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KRISHI RUPANTAR

Increasing Livelihood Of Farmers Through Best Management Practices Of Potato Cultivation

Makibar Rahman

District Horticulture Coordinator
APART, Bongaigaon

As the demand and importance of processing varieties of potato are increasing nowadays, Lady Rosetta Variety has been taken for cluster demonstration under the World Bank Funded project, Assam Agri-business and Rural Transformation Project (APART) in Bongaigaon district for the first time. Lady Rosetta variety is virus resistant and red violet colour variety, dry matter content is about 21 % and used for chips making and

potential to good yield. A farmer of Krishijyoti Agro Producer Company Ltd. namely Chitta Ranjan Barai s/o- Gobinda Barai resident of Village 1 No Nowapara has received a potato cluster demonstration under APART from the Department of Agriculture, Bongaigaon & Director of Horticulture and Food Processing, Khanapara in 2022. Initially, he was not interested to cultivate the Lady Rosetta variety as the variety was

very new to him as well as in the district. So, he was imparted technical training under APART regarding improved package and practices for potato cultivation (BMP), and post-harvest management and started cultivation as per package and practices under the proper guidance of the District Horticulture Coordinator. His products were procured by Siddhivinayak Agri Processing Pvt. Ltd for the first time under the market linkage program. He has earned an amount of Rs.1,50,000/- and decided to purchase land for area expansion of potato and other off-season vegetable cultivation to earn more profit from the land and will create employment opportunities for others which will increase better livelihood for all. As the APART project is introduced in the Bongaigaon district with this demonstration we got many positive responses from other farmers of the district towards processing varieties and technologies that was



Field Day



Plot monitoring

followed in the demonstration. The farmer who visited the demonstration site is planning to adopt the variety for the upcoming season. He is very happy with the timely supply of all inputs, technology & Variety introduced by the International Potato Centre (CIP), frequent monitoring of plots, an average production of 44 quintals per bigha in the adverse climatic condition and immediate market linkage after harvest, earlier which was the main problem for him. He is planning to cultivate the variety on 2 hectares of land next year. His success will motivate other classes of farmers the adoption of technology, variety and market linkage. It will contribute to the economy of Assam as well as India for a better tomorrow

Natural Farming

Compiled by:
Mrinalinee Khanikar,
FSS/ HC i/c ARIASS

In ancient times, farmers mainly practised the growing of crops which are naturally found by using natural resources. With time farmers became more productive oriented and as a result, they have emphasized the judicious use of chemical fertilisers, pesticides and use of farm mechanisation, use of hybrid seed etc. to get more production in a short period. This leads to the distortion of cultivable land due to repeated intensive ploughing practices resulting in unfertile soil and health hazards. Natural Farming offers a solution to various problems, such as food insecurity, farmers' distress, health problems arising due to pesticide and fertilizer residue in food and water, global warming, climate change and natural calamities. It also has the potential to generate employment, thereby stemming the migration of rural youth. Natural Farming, as the name suggests, is the art, practice and, increasingly, the science of working with nature to achieve much more with less.

Farmers practising Natural Farming reported similar yields to those following conventional farming. In several cases, higher yields per



harvest were also reported. Natural Farming aims to make farming viable and aspirational by increasing the net income of farmers on account of cost reduction, reduced risks, similar yields, and incomes from intercropping. Natural Farming aims to drastically cut down production costs by encouraging farmers to prepare essential biological inputs using on-farm, natural and home-grown resources.

As Natural Farming does not use any synthetic chemicals, health risks and hazards are eliminated. The food has higher nutrition density and therefore offers better health benefits. Natural farming generates employment on account of natural farming input enterprises, value addition, marketing in local areas, etc. The surplus from natural farming is invested in the village itself

Natural Farming Eliminates Application Of Synthetic Chemical Inputs. The overuse of synthetic fertilizers, especially urea, pesticides, herbicides, weedicides etc. alters soil biology and soil structure, with subsequent loss of soil organic carbon and fertility.

Natural Farming ensures better soil biology, improved agrobiodiversity and more judicious usage of water with much smaller carbon and nitrogen footprints. NF helps **Reduced Water Consumption.** By working with diverse crops that help each other and cover the soil to prevent unnecessary water loss through evaporation, Natural Farming optimizes the amount of 'crop per drop'. NF **Rejuvenates Soil Health.** The most immediate impact

of Natural Farming is on the biology of soil—on microbes and other living organisms such as earthworms. Soil health depends entirely on the living organisms in it.

The integration of livestock in the farming system plays an important role in Natural farming and helps in restoring the ecosystem. Ecofriendly bio-inputs, such as Jivamrit and Beejamrit, are prepared from cow dung and urine, and other natural products.

Govt. of India has emphasized the practice of natural farming which is also called Zero Budget Natural Farming to tackle this issue. It helps to conserve the soil water, seed flora and fauna for future generations.



Some of the benefits of natural farming are:

- It minimizes the cost of production, thereby increasing farmers' yield and income.
- It ensures better health with the elimination of chemical input and favours traditional farming practices.
- Natural farming is one of the key ingredients of Environment Conservation.
- It also supports a reduction in water consumption.
- It also creates employment generation.

Natural farming which is also called Zero Budget Natural Farming (ZBNF) tackles this issue. It helps to conserve the soil water, seed flora and fauna for future generations. Some of the benefits of natural farming are:

9 Principles of Natural Farming are:

1. Soil to be covered
2. Minimal disturbance to the soil
3. Biostimulants as necessary catalysts
4. Use of indigenous seed
5. Diverse crops/trees of 15-20 crops
6. Integrate animals into farming
7. Increase organic residues on the soil
8. Pests and diseases management through botanical extracts and
9. No synthetic fertilizers, pesticides and herbicides

ZBNF is based on 4 pillars:

- 1. Beejamrit:** The process includes the treatment of seed using cow dung, urine and lime-based formulations.
- 2. Jivamrit:** The process enhances the fertility of soil using cow urine, dung, flour of pulses and jaggery concoction.
- 3. Acchadana (Mulching):** The process involves creating a microclimate using different mulches with trees, and crop bio-mass to conserve soil moisture.
- 4. Whapasa (Return to Natural Farming):** The process involves activating earthworms in the soil to create water vapour condensation.

With these objectives APART project has included a natural farming demonstration in the Annual work plan of 2022-23 on a pilot basis for 5 districts of Assam viz Kamrup, Karbi Anglong, Golaghat, Sonitpur and Nagaon implemented by OPIU-Horticulture & Food Processing, Directorate of Horticulture and FP, Khanapara, Guwahati.

