



# Newsletter



## TOWARDS CLIMATE RESILIENT AGRICULTURE NICRA NEWS

ICAR-Agricultural Technology Application Research Institute Kolkata

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### Inside the Issue

- *Bongheri, NICRA Village withstands the massacre of cyclone Yaas in Sundarbans of South 24 Parganas*
- *Yearling stocking a Profitable Pisciculture in seasonal Rainfed pond in Ganjam I, Odisha*
- *Crop intensification in post-flood situation: A boon to flood affected area in Kendrapara*
- *Zero tillage wheat cultivation - A profitable and sustainable farming practice in Malda*
- *Official Report of *Sarcoptes scabiei* in pig at Lal Pahar Village of South Andaman*
- *Azolla as poultry feeding practiced in Kalahandi now*
- *Organic and poly mulching augmented vegetables production in Coochbehar*
- *Proceedings of the Annual-cum-Concluding workshop, NICRA-TDC Project of ICAR-ATARI Kolkata on June 23, 2021*
- *Publications*

### Introduction

**A**growing global population and changing diets are driving up the demand for food. Production is struggling to keep up as crop yields level off in many parts of the world, ocean health declines, and natural resources—including soils, water, and biodiversity—are stretched dangerously thin. A 2020 report found that nearly 690 million people—or 8.9 percent of the global population—are hungry, up by nearly 60 million in five years. The food security challenge will only become more difficult, as the world will need to produce about 70 percent more food by 2050 to feed an estimated 9 billion people.

The challenge is intensified by agriculture's extreme vulnerability to climate change. Climate change's negative impacts are already being felt, in the form of increasing temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events. On farms, climate change is reducing crop yields, the nutritional quality of major cereals, and lowering livestock productivity. Substantial investments in adaptation will be required to maintain current yields and to achieve production and food quality increases to meet demand.

In order to deal with climate change and its impact, A Network Project entitled, 'National Innovations on Climate

Resilient Agriculture (NICRA)' of Indian Council of Agricultural Research (ICAR) has been launched aiming to enhance the resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. Technology Demonstration Component (TDC) of NICRA offers great opportunity to work with farmers and apply such technologies under field conditions to address current climate variability. This will enhance the pace of adoption of these resilient technologies. NICRA KVKs prepared and implemented village level contingency crop plans and measures. Technology Demonstration Component (TDC) of NICRA offers a great opportunity to work with farmers to address current climate variability with matching responses. Climatic vulnerability of selected nine KVK districts of West Bengal, Odisha and A & N Islands at district level regionally coordinated by ICAR-Agricultural Technology Application Research Institutes (ATARIs) 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



## Bongheri, NICRA Village withstands the massacre of cyclone Yaas in Sundarbans of South 24 Parganas

The recent severe cyclone 'Yaas' ravaged the coastal and deltaic districts along the northern shore of the Bay of Bengal, on 26th May 2021. Though Sundarbans escaped the direct impact of the nightmarish tropical storm, it became probably the worst affected region in terms of damage to the agricultural lands. The cyclone coincided with the full moon high tide (perigean spring tide) and induced an extraordinary rise in the water level (2-4 m) in the rivers and creeks of Sundarbans. The storm surge breached the river embankment in many places, flooding around 1000 villages with saline water.

However, the impact of Yaas was

minimal at Bongheri village, thanks to the implementation of NICRA programme. The village lies adjacent to the river Matla and has a decade old experience of witnessing the carnage by the cyclone Ailain 2009. The untired and united approach towards protection of its river embankment resulted in saving the entire village this time. The Village Climate Risk Management Committee planted and maintained a thick Mangrove barrier on the Matla riverbed which decreased the generation of wind-waves, wave setup and run-up that contributes to surge levels and associated loss during such cyclones. As a consequence, the embankment

remained unscathed and the village was saved from saline water intrusion. At the same time the farmers were prepared to harvest the rainwater as much as possible in the numerous farm ponds created during the project.



