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Newsletter

TOWARDS CLIMATE RESILIENT AGRICULTURE

NICRA NEWS

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Introduction

In many regions of the world, crop yields are levelling off, ocean health is deteriorating, and natural resources including soils, water, and biodiversity are being drastically reduced. Production is having trouble keeping up with these changes.

Agriculture is particularly vulnerable to climate change, which exacerbates the issue. Currently, the negative impacts of climate change include rising temperatures, more frequent extreme weather events, changing agro-ecosystem boundaries, invasive crops and pests, and weather variability. On farms, climate change is lowering agricultural yields, animal output, and the nutritional value of important grains. Adaptation would require large investments to maintain current yields and boost production and food quality to meet demand.

The National Initiative on Climate Resilient Agriculture (NICRA), a Flagship Network Project of the Indian Council of Agricultural Research, was introduced in February 2011 during the XI Plan and is now known as "National Innovations in Climate Resilient Agriculture" (NICRA) during the XII Plan. Given that climate change is an ongoing problem, more attention must be paid to this crucial subject going forward. In light of this, a single strategy has been reinforced, and attempts have been made to expand on the initiative implemented during the XII five-year plan. Thus National Innovations in Climate Resilient Agriculture' (NICRA) has been continuing with these objectives 1. To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies, 2. To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks, 3. To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application and 4.To draw policy guidelines for wider scale adoption of resilience-enhancing technologies and options.

NICRA Technology Demonstration Component (TDC) provides an excellent chance to collaborate with farmers and implement such technology in the field to handle the current climate variability. The adoption of these reliable technologies will increase as a result. Through KVKs and seven ICAR core research institutes, village clusters are conducting on-farm participatory demonstrations for climate resilience in 151 climatically vulnerable locations around the country. Documenting and expanding our understanding of how technologies work in diverse farming systems and agro-ecologies has been the main goal. This makes determining what constitutes climate resilience in different biophysical and socioeconomic contexts easier. Village-level contingency crop plans and strategies were developed and implemented by NICRA KVKs.

The NICRA program's assessment of the climate vulnerability of 17 KVK districts in Odisha (9), West Bengal (7), and the Union Territory of A & N Islands (1) revealed clear needs for technological assistance, human resource development, and general farming community empowerment to help them deal with climate vulnerabilities such as droughts, unpredictable rainfall, heat waves, floods, and cyclonic storms. As a result, a plan of action was created for its execution, which involved implementing technological interventions to start crop production, resource conservation, raising livestock and fish, harvesting water, and other activities in the KVK districts' most vulnerable communities.

"Climate change is a terrible problem, and it absolutely needs to be solved. It deserves to be a huge priority." - Bill Gates

Performance of Stress tolerant rice var. *Swarna Shreya* cultivation in NICRA adopted village Odiapali of district Bolangir

A demonstration on Stress tolerant rice variety "*Swarna Shreya*" was conducted in Kharif 2023 at Odiapali Village, GP-Atgaon, District-Bolangir, Odisha under NICRA TDC Project. In Odiapali village climate vulnerabilities like delayed onset and quick withdrawal of monsoon, unseasonal rainfall, early and mid-

season drought are the major problems. Rice is the major crop in this village in

kharif season. Farmers in the village normally grow long duration local rice varieties (130-140 days), which regularly experience moisture stress and are prone to more disease and pest problem during various growth stages of the crop.

Due to water stress in the vegetative as well as reproductive stage, the yield of the rice gets drastically reduced for which farmers face problem and get low income. After intervention of NICRA TDC Project by KVK, Bolangir under climate resilient crop management systems, stress tolerant rice variety, *Swarna Shreya*, having the characteristics of 120-125 days duration, semi dwarf (105-110 cm), capacity to withstand

drought and tolerance to many diseases and insects, was provided to the farmers and the farmers got 19.3% higher yield than farmer practice.

Technology demonstrated	Yield(q/ha)		% increase	Economics of demonstration(Rs./ha)		
	Demo	Local		Gross Cost	Net Return	B:C Ratio
Stress tolerant rice var. *Swarna shreya*	40.8	34.2	19.3%	45600	41712	1.91

(Dr. S. Satapathy, Dr. B. Mohanta and Mr. Jyotiprakas Sahoo
Bolangir Krishi Vigyan Kendra, Odisha
Dr. P. J. Mishra and Dr. A. Phonglosha, OUAT, Odisha)

Swarna Sub 1 - A breakthrough in waterlogging-tolerant rice varieties for the low lands of Jagatatsinghpur

Jagatsinghpur District, known for its extensive low-lying areas, faces recurrent issues of waterlogging, particularly during the Kharif season. These conditions severely hamper rice cultivation, a staple crop for the

region's agrarian economy. Recognizing the urgent need for climate-resilient solutions, the NICRA project initiated trials of *Swarna Sub 1* in collaboration with local farmers and research institutions.

