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BINA DHAN 11 BECOMES A GAME CHANGER IN THE RIVERINE AREA

The Story of Jubeda

-A. Mannan Choudhury, Puja Rajkhowa and Neeraj Kumar Tyagi, IRRI

Dhubri is one of the most flood-affected districts in Assam, causing massive destruction of lives and agricultural land and displacing hundreds of people annually. Andabari is a hamlet in Dhubri, under Nayeralga block, which is severely prone to such devastating floods. Jubeda Khatun, an enterprising young lady with the zeal to improve the economic conditions of her household, belongs to this hamlet.

Jubeda and her family fall under the marginal landholding category and possess $\frac{1}{2}$ an acre of land. As a family of three, they require approximately 1000 kg of rice per year, but need an additional 500 kg to accommodate the demands of festivals and visiting relatives annually.

The Story of Jubeda

Jabeda was constantly looking for means of economic empowerment and had cultivated only summer paddy most of her life, due to her medium upland conditions and the area being flood-prone. This made her hesitant to consider cultivating Sali paddy due to food security concerns.

A Civil Society Organization (CSO), Xeuji Foundation, has been working tirelessly to create awareness and sensitize the people of Dhubri. One of the volunteers of the CSO got an opportunity to attend a training program arranged by KVK Dhubri, in the pre-monsoon of 2023-24 on "Scope of submergence-tolerant rice variety cultivation" in the flood-prone areas of Dhubri under APART. Under the guidance of KVK and IRRI, the CSO started awareness in its operational villages and approached a few Farmer Producer Companies (FPCs) to cultivate the submergence-tolerant rice varieties namely -BINA Dhan 11 and Ranjit_Sub1.

Jabeda Khatun, one of the members of the Noi Poria FPC, was convinced and agreed to cultivate BINA Dhan 11 in her 1 bigha field during the Sali season. She developed her faith in crop survivability by two weeks under submergence conditions and decided to cultivate the

submergence-tolerant variety on an experimental basis. When asked about her experience with the Sali crop, she highlighted the advantage in favor of the submergence-tolerant rice variety BINA Dhan 11 and expressed that the crop survived under the submergence period of 2 weeks.

Despite being affected by floods twice, the crop was found undamaged and healthy with vigorous growth. Finally, she harvested her crop by the end of October, with a yield of 16 mon from her plot. She confidently shared her firsthand experiences such as 1) Cultivation of the short-duration variety can add additional food grain in the family, 2) Selection of land (only upland / medium upland) in the Sali season with a proper time slot of nursery raising and transplantation (preferably by mid of August) in the riverine area and 3) Easy management as compared to boro/summer paddy.

Many women members of the CLF (cluster-level federation of the SHGs) contacted her for the seed to cultivate in the next Sali season. Jabeda acknowledges KVK, IRRI, and APART through the CSO Xeuji Foundation for the technical support received. This intervention has been a beacon of hope to many like her in the community.

ALTERNATE WETTING AND DRYING (AWD): A PRACTICE FOR WATER SAVING

-Vipin Kumar, Suryakant Khandai and Jami Naveen, IRRI

Assam falls in a high rainfall zone, even though the post-monsoon (Oct-Dec) and winter (Jan-Feb) seasons receive very little rainfall. Boro rice exhibits a higher productivity in comparison to both winter and autumn rice. It occupies over 3.70 lakh hectares in Assam. However, Boro rice heavily depends on irrigation, which is highly water-intensive and a major contributor to greenhouse gas (GHG) emissions and global warming. In Assam, summer (Boro/early Ahu) rice is predominantly grown under continuous flooding in an irrigated ecosystem, where increasing water productivity and reducing environmental pollution are the major challenges. So, a climate-smart practice that presents both mitigation and adaptation benefits is critical to addressing the climate change in rice production. Installation of Pani pipe in AWD plot at Dhubri Keeping this in mind, adopting alternate wetting and drying (AWD) is a suitable measure that can save water as well as mitigate methane. [AWD](#), also called controlled irrigation or intermittent irrigation, is now accepted as a viable mitigation measure in agriculture. Rice fields using this technology are alternately flooded and dried. Through this technique, rice farmers can reduce methane emissions, cut their pumping costs, and enhance the efficiency of their water use.

Assam Agricultural University (AAU) with the technical support of IRRI under APART conducted AWD in 10 locations during the Boro/early Ahu season, 2022-23. Out of the 10 locations four are on-station experiments, viz., Instructional-Cum-Research (ICR) Farm, AAU Jorhat, Krishi Vigyan Kendra (KVK), Nagaon, KVK, Kamrup, and ZRS, Kokrajhar and on-farm pilot testing at six locations, viz., KVK, Sonitpur, KVK, Barpeta, KVK, Dhubri, KVK, Nalbari, KVK, Morigaon, and HRS, Kahikuchi.