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

## Yearling stocking a Profitable Pisciculture in seasonal Rainfed pond in Ganjam I, Odisha

Pisciculture is an important enterprise in Ganjam district. Farm ponds are generally seasonal where water is available only 06 months i.e.



from July to December and gradually decreases from January to March and becomes dry in April and May which hampers Pisciculture. Also farmers were stocking Fry and fingerlings of IMC (*catla*, *Rohu* and *Mrigal*) whose average growth was 0.4 kg upto end of December and they were bound

to harvest the small sized fish in January month due to water scarcity. The yield and net profit was very less due to low growth rate of fish. To cope up with the problem KVK, Ganjam-I has conducted a demonstration programme in NICRA cluster villages - Chopara, Chikili, Nada and Lepa of Jagannath Prasad block in 02 ha. area involving 05 farmers. The pH of water was measured and accordingly liming was done in the pond. Farmers were supplied with 5000 yearlings / ha. of *Catla*, *Rohu* and *Mrigal* at a ratio of 3:4:3 which were stocked in the pond in 1<sup>st</sup> week of August after proper manuring with raw cow dung. Floating fish feed was applied @ 1 % of body wt. during the culture period. Harvesting was done in January month and the yield was 33% more (36.3q/ha) as



compared to farmer's practice of 27.3 q/ha. Also the avg. body growth was 0.82 kg. The net profit in yearling stocking ponds were Rs. 244000/ha. as compared to Rs. 174400/ha in farmer's practice. Yearling stocking increased the growth rate of fish and hence enhanced the total fish yield and net profit. The technology has been spread to 18 ha with 55 farmers of nearby villages.

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



## Crop intensification in post-flood situation: A boon to flood affected area in Kendrapara

The natural calamities like flood and cyclone hit worse the coastal farmers of Odisha. In Kendrapara district, climatic vulnerability like flood mostly affected agricultural crops in the riverside cultivation area of Marshaghai block. To combat the adverse effect of flood, under NICRA project, KVK Kendrapara demonstrated crop intensification in post-flood situation at NICRA village of Marshaghai. Under crop intensification, intensification was done, both, through time and space.

Demonstration was done on mixed cropping of toria and coriander (seed purpose). The common goal of mixed cropping is to produce a greater yield on a given piece of land by making use of resources that would otherwise not be utilised by a single crop. Mixed

cropping reduces the risk of crop failure, instability of crop production, better utilisation of farm resources, maintains soil fertility and ultimately gives additional income to the



farmer. Keeping these things in view, demonstration on toria + coriander was conducted wherein toria was taken as main crop and coriander was taken as mixed intercrop.

Full seed rate of toria (8 kg/ha) with half seed rate of coriander (10

kg/ha) was used for sowing of the crops in the system. Previously, only toria was grown by farmers where monocropping was replaced by mixed intercropping. As a result, there was efficient utilisation of soil moisture under post-flood situation and extra income was assured. The demonstration was compared with the farmer's practice of growing sole toria in which farmers realised 8.5 q/ha yield of toria whereas, in the mixed intercropping system, farmers obtained 9 q/ha toria along with 6 q/ha of coriander seeds. As a result, farmers got an extra income of Rs 23,500/ha by adopting crop intensification over sole cropping.

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

## Zero tillage wheat cultivation - A profitable and sustainable farming practice in Malda

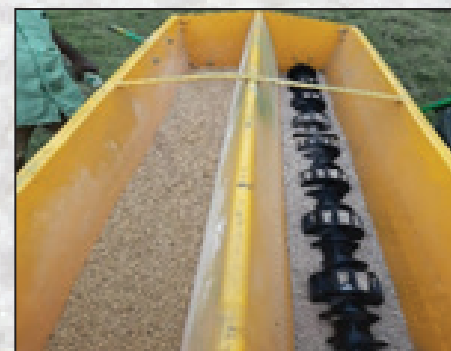
Shri Rajen Mandal is a progressive and innovative farmer from deherutala village, Narayanpur, an adopted village of Malda Krishi Vigyan Kendra, Malda, West Bengal. His hard work and dedication being shared across the Malda district. He had approximately 2 hectares of cultivated land along with 2 milch cow and 2 goats. Shri Rajen Mandal had contact with Malda KVK when NICRA project was launched to his village Deherutala, Narayanpur. He used to cultivate traditionally before