In a significant development towards climate-resilient agriculture, the National Innovations in Climate Resilient Agriculture (NICRA) project under KVK Jagatsinghpur has reported groundbreaking results from trials of the waterlogging-tolerant rice variety, *Swarna Sub 1*. *Swarna Sub 1* was developed by the breeders at the International Rice Research Institute (IRRI) in 2009. It is typically a medium-duration rice variety, similar to its parent *Swarna*. It usually matures in around 120 to 130 days after transplanting. The main special characteristic of *Swarna Sub 1* is its ability to withstand complete submergence for up to two weeks. This trait is crucial in regions prone to flash floods, where rice fields can get submerged temporarily. This trial was conducted in the village of Achyutdaspur, situated in the waterlogged terrains of Erasama Block,

Jagatsinghpur District, Odisha,. The result showcased the potential of *Swarna Sub 1* in combating waterlogging challenges during the Kharif season.

The trials conducted in 6 ha area of village *Achyutdaspur* and yielded promising outcomes under waterlogged conditions. Compared to traditional rice varieties, *Swarna Sub 1* has exhibited a significant yield advantage. While the traditional variety yields approximately 38.6 quintals per hectare, *Swarna Sub 1* has delivered an impressive yield of around 46.7 quintals per hectare. This translates to a remarkable yield advantage of approximately 18.4% above the traditional variety.

Technology demonstrated	NICRA Farmer		Non-NICRA Farmer		Economics of demonstration (Rs./ha)	
	Yield (q/ha)	Net Return (Rs/ha)	Yield (q/ha)	Net Return (Rs/ha)	% increase in yield	B:CRatio
Water logging tolerant variety *Swarna Sub 1*	45.7	42200	38.6	32500	18.4	2.1

The success of *Swarna Sub 1* in waterlogged terrains holds immense implications for farmers in Jagatsinghpur District and regions facing similar challenges. By adopting Swarna Sub 1, farmers can mitigate the adverse effects of waterlogging on rice cultivation, thereby ensuring food security and livelihood sustainability. Additionally, the increased yield potential of *Swarna Sub 1* offers economic benefits to farmers, enhancing their resilience to climate-related risks.

Building on these encouraging results, the NICRA project aims to scale up the adoption of *Swarna Sub 1* among other farmers in waterlogged areas of Jagatsinghpur District and beyond.

The trials of *Swarna Sub 1* in Achyutdaspur mark a significant milestone in the quest for climate-resilient agriculture. By harnessing the potential of innovative technologies like Swarna Sub 1, the NICRA project reaffirms its commitment to supporting

farmers in adapting to climate change and building a sustainable future for agriculture in Odisha.

Coastal saline soil management: A holistic approach for sustainable agriculture at Jagatsinghpur

The coastal district Jagatsinghpur is grappling with a pressing issue of increasing soil salinity, which has threatened the foundation of coastal agricultural and livelihoods. In blocks of Jagatsinghpur district like *Kujanga*, *Balikuda*, and *Erasama*, the encroachment of saline water has emerged as a multifaceted challenge, driven by various factors including saline groundwater, tidal flooding, and the discharge of saline effluents from prawn ponds. This intrusion of sea water into the inland aquifer system has not only compromised drinking water sources but also endangered the agricultural productivity, posing a grave threat to food security in the region.

The root causes of soil salinity are deeply entrenched, aggravating the difficulty of

coastal communities. Low fresh water infiltration, coupled with tidal inundation of low-lying areas, has led to the ingress

of sea water into the inland freshwater aquifer system. Moreover, the absence of deep tillage practices has exacerbated the situation, resulting in the formation of a hard pan layer that impedes the percolation of fresh water and reduces natural leaching and groundwater recharge. This vicious cycle of salinization has disrupted the traditional rice-green gram cropping system, pushing farmers towards the brink of economic distress.

