RICE VALUE CHAIN

QUARTERLY NEWSLETTER

ASSAM AGRIBUSINESS AND RURAL TRANSFORMATION PROJECT (APART) 1st Issue April 2019

Introduction:

Assam is a region with the higher density of rural poverty, higher crop yield gaps and food and nutritional insecurity compared to other parts of the country. Rice is an important crop and staple food of the people in the region. Abiotic and biotic stresses, poor access to appropriate cultivation methods, erratic monsoon and poor agronomy including late sowing/planting of inappropriate aged seedling, poor weed and nutrient management are some of the reasons for low productivity of rice-based systems of this region.

Total rice area in Assam is approximately 25 lacs ha. More than 50% of the growing areas are prone to various abiotic stresses, including flood submergence and drought. Almost, 8 lacs and 2 lacs ha rice area in the state is frequently affected by flood and drought, respectively. Rice productivity in these areas is not only low but also fluctuating. Farmers in the stress prone areas use little inputs for the fear of losing not only crop but also inputs in case there is flood or drought. It further adds to low productivity. In addition, these farmers are also affected by rising scarcity of labour, climate change, and rising production costs.

A huge potential exists to bridge the yield gap, derisk farming in these risky and fragile environments, and to improve the income. Post harvest management, processing, value addition marketing has been one of the major concerns of Assam's rice value chain. No proper supply chain frame work for it has been developed. With a holistic market led approach, overall living standards of smallholder and marginalized farming communities in Assam can be improved a lot.

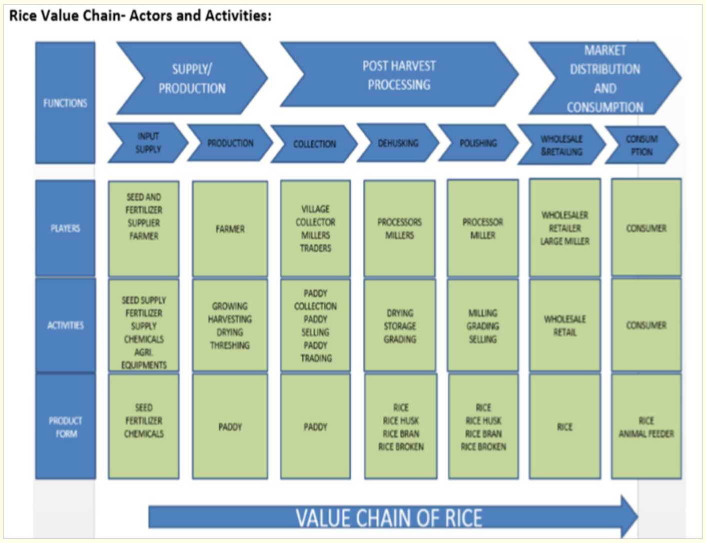
Major constraints in rice value chain

- Role of input suppliers in rice value chain is minimal as most of the farmers cultivate their own seed, year after year, which in turn reduces the productivity of the rice produced.
- Use of fertilizers and pesticides are low in rice cultivation as the farmer tries to keep his cost of production low, hence dependence on the inputs is low.
- Input supplier is compelled to buy his goods at a higher price from the bulk dealers (in case of fertilizers). In the process the high price is transferred to the farmers/ producers.
- Level of mechanization in rice production is low
- High moisture content in the harvested product remains an issue
- Level of processing is still low. Machines and equipments used for processing are traditional/ obsolete

Rice Clusters:

Rice being the predominant crop covering 61% of the total gross cropped area and rice shelling being the main agro-processing industry (60% of total industrial units) has been prioritized and is being taken as an important commodity value chain in all APART plotted production blocks (clusters). Production of speciality rice (Bora, Joha, red rice, black rice) is also being taken up in the identified blocks (clusters).

Indicative Rice Value Chain – Actors and Activities:



UPGRADING STRATEGIES ADOPTED BY APART FOR RICE VALUE CHAIN

Sl No	Critical Constraints	Upgrading Strategies
1	Majority farmers fall in the category of small and marginal ones, therefore have fragmented and small areas of land for paddy cultivation. As a result high technology adoption, marketing management etc. becomes difficult	Farmers to be organized under common platform of FPO/CSC to use modern technology and better marketing management practices