taking up the zero-tillage method. After the KVK intervention, he has been able to get the information and practise agriculture with modern zero tillage (ZT) method. In case of ZT method crop yield increases due to the early sowing of at least 7-8 days which helps in vigorous growth of plant and also plant brings more tillers as well panicle too which results more yield of crop. Before adopting zero tillage, he had to plough field 4-5 times before raising crop which used to consume about 36-45 litre diesel per hectare area. There was lot

of pollution due to burning of fuel as well as increases fuel value.

He had observed that crop residues give moisture to the field if not burned. During the 2008-09 crop season, average wheat yield at his farm was 6q / bigha using conventional method, but after adopting zero tillage method the yield has increased to 7.5q / bigha. Therefore, he enhanced this income of Rs.2550 per bigha in wheat farming through production in ZT method as compared to traditional





method. The operational expenditure was Rs.2000 per bigha in traditional method. Where in case of ZT practise expenditure was Rs.500 / bigha. He saved at least Rs.1500 / bigha. In this way, Shri Rajen Mandal could earn additional Rs.4050 / bigha with this method. He has now become a role model for other famers in his village. This technology also helps to increase soil organic matter content and improve soil health and it didn't intervene the soil structure. Further, this technology checked the crop residue burning which could have created climatic hazards. His future



plan is to increase his cultivate area under zero tillage practice and encourage other farmers in the village to adopt the same method of farming. This ZT method is now in huge demand for wheat and maize production in all over Malda

district. Custom hiring facilities is provided to the farmers of Malda district through Malda KVK, Ratua and Custom hiring centre at NICRA village for large scale adoption of this technology. "My special thanks to Malda KVK, Ratua for providing me the necessary training and farm implements through custom hiring centre to increase my crop yield" -says Shri. Rajen Mandal.

**Revelation:** Zero tillage is the more profitable practices for farmers and sustainable for the environment.

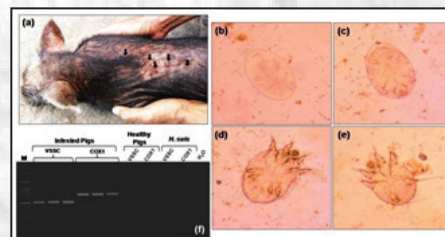
(Drs. Rakesh Roy and Adwaita Mondal  
Malda Krishi Vigyan Kendra, WB)

### Official Report of *Sarcoptes scabiei* in pig at Lal Pahar Village of South Andaman

Scabies or mange caused by *Sarcoptes scabiei* is latest addition of WHO's list of tropical neglected diseases. It causes severe itching to the host. It has a wide host range including human, farm animals, companion animals and wild animals. It is a emerging /re-emerging disease with high prevalence in underdeveloped and developing countries. The disease has zoonotic importance and is of significant public health concern as cross-transmission or species jumping is very common. This disease in pigs was reported for the first time from the Pig unit of two farmers Shri B.D. Mazumder and Shri Rakesh of Lal Pahad village which is covered under the National Innovations of Climate Resilient Agriculture (NICRA) project of ICAR-Krishi Vigyan Kendra (KVK), South Andaman. Here, we for the first time in Andaman and Nicobar Islands

report the clinical case of mange in pig with demonstration of *S. scabiei* on the basis of morphological characters and molecular based approach. Clinical examination of the affected pig showed intense pruritus associated with hyperkeratosis and crusts in the skin. Skin of the animals were thickened and wrinkled in appearance which was a characteristic feature of crusted scabies/Norwegian scabies. Alopecia in the affected area was observed (Figure 1a). On the basis of clinical symptoms, skin scrapings from infested animals were examined under microscope for the presence of mites. Microscopic examination confirmed the presence of all developmental stages of *S. scabiei* (Eggs, eggs with six legged larvae and nymphal stage) (Figure 1b-e). The adult and nymphal stages had short legs. Third and fourth pair

of legs never projected beyond the body. Morphologically the mites were indistinguishable from *Sarcoptes*. Further, *Sarcoptes* was confirmed at the molecular level with the help of one mitochondrial gene (COX1) and one nuclear gene (VSSC) (Figure 1f).