The three on-station experiments reveal that there was no significant variation between the grain yield of the AWD plots and continuous



flooding (CF) plots. There was a saving of 2-3 irrigations with AWD as compared to CF, with an average 24% saving of irrigation water. Irrespective of water regimes, pre-emergence application of pretilachlor (9 ml/plot) at 2-3 DAT and post-emergence application of bispyribac-sodium (1.5 ml/plot) + pyrazosulfuron-ethyl (1.5 g/plot) at 20-25 DAT recorded the highest grain yield. In on-farm trials too, no significant difference in yield was observed whether the paddy crop was irrigated with AWD practice or with the CF practice. Like on-station experiments, the AWD method in on-farm trials also led to a 22.6% saving of irrigation water along with a saving of 2-3 nos. of irrigation in comparison to CF. The weed management practices followed a trend almost similar to that observed in on-station experiments.

In this current season of Boro/early Ahu season, 2023-24 there are again 10 experiments in 10 different locations. At HRS Kahikuchi and KVK Dhubri, transplanting is completed and the crop in the remaining locations is on nursery beds and expected to be transplanted in the main field within 1-2 weeks.

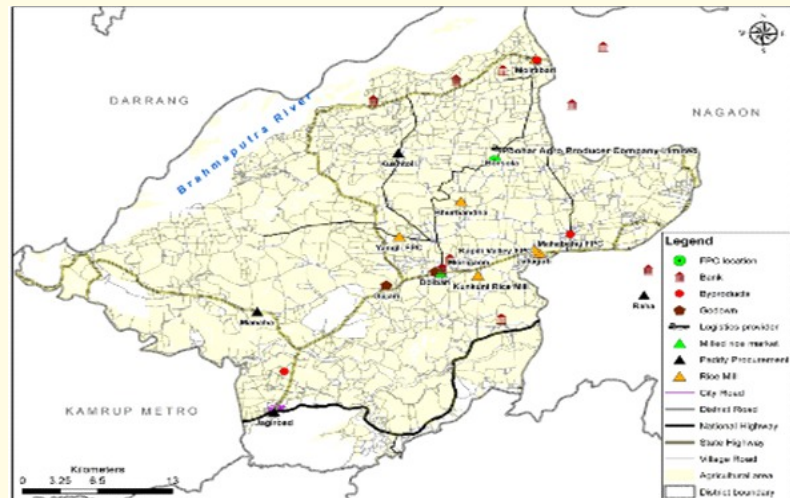
BUSINESS SUITABILITY MAPPING OF FPCs

-Gyandip Pandia, Suranjana B. Borah and Dr Kasturi Goswami, IRRI

To help Farmer Producer Companies (FPCs) in the rice sector succeed, it's critical to map out where they can succeed best. This involves looking at different important factors that will help the FPCs to ensure optimal resource allocation and strategic decision-making while building their business model. With this basic principle, the Assam Agricultural University, with technical support of IRRI under APART prepared the Business Suitability Mapping of six FPCs.

Understanding Key Factors: A Participatory Approach

The foundation of business suitability mapping lies in understanding the dynamics of the rice sector in the operational areas covered by each FPC. Participatory exercises, such as the recent engagement/ FGDs with six FPCs, provided invaluable insights into the factors influencing business operations. Through detailed data collection on seed business, machinery, milling services, and collection of geo-coordinates, a holistic understanding of the operational landscape is achieved.



Leveraging Geospatial Insights for Strategic Decision-Making

Geospatial analysis emerges as a potent tool in agricultural management, empowering FPCs with the understanding of their strengths, weaknesses, opportunities, and threats. Harnessing technologies like geo-tagging, remote sensing, and Geographic Information Systems (GIS), FPCs are informed about critical parameters, such as soil characteristics, climate patterns, water availability, infrastructure, and market dynamics. This integrated approach enables the FPCs to make rational business decisions.

A Holistic Framework for Strategic Planning

Central to the business suitability mapping exercise is the adoption of a holistic framework for strategic planning and risk management. Through a SWOT analysis supported by geospatial insights, FPCs can effectively map the complexities of the rice industry. By identifying clusters of similar businesses, assessing market access, evaluating infrastructure, and leveraging extension services, FPCs can position themselves for growth and sustainability.

Key Outcomes-

Assam Agricultural University, in collaboration with IRRI, has completed Business Suitability Mapping for six Farmer Producer Companies (FPCs). These maps, resulting from participatory exercises and geospatial insights, empower FPCs with a comprehensive understanding of operational and market dynamics. The outcomes include strategic roadmaps for accessing infrastructure, collaborating with potential partners i.e. other FPCs, and private firms, addressing

potential challenges, seizing business opportunities like utilizing rice-fallow, diversifying into new business in the rice value chain and expanding to new areas, establishing financial linkages, and accessing new markets for products, by-products and services.

LEARNING FROM THE COMMUNITY THROUGH FOCUS GROUP DISCUSSIONS (FGDs) *-Dr.Lisa Mariam Varkey, IRRI*

Participatory rural appraisal (PRA) is a qualitative research technique capitalizing on the citizen-centered methods of development. It aims to empower communities by engaging residents in the processes of identifying issues, implementing solutions, and monitoring evaluation. PRA employs various tools for facilitating interactions of which Focus Group Discussion (FGD) is an often adopted one. Under FGD, a researcher gathers a group of individuals, usually a small group of 8 to 12 persons to discuss a specific topic, aiming to draw from the complex personal experiences, beliefs, perceptions and attitudes of the participants through a moderated interaction. Participants in a FGD are encouraged to engage in conversation with other group members which allows the investigator to solicit both the participants' shared narrative as well as their differences in terms of experiences, opinions and worldviews during such 'open' discussion rounds.