In response to the growing problem of soil salinity in coastal blocks of the district, the National Innovations in Climate Resilient Agriculture (NICRA) Project, spearheaded by the Krishi Vigyan Kendra (KVK) in Jagatsinghpur, has devised a comprehensive strategy to combat soil salinity and restore agricultural viability. A package of interventions has been introduced to address the salinity challenge holistically like green manuring with Dhanicha, introduction of salt-tolerant rice varieties, rainwater garvesting and farm pond construction and adoption of sprinkler irrigation for greengram cultivation in the NICRA-TDC project

adopted Village *Achyutdaspur,* situated in *Erasama* Block of Jagatsinghpur district. The average electrical conductivity in the saline affected fields is around 2.3 dS/m and groundwater is around 3.8 dS/m.

Green manuring with Dhanicha: cultivation of Dhanicha (*Sesbania*

rostrata) as a green manure crop before rice cultivation serves a dual purpose. Not only does it enrich the soil with organic matter, but its deep taproot system also helps to break the hard pan, facilitating the percolation of fresh rainwater and reducing soil salinity through leaching.

Introduction of salt-tolerant rice varieties: Varieties like *Luna Subarna*, *Luna Barihal*, and *Luna Ambiki*, renowned for their tolerance to saline conditions, have been introduced to mitigate the impact of soil

salinity on rice yields. These resilient varieties offer hope for sustaining rice production in the face of adversity.

Rainwater harvesting through on-farm pond: The construction of farm ponds serves as a vital water management tool, enabling rainwater harvesting during the monsoon and providing supplemental irrigation support during dry spells. This

not only mitigates moisture stress but also helps dilute soil salinity through controlled irrigation practices.

Adoption of sprinkler irrigation for green gram cultivation: In the cultivation of green gram, which is highly sensitive to soil salinity, the adoption of sprinkler irrigation helps ensure precise water application, minimizing the risk of salt accumulation in the root zone and safeguarding yield potential.

As the NICRA-TDC project unfolds its interventions in villages like *Achyutdaspur*, it offers a ray of hope amidst the looming shadow of soil salinity. By promoting sustainable agricultural practices and resilient crop varieties, coupled with efficient water management strategies, the project endeavours to usher in a new

era of resilience and prosperity for coastal communities.

(Dr. J. Sen and Dr. Dwarika Mohan Das Jagatsinghpur Krishi Vigyan Kendra, Odisha, Dr. P. J. Mishra and Dr. A. Phonglosa, OUAT, Odisha)

Reaping hope in flood prone lands: Flood-tolerant rice varieties (*Swarna Sub-1* & *CR-1009 Sub-1*) safeguarding kharif rice in flood affected situation of the Bhadrak district

Flooding is recurring challenge during the Kharif season in the NICRA adopted village Fatepur. The village Fatepur was experiencing less scope of Kharif rice

cultivation due to adverse effect of water submergence. Looking at this prioritized issue a demonstration on flood tolerant rice variety *CR-1009 Sub-1* and *Swarna Sub-1* using direct seeding was conducted

in Kharif 2023-24 involving 30 farmers. Farmers usually broadcasting rice variety such as *Swarna* which is not tolerant to flood. Unfavourable weather in July causes extensive flooding, which significantly affected the crops at the crucial tillering stage.

Normal varieties registered a setback due to flooding and leading to partial crop damage, whereas the demonstration plots showed promising results due to ability to resist the standing water and recurring flood. Number of hills/m^2, average no of tillers/hill and grain yield were higher under demonstration over the farmers practice. Farmers have expressed positive feedback and are hopeful about expanding their cultivation areas in the coming years by utilizing this technology.

Technology	No. of hills/m^2	Avg No. of effective tillers/ hill	Grain yield (q/ha)	Cost of cultivation (Rs./ha)	Net income (Rs./ha)
FP	15	18	22	24,300	16,400
Demo (*Swarna Sub-1*)	27	25	38.5	41,700	29,525
Demo (*CR 1009 Sub-1*)	29	28	41.8	41,900	35,430

Integrated Farming System: A livelihood support under climate change at Bhadrak

Sri Debendra Basantia, residing in the village Fatepur of Dhamnagar block have 10 acres of land. Occurrence of flood is a regular phenomenon in village Fatepur. During monsoon season the entire land remain submerged leaving him no other scope than growing low yielding traditional rice that is being broadcasted which also is drowned by flood. Before

implementation of NICRA project he was able earn hardly Rs. 1.21 lakhs per annum from farming.