Followed by the pilot project the Mission on Natural Farming has been initiated by the Directorate of Agriculture covering selected 10 more districts of Assam totalling 15



districts viz Barpeta, Dhemaji, Dima Hasao, Kokrajhar, Baksa, Chirang, Odalguri, Goalpara, Dibrugarh and Majuli. The initial grounding has been anchored by OPIU-DoHFP in collaboration with the Department of Agriculture.

Assam Floriculture Mission

Floriculture is one of the most potent components of the Horticulture industry, being important from aesthetic, social and economic points of view. It has the potential for generating employment opportunities around the year and earning foreign exchange. In many countries, different floricultural value-added products are the main export items from the agriculture sector. It has got huge domestic market in a country like India.

Floriculture is a high-income



generating enterprise having the potential to create employment for rural as well as urban youths.

Agro-climatic conditions of Assam offer an excellent opportunity for

floriculture, but it has not flourished in Assam owing to various constraints. With proper planning and execution, floriculture can play a vital role in increasing farmers' income as well as fulfilling the vision of making Assam self-sufficient in the flower sector.

Status of Assam in Floriculture:

Assam has a market for Flowers, Ornamental plants, Value added products & Services and the Value of flower, ornamental plants & value-added products consumed by the state Approx. INR 135 Crore annually. The Value of Local Production is approx. INR 15 Crore annually. There is a deficit of approx. INR 120 Crore annually. To tap this deficit AFM is proposed which will help in increasing farmers income.

Objectives of the AFM:

The Assam Floriculture Mission is being taken up with key objectives of Enhancing the net income of farmers with a primary focus on floriculture, Intensification of floricultural activities through mass adoption of protected and open cultivation of high-value flowers, Development of skill and capacity

building of flower growers-create opportunity for self-employment



for the adoption of highOtech floriculture to enhance production and market competitiveness, Self-sufficiency in commercial floriculture by the production of quality planting materials and Additional income generation by value addition flowers.

There are 5 (five) objectives in this mission.

- **Objective 1:** Enhancement of net income of farmers with a primary focus on floriculture.
- **Objective 2:** Intensification of floricultural activities through mass adoption of protected and open cultivation of high-value flowers.
- **Objective 3:** Development of skill and capacity building of flower growers- create opportunity for self-employment for the adoption of high-tech floriculture to enhance production and market competitiveness.
- **Objective 4:** Self-sufficiency in commercial floriculture by the production of quality planting materials.
- **Objective 5:** Additional income generation by value addition of flowers

Floriculture covers 2200 Ha of the area in Assam, which is less than 1% of the total area under cultivation. To increase the area under floriculture, technology demonstration on the scientific package of practices will be taken up, under the mission including the development of a nursery for the production of quality planting materials and protected cultivation of high-value flowers. Over 5 years, the area under floriculture will be increased from the existing 2200 Ha to 3715.39 Ha.



(11) Sivasagar (12) Tinsukia (13) Dima Hasao (14) Karbi Anglong (15) Sonitpur covering 19075 flower growers of the state.

The mission proposes area expansion from 2,200 hectares to 3,288 hectares for 3 years. The AFM is being implemented in 15 districts of Assam where Floriculture activities are going on at a small scale viz (1) Kamrup (2) Kamrup (M) (3) Nalbari (4) Kokrajhar (5) Chirang (6) Morigaon (7) Nagaon (8) Golaghat (9) Jorhat (10) Dibrugarh

Stakeholders of the AFM:

The stakeholders of the mission are the Department of Agriculture, Directorate of Horticulture and Food Processing, Horticulture Research Station, Kahikuchi, Assam Agricultural University, APEDA, ASOCA, and Assam Seed Corporation.

The AFM will be implemented through the following components:

A. Area Expansion (Cut & Loose Flowers): For area expansion of Cut and Loose flowers are proposed - under open cultivation, Winter Marigold, Gladiolus, Chrysanthemum, and Liliun, summer flowers like Marigold, Lotus, and Tuberose and under protected cultivation Gerbera, Orchid, Anthurium, Green Foliage plants, and Dutch Rose.

B. Development of Floriculture nursery for quality planting materials production: AFM proposes the establishment of a mother block in the 2nd year. In the subsequent years multiplication of the flowers is proposed.

C. Post Harvest Management: In the Post Harvest Management section, provision for Pack House Up to 80% subsidized rate to FPCs/ Farmer groups. Provision for Transport Vehicles Up to 80% subsidized rate to FPCs/ Farmer groups Provision for refrigerated van at Rs.13 Lakh (9 MT capacity) subsidized rate to FPCs/ Farmer groups are proposed. In Value addition facilities to FPCs/ farmer groups: Agarbatti units up to 80% subsidized rate and Essential & Aromatic Oil Extraction units up to 80% subsidized rate are proposed.

D. Market Linkage: In Market Linkage development of the Wholesale flower market (Existing /New) are proposed along with exploring the potential of export.

F. Capacity Building: Under this component, Training of Farmers and Officials on production technology, post-harvest management and value addition shall be provided along with exposure visits of farmers and officials.

Status so far:

The AFM will be supported under APART for the first one and a half years to be coordinated by OPIU-Horticulture and FP. The mission has been rolled out through exposure visit of 20 (Twenty) nos of State Level Nodal

Officers and District Nodal Officers of the Department of Agriculture to IIHR (Indian Institute of Horticulture Research), Bangalore 25th March to 30th March 2023 coordinated by OPIU-APART Cell.

Seed Production by FPCs in Assam: An Overview

*-Dr. Neeraj Kumar Tyagi & Jyoti Bikash Nath,
Sr. Specialist, IRR*

Seed is a basic input in agriculture and plays the most vital and crucial role in crop production. Availability of quality seeds is not only critical but also a basic and mandatory factor in increasing production of a particular crop. Non-availability of quality seed of high yielding variety is one of the main reasons for low productivity of rice in Assam. Besides low seed and varietal replacement rates, deteriorating soil health, imbalanced agriculture development across districts, post-harvest losses and inadequate processing facilities are few critical problems in the agriculture sector in Assam.