Under IRRI-APART Phase II, a total of 48 FGDs (PRAs) were planned to be done in 2 years on different focal themes of the project, with 24 across genders and 24 focusing on women. FGDs in the current boroseason consisted of 14 FGDs, of which 10 were planned with women SHGs/Women FPC members practicing rice-based cropping systems and 4 with those farmers who have started cropping in fallow areas in recent times. These SHGs/FPCs as institutionalized mediums were understood to be facilitating the process of economic empowerment among these marginalized women. They have provided an effective platform for the participant women farmers to gain farm-related technical know-how, to ensure financial stability by diversifying their income sources and to experience an improvement in their living standards. The discussions around fallow cropping indicated that the conversion from unmanaged rice fields to economically valuable rice-based cropping systems is a challenging task.

The acceptance of the technically feasible strategies at the household level was understood to be primarily determined by political and socio-economic factors that directly or indirectly impinge on households. The participants pointed out that an encouraging policy environment which supports farmer-generated solutions in the context of livelihoods would be crucial for upscaling fallow cropping.



TRAINING ON GEOSPATIAL ANALYTICS USING EARTH OBSERVATION DATA

- Suranjana B. Borah, IRRI



Under objective I of APART Extended Phase, one of the activities was to establish GIS facilities at multiple locations as sub-units of the GIS lab set up at AAU, Jorhat in Phase I. Within this activity, three new GIS facilities were set up at SCS College of Agriculture, Dhubri, College of Horticulture and FSR, Nalbari, and Biswanath College of Agriculture with fully equipped facilities including hardware, software, and trained manpower. Capacity building programs including a total of 8 trainings were planned including 2-day and 5-day trainings to build the capacity of in-house faculty/students of the colleges where GIS sub-units were set up. These trainings were organized to train the staff in the use of Remote Sensing and Geographical Information Systems (GIS) technology for geospatial analysis and mapping so that GIS facilities established under APART are sustainable and aptly utilized after project completion.

Four basic 2-day trainings on 'Introduction to Remote Sensing and GIS' was completed in 2023 at each of the locations where GIS facilities have been set up under APART. In continuation to the same, two advanced 5-day trainings on geospatial analysis with more intensive hands-on sessions was organized in February 2024 at Guwahati and Jorhat. The first training was held at Guwahati from February 5– 9, 2024, where a total of 19 participants including faculty and project staff from SCS College of Agriculture Dhubri, and College of Horticulture and FSR, Nalbari who had previously attended the 2-day basic training. The training ended with the participants completing a group activity with different ideas implemented using geospatial data and software analysis.

STAKEHOLDER WORKSHOP-CUM-SEED DIALOGUE ON “STRENGTHENING RICE SEED SYSTEM FOR SUSTAINABLE AND RESILIENT AGRICULTURE IN ASSAM”

- *Dr. Neeraj Kumar Tyagi (IRRI), Jutika Das (AAU)*



A two-day stakeholder workshop-cum-seed dialogue took place at Assam Agricultural University in Jorhat on February 20-21, 2024. The workshop was held at AAU, Jorhat and focused on "Strengthening rice seed systems for sustainable and resilient agriculture in Assam." A total of 61 participants attended the meeting, including representatives from AAU, IRRI, ASOCA, DoA officials, private seed companies and seed-producing farmer producer organizations/companies (FPO/FPCs) from different districts of Assam.

Dr Sanjay Kumar Chetia, Director of Research (Agri), graced the meeting, along with Dr Prasanna Kumar Pathak, Dean, College of Agriculture, Mr Madhuram Patiri, Director, Assam Seed & Organic Certification Agency (ASOCA), Mr Anupam Gogoi, Nodal Officer, OPIU (Agri), Govt. of Assam, Dr V.K Yadav, Resident Coordinator, IRRI, Dr Rupam Borgohain, Principal Scientist & Nodal Officer APART, and Dr R. K. Saod, ADEE, Dr Prakash Bora, Principal Scientist & in-charge, NSP, and Dr Kalyan Pathak, Head, Dept. of Agronomy, AAU, Jorhat.

The workshop aimed to discuss the scope of increasing the seed production business in Assam, with a particular focus on the need for farmers to have adequate knowledge of breeder, foundation, and certified seeds. Dr Rupam emphasized FPC/FPO in capitalizing on seed production for the state and forming a common market platform to fulfil the new variety of seed requirements of the state. He also suggested that FPCs should explore other ventures such as cocoon rental services and machine service providers.