After suitable scientific and technological intervention made through training

and demonstration under NICRA-TDC project, he has improved his farming practices by adopting different new technologies. He has an unutilized pond of 0.2 ha area. He renovated the pond and started fish production in that pond. Around the pond, he has developed an Integrated Farming System using

his land for different land uses such as horticulture production though land embankment development (vegetables, banana, papaya, elephant foot yam, yam, mango and coconut plantation and rest of land adjoining to that area he cultivated drill seeded direct seeded rice cultivation method using flood

tolerant rice variety *Swarna Sub-1* and *CR-1009 Sub-1* in kharif season, rice fallow management with black gram, ICM in sugarcane, other than this he has adopted mushroom cultivation with the straw available, backyard poultry with rainbow rooster bird and azolla production.

Enterprises	Before NICRA		After NICRA	
	Area (ha/No.)	Net income (Rs)	Area (ha/No.)	Net income (Rs)
Rice	1	11,500	2	53,050
Summer rice	0	0	3	79,525
Blackgram	1	25,000	1	33,800
Horticultural crops	0.2 (pond dyke)	50,000	0.3	110,000
Fish	0	0	0.2	70,000
Mushroom production	0	0	300 bed	10,200
Poultry rainbow rooster	0	0	20 bird	10,000
Sugarcane	1	24500	2	49,000
Sunflower	0	0	0.1	10,000
Green gram	0.2	10,000	0.2	16000
Total annual income		**1,21,000**		**4,41,575**

(Dr. S. Mohanty, Dr. J. Maharana & Miss. Bhanumati Dinda
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Performance of stress tolerant high yielding Cowpea variety (*Kashi Kanchan*) in drought prone village of Dhenkanal

A demonstration of "Stress-tolerant high yielding cowpea variety *(Kashi Kanchan)*" was held in Village Arachua, GP-

Mathatentulia, Block Gondia, District Dhenkanal, Odisha under the NICRA-TDC Project by KVK, Dhenkanal in the year 2023-24. Climate vulnerabilities such as early and mid-season droughts, high temperature, delayed onset and quick withdrawal of the monsoon, scanty and unseasonal rainfall with irregular distribution, dry spells, and cold waves are major issues contributing to crop failures. These challenges make farming difficult for the majority of villagers who rely on agriculture as their main

source of livelihood. Rice is the primary crop grown, followed by vegetables and livestock. The farmers in the village face numerous challenges due to insufficient rain and limited access to water resources.

After the intervention of the NICRA TDC Project under Krishi Vigyan Kendra (KVK) in Dhenkanal, a stress-tolerant and high yielding cowpea variety *Kashi Kanchan* (dwarf and bush type) was introduced as part of climate-resilient crop management systems. *Kashi Kanchan*, is compact in size reaching a height of 50-60 cm, exhibits photo-insensitivity, early flowering (40-45 DAS) and early maturing (50-55 DAS). It is resistant to golden mosaic virus and *Pseudocercospora cruenta*. The seeds of this variety were distributed to 30 no. of farmers and farm women of the village. *Kashi Kanchan* is well-suited for spring-summer and rainy seasons, making it an adaptable choice for the farmers looking to enhance their crop productivity and resilience to challenging environmental conditions.

Technology demonstrated	Yield (q/ha)		% increase	Economics of demonstration (Rs./ha)		
	Demo	Local		Cost	Net Return	B:C Ratio
Stress tolerant high yielding Cowpea variety *(Kashi Kanchan)*	147	110	34%	55,000	1,65,500	4.00

Deworming and Vaccination Camp at NICRA adopted village of Dhenkanal district

An animal health camp was organised on September 22, 2023, at Arachua village, GP-Mathatentulia, Block- Gondia of Dhenkanal district under the NICRA-TDC Project by KVK, Dhenkanal. Around

60 numbers of farmers, farm women, and rural youth actively participated in the program. The animals were examined

by Dr. Tusar Ranjan Sahoo (ADVO, DC), Dr. Roshni Bala Nayak (Scientist, Animal Science, KVK, Dhenkanal), and Dr. Subrat Martha (VS, Joranda). Among the 120 livestock examined, parasitic infestation

was the most widespread issue, followed by diarrhea, foot and mouth disease, and low milk yield in lactating dairy cattle.