The State Agriculture Department and Assam Agriculture University focus on raising productivity of rice by introducing and promoting high yielding and stress tolerant rice variety seeds, amongst the farmers. Under APART, developmental efforts are taken up to make Assam self-sufficient in the seed sector, particularly in paddy seeds. The involvement of Farmer Producer Companies (FPCs) in the seed value chain has become imperative as the:



1. Public seed production system is not sufficient to meet the total seed demand of Assam
2. FPOs/FPCs are well organised business entities with good farmer base
3. They have available land for collectivization
4. They have a well structured business team.
5. FPOs/FPCs can generate necessary capital for seed and other business
6. Some FPCs have necessary infrastructure
7. Credit linkage in terms of bank loan is relatively easier
8. Government supports the FPOs/ FPCs

With the technical support of International Rice Research Institute (IRRI), few FPCs have taken up initiatives to produce certified paddy seeds through a buy back arrangement with the Apex Government agencies that deal with seed players, like Assam Seed Corporation Limited (ASCL) and Assam Agricultural University. Initially, breeder seed of selected STRVs (Ranjit-Sub1, Bahadur-Sub1, BINA Dhan 11 and Swarna-Sub1) were distributed to 3 different FPCs in Kamrup, Morigaon and Nagaon districts. These FPCs then distributed the seeds to the member farmers. The quality control of the seed production program follows a strict seed production protocol. The Assam Seed and Organic Certification Agency (ASOCA) in collaboration with the different state departments monitor the seed production plots through their inspectors by involving farmers. FPCs receive a Seed Certification Tag after harvesting, grading, and clearance of the seed samples.

During 2018-22, 16,875 kg breeder seed (BS) of different rice varieties like Ranjit-Sub1, Bahadur-Sub1, Swarna-Sub1, BINA Dhan 11, DRR Dhan 44,

BINA Dhan 17, BRRI Dhan 75, Keteki Joha, Bokul Joha and CR Sugandh Dhan 909, and 10,570 kg foundation seed (FS) of rice varieties- Ranjit-Sub1, Bahadur-Sub1, Samba Mahsuri-Sub1, BINA Dhan 11, BINA Dhan 17 and DRR Dhan 44, were distributed with different institutions/entrepreneurs/FPCs of the State.

To increase the quality seed production in the State, ASCL has involved 15 FPCs for paddy seed production during the *Sali* season, 2022. A total of 217 kg foundation seed of Ranjit-Sub1 and



25 kg foundation seed of Bahadur-Sub1 were provided for multiplication to these FPCs (Table 1).

Table 1: List of Farmer Producer Companies involved in paddy seed production in Assam

Sl	Districts	Name of FPC
1	Biswanath Chariali	Burhigang Valley FPC, Baghmora block, Biswanath, Gingia ADO circle
2	Golaghat	BokakhatAgro Organic Producer Company Ltd, Golaghat
3	Kamrup	TeteliaAgro Organic Producer Company Limited, Tetelia, Kamrup (M)
4	Morigaon	PooharAgro Producer Company Ltd., District- Morigaon.
5	Nagaon	Sankar Azan Agro Producer Co. Ltd., Bengenaati, Nagaon
6	Kamrup	Dobok Progressive FPC, 1 No. Dobok, PO- Dobok, District- Kamrup
7	Golaghat	Golaghat Tomato FPC Ltd., Rupkolia, Furkating, Golaghat, Assam- 785702
8	Golaghat	PadumpotharAgro Organic Producer Co. Ltd., Golaghat
9	Morigaon	Seuji FPC, Vill- Bhurbandha, Morigaon
10	Nagaon	Noipam Agro Producer Co. Ltd., Village- Sukatiputa, P.O.- Tulashimukh, Block- Pakhimaria, Nagaon PIN- 782101
11	Kamrup	Ampri Orange Producer company limited, Kamrup
12	Lakhimpur	Madhabdeb Organic Agro Producer Company Limited
13	Darrang	DAST- R, Mahaliapara, P.O.- Burhinagar, Sipajhar, Darrang, Pin-784147
14	Sonitpur	Majiya Farmer Producer Company Limited
15	Biswanath	Jeutia Garaka Farmer Producer Company Limited, Sootea, Biswanath (Assam)

IRRI with its partners is continuously working with the FPCs to strengthen the seed system in the State. The seed sector in Assam needs to be developed with the active involvement of different community organizations and involvement of FPCs may be the game changer for the seed value chain of Assam. Few of the activities are suggested below for immediate execution by FPCs and other stakeholders for development of a sustainable seed business:

- Raise awareness of farmers on use of certified seeds
- Train a core set of FPCs farmers on seed production and multiplication techniques
- Identify seed varieties that are conducive to the region
- Establish downstream aspects of seed production for farmer groups such as seed processing, packaging, seed marketing, etc.
- Establish seed marketing and distribution networks
- Strengthen the linkage with various players in the ecosystem including farmers, NGOs, SAUs, seed companies, certification agencies, exporters, and other stakeholders
- Developing a digitized platform for seed production and supply chain activities
- End to end traceability for better visibility and supply chain optimization
- Adoption of sustainable and climate-resilient practices for production
- Access to finance/credit facility for the farmers

From Paddy to Prosperity: Harnessing Opportunities in Rice-based Business Ventures

-Gyandip Pandia,
Senior Specialist, IRRI

Assam Agricultural University, under the Assam Agribusiness and Rural Transformation Project (APART), with technical support from IRRI is focusing on promoting profitable business models to address the technology and service gaps. It also aims to increase supply-chain efficiency through drying, processing, milling, storage, marketing, and other services to smallholder farmers through Farmer Producer Companies (FPCs). Potential product-based businesses, like seed processing, rice milling, and service-based units have been established to improve profitability and promote



inclusive access to technology and services amongst the farm communities.

A business-driven model with the active engagement of community

institutions will ensure ownership and sustainability of the model. Business opportunity for a Farmers Producers Company (FPC) in a rice-based cropping system involves various aspects of the rice value chain. The business opportunities can be divided into three major stages of the rice value chain, i.e. pre-production, production and post-production stage.

Pre-production

- » Input business: Starting an input business for a FPC can be a venture to support and empower local farmers. They can venture into the sales of inputs like seeds, fertilizer, pesticides, etc.
- » Nursery enterprise: Paddy mat-type nursery can be a profitable business for agri-entrepreneurs or FPCs.

Production

- » **Seed production:** FPCs can be engaged in paddy seed production. They can produce and sell high-quality paddy seeds to other farmers, ensuring genetic purity, disease resistance, and improved yield. Seed production can be a profitable business.
- » **Custom hiring centres:** Establishing a custom hiring centre can be a lucrative business opportunity, especially in rice production areas. Custom hiring centres will provide machinery and equipment on rent to farmers, allowing them to access modern and expensive farming equipment without the need for large

upfront investments.

- » An entrepreneur-driven private service provider model is a business that focuses on providing farmers with access to localized crop-specific, customized farm machinery and equipment on a rental or hire basis.
- » **Farm extension and advisory:** Initiating a farmers' advisory and extension business by a Farmer Producer Company (FPC) can provide valuable support and knowledge to farmers, enabling them to improve their agricultural practices and increase their yields.
- » **Premium quality (PQR) farming:** With the increasing demand for PQR growing and marketing of, PQR varieties can be a lucrative business opportunity.