Dr. Sanjay Kumar Chetia spoke at length on the breeder seed requirement for the state of Assam being fulfilled by AAU and emphasized intensifying efforts to meet the same requirement for foundation and certified seeds. He urged the FPOs/FPCs to produce seeds of new varieties on their own and to follow proper guidelines for obtaining high-quality seeds.

Dr. V.K Yadav emphasized APART's role in increasing the productivity and profitability of farmers by promoting stress-tolerant rice varieties, scaling up mechanization and post-harvest value chain practices, and supporting FPCs through business models and disseminating and scaling out sustainable, resource-efficient, and climate-smart technologies suited for rice-based systems in Assam. He suggested that FPCs should have their business plan, develop self-strength, and reduce dependence on government agencies for financial support.

The technical session commenced with a presentation by Dr. Neeraj Tyagi, Senior Seed Specialist, IRRI on "Scenario of rice seed system in Assam," wherein he elaborated on the rice seed value chain system in Assam and emphasized increasing the formal seed system and availability of good quality seeds on time to farmers.

The participants interacted with Mr. A. Wagh of Pinnacle International, who shared the improved seed storage for quality seed production. Following this, Mr. Gyandeep, Specialist, IRRI, elaborated on the role of seed entrepreneurship in developing the seed ecosystem of Assam. Mr. Dipnarayan Borah, Aryan Biogenetics, a private player from Assam, mentioned the constraints of seed production and how to tackle them with attractive branding, awareness, and quality products.

The two-day workshop was successful with insights provided by key players and experts in the field. On a concluding note, the participants visited the seed processing unit of Assam Agricultural University funded under APART to get first-hand information on the processing unit.

FORMATION OF JINJIRAM DAIRY CO-OPERATIVE SOCIETY, GOALPARA UNDER APART, DAIRY DEVELOPMENT

-Hriday Nath, Astd. District Coordinator, Goalpara-APART, Dairy Development



In rural communities, change is driven by the spread of knowledge and skills. Recently, a group of farmers underwent a transformative journey by attending a comprehensive training program on dairy development techniques. Previously, their practices were rooted in tradition, but they now have newfound insights and strategies.

The World Bank-funded project, APART, is doing a tremendous job in different departments across Assam. One of its successful departments is the Dairy Development Department in the Goalpara District. The Dairy Development Officer cum District Coordinator, APART, Goalpara, had organized a Milk Producer training at Simulkandi, a remote area under Lakhipur Block, Dist – Goalpara. A total of 30 farmers, including 17 females and 13 males, attended the 5-day Milk Producer training with curiosity.

Before attending the training program, the farmers had been operating within the confines of traditional methods, unaware of more efficient or sustainable practices. They had been stuck in a cycle of stagnation, unable to capitalize on emerging opportunities or adapt to evolving market demands. They had a total of around 800-1000 Liters (Approx) of milk collection per day which they used to sell in the local area, i.e. they had limited productivity, hampering their ability to maximize profits and support their livelihood adequately.

However, after the training sessions and several motivating awareness meetings by the departmental officers, they acquired much information and knowledge regarding the Dairy Co-operative Society (DCS) and its benefits. With the help of Dairy department officers, they formed a Society named “Jinjiram Dugdha Utpadak Samabay Samittee.” At present, a total of 40 farmers are in this society. The most notable point is that their productivity increased rapidly to about 5500



Liters (Approx) over time, out of which they sell 3500 Liters (Approx) to 'WAMUL,' and the remaining goes to the local area as well as sweet shops.

The farmers discovered the intricacies of optimizing dairy production while prioritizing animal welfare and environmental stewardship. The training program catalyzed empowering farmers to become agents of change within their communities. Equipped with newfound expertise, they are not only enhancing their livelihood but also sharing their knowledge with fellow farmers, fostering a culture of continuous learning and improvement.

LINKING FARMERS TO MARKET UNDER POTATO CONTRACT FARMING AND EXPANSION INITIATIVES

- Dhanaji Jadhav, DAMC, APART, ATMA, Morigaon

Assam is committed to enhancing agricultural productivity and uplifting farmer livelihoods. To achieve have undertaken ambitious initiatives in potato contract farming for the fiscal year 2023-24.

Spearheading this initiative is Siddhivinayak Foods, supported financially by Rangde Ltd. through the Xamahar initiative of APART. They have established formal contractual agreements with three Farmer Producer Companies (FPCs) in Morigaon District:

- **Suntali FPC Ltd., Mayong**
- **Seujee FPC Ltd., Bhurbandha,**
- **Poohar FPC Ltd., Borchala**

To ensure fair returns for farmers while maintaining market competitiveness, the buyback price for potatoes has been meticulously set at Rs. 12.40 per unit. Siddhivinayak Foods and the FPCs have collaborated with the District Agriculture Office to ensure regulatory compliance and operational efficiency.

The World Bank-funded APART Project had initiated a potato area expansion program, covering 782



Bigha, in parallel with the contract farming initiatives. Despite challenges posed by the outbreak of Late Blight disease, harvesting activities are ongoing. Siddhivinayak Foods Ltd. has already bought back 50 metric tons of potatoes.