The farmers were advised to routinely deworm and vaccinate their livestock, as well as feed them supplemental mineral vitamin mixture to improve their overall health. Dr. Roshni Bala Nayak emphasized on scientific livestock management techniques and the role of nutrients in enhancing production, and improving livestock reproductive health. Dr. Tusar Ranjan Sahoo spoke

about the schemes and facilities provided by the Government of Odisha. The Animal Health Camp was successfully conducted with the support of President Sri Dasarathi Sahoo and all members of VCRMC.

(Dr. Bimalendu Mohanty, Dr. Dibya S Kar and Ms. Soumyashree Swain

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Drought resistant rice var. *CR Dhan 801* cultivation improved the productivity and income generation in Kalahandi

Sri Gouranga Sahu was a marginal farmer of Narla block, Kalahandi district having low economic background and managed his family with lot difficulties. He was completely dependent upon agriculture for his daily expenses. Paddy is the main crop cultivated by him. In 2020, he decided to start vegetable farming in addition to cultivation of paddy as an enterprise to provide economic stability and sustainable livelihood for his family.

Sri Sahu embraced *CR Dhan 801*, a drought-resistant rice variety, as part of the NICRA Project, aimed at combating low rainfall and drought in his region. This variety is specifically developed to withstand climatic stresses such as low rainfall and drought. It is genetically enhanced to have higher drought tolerance, requiring less water for growth compared to traditional varieties. By adopting *CR Dhan 801*, he can ensure a more reliable yield even in adverse climatic conditions. The NICRA Project also include interventions for soil health management. Practices such as mulching, composting, and minimum tillage help improve soil structure and water retention capacity, further enhancing the resilience of crops to drought conditions. Sri Sahu and other farmers in the village also received training and capacity-building sessions on best agronomic practices for climate-smart agriculture. This includes knowledge sharing on crop management, pest and disease control, and post-harvest handling techniques tailored to the specific needs of the region and the selected rice variety. Overall, the adoption of *CR Dhan 801* and associated technical interventions not only addresses the immediate challenge of water scarcity but also promotes sustainable agriculture practices that build resilience to future climate uncertainties. By combining traditional knowledge with innovative solutions, Gouranga Sahu and other farmers in *Indramal* village can secure better livelihoods amidst changing environmental conditions.

Gouranga Sahu's involvement in the NICRA Project, particularly embracing the climate-smart rice variety CR *Dhan 801*, has resulted in notable technological advancements, elevating both his agricultural output and income. With the introduction of *CR Dhan 801*, renowned for its resilience to drought, Gouranga has managed to achieve heightened yields despite challenging weather conditions such as low rainfall and drought. Furthermore, practices like mulching, composting, and minimum tillage have bolstered soil health, promoting better moisture retention crucial during periods of diminished rainfall. Additionally, his active participation in training and capacity-building initiatives has furnished him with expertise in climate-smart farming techniques, empowering him to make well-informed decisions regarding crop management, pest control, and post-harvest handling, thus further amplifying productivity

and income from Rs. 85000 annually to Rs. 127300 from paddy. Collectively, these technological interventions highlight the efficacy of technology-driven strategies in tackling agricultural hurdles and enhancing the livelihoods of

farmers, particularly in regions grappling with climatic stress like low rainfall and drought.

Witnessing the profit gained from the crop other educated youth also tried to follow his footsteps. The farmers in that village and nearby area are supported with seeds of *CR Dhan 801* for further cultivation. Several training programme, field day and awareness have created a positive social impact in regards of acceptance of this variety for cultivation.

KVK Kalahandi plays a vital role in implementing interventions like the demonstration of climate-smart rice varieties such as *CR Dhan 801* under the NICRA Project. Key aspects of their involvement include identifying suitable interventions through research, disseminating technology and knowledge through training sessions and field demonstrations, providing technical support to farmers, monitoring progress and evaluating impact, and facilitating knowledge exchange and networking among stakeholders. Overall, KVK's engagement significantly contributes to enhancing agricultural productivity, resilience, and livelihoods in regions facing climatic stresses like low rainfall and drought, exemplified by their support to farmers like Sir Gouranga Sahu in *Indramal* village.

Sir Sahu's farm land is been visited by farmers of in and out of the district and

been renowned as technical expert in his village in terms of climate-smart paddy farming.