*Sarcoptes scabiei* infestation in pig.

(a) An infested animal with thickened and wrinkled skin and hair loss (black arrows), (b) Mite egg, (c) Mite egg containing larvae, (d) Mite nymph, (e) Larval stage of mite, (f) Amplification of cytochrome C oxidase subunit 1 (COX1) and voltage sensitive sodium channel (VSSC) gene segments. Infested animals were positive for both of the gene fragments whereas control animals were negative. Primer specificity was verified using the lice (*Haematopinus suis*) DNA as negative control.

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





## Azolla as poultry feeding now practiced in Kalahandi

Scavenging in birds, lower growth rate and egg production due to inadequate nutrition. To combat this technology such as azolla practiced for poultry feeding which enhances growth rate and egg production of poultry as well.



SriChitaranjan Patra is an enthusiastic farmer in the NICRA adopted village, Pipalpada of Kalahandi district of Odisha state. He is of 45 year old and always open to accept the new technologies. *Kalinga brown* and *Kadakhnath* breed as backyard poultry rearing was demonstrated under NICRA project. These birds were fed with azolla as a supplementary



feeding. Azolla cultivation was done by Sri Chitaranjan Patra in a poly tank of dimension (6'x3'x1'). The fresh harvested azolla was mixed with commercial feed in the ratio 1:1 or given directly to the poultry bird.

In poultry production the feed cost account for 60% of total cost. Provision of commercial feed increases the cost of production and subsequently lowers the profit margin. Replacement of costly commercial feed with easily available nonconventional feed would be an option for reducing the production cost. Azolla, an aquatic fern, have higher biomass and protein content.

The water fern Azolla, which grows in association with the blue-green alga *Anabaena azollae*, is the most promising plant for poultry feeding.

Birds supplemented with azolla gained 2.4 kg compared to birds let out for scavenging only who gained 1.35 kg body weight in a period of 6 months. The supplemented birds layed 75 eggs up to 28th week of age, where as group let out for scavenging only produced 30 no of eggs during

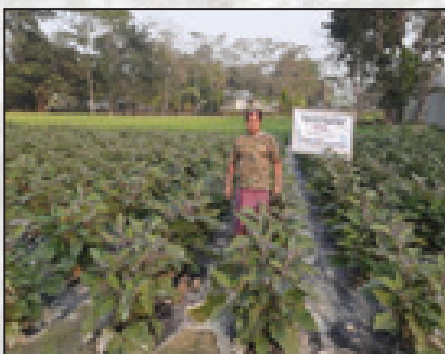


the same period of time. B:C ratio was 2.7 in supplemented group compared to 2.15 in non-supplemented group

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

## Organic and poly mulching augmented vegetables production in Coochbehar

Improving the water use efficiency without increasing cost of production is an ongoing goal in crop production system. Natural resources (like soil and water) are being constantly under pressure and require a scientific and precise



approach to increase the productivity of agricultural crops. In order to minimize degradation of soils, water and other natural resources and for environmental protection, we adopt the conservation practices like mulching by which these objectives can be accomplished.

The demonstrations are conducted on Khagribari and Singimari village in 2 ha of land with 15 farmers.

Poly and straw mulch conserved higher soil moisture, reduces erosion by protecting the soil surface and also reduces unproductive evaporation from the soil surface, which is of benefit in water limited conditions





and plant water status is maintained. Straw mulch helps keep fruits clean from contacting the ground, reduces soil rot, fruit cracking and blossom end rot. The yield and keeping quality of vegetables has been improved by straw mulch.