Stakeholders are optimistic about the long-term benefits of the potato contract farming initiative. Ongoing efforts to mitigate production challenges and enhance market access are expected to ensure a sustainable and prosperous future for the farming community.

This collaborative endeavor underscores the pivotal role of public-private partnerships in catalyzing agricultural development and empowering farmers to thrive in a dynamic market environment.

AGRICULTURAL MARKET INTELLIGENCE UNIT (AMIU)

-AMIU Team- APART



In the fast-paced agricultural sector, farmers require accurate and timely information to make informed decisions. Recognizing this critical need, the Agricultural Market Intelligence Unit (AMIU) was established under the Assam Agribusiness and Rural Transformation Project (APART) at Assam Agricultural University (AAU), Jorhat, to be an invaluable resource for farmers in select districts of Assam.

On February 16, 2024, a momentous event the AMIU building was inaugurated at AAU, Jorhat. The ceremony was graced by the esteemed presence of Prof. Ramesh Chand, a distinguished member of NITI Aayog, Govt. of India, and Dr. Bidyut C. Debra, the Vice-Chancellor of AAU, along with other dignitaries and representatives from APART. The convergence of agricultural expertise and visionary leadership marked a collaborative effort towards agricultural advancement.

AMIU expertly bridges the information gap between farmers and markets, encompassing data from 70 wholesale markets and 60 agricultural commodities across APART districts. A network of dedicated Field Data Enumerators (FDEs) in each district collects and disseminates real-time data on market prices, arrival trends, market advisories, and various agricultural data, empowering farmers to make strategic choices about when and where to sell their produce, thereby optimizing their revenue streams. Data is collected from various wholesale markets and effectively disseminated through various channels, including the AMIU website, ticker board, blackboard, social media, SMS service, and WhatsApp groups, and broadcasted through the Doordarshan channel.

The AMIU website, ticker boards, and SMS alerts ensure timely access to information for farmers, allowing them to make informed decisions. This signifies the continued commitment towards strengthening and expanding the reach of AMIU, further empowering Assam's farmers on their path towards better realization. AMIU is a valuable resource that will continue to provide farmers with the necessary tools to make informed decisions and succeed in the agricultural sector.

STORY OF MILLET FARMING IN NAGAON DISTRICT

- Ashrini Borah, Millet Marketing Executive, Nagaon

Bul Chandra Bhuyan is a visionary farmer from Nagaon district whose journey exemplifies the transformative power of millet farming. Despite facing challenges familiar to many farmers in Assam, especially weather-related setbacks and scepticism from the community Bul Chandra Bhuyan's steadfast dedication and innovative approach have propelled him to success. Overcoming initial challenges through perseverance and the acquisition of valuable knowledge. Starting with finger millets, his determination led him to explore other millet varieties, such as foxtail millet, with the support of the Agricultural Department. The low maintenance requirements of millet farming emerged as a beacon of hope, allowing him to efficiently utilize his resources while securing a diversified income.



The diversified uses of millets, including food grains, fodder, and value-added products, enabled him to tap into various income streams, bolstering his economic resilience and providing stability for his family. He observed several improvements and changes in their farming ecosystem due to growing millets. Firstly, millets act as a natural soil conditioner, enhancing soil fertility and structure over time, which can lead to improved yields for subsequent crops. Additionally, the deep root systems of millet plants help prevent soil erosion and promote water retention, contributing to better soil health and conservation efforts. Furthermore, the cultivation of millets can diversify crop rotation patterns, reducing the risk of pest and disease outbreaks and enhancing overall resilience in the farming ecosystem.

Moreover, the adoption of millets can foster biodiversity by providing habitat and food sources for beneficial insects and wildlife. Overall, growing millets in his field brings about positive ecological changes that support sustainable farming practices and long-term agricultural viability. With determination and foresight, he transitioned his agricultural practices to focus on cultivating millets, embracing sustainable farming techniques and leveraging local resources to maximize efficiency. With his commendable ability, he was able to market his produce of Foxtail millet, which gave him a diversified source of income. He adopted millet farming and is looking forward to making value-added products in the near future.

PROACTIVE ATTITUDES OF MORONGI KRISHI PRODUCER COMPANY LIMITED – *THE INSIDE STORY...*

- *Abhishek Singha, RT APART Project, Golaghat*

Morongi Krishi Producer Company Limited was established in August 2023 at Murphuloni village under Sarupathar LAC of Golaghat district. Initially, the FPC had only ten members and now, 12 currently, the FPC has twelve Farmers' Interest Groups (FIGs) supporting around three hundred families of small and marginal farmers. With an aim for the sustainable development of farmers, Morongi Krishi Producer Co. Ltd. has started activities and programmes. In this regard, the District Agriculture Office, Golaghat and World Bank-funded APART Project support the FPC through its Central Government and State Government holistic schemes (viz. Rashtriya Krishi Vikas Yojana, Area Expansion Programmes, etc.). The establishment of Morongi Krishi Producer Company Limited has mobilized small and marginal farmers into Farmers' Interest Groups. This has enhanced not only their income levels but also boosted their confidence and social standing.