Post production

- » **Rice processing and milling:** Establishing a modern rice processing and milling facility can add value to the rice produced by the farmers. The FPC can purchase paddy directly from the farmers, process it into high-quality rice, and sell it in the market. This can include activities, such as cleaning, hulling, polishing, sorting, and packaging.
- » **Rice packaging and branding:** Developing a unique brand for the rice produced by the FPC can help differentiate it in the market. The FPC can focus on attractive packaging, ensuring quality standards, and promoting rice as a premium product. This can target consumers who value

quality and are willing to pay a higher price.

- » **Rice by-products:** Rice milling generates various by-products such as rice bran, rice husk, and broken rice. These by-products can be utilized to make different value added products.
- » **Value-added products:** FPCs can venture into the production of value-added paddy products. This may include products like rice flour, puffed rice, flattened rice (poha), rice bran oil, rice-based snacks, and ready-to-cook rice mixes. Rice-based beverages like rice milk or rice wine have gained popularity in recent years.

The FPCs need to conduct feasibility studies, assess market demand, analyse costs and profitability, and consider the local agricultural

ecosystem before deciding on any specific paddy-based business opportunity. Additionally, collaboration and collective decision-making among members of the FPC will be crucial for success. Rice-based businesses can support FPCs in consolidating the market power of small and marginal farmers. By aggregating the rice produce from multiple farmers and adding value to the product, FPCs can negotiate better prices, access larger markets, and enhance the overall bargaining power of the farmers. This will result in reducing the transition velocity of the product, bringing in more transparency; traceability and trust to the rice value chain and better price realization for the smallholder farmers.



Rice Doctor Assam For Accurate And Timely Diagnosis Of Rice Problems

Puja Rajkhowa,

Junior Researcher, Communication, IRRI



Rice is an important crop in Assam, growing at about 70% of the total cultivated land in the state. The hot and humid climate of Assam, makes it favourable for insect pests and diseases and causing yield losses of nearly 15-20% in rice. Rice grown in Assam is subject to different insect pests and diseases and if it is left untreated, can lead to significant yield losses and ultimately reduction in farmer's profits. Therefore, to manage yield-limiting factors effectively, the most important step is early and correct diagnosis of the problem and its subsequent management.

Effective agricultural extension and access to knowledge are essential to facilitate improvements and productivity gains in the agricultural sector.

The need to develop user-friendly insect-pest, nutrient deficiency/toxicity and disease diagnostic tools for climate-resilient sustainable rice production in Assam has been of utmost importance. Stakeholders in all rice-producing regions of Assam can now benefit by having access to science-based tools on their smart mobile devices. Rice Doctor is a mobile app developed by AAU in collaboration with IRRI under the aegis of APART and built on the Lucid/Identic platform to expedite and simplify the task of pinpointing the cause of field problems and provide instant solutions and management practices recommended for Assam.

The app is developed in two languages (English and Assamese) for the ease of use and wide dissemination as a diagnostic tool. The app is also

used as an educational material for the stakeholders, thus reducing the cost and improving the quality of the rice crop. Targeting different stakeholders, like farmers, extension advisors, students, and input-dealers etc, the app aims at bridging the information gap between research and farm practice. It is a one-stop source of information on 63 insect pests, diseases, nutrient deficiencies, toxicities and agronomy-related problems.

Since the launch of the app in September 2022, several trainings on the operations and functionality of the app for the farmers, extension functionaries, students and academicians and others have been conducted. Boro season 2022-



23 witnessed more than 370 end-users trained to operate the app. In addition, in the current Sali season, 36 trainings are scheduled across 18 districts of Assam. The app has already been installed by 1000 users and counting. The app has created much enthusiasm amongst the farm community as it helps timely and accurate diagnosis of rice problems

Grand Harvest Program For Demonstration Of Harvesting Technologies

Suryakanta Khandai, and Silas Wungrampha, IRRI

Assam hugely relies on the agriculture sector for its economy with 27.5 lakh farm families. The agro-climatic condition of Assam with its highly fertile arable soils, abundant rainfall, and rich biodiversity favours the production of rice in the state. However, the average productivity of rice (2237

kg/ha) is lower than the national average (2809 kg/ha). Amongst various reasons, the non-adoption of modern technology is one of the limitations for low productivity of the state. Paddy harvesting is traditionally done manually. Manual harvesting is labour-intensive and costly. Moreover,

the harvest window is very short. Farmers often find it difficult to harvest crops during this period. To address these challenges, Assam Agricultural University, and the Department of Agriculture (DoA), Govt. of Assam, with the technical support of IRRI under the APART are promoting farmer-friendly modern harvesting and threshing technology like mini combine harvester, reaper, reaper-binder, axial flow thresher, open drum thresher, etc. These technologies are being promoted among farmers through different trainings and demonstrations.

Technological exhibitions play a critical role by increasing awareness among key stakeholders, especially farmers and officials of agriculture and allied departments, thereby promoting farm mechanization and post-harvest technologies and encouraging entrepreneurship among youths and women. Hence, grand harvest programs using mini combine harvesters and reapers are being organized with the objectives of

- » on-site demonstrations to showcase the advantage of improved modern technologies for disseminating information and influencing farmer groups to adopt modern technologies
- » educating the farmers about critical inputs and practices for getting



maximum yield from the field.

- » wider publicity of modern technologies in the district.
- » providing firsthand knowledge on the benefits of improved technologies in yield, saving in cost and time of operation, reducing postharvest losses, etc.

During the Boro season, 2023, 176 Grand Harvest programs (92 under DoA, and 84 under AAU) are planned to be organized. The programs are participated by farmers, FPC members, panchayat members, representatives of district administration, and local MLAs/representatives. This collective gathering of experts and policy makers on one platform helps farmers to clear several technical and policy-related doubts that a farmer has. Over the years, several farmers are getting benefited from this program. More than 100 farmers participate and interact with scientists, and agriculture officers during the event.

During the grand harvest program, IRRI experts practically demonstrate the use of machines in the field and explain the benefits of mechanized harvesting and threshing and a comparative advantage of combine harvester and reaper/axial flow thresher use over the traditional

method of harvesting and threshing. The biggest motivation for the farmers on using improved technologies as said by some progressive farmers is that with the use of post-harvest machinery, the field could be vacated early, facilitating timely plantation/sowing of the next crop.