The utilization of poly and straw mulch in has played a major role in the increases in production of brinjal, tomato, winter cucumber, okra and pointed gourd among other vegetables. Poly and straw mulch reduced weed emergence by 60% to 80% during the growing season.



Mulches are more effective for weed control.

Mulch provides many benefits to crop production such as protecting the roots of the plants from heat and cold, making amicable condition

for the plant growth by temperature moderation, reducing salinity and weed control and thereby improving the yield and quality of the crop.

Therefore in the days to come, farmers will make use of this innovative technique that helps them conserve moisture, avoid weeds and improve soil health tremendously while producing more. This will also go a long way in the world achieving food security sustainably.

*(Drs. Bikash Roy and Ganesh Das  
Coochbehar Krishi Vigyan Kendra,  
Coochbehar, WB)*

### Proceedings of the Annual-cum-Concluding workshop, NICRA-TDC Project of ICAR-ATARI Kolkata on June 23, 2021

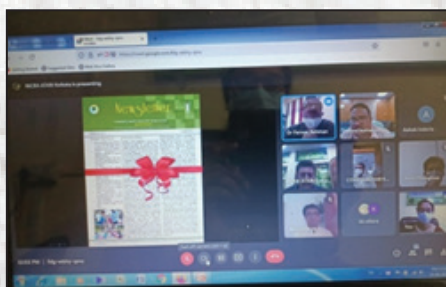
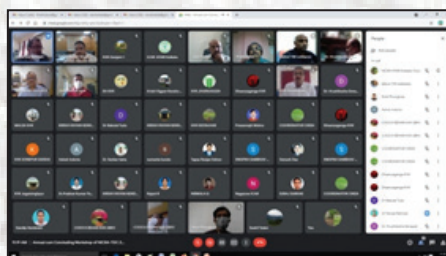
Concluding Zonal Workshop of NICRA KVKs of Zone V was organized by ICAR-Agricultural Technology Application Research Institute Kolkata on June 23, 2021 on virtual mode under the chairmanship of Dr. V. K. Sing, Director, CRIDA. The workshop was attended by Prof. H. K. Senapati, Chairman of ZMC, Dr. S. K. Roy, Director, ICAR-ATARI, Kolkata, Dr. P.K Pal, DEE, UBKV, Dr. P.J Mishra, DEE, OUAT, Dr. JVNS Prasad, Coordinator, NICRA-TDC, CRIDA, Dr. F. H. Rahman, Nodal Officer, NICRA-TDC, Dr. Amit Phonglosa, JDEE, OUAT and Heads of nine NICRA KVKs of the zone. The Heads of new six NICRA-KVKs of the zone and scientists from CRIDA Hyderabad also attended the workshop.

The workshop started with welcome address by Dr. S. K. Roy, Director, ICAR-ATARI, Kolkata and he highlighted the overall impact of the NICRA project in Zone V.

Dr. F. H. Rahman, Principal Scientist, ATARI, Kolkata has delivered his lecture depicting all the salient achievements of this project within this Zone. He has elaborately detailed

different prospects of different climate resilient models that are being used in the KVKs of this Zone. He has praised few KVK teams for their dedicated approach towards this Project but he has expressed his concerns also on the issue of discontinuance of the project in some cases.

Dr. P.K Pal, DEE, UBKV, West Bengal enlightened the house with the social



impact assessment studies in the NICRA KVKs of the zone taking into consideration both life and livelihood

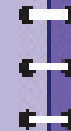
prospects.

Dr. P.J Mishra, DEE, OUAT, Odisha expressed his gratitude to CRIDA, Hyderabad for extending all possible guidance to the KVKs for upscaling the resilient technologies. He highlighted the adoption of farm pond excavation and promotion of drought, salinity and submergence tolerant rice varieties by the state Government of Odisha.