It was in October 2023, RT of the APART Project; Golaghat Abhishek Singha interacted with the Chairman, CEO, BoDs and Shareholders of Morongi Krishi Producer Company Ltd. and took stock of the availability of land and other needful details for Potato and Mustard cultivation under Rashtriya Krishi Vikas Yojana 2023-24 and Area Expansion Programmes 2023-24. He then briefed the inputs to the District Agriculture Officer, Golaghat Krishna Ranjan Saikia, Assistant Director of Agriculture, Golaghat and District Nodal Officer of APART Project, Golaghat Ranjan

Baruah and Deputy Project Director of CSS-ATMA, Golaghat Tapan Kr. Mahanta. The potato tubers and mustard seeds were allotted to the FPC for twenty-nine (29) Bighas under the RKVY

scheme and Potato and Mustard Area Expansion Programmes 2023-2024. The small and marginal farmers took the challenge, and followed the scientific management of potato and mustard starting from field preparation to harvesting as per the recommendation of the District Agriculture Officer, DNO APART Project, Golaghat, Dy. Project Director of CSS-ATMA, Golaghat and RT APART Project, Golaghat. With their guidance, Morongi Krishi Producer Co. Ltd. has also institutionalized tie-ups with wholesale markets. Farmers have benefitted by ensuring market linkages for produce throughout the year and it has given a push to the adoption of new crops as well as new technologies in cultivation, harvesting and post-harvesting. The proactive attitudes of Morongi Krishi Producer

Company Limited have also inspired budding youngsters and small and marginal farmers of Murphuloni village and nearby villages of Murphuloni region to form Farmers' Interest Groups (FIGs) under Morongi Krishi Producer Co. Ltd. and to adopt similar practices, leading to a collective uplift in agricultural practices in the Sarupathar LAC of Golaghat district.

ToT ON CARP-FRESHWATER PRAWN POLYCULTURE AND NURSERY PRODUCTION OF JUVENILE FRESHWATER PRAWN

-Neeta Beypi, Technical Officer, WorldFish

One day Training of Trainers (ToT) programme on Carp-Freshwater Prawn Polyculture and Nursery Production of juvenile Freshwater Prawn was organized by WorldFish in collaboration with ARIAS Society, and the Department of Fisheries, Assam under World Bank-funded Assam Agribusiness and Rural Transformation Project (APART) on Thursday, 19th January 2024 in SIPC conference room, Six mile, Guwahati, Assam. Mr. Anoop Tandon, Resident Consultant, WorldFish-India served as the resource person for the Training of Trainers Programme (ToT) on Carp-Freshwater Prawn Polyculture and Nursery production of Juvenile Freshwater Prawn. A total of 33 participants were present.



The program was organized with the main objective of engaging the WorldFish Master Trainer in training the DoF Officials, APART officials and FPCs officials on building a pool of competent instructors who can then teach the materials to the other trainees.

In the first session "Introduction, Morphology and Biology of Prawns" were discussed followed by an explanation of Better Management Practices and Nursery Rearing of Freshwater Prawns which includes the pre-stocking management, stocking, and post-stocking management practices of freshwater prawns. In the last session, the

resource person trained the trainees on the Polyculture of Carps with Freshwater Prawn.

Overall, motivated all the participants to understand the value of prawns in the present market situation and the importance of nursery rearing of prawns in the culture practice as it considerably decreases the mortality of prawns while integrating with carp polyculture.

WORKSHOP CUM TRAINING OF FPC MEMBERS ON QUALITY FISH SEED PRODUCTION

□Neeta Beypi, Technical Officer, WorldFish

WorldFish in collaboration with the Department of Fisheries, Assam and ARIAS Society organized a workshop cum training for the FPCs Officials and Members on Quality Fish Seed Production and Dissemination to Farmers. The workshop cum training was organized at the SIPC Conference Hall, Six Mile, Guwahati on 3rd February 2024. A total of 30 participants attended the program including FPC Officials, Members, DoF Officials and Technical Expert Fisheries. Mr. Mohammed Yasin, Dissemination Manager, at WorldFish, Bangladesh served as the resource person.

The key objective of the workshop cum training on Quality Fish Seed Production is to equip the participants with the necessary knowledge, tools, strategies, and skills in identifying, producing and maintaining good quality fish seed ultimately improving the productivity and sustainability of aquaculture practices.

There were three main sessions to the event. The technical and business aspects of Hatchery and Seed Bank operations were covered in the first session. The second session focused on Broodstock acquisition and management strategies to minimize overall genetic merits and prevent inbreeding depression.

During the third session, the FPC members were given recommendations derived from the field visits.



WORLD FISH EXPERTS FROM BANGLADESH VISIT FISHERY FARMER PRODUCER COMPANIES (FPCs)

-Neeta Beypi, Technical Officer, WorldFish

Dr. Benoy Kumar Barman, Senior Scientist, WorldFish, Bangladesh and Mr. Mohammed Yasin, Dissemination Manager, WorldFish, Bangladesh visit Assam to provide technical support to the Fishery FPCs for implementation of Business Plan. The major aim was to have a thorough interaction with the FPC officials and Members under APART as well as visit the FPC sites to provide technical assistance on improving Quality Fish Seed Production and Dissemination to Farmers.