Promoting Sustainable Rice Cultivation In Assam Through The Use Of Biotic Agent

*Thanga Suja Srinivasan,
Specialist, IRRI*

Rice is the most important staple food crop in Assam and its cultivation is carried out in 2.54 million ha of the total cropped area (4.16 million ha) in the state. The promotion of sustainable agriculture practices like bioagents, can intensify rice production and productivity with a minimal reliance on chemical-based cultivation practices in rice. Bio agents can be bio fertilizers, bio pesticides, predators and parasitoids that reduce the intensity or severity of insect pest damage and promote plant tolerance against biotic and abiotic stress factors

Biofertilizers in rice cultivation

Bio-fertilizers can be symbiotic or non-symbiotic microorganisms that help in fixing nutrients or convert

unavailable nutrients to bioavailable form(s) through microbial processes. Bio-fertilizers include beneficial bacteria and fungi that are isolated, screened and commercialized as



bio-fertilizers like nitrogen (N) fixing microorganisms - Azospirillum, phosphate (P) solubilizing bacteria (PSB), potash (K) solubilizing bacteria (KSB), and zinc (Zn) solubilizing bacteria (ZSB). These inoculants can be applied directly or indirectly to seed, soil or plant surface for increased plant growth and yield by mechanisms involving nutrient fixation, improved nutrient bioavailability and uptake, increased root biomass and enhanced defense responses against stress factors.

Biopesticides in rice cultivation:

Biopesticides can be of microbial origin or plant-based. Microbial agents of fungal, bacterial or viral origin have been isolated, evaluated for their efficiency and commercialized against numerous pests and diseases of crop plants. Among them, *Trichoderma* spp. of fungal origin and *Pseudomonas* spp. of bacterial origin have been successful in controlling many diseases of rice crops.

Trichoderma spp.: *Trichoderma* is a well-recognized biocontrol agent that protects crops against several soil and airborne pathogens, like sheath blight, sheath rot and a brown spot of rice. They act through rhizosphere competition, antibiosis, and mycoparasitism against phytopathogenic fungi, bacteria, and nematodes. Their



efficacy against soil-borne fungal pathogens is higher compared to fungicides.

***Pseudomonas* spp.:** *Pseudomonas* spp. occurs in all agroecosystems including plant surface, soil, plant debris and organic matter content. *Pseudomonas fluorescens* belongs to the plant growth-promoting rhizobacteria (PGPR) and is involved in plant growth promotion, induced systemic resistance, and biological control of plant pathogens. *Pseudomonas fluorescens* protects crops against fungal and bacterial plant pathogens, especially bacterial blight, blast and sheath blight of rice.

Predators and parasitoids in rice cultivation: Predators and parasitoids population naturally occur in rice ecology and help to maintain the pest population below threshold levels.

Bio agents promoted under APART : Zinc solubilizing bacteria
Manures and biofertilizers: **Biopesticides:** *Pseudomonas fluorescens*, *Trichoderma viride*, Egg parasitoid- *Trichogramma* spp. as Trichocards
 Enriched compost, N fixing bacteria: *Azospirillum*, Phosphorus solubilizing bacteria (PSB): *Phosphobacterium*, Potash solubilizing bacteria (KSB),

- » **a. Enriched compost:** Enriched compost contains loads of microbial inoculants/ live cell formulations that have colonized organic manures (compost, FYM, vermicompost etc.) and proliferated several folds in the manure. The enriched compost has higher organic matter content, nutrients, plant growth-promoting substances, phytohormones, humic acid etc. They can act as both biofertilizers and biocontrol agents by improving overall soil health and plant health.
- » **b. Seed treatment using either *Trichoderma* or *Pseudomonas*:** Exposure of rice seeds to biological agents like *Trichoderma* spp. or *Pseudomonas* spp. promotes seed germination, and plant biomass, and also acts as an immune stimulator protecting a broad range of rice diseases. To successfully establish microbial inoculants in the rhizosphere region, either *Trichoderma* or *Pseudomonas* is applied as dry seed treatment @ 10g/kg of rice seed for 1 hr followed by shade drying for 30 mins and sowing.
- » **c. Seedling root dip method before transplanting using bio-fertilizers:** Microbial agents like *Azospirillum*, *Phosphobacterium*, potash solubilizing bacteria (KSB) and zinc solubilizing bacteria (ZSB) can substantially reduce the chemical fertilizer usage by increased nitrogen fixation (N), nutrient mobilization and solubilization in case of phosphorus (Ph), potash (K) and zinc (Zn) nutrients. These miniature inoculants colonize the root rhizosphere and promote nutrient acquisition and plant growth. The seedling root dip method can be adopted for colonizing rice roots. A bed of size 2.5 m x 2.5 m x 0.15 m is prepared in the field and filled with up to 2 inches of water to which 4.0 kg of NPK consortium (*Azospirillum*, PSB and KSB) along with 4.0 kg of ZSB (for 1 ha rice seedlings) is suspended and a slurry is prepared. The roots of the rice seedlings are dipped for 8 to 12 hours (overnight) and then transplanted to the main field.
- » **d. Trichocards:** *Trichogramma* is tiny beneficial wasps that feed on the eggs of several insect orders, including Lepidoptera, Coleoptera, Diptera, Hemiptera, Hymenoptera and Neuroptera. Tricho-cards containing *Trichogramma* are an efficient way for controlling lepidopteran pests of rice like stem borers and leaf folders.

Gohpur Fish Farmer Producer Company Ltd

Background: Jokapura village near Gohpur town in Biswanath District of Assam has witnessed a Blue Revolution model despite geographic challenges even during the times of Covid because of the vision of one entrepreneur, Anup Sarmah, 45, son of a retired Govt teacher Siva Sarmah constructed a 10-acre fish pond in the middle of a 30 sqm wasteland in 2015. With his brothers, has converted the fishery into a 150 bigha (50 acres) project in 2020. He divided the fishery into 20 ponds and fish seed nurseries which have been managed by 10 skilled personnel.

In the year 2020, The Department of Fisheries, Govt of Assam, led by Commissioner & Fisheries Shri Rakesh Kumar, IAS, Director Fisheries Shri Nirmal Kanti Deb, ACS, other



Gohpur Fish Farm

special officers from the Department and Fishery Coordinator from ARIAS Society visited the fish farm of Anup Sarmah. The World Bank finance project APART under ARIAS Society was kind enough to suggest he take up the FPC movement by engaging local fish farmers of the greater Gohpur area. With the support & guidance from APART, the Gohpur Fish Farmer Producer company was incorporated in March 2021.

- **Name:** Gohpur Fish Farmer Producer Company Limited
- **Date of incorporation:** 11th March 2021
- **Corporate Identity Number:** U01100AS2021PTC021119.
- **Registered Address:** Khatarbari, Barangabari, 784172, Gohpur, Assam
- **Shareholders:** 453 (Male: 366, Female: 87). No of FIGs: 33
- **Staff strength:** Total 7 nos: Supported by APART: 3 nos (CEO-1, Accountant-1 & Office Assistant- 1): Supported by FPC: 4 (four nos). Total 7 nos

The Journey:

With support from APART, the FPC was approved for the establishment of a genetically improved Fish Seed Bank and also the construction of a Fish Seed hatchery. To start the work APART project organized an exposure visit to Orissa in Feb 2021 to see the seed bank, and brood bank and also to acquire practical knowledge on aquaculture. After returning from Orissa, the FPC started constructing the Fish Seed bank comprising an area of 16 acres divided into four nursery tanks and nine rearing tanks of different sizes.