Only traditional rice varieties like- *Swarna, Pooja,* and *Lalat* were grown without any scientific care and management. As these varieties requires more amount of water, so crop establishment , growth and yield is comparatively low in case of climate-stress area. The drought tolerant rice variety *CR Dhan 801* resulted in increased production from same land mass. Proper care and management was taken into practice.

Farmers were not aware about such climate-smart paddy varieties. They were practicing the cultivation of traditional paddy varieties. Farmers were not aware about such climate-smart paddy varieties. They were practicing the cultivation of traditional paddy varieties.

Impact	Before Adaptation	After Adaptation
Yield of Product	39.5q per hectare	48.2q/ha
Gross Income from Paddy	85000/- per Year	127300/- per Year
Knowledge gain based on 1- 5 scale*	1	5
Feeling of economic security based on 1- 5 scale*	1	4
Ability to understand and solve problems based on 1- 5 scale*	1	5
Self image in community based on 1- 5 scale*	1	4
Self confidence based on 1- 5 scale*	1	5

*1-5 scale indicates 1= Lowest and 5= Highest

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Storm resistant two-tier shelter model for backyard poultry in Sundarban

Poultry is a popular livelihood option for the villagers. However, due to frequent storms and cyclones, the traditional housing is damaged on and often leading to increased mortality of birds and financial loss to the farmers. The existing structures could only accommodate 10-15 birds in an overcrowded condition. The floor was very close to the ground or in some cases the birds were kept on the ground. During rainy season the ground becomes water logged or muddy and there is high incidence of the parasite infestation (ecto- and endo-parasites). Hence a modified poultry shelter was designed by RAKVK Nimpith and demonstrated in the NICRA village.

Traditional poultry shelter

Strom resistance 2- tier poultry shelter

Technology details: The storm-resistant two-tier poultry shelter is a 6-ft in long and 4-ft wide wooden structure with 7-ft height. It has two floors to accommodate 15 birds in each floor. There is a ground clearance of 1.5 ft to protect the ground floor from submergence during heavy rain. The side walls are constructed with GI net (2 mesh size) and the roof is made up of corrugated tin sheet. The inside of the roof is insulated with thermocol sheet and the side walls are protected with curtains (green shade net) to maintain ambient temperature inside of the structure during extreme weather. The curtains also protect the birds from rain splash during rainy season. The entire structure is transferable, to cope

up with sudden abnormal situation (like breakage of tree, inundation etc.).

Performance and impact of the technology: The structure was demonstrated to 5 beneficiaries who had traditional poultry shades and fewer birds. The modified structures are strong enough to withstand storms. The high ground clearance saved the birds from submergence or from the mud. The spacious structure with good aeration also improved the overall hygiene. The birds are saved from rainwater splashes during windy monsoon. The roof insulation and curtains help to maintain the temperature and humidity during summer and winter. It is easy to clean the litter from both the floors. This housing system has also helped to minimize the attack of snake, mongoose, dog, fox and/ or other wild carnivores. A total of 30 birds are accommodated in each shelter which has doubled the income of the farmers. The culling percentage now reduced due to better sanitation and hygiene. The body weight gain and egg laying capacity also improved.

Upscaling: The cost of a two-tier poultry unit is Rs. 16000/- (Rupees Sixteen Thousand). Farmers can easily upgrade their poultry shed with this technology. However, this technology can further be scaled up by support through other programmes of the state and central government or by initiative of other voluntary organizations.

Economics:

Technology	Total birds/ unit	Space per bird (sq ft)	Eggs/ bird/ year	Economics per beneficiary per year		
				Gross cost (Rs.)	Net return (Rs.)	BCR
Traditional system	15	1.0	159	6050	6700	2.11
Storm-resistant two-tier shelter	30	1.6	168	12400	15900	2.28

(Dr. C. K. Mondal, Dr. P. K. Garain and Mr. A. Saha
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Nimpith, S 24 Parganas, West Bengal)

Ensuring livelihood security by introducing oyster mushroom cultivation in the NICRA adopted village of Kalimpong

Krishi Vigyan Kendra Kalimpong through NICRA project introduced scientific method of Oyster Mushroom cultivation. Oyster mushrooms are loaded with fiber, vitamins, minerals and other important nutrients and are also low in carbohydrates. Due to its several advantages and demands during the past years, it is important that KVK should prioritize its cultivation in NICRA adopted village. The climate of Kalimpong is favorable for Mushroom cultivation.