During the visit, 10 nos. of FPCs and 2 NGOs were covered, namely - AxomAgro Producer Company Limited, Anunad Agro Producer Company Limited, Neerjeevan Fish Producer Company Limited,

Chengnoi Farmer Producer Company Limited, Jungal Balahu Agragrami Fishery Farmer Producer Company Limited, Marachaulkhowa Farmer Producer Company Limited, Milanjyoti Farmer Producer Company Limited, Kharmuza Farmer Producer Company Limited, Pub Jania Farmer Producer Company Limited, Betbari Farmer Producer Company Limited, Kalong Kapili and Amar Pathar.

During the visit, the Experts from Bangladesh, Dr Benoy Kumar Barman, Mr Mohammed Yeasin and the WorldFish Assam team provided detailed information and suggestions about quality carp seed production and how quality should be managed in the hatchery and nursery. The team explained the genetic management of broodstock, the significance of broodstock management for good-quality seed production and the best practices for hatchery operations.

The team stated that seed producers and suppliers play a major role in quality seed production. They expressed that best broodstock management practices with an ethical code of practice are required to produce quality seed (spawn, fry and fingerlings). The team also mentioned about inbreeding, inbreeding depression, determining the inbreeding rate, and managing the inbreeding rate in seed farms. They also explained the imbalance in the ratio of male to female fish during mating and the use of the uniform size broodstock for better results. Mixed species rearing should be avoided because seed segregation is difficult. Suggested the need for better husbandry practices and record keeping for improving the quality of carp seed produced by the hatcheries and nurseries. The team also encourages and suggested to include more women members in the FPC.



RICE CULTIVATION IN RAINFED REGIONS: PRACTICING DSR

- Dr. Abhinav Jain, SME, APART



Rice cultivation in India is primarily done in the rainfed regions depending on rainfall with no assured irrigation facility. Rainfed regions are more affected by unpredictable climate. Water scarcity, drought, flood or erratic rainfall pattern are increasingly posing challenge to agriculture production. Labour problem during transplanting time is another growing concern in rice cultivation. Direct Seeded Rice (DSR) is one promising technique which can address the water scarcity and labor shortage to some extent.

Direct Seeded Rice (DSR)

The sowing of paddy seeds directly into the soil instead of transplanting rice seedlings is regarded as dry direct seeding. In transplanting method, sowing is first taken up in nursery beds and seedlings are transplanted in puddle flooded soil, while in DSR, direct seeding into the soil is done. There can be different modified method of DSR sowing, depending upon the situation and needs, like wet seeding, water seeding or dry seeding. DSR method is an age old method generally practiced in hilly upland rainfed regions. In these regions, water stagnation and accumulation is difficult and varieties grown are generally of short duration period. Transplanted Rice (TPR) is a refined method generally practiced in plains and low lying field areas of the rainfed regions where water can be easily accumulated. This lowers the possibility of weed growth and varieties of medium to long duration are generally grown. In rainfed lowland regions, DSR is a good alternative to TPR in terms of reduced water usage and labour savings.

Merits and Demerits of DSR

The DSR methods offers several advantages like low input demand of water and labour, mitigate green house gas emissions, less damage to soil structure etc. The DSR method also poses some challenges like weed infestation, unlevelled field, soil moisture unavailability etc. Nevertheless, by utilizing less water and labour along with the adoption of promising varieties and good crop management, yield equivalent to transplanted rice can be realized.

Prospects and scope of DSR

The DSR method of seeding is good alternative to TPR especially where water and labour problems persists. The DSR method has gained worldwide importance and being adopted in rainfed lowland regions as well. It is being encouraged in countries like Nepal, Vietnam, Philippines, Myanmar, Bangladesh and India. With increasing awareness of utilizing rice fallow areas, growing of short duration varieties under DSR condition in medium and lowland rainfed regions can be very conducive. More research work on breeding promising varieties suitable to DSR condition can help in augmenting the rice yield under limited water condition, since most of the varieties bred today are for favorable irrigated condition. Some desirable traits like weed competitiveness, anaerobic germination, nutrient uptake, early vigour can be incorporated in breeding varieties for DSR condition. With more innovations and refined techniques in DSR like development of drought tolerant DSR varieties, precision seeding technique, sensor based technology for irrigation, efficient weed and pest management, etc. will further enhance the efficiency of DSR cultivation.

CARBON TRADING, CARBON MARKETS: ITS EMERGING SIGNIFICANCE IN AGRICULTURE AND ALLIED SECTOR IN THE CONTEXT OF APART.

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Carbon markets are trading systems where entities can buy and sell carbon credits. These credits represent one tonne of carbon dioxide or an equivalent amount of other greenhouse gases reduced, sequestered, or avoided. Carbon markets provide a way for companies and individuals to offset their greenhouse gas emissions by purchasing carbon credits from entities that remove or reduce greenhouse gas emissions.