This fishery project site and its adjoining villages under the BakoriDoloni Gram Panchayat area are completely flood prone and get submerged from April to October as the Brahmaputra gets flooded with extra volume of water which overflows both sides of the



Inauguration of CSC of FPC



Fish Seed Bank

river causing serious damage to agriculture. Due to recurrent floods and deluge, these lands become unsuitable for paddy cultivation thus making marshy land. The entire land area became a wasteland, lying for decades and becoming unproductive for generations. To prevent the flood, the pond embankment was raised to 14 feet in height with a width of 80 feet at the base. The top surface of the embankment is made provisions to cross the two vehicles together with a width of 20 feet. This has helped the FPC to prevent the entry of flood water levels. For proper balancing and protection of the embankment, they have also installed sluice gates which regulate the water level inside the pond.

Mr Sarmah, an MSc in Botany from Gauhati University, resigned as a research associate from the erstwhile Regional Research Laboratory in Jorhat Assam and

took up this challenge to convert these flood-affected wastelands to address the unemployment problem of the area which was recognized by the National Fishery Development Board (NFDB), Dept of Fisheries, Govt of India on 21st Nov 2021 on the occasion of the world fishery day as the Best Fish Farmer under the category NE & Hilly states.

The Business Plan:

The FPC brings GI fish seeds from NFFBB Bhubaneswar by air service which are packed in plastic oxygen packets. These seeds are grown here in the seed bank which is the largest GI fish seed bank in central & eastern Assam. The Central Institute of Freshwater Aquaculture CIFA under ICAR), The National Fishery Development Board (NFDB under Dept of Fisheries) and many more research institutions have been working relentlessly in bringing the best genetically resourceful fish variety. Through the scientific research, selection and hybridization process, the following few varieties have been developed by these institutions which have a greater weight gain and advantages over the normal varieties which are grown in the seed bank of the FPC

- » Jayanti Rohu in place of normal Rohu
- » Amur Common carp in place of Common Carp
- » Improved Catlain place of normal Catla
- » GIFT Tilapia in place of normal Tilapia
- » Scampi (freshwater Scampi)

Under the APART-supported project, the FPC has already established a Fish Seed bank of High Yielding or Genetically improved fish seeds covering an area of 16 acres, the largest single unit GI fish seed bank cum fish seed Nursery in the NE region. Fish spawns brought from NFFBB Bhubaneswar are released in earthen pond nurseries. The early fry or fry seeds will be released in ponds for fingerling and then yearling production. Fry, fingerling and yearling seeds are kept for sale which becomes the income for the FPC.

The Seed Bank has a brood bank pond, nursery tanks, rearing tanks and a carp seed hatchery is being constructed.



Indicators	2020-21	2021-2022	2022-23
Expenditure (capex & opex)	Capex: Rs 7.2 lakhs	Cap: Rs 47.6 lakhs	
Opex: 11 lakhs	Capex: Rs 3 lakhs		
Opex: Rs 14 lakhs			
Seed Fry & Fingerlings sale	Nil	1 lakhs pcs	8 lakhs pcs
Seed: Yearlings	Nil	2000 kg	8000 kg
Revenue generation	0	Rs 14 lakhs	Rs 23 lakhs

Fish Seed production and business volume:

Convergence:

- » Training & capacity building from the Department of Fisheries, Govt of Assam
- » Aqua-Tourism Park inside the FPC fishery complex under PMMSY by a shareholder
- » GAIS: 4000 fish farmers enrolled in 2022-23, continuing
- » NFDB: NFFBB, Gol: GI seed spawn & technical support
- » Rang De Financial Service: MoU signed for a loan to shareholders
- » Assam Energy Development Agency for 10 kW solar plant
- » APDCL: 63 KVA electricity connection at 80:20 financial support pattern
- » KVK: Technical support



10 kW solar plant



63 kva electricity connection

Other Support from APART:

- » Financial support of Rs 35 lakhs (till April 2023) for the establishment of Seed Bank
- » Recruitment of three nos of HR (CEO, Accountant and Office Assistant) for the FPC
- » 11.6 km long all-weather FPC production approach road is being constructed with a cost of Rs 1.96 cr
- » Training in Bhubaneshwar (CIFA, NFFBB)
- » Exposure visit to Tripura for Freshwater prawn & Pabda culture & their breeding
- » The recommendation in obtaining a 10 kW solar plant from AEDA, Govt of Assam



Road construction is underway



Media coverage

Achievements:

- » Awarded as the Best Fish Farmer under the NE & other Hills state category by NFDB, Dept of Fisheries, Govt of India in 2021
- » Awarded as the best fish farmer in Assam: By Fishery Minister, Govt of Assam, 2021
- » Selected for the presentation in the FPC conclave in Guwahati (July 2022)

Krisarthak – Pilot Implementation And Findings

Krisarthak - The name is composed of the word "Kri", which is derived from Krishi (agriculture), and "Sarthak", which means "significant". Krisarthak is a program under the project APART, which aims to significantly improve the financial lives of farmers by educating them about various financial tools that can free them from money worries and improve their standard of living.

The pilot phase of the Krisarthak program, also known as financial education and counseling (FEC), was conducted in six districts of Assam from January to March 2023. The districts were Kamrup, Sivasagar, Charaideo, Baksa, Barpeta, and Nagaon. During the pilot phase, 2834 beneficiary farmers of the APART were mobilized under the FEC initiative. Of the total number of beneficiaries, 52.5% were female and 47.5% were male, 37.8% used smart phones and 58.2% used basic phones.

The pilot tested all ICT tools and processes developed under the Krisarthak program to verify their effectiveness for the final rollout phase. Since Krisarthak is a digital program, the pilot was crucial to



find out how receptive the farming community is to these ICT tools. At the same time, Krisarthak proposed a balanced mix of digital and physical components in mobilizing and training beneficiaries. In this regard, the pilot provided a good opportunity to test the assumptions, strategies, and components that the Krisarthak team had outlined in its rollout and inception plan.

One of the core components tested during the pilot was the BittiyaSakhichatbot, through which farmers could easily access financial literacy content. The chatbot consists of animated videos in the local language through which people can learn more about various financial products and services in an engaging way. The chatbot's modules are intended to be self-paced by all



farmers. During the pilot, 1093 smartphone users registered with the chatbot, of which 561 users completed the modules.