For this, the hands-on training along with demonstration was conducted to famers by Scientists prior to its cultivation in the village. There were around 20 farmers who have been benefited from this module. Krishi Vigyan Kendra through NICRA project has provided the inputs like Spawn of Oyster mushroom, plastic and straw to the group of farmers. The necessary technical assistance and follow up was taken up to the farmers for its successful cultivation. The intervention has taken positive impact as farmers and SHGs are adopting this technology for generating income source. The farmers are determined to take this technology of mushroom cultivation to the extent that they believed one day it will be the hub of Mushroom unit in Kalimpong.

(Dr. M.W. Moktan, Dr. Pranab Barma and Dr. Novin Chamling
Kalimpoong Krishi Vigyan Kendra, West Bengal)

Marigold cultivation to meet the quality planting material demand round the year at Kendrapara

Without marigold flower, nobody can think of worshipping decoration of temples, marriage pandals, political rallies, celebration of functions and performing rituals etc. Beauty of this flower is its affordability, keeping quality and round the year availability. Considering the round the year local demand, under NICRA project KVK, Kendrapara introduced summer marigold cultivation at NICRA adopted village *Gajapitha*. For the cultivation, three numbers of women self-help groups (WSHG) were selected from the village. Hands on training to the members were conducted. The members of the WSHG were trained how to cultivate offseason marigold as well as produce planting material. After proper handholding, they were being provided

with three thousand rooted cuttings of marigold variety *Bidhan Marigold-2* were distributed to the members. They planted these rooted cuttings as per the recommended cultural practice. They obtained yield of 95 quintals of flower per hectare. The members of the WSHG were also produced planting materials, by maintaining 10 % mother marigold plants. The members of SHG produced 15,000 seedlings, on an average, per month, and sold it for Rs.15, 000.00 (One Rupee per seedling). Cost of production was Rs.0.45 per seedling with a net profit of Rs. 0.55 per seedling.

Transforming rice-fallow into rice-pulse cropping system to combat the climate change at Kendrapara

A number of farmers of NICRA adopted village *Gajapitha* used to cultivate only rice during kharif season leaving the land fallow during rabi. No irrigation and low residual soil moisture conditions offered little opportunity for a second crop. As a climate resilient technology KVK, Kendrapara, transformed the rice-fallow into rice-pulse cropping through agronomic management under NICRA project. Conventionally grown late rice variety *'MTU 7029'* was substituted with shorter duration *'Bina 11'*. Rice could be harvested earlier leaving adequate residual soil moisture which

was utilized successfully for growing a black gram as paira crop. It was sown in standing rice crop about 10 days before the harvest. This intervention was successful in utilizing the fallow for crop intensification. Annual net income increased from Rs.24,500.00 /ha to Rs.46,140.00 /ha and could utilize rice fallow for successful cropping.

(Dr. A. Das, Dr. T. R. Sahoo and Mr. Matru Prasad Mohanty
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Poly-mulching augmented vegetable cultivation in drought prone area of Keonjhar district

Vegetable farmers are facing problems due to the climate change which leads to outbreak of pest and diseases, drought situation and labour scarcity etc. In order to improve the water use efficiency without increasing cost of cultivation is the only motto in crop production system to increase the productivity in

drought affected area. Subsequently cost of cultivation has also gone up and labour shortage has a major problem for farming community. Farmers are finding it difficult to cope up with the raised input costs and other problems faced.

To mitigate these problems, Krishi Vigyan Kendra, Keonjhar, initiated a

demonstration of Poly mulching and stacking technology in Tomato, Capsicum and Brinjal crops under NICRA project. The demonstration was conducted in *Denua* village in 1.2 ha area of land. The utilization of poly-mulch in ridge bed and furrow system has played major role in reduced weed infestation by 60-80% and increased water use efficiency, thereby maximizing the productivity and quality of the produce of Tomato, Capsicum, Brinjal. Therefore, farmers are encouraged by innovative technique that help them conserve moisture, minimize weed infestation. By seeing the low-cost profitable technology, farmers of surrounding villages were very impressed by the result of this technological intervention of plastic-mulching. Farmers from the village are

of the opinion that by following these technologies, they can reduce the weed incidence and also increase the water use efficiency. The number of seedlings

required for planting in a unit area is also less because of the decreased seedling mortality. The fruits obtained are of better quality and colour, which fetched more prices in the market in-spite of terminal drought condition.