Dr. JVNS Prasad, Coordinator, NICRA-TDC, CRIDA, Hyderabad stressed upon up-scaling of low cost promising technologies to neighbouring villages and documentation of success stories. He also emphasized that development of different models of entrepreneurship with focus on custom hiring centres, seed bank and primary level of value addition.

Prof. H. K. Senapati, Chairman of the Zonal Monitoring Committee has appreciated the overall performance NICRA has provided so far in these states and the positive impacts it has created so far upon the farming community. He has suggested to cover me and more area under this project in future and assured to





help in all ways possible. He has encouraged the KVK personnels to be indulged in this venture and to have proper area based strategy.

Dr. V. K. Sing, Director, CRIDA, in his opening remarks, emphasised on farming system typology based planning and then its implementation through a family based approach. He appreciated the convergence programmes with Government schemes in the States of Bihar and Orissa. He urged for more crop diversity in the areas of rice based farming systems. In case of outgoing NICRA KVKs he suggested that the VCRMC should be encouraged to utilize the VCRMC fund for further upscale of the custom hiring centre.

The opening session ended with the release of publication of NICRA News Letter.

The technical session was chaired by Dr. V. K. Sing, Director, CRIDA and co-chaired by Dr. S. K. Roy, Director, ICAR-ATARI, along with Prof. H. K.

Senapati, Dr. P. Mishra, Prof. P. K. Paul, Dr. JVNS Prasad, CRIDA and Dr. F. H. Rahman as the panellists.

Heads of NICRA- KVKs presented salient achievements of out scaled technologies during the last ten years and Action Plan of 2021-22.

### Salient Suggestions came out during deliberation

- Acidic and Saline soil management must be taken into consideration under NRM
- IFS must be developed with suitable predominant components namely Pond based and Horticulture based IFS
- Beekeeping can also be incorporated according to the flora availability
- Identification of the adopted village according to soil type, soil fertility, stress situation is very important.

- Liasoning with the state line department officials and showcasing the resilient technologies
- Convergence for up-scaling the resilient technologies
- Success stories of resilient technologies in NICRA villages are to be compiled and published for onward submission to GoI
- Crop diversification and crop intensification must be incorporated
- Quality publications are to be framed
- Comprehensive action plan must be prepared for addressing multiple climatic issues
- Minimum two number of new villages are to be adopted in the new phase
- Convergence with Watershed project and MGNREGA for better implementation of NRM activities

## Publications (January - June 2021)

### Publication

#### Research Paper

1. N. Bommayasamy, L. B. Singh, R. Bhattacharya and F. H. Rahman (2020). Response Of Split Application Of Nitrogen On Yield And Nitrogen Use Efficiency Of Rice Under High Rainfall Area Of Andaman & Nicobar Islands. *Indian Journal of Extension Education* Vol. 57, No.32, 2020.
2. S. Das, R. Bhattacharya and F. H. Rahman (2020). Response of Black Cumin (*Nigella sativa* L.) to Different Spacing and Nitrogen on Growth and Yield in New Alluvial Soil of West Bengal. *Indian Journal of Extension Education* Vol. 57, No.32, 2020.
3. S. Mukherjee, F. H. Rahman, N. K. Bej and S. Das (2020). Assessment Of Bio Fungicides

To Control Blast In Rice In Red And Lateritic Belt Of Paschim Medinipur District Of West Bengal. *Indian Journal of Extension Education* Vol. 57, No.32, 2020.

4. H. N. Malik, U. Naik, U. Sahoo, A. Panda, A. Phonglosa, R. Bhattacharya and F. H. Rahman (2021) Influence of Micronutrient Management on Growth and Yield Attributes in Pigeonpea [*Cajanus cajan*(L.) CV. RG176] in Kalahandi District of Odisha. *Journal of Experimental Agriculture International* 43(2): 86-93, 2021.
5. P. Majhi , F. H. Rahman and R. Bhattacharya (2021). Continuous Rice Cropping System with Integrated Use of Inorganic and Organic Sources of Nutrients for Soil Quality Improvement.