As part of the physical component, Sahayaks were recruited in different districts during the pilot phase. Their tasks included contacting Farmer Producer Company (FPC) CEOs and BODs in their respective districts and asking for their help in mobilizing farmers. The Sahayaks also conducted workshops to train farmers on how to use the BittiyaSakhi chatbot.

In the physical workshops, farmers were digitally trained by the Sahayaks, making the Krisarthak program accessible to all farmers. In addition to mobilization, the sahayaks also assisted the central team in reporting, taking requests from the field, conducting surveys, and troubleshooting digital issues wherever needed. The Sahayaks were also responsible for conducting feedback workshops to determine the effectiveness of the program. In addition to digitally-enabled financial education, the Krisarthak

program also aims to bring financial advice to each farmer's home. During the pilot, this face-to-face advice was provided to farmers through call centers. Through the BittiyaSakhichatbot, farmers could fill out a survey form and receive personalized advice from financial experts. These consultations were arranged through the call center.

In addition to providing financial advice, the call center was also used for various other purposes, such as answering beneficiaries' questions, receiving feedback, and following up on workshops and modules.

During the pilot, the call center received about 38 requests for advice and another 62 calls about technical and financial issues. The call center also played a critical role in collecting feedback from 1622 farmers who had participated in the Krisarthak program. In many cases, the call center helped basic phone users register on the BittiyaSakhiChatbot using the Smartphone available in the family.

In April 2023, the results of the pilot phase were summarized in a report and submitted to APART. Necessary changes were made for the effective implementation of the program. From May 2023, the final implementation phase of the Krisarthak program is being initiated across the state.

Nutri-Cereals Millets – The Power House Of Health

Smti Porna Sarmah,

SMS, Community science, KVK, Kokrajhar, AAU- Jorhat, Assam.

Millet is the term used for a wide range of cereals that describes seeds from taxonomically divergent species of grass that are grown in marginal agricultural areas where the major cereals fail to give substantial yields.

Millets are grown extensively in India and research reveals that millets are most likely cultivated simultaneously in Asia and Africa for thousands of years. Millets are the world's six most important cereals and there are wide ranges of millets. The major varieties are pearl millet (*Pennisetum Glaucum*), Proso or white millet (*Panicummitiaceum*), Finger millet (*Eleusine coracana*) and Foxtail millet (*Setaria Italic*). Others are Barnyard millet (*Echinochlore Spp.*), Kodo millet (*Paspolum Scrobiculatum*), Guinea millet (*Brochiaradeflexa*) and Brown top millet (*Urochloa Romosa*). In Assam, mostly finger, foxtail and proso millets are grown, these millets are also climate friendly.

Changing lifestyle, urbanization, age, race, specific nutritional status,



attested immunity, socio-economic status, sedentary lifestyle, stress and changing food patterns are some of the contributing factors to increased risk of 'Non-communicable disorders' namely obesity, diabetes mellitus, cardiovascular disease (CVD), overweight, hypertension, osteoporosis and others.

Modern life with increasingly sophisticated communication also indirectly influences one's diet. Generally, fast food tastes delicious but contains saturated fat, and is low in dietary fibre, as vegetables and fresh fruits are used only for garnishing purposes. The market for

semi-processed/cooked and ready-to-eat foods is rising at a rate of 20% with rapid urbanization.

The challenge is to identify hypoglycemic, non-cholesterolemia staples of the region, that are farmer friendly and climate resistant and promote their use in the demand-driven lifestyle. Millets- t the age-old cereal crop stands up first in the list of being naturally nutraceutical.

Millets with nutraceutical properties exhibits remedial solution against problems of stress and restores a feeling of wellness, peace and relaxation due to steady release of 'Serotonin' a neurotransmitter. Lifestyle products, made from millets, for all age groups also contribute phytochemicals, phytoestrogens, anti-oxidants etc which combat NCDs like Diabetes, CVD, osteoporosis, overweight, obesity, mental stress etc.

In India, especially in Assam millet utilization is limited to some pockets and found to be consumed by specific communities only. However, millet can be blended well with common staples without any pronounced off flavours. Millets have the potential to be used as staples in ready-to-eat (RTE) foods, ready-



to-use (RTU) foods, mixes etc. Millets combined with regional legumes, and oilseeds sprouted over 24 hours with a one-centimetre sprout length could be even served as millet salad. Moreover, there is a wide scope for processing millet into breakfast flakes, RTE foods, staple convenience food, nutritional convenience foods and snacks. Millet is a delicious grain whose consistency varies depending upon the cooking method; it can be creamy like mashed potatoes and fluffy like rice. Additionally, since millet does not contain gluten, it is a wonderful grain alternative for people who are gluten sensitive. When such nutria-rich minor grains forms a major share almost 70% of noodles or pasta, the meal would be not only delicious but also healthy.

Millet- the powerhouse

Millets are a good source of some very important nutrients, including

manganese, Phosphorous, and magnesium known for heart health. The phosphorous provided by millet plays a role in the structure of every cell in the body. In addition to its role in forming a mineral matrix of bone, phosphorous is an essential component of numerous other life-critical compounds including ATP (adenosine triphosphate), the molecule that is known as the energy currency of the body. Phosphorous is an important component of nucleic acids, the building blocks of the genetic code. In addition, the metabolism of lipids (fats) relies on phosphorous and phosphorous is an essential component of lipid-containing structures such as cell membranes and nervous system structures. Millets and other whole grains are rich sources of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including

enzymes involved in the body's use of glucose and insulin secretion.

Finger millet contains about 5-8% protein, 1-2% fat, 65-75% carbohydrates, 15-20% dietary fibre and 2.5-3.5% minerals. It has the highest calcium content i.e., 344mg/100g among all cereals. Ragi also has a good number of Essential Amino Acids (EAA) namely valine, Methionine, Isoleucine, Threonine and tryptophan which are essential for the human body. Valine is essential for the repair of tissues, muscle coordination and metabolism; isoleucine is for ensuring blood formation, and keeping a check on blood sugar levels; threonine helps to maintain protein levels in the body; tryptophan acts as a natural relaxant and helps fight anxiety, depression and insomnia; methionine helps promote the growth of healthy skin and hair.



Fishery Minister distributes Formalin and Water testing kits under APART

The Minister of Fisheries, Shri Parimal Suklabaidya distributed the formalin and water testing kits to the officials of the Department of Fisheries, Assam at Dispur on 7th July. In the ceremonial distribution, the Minister elaborated on the importance of formalin detection kits as most cases, dishonest traders use formaldehyde to prevent spoilage and keep the fish in marketable condition. "As this solution is widely available in the market, fish traders and suppliers have easy access to the chemical for adulteration", he added. He also stressed the importance of water testing kits with all Departmental Officers so that the water quality can be analysed on the spot for the benefit of the farmers. A total of 30 Officials from across the project districts of APART attended the



function and received 60 formalin detection kits (1500 samples capacity) and 20 water testing kits (2000 samples capacity).