(Dr. S. K. Sahoo, Dr. Deepak Hembram and Mr. Kiran Kumar Pradhan
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Deep water rice variety cultivation as a climate resilient technology in flood prone area of Puri district

Puri district of Odisha is worst affected by untimely heavy rainfall, cyclone, super cyclone, flood, flash flood *etc*. More than 70% of the district's geographical area are low-lying and become water-

logged during monsoon season. Water logging affects the low land in kharif in village *Jatipur* of Purisadar block adopted by KVK under NICRA. Both semi deep

and deep water ecology existing in the village in which water level rises to 75cm to one meter and remains for more than a month.Waterlogging environment is

less receptive to better management because of the repeated submergence owing to flash floods and waterlogging.

Waterlogging during the early phases of crop development inhibits tillering and increases plant mortality. Flooding stress causes substantial crop losses because it creates an anaerobic environment. Looking at this prioritized issue, a demonstration was conducted in deep water rice variety *CR Dhan 506* and *CR Dhan 508* involving 20 farmers. The maturity duration of *CR Dhan 506* and *CR Dhan 508* is 160 and 160-165 days respectively. Flood situation during

august and cyclonic storm during October affects the *Pooja variety* taken up by the non-NICRA farmer, whereas the newly introduced variety registered encouraging results. Seeing the results,

farmers have stored the seeds of these deep water rice varieties in the seed bank of village for cultivation in kharif, 2024.

Technology	Grain Yield(q/ha)	Test weight (g)	Filled Grains/ panicle (No.)	Panicle Length (cm)	EBT/m2 (No.)	Net Return (Rs/ha)	B:C Ratio
FP	40.5	21.2	91	20.6	302	38412	1.77
Demo (CR Dhan 506)	43.4	21.6	104	22.4	325	41742	1.79
Demo (CR Dhan 508)	46.2	22.6	112	21.8	344	47855	1.90

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Introduction of sunflower cultivation: An initiative to income generation during summer season at Purulia district

In Purulia district where mono-cropping of rainfed Kharif crop is the pre-dominant cropping practice. In some medium land patches after harvesting Kharif rice, late sowing of mustard in the 2nd fortnight of December was done. That results in poor

yield of thermo-sensitive mustard utilizing the precious irrigation water. In our NICRA adopted village *Haramjanga*, where we have already constructed several fields dug wells for tapping the subsurface flow after cessation of monsoon rain, we have decided to introduce Sunflower hybrids that can be sown in rabi-summer season

with a much higher yield and benefit cost ratio utilizing the available irrigation water in a better way. Farmers also adopted this practice and growing Sunflower, a good source of vegetable oil with higher market price compared to other edible oils as a good source of Vit-E and for other health benefits.

This year we have sown Sunflower hybrid c.v.- *MFSH-17* at 5kg/ha. in rows (60cm X 30 cm) and 4-5 cm deep behind the plough in the 1st week of February after basal application of FYM @ 50q/ha and N:P:K:S @ 20:40:40:14 kg/ha with pre-sowing irrigation.

Before sowing, the seeds are treated with Carbendazim + Mancozeb at 2gm + Imidacloprid 5 gm/kg seed and soaked for 48 hrs for easy germination of seed. Prior to first irrigation, weeding followed by thinning and gap filling for maintaining proper plant population was done 20-25 DAS along with first top dressing with Urea at 30kg/ha. After 1st top dressing, earthing-up of plant was done to prevent lodging of the plant after head formation. At 40-45 DAS second top dressing was done with urea at 30 kg/ha. Followed by irrigation is most vital for the active growth phase to hold larger size flowers. At least two to three more irrigation is required at an interval of 15-20 days was found essential for good crop yield.

The crop ripened during the 1st fortnight of May with an average yield of 13.98 q/ha sunflower seed (*i.e.* % higher than farmers practice) with a benefit cost ratio of 2.10.

Table: Result of Demonstration on Sunflower Hybrids during Rabi-Summer Season in Purulia, W.B.

Crop	Variety	Area (ha.)	Farmers Practice (Qui.)	Demonstration (Qui.)	Economics			Yield enhancement (%)
					Gross cost	Net Return	B:C	
Sunflower	*MSFH-17*	2.1	9.93	13.98	30650	33862	2.1	40

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

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"Industrial agriculture characteristically proceeds by single solutions to single problems: If you want the most money from your land this year, grow the crops for which the market price is highest."
- Wendell Berry