A study on agricultural information preservation by the farm women of North Bengal 6 International Conference On Current Issues in Agricultural, Biological & Applied Sciences for Sustainable Development (CIABASSD-2022)At: Kalimpong Science Centre, Deolo, Kalimpong, W.B.
- 7. S. Sultana, B. Roy, S. Saha, G. Das, S. Sarkar, S. Hembram, F. H. Rahman and B. Ganguly (2022). Assessment of Optimum Planting Material Size for Ginger under Organic Mulch Condition 9th Annual and National Webinar of Society for fertilizer and Environment At: Kolkata, West Bengal, India

Awards/ Recognitions

F. H. Rahman was Awarded Fellow of Himalayan Scientific Society for Fundamental and Agricultural Research 2022 during 6th International Conference on 'Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development' (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, during June 11-13, 2022.





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