Addressing the occasion, Shri Rakesh Kumar, Commissioner and Secretary, Fishery Department appreciated the efforts of Assam Agri-business and Rural Transformation Project (APART) for providing this facility to the fishery Department officers for the benefit of the farmers.



Anchoring the programme, Dr Dhruba Jyoti Sharma, Nodal Officer, APART and Managing Director, FISHFED said that the formalin detection is recommended by ICAR-CIFT (Cochin) and the existence of formalin can be measured within 30 seconds.

Amongst others, Sri N. K. Debnath, Director of Fisheries, Sri P. Barkakati, MD, Assam Fisheries Development Corporation, Sri. P. Baishya, Deputy Secretary, Fishery Department, Kishor Ranjan Das, Director of Instruction,

RFTI, Amranga, Dr R. C. Barman, Joint Director of Fisheries, Dr Sanjay Sarma, Fishery Co-ordinator, APART advised the Officials for optimal use of the tools for the benefit of the fishery entrepreneurs.

Cage Culture For High Yielding Fish Seed At Gorukhuti Kuhtoli Beel

Cage culture is an aquaculture production system where fish are held in a floating net and water is allowed to pass freely from the resource permitting water exchange and waste removal into the surrounding water. A Cage culture can be established in any suitable water body, including lakes, ponds, mining pits, streams or rivers with proper water quality, access and legal authority. This flexibility makes it possible to exploit under used water resources to produce fish.

Under the World Bank-funded project APART, cage culture of fishes was inaugurated recently at the Kuhtoli Beel by Shri Padma Hazarika, Chairman of Gorukhuti Bahumukhi Kripi Prakalpa, Darrang District. He thanked the Fishery Department for taking up the initiative to fulfil the demands of high-yielding fish seed at an affordable price through this



cage culture unit. Amongst, others, the Chief Executive Officer of

Gorukhuti Prakalpa Sri Udipta Gautam, the District Fishery Development Officer, Darrang Sri Bipul Khataniar, progressive fish farmer Biswajyoti Sarma and Amal Medhi attended the programme.

Explaining the seed-rearing capacity of the cage culture unit, the District Officer mentioned that every three months this unit could produce 70,000-80,000 nos of advanced fingerlings for the use of farmers.

It is pertinent to mention that the quality of fish seed depends on the scientific rearing practices followed in the preparation and management of nursery ponds. But due to the geographic location, the lack of nursery ponds is the main cause of constraint for fish culture at the Gorukhuti project. To make availability of quality fish seed in the Krishi prakalpa, Cage culture is an aquaculture production system where fish are held in a floating net and water is allowed to pass freely from the resource permitting water exchange and waste removal into the surrounding water. A Cage culture can be established in any suitable water body, including lakes, ponds, mining pits, streams or rivers with proper water quality, access and legal authority. This flexibility makes it possible to exploit under used water resources to produce fish.

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availability of quality fish seed in the Krishi prakalpa, the rearing of high-yielding fish seed is practised in cages and installed at natural water resources. This facility makes it possible to exploit underused water resources to produce quality fish seed. Attending a training session before the inauguration of the cage culture unit, Dr Sanjay Sarma, Fishery Co-ordinator of ARIAS Society explained the importance of Genetic awareness and the introduction of high –a yielding fish variety campaign in a massive way to educate the fish seed producers



and growers on planned breeding programme. He gave some technical inputs to the farmers associated with the cage culture unit so that they can constantly supply quality seed to the farmers who are engaged in table fish production in that locality.

Exit Strategy Workshop of WorldFish under APART

WorldFish, also known as the International Center for Living Aquatic Resources Management (ICLARM) was engaged under the World Bank-funded Assam Agri-business and Rural Transformation Project (APART) for providing technical support to the Directorate of Fisheries in the implementation of the Fishery Value Chain. The fishery Department organized an exit strategy Workshop at the Conference Hall, Associate Directorate of Extension Education, CVSc, Khanapara on 28th June 2023. A total of 100 participants consisting



of various partners and stakeholders attended the programme. Keeping in line with the Project Development Objective of APART, WorldFish provided a technical contribution that envisages accomplishing

the objectives and enhancing the contribution of small-scale fisheries to food security in Assam. Addressing the occasion, Dr C. V. Mohan, Principal Scientist of WorldFish explained their activities for increasing the availability, access and consumption of nutrient-rich safe fish, especially for women of reproductive age, infants and young children. Dr R. Suresh, Resident Consultant of WorldFish-APART, lauded their support to promote gender transformative approaches to sustainable aquaculture and community management beel fisheries.

Sharing the experiences of working with WorldFish, Shri N. K. Debnath, Director of Fisheries, Dr Dhrubajyoti Sharma, Nodal Officer, APART, Dr Ramendra Ch. Barman, Joint Director of Fisheries and Dr Sanjay Sarma, Fishery Co-ordinator, ARIAS Society, highlighted the achievements of APART Fishery activities under the technical support of WorldFish for promoting climate resilient technologies for sustainable aquaculture and small-scale fisheries practices in Assam. They also praised the International organization for conducting several ToT programs at the College of Fisheries and field-level training



programmes under Assam Agril University.

Under APART, the climate resilient technology, such as small indigenous fish culture is being practised scientifically with carp farming and hygienically dried fishes as per the specifications and requirements of the market. Further, the production cycle is adjusted, so that the fish can be sold in the market during the high-demand period i.e. April to June and the farmers get an additional amount of Rs. 30-40/kg from their fish.

Dr Arun Padiyar summarised the feedback from stakeholders and shared that the Farmer Producer Groups (FPGs) are following the Best Management Practices (BMPs) provided by WorldFish, wherein they are obtaining market-led fish produce.

Dr Binod Kalita, Dean College of Fisheries, Dr B.N. Saikia, Dean, CVSc, Dr Atul Bargosai, Associate Director of Extension Education and others also elaborated on the technical support extended to the Department of Fisheries for the successful implementation of APART Fisheries activities.



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KRISHI RUPANTAR

ARIAS SOCIETY

(An Autonomous Body of the Govt of Assam)

Agriculture Complex, Khanapara, G.S Road, Guwahati -781022 (Assam, India)

Tel: +91 361-2332125 | Email: spd@arias.in | Web site: www.arias.in

Grievance Redressal : grievances@arias.in | Toll Free : 1800-102-0338

(10 a.m – 5 p.m- excluding holidays)

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