Despite some progress, the world still faces a significant challenge in reducing greenhouse gas (GHG) emissions. Scientists warn that unless deep reductions in GHG emissions are achieved, the warming will exceed 2°C during the 21st century. Carbon markets have been seen as a crucial solution to climate change for decades. More than two-thirds of countries plan to use carbon markets to meet their Nationally Determined Contributions (NDCs) to the Paris Agreement. Additionally, innovative digital solutions are fast evolving as a new international carbon market nears reality. It is expected that over time, carbon markets will become redundant as every country gets to net-zero emissions, and the need to trade emissions diminishes.

In India, the Centre is planning to establish the Indian Carbon Market (ICM) by establishing a national framework that will help in decarbonising the domestic economy. The draft framework for the Indian Carbon Credit Scheme 2023 was recently notified by the Union government. The Bureau of Energy Efficiency, functioning under the Ministry of Power, has been tasked with developing the Carbon Trading Scheme in tandem with the Ministry of Environment, Forest & Climate Change.

Carbon markets establish a financial incentive system where entities are allotted emission limits and can trade emission permits. This encourages companies to reduce emissions below their limits and penalizes excess emissions. Carbon markets prioritize cost-effective emission reductions, incentivizing companies to reduce emissions more easily and at a lower cost. This leads to overall emission reductions at a lower economic cost. Businesses are provided with flexibility in choosing how to reduce emissions; including investing in cleaner technologies, improving energy efficiency, or purchasing carbon credits from emission reduction projects elsewhere.

Carbon markets stimulate the development and adoption of cleaner technologies and practices, promoting clean tech. Projects that reduce emissions, such as renewable energy, afforestation, reforestation, and energy efficiency projects, generate funds for sustainable projects that earn carbon credits, which can be sold in the market, attracting investments. Carbon markets can be tailored to align with a country's climate goals and international commitments, which helps nations meet their emission reduction targets, such as those set in the Paris Agreement, by creating a mechanism for tracking and reducing emissions. Participation in carbon markets requires accurate measurement and reporting of emissions, leading to greater transparency and accountability in tracking and reducing greenhouse gas emissions.

Governments can generate revenue through carbon markets by auctioning emission permits or imposing carbon taxes. This revenue can be reinvested in sustainability initiatives or used for other public purposes. Additionally, companies can earn revenue by selling carbon credits. For instance, Tesla, a company that produces electric cars, has profited from selling carbon credits to other car manufacturers.

Carbon markets play a vital role in mitigating climate change and promoting sustainability. By providing financial incentives for reducing emissions, carbon markets encourage the adoption of cleaner technologies and practices, which can lead to overall emission reductions at a lower economic cost. They also help countries meet their emission reduction targets and generate revenue for governments and companies.

Initiatives in Assam on Carbon Trading in the context of APART:

The ARIAS Society (Assam Rural Infrastructure and Agricultural Services) recently partnered with Integra Micro-systems Pvt Ltd, FCF India Pvt Ltd, and Sanjog, an NGO, to support the farmers of Assam in making agriculture more profitable and sustainable. The goal is to enhance farmers' income by

providing easier credit, improved farming methods, and reducing carbon emissions. Integra Microsystems is helping smallholder farmers access easy lines of credit to improve their farmlands.

FCF India is developing a carbon project with the farmers to help them earn a secondary source of revenue through carbon credits. Sanjog is the on-ground implementing partner for the project and is mobilizing the farmers at the grassroots level.

FCF India and IRRI organized a design consultation meeting on 30th November 2023 to receive feedback from relevant stakeholders. The project is proposed as a Programme of Activities (PoA) under the Gold Standard Mechanism. The traditional practice of rice cultivation in Assam involves continuously flooded irrigation, which cuts off air transportation between soil and atmosphere. This submerged condition leads to the emission of methane, a potent greenhouse gas, into the atmosphere. The project promotes the use of the "Alternate Wetting and Drying (AWD) method" as a sustainable technique for rice cultivation. AWD involves periodically allowing the rice fields to partially or completely dry out instead of maintaining continuous submergence, which reduces water usage while maintaining or even improving crop yields. The project boundary is the state boundary of Assam, and it is expected that around 10,000 carbon credits (tCO₂e) could be generated from 2500-3000 hectares of rice-cultivated land using AWD practices. The project is currently implemented in Barpeta district, on a pilot basis.

Conclusion:

As the country moves steadily towards a net-zero world, decarbonising industrial activity will be critical. It is here that industry leaders in carbon management solutions and clean energy transition can play a pivotal role in facilitating the transition towards a net-zero future by helping the nation switch from fossil fuel or legacy technologies to clean energy systems.

As India tries to strike a delicate balance between economic needs and environmental concerns, a vibrant carbon trading mechanism can be crucial in creating a more sustainable future. In Assam, APART project shall be pioneering the activities regarding this which is futuristic and will have immense effect in Agriculture and allied sector in the days to come.



Participants in the first design Workshop about Carbon Trading and Reduction of GHG emissions held by FCFI and IRRI on Nov 30, 2023