*International Journal of Environment and Climate Change* 11(2): 109-123, 2021

6. S. Mangaraj, S. Sahu, P. K. Panda, F. H. Rahman, R. Bhattacharya, D. Patri, P. J. Mishra, A. Phonglosa and S. K. Satapathy (2021). Assessment of Stress Tolerant Rice Varieties under Rain Fed Condition in North Eastern Ghat of Odisha. *International Journal of Environment and Climate Change* : 11(4): 128-134, 2021; Article no.IJECC.69714 ISSN: 2581-8627
7. Ganesh Das, F. H. Rahman, Sankar Saha, Sandip Hembram, Sujan Biswas, Samima Sultana, Suraj Sarkar, Augustina Saha, R. Bhattacharya, Bablu Ganguly, Rahul Deb Mukherjee, Bikash Roy and Prabhat Kumar Pal

(2021). Pond Renovation for Harvesting and Recycling of Rain Water: An Experimental Trial in Sub Himalayan Terai Region of India. *International Journal of Environment and Climate Change* 11(5): 1-7, 2021; Article no.IJECC.70032 ISSN: 2581-8627

**Book**

1. P. K. Garain, P. Chatterjee, F. H. Rahman and S. Jana (2021). *Climate Resilient Agriculture- A Road Map Towards Sustainable Rural Livelihoods in Sundarbans*. Book published by RA Mission, Nimpith. pp 1-186

**Technical bulletins**

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

**Paper presented in national/international seminars etc.**

1. J. Udgata, D. Parida, R. Bhattacharya and F. H. Rahman

(2021). Assessment of balane nutrition (N, P, K, Zn and B) and green manurig on yield, nutrient uptake, economics and soil fertility of rainfed rice (*Oryza sativa L.*) in drought prone areas of Odisha’ in the National Webinar on ‘Stewardship of Agrochemicals for Upkeeping Environment’ organized by the Society for Fertilizers and Environment in collaboration with Bidhan Chandra Krishi Viswavidyalaya, Mar 30-31, 2021.

2. R. Bhattacharya, T. R. Sahoo, P. Mishra, N. M. Mohapatra, S. N. Mishra and F. H. Rahman (2021). The Response of Green Manuring of *Sesbania aculeate* on growth and yield of rice in flood prone area of coastal Odisha’ in the National Webinar on “Stewardship of Agrochemicals for Upkeeping Environment” organized by the Society for Fertilizers and Environment in collaboration with Bidhan Chandra Krishi Viswavidyalaya, Mar 30-31, 2021

3. H. N. Malik, U. Naik, U. Sahoo, A. Panda, A. Phonglosa, F. H. Rahman (2021). Influence of micronutrient management on growth and yield attributes in pigeonpea (*cajanus cajan* (L.) Cv. Prg176 in the National Webinar on “Stewardship of Agrochemicals for Upkeeping Environment” organized by the Society for Fertilizers and Environment in collaboration with Bidhan Chandra Krishi Viswavidyalaya, Mar 30-31, 2021
4. Sujan Biswas, Surajit Sarkar, Augustina Saha, Sankar Saha and F. H. Rahman Study On Interaction Of Earthworm With Bioagents During Vermicomposting in the National Webinar on “Stewardship of Agrochemicals for Upkeeping Environment” organized by the Society for Fertilizers and Environment in collaboration with Bidhan Chandra Krishi Viswavidyalaya, Mar 30-31, 2021

**Newspaper Coverage**



**For details please contact:**

DR. F. H. Rahman,  
Nodal Officer, NICRA  
ICAR-ATARI Kolkata  
Bhumi Vihar Complex, Sector III,  
Salt Lake, Kolkata - 700097  
Email: nicrakolkata@gmail.com  
Ph. 9432955117

**ICAR-ATARI Kolkata NICRA News**

A Newsletter of NICRA-TDC Project  
of  
ICAR-Agricultural Technology  
Application Research Institute  
Kolkata

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