Sl No	Critical Constraints	Upgrading Strategies
2	Non – accessibility to quality seed and stress tolerant varieties. Most farmers routinely save their seed from one harvest to the next which results segregation loss of Hybrid and certified seeds.	Intervention to strengthen the seed systems (informal, semi-formal and formal) by enhancing the capacity of farmers, seed growers, seed dealers and distributors, seed companies/corporations, extension workers etc. in seed production, Processing and storage, ensuring the viability of quality foundation seeds for multiplication to seed growers, promoting seed entrepreneurships to increase the profitability of farmers and ensure a local supply of quality seed, multiplying seeds and evaluating new varieties in a participatory mode. Stress Tolerant Rice varieties (STRVs) including drought and submergence tolerance to be promoted.
3	Business of rainfed nature and because of high risks associated with monsoon season, farmers' investments in fertilizer and irrigation water are very minimal. Economic condition of poor farmers also stand on the way of fertilizer use, irrigation investment etc.	Once the risk factor is taken out, farmers will start investing more. Derisking by deploying high yielding stress tolerant rice varieties. Nutrient management practices, water efficient technologies to be demonstrated. Credit access from banks, crop insurance will encourage farmers for higher investment in rice cultivation.
4	Post harvest Management practices are poor causing loss in quantity and quality of produce.	Improved and modern Post harvest management practices (including moisture management) will be adopted.
5	Most of the farmers are not acquainted with the value chain activities and its usefulness. Moreover, due to immediate cash needs, the farmers are not able to fetch the advantage of value addition. Value addition by processers in Rice Industry is almost non-existents	A proper value addition chain of processed and non-processed rice food chain will be developed.
6	Lack of well organized marketing management chain	Marketing Management chain to be well developed

Action Plan for Rice Value Chain:

1. Strengthening the seed systems and adoption of stress tolerant rice varieties.
2. Introducing and promoting scale appropriate mechanization.
3. Promotion of improved crop management practices including ICT-based decision tools precision agronomy.
4. Supporting and strengthening entrepreneurship to increased access to technologies and rural employment generation.
5. Developing science based rice monitoring system for yield prediction and better science based crop insurance policy.
6. Training and capacity building of value chain stakeholders.
7. Promotion of better and improved post harvest management.
8. To encourage value adoption in processed products of Rice.

IRRI intervention: The Project has partnered with International Rice Research Institute (IRRI), Manila for 'Technical Assistance to APART in increasing productivity and profitability of small and marginal farmers in rice based cropping systems of Assam". The objectives of IRRI-APART partnership are enumerated below:

- **<u>Objective 1</u>**
  Enhancing the adoption of STRVs and strengthening their seed supply system in Assam

Introducing STRVs/HYVs and strengthening seed supply system

Minikits, On Farm Adaptive, Cluster, Dealer & H2H demonstrations, 2018-19

Technology	Implementing partner	Sali	Boro	Total
Minikits - STRVs	AAU	1651	349	1984
	DoA- ATMA	2556	2444	5000
On Farm Adaptive Demonstrations	AAU	188	12	200
Cluster demonstrations	AAU	221	29	250
Demo. through dealer network	AAU	181	69	250
Head-to-head demonstrations	AAU	425	475	900

***STRVs in Sali season : Bahadur Sub 1, Ranjit Sub 1 & Swarna Sub 1 & PQR - Joha*

Varieties in Boro season:-BINA dhan 11 and DRR-45

*AAU – Assam Agricultural University *DoA – Department of Agriculture
*ATMA – Agricultural Technology Management Agency

Distribution of Minikits

Field demonstrations

Training & Exposure visits

Expo/Training/ Meeting detail	Season	Target	Achieved	No. of Participants
Crop Cafeteria		1	1	
QSP	Sali	30	30	803
	Boro	20	11	569
Awareness Meeting		10	10	409
Dealer Meeting		7	7	293
Seed stakeholder workshop		1	1	47
Survey through Mobile App		1	1	943

- **Objective 2**
  Raise productivity, profitability & resource-use efficiencies of rice-based systems in Assam through improved crop and natural resource management and scale appropriate mechanization and a supporting service economy.

Harnessing varietal potential with better-bet Agronomy & mechanisation

Integrated Crop Management Demonstrations (ICMDs) & Learning Centre Demonstration (LCDs), 2018-19

Technology	Imple-menting partner	Sali	Boro	Total (100% achieved)
Identification of progressive farm-er & local dealer for decision Agronomy demo.	AAU	1	14	15
ICMD - STRVs	AAU	99	51	150
	DoA- ATMA	168	232	400
ICMD – PQR	AAU	15	5	20
	DoA-ATMA	30	20	50
LCD – STRVs	AAU	46	54	54
LCD – PQR	AAU	12	3	15
Field day on LCDs	AAU	73	3570 (participants)	

Crop Cutting of Sali paddy

ICMD Demonstration Plots

Alternate Crop establishment Methods - MTR, Wet & Dry DSR, 2018-19

Technology	Sali	Boro	Target	Achieved
Raising mat-type nursery (MTR)	-	40	40	40
Dry DSR	-	40	40	40
Wet DSR	13	27	40	40



Mechanization of farming techniques through APART

Trainings & Exposure Visits

Activities	Implementing agency	No. of trainings planned	Trainings completed	Target Participants in each events	No. of Participants
One-day training	ATMA/AAU	15	15	30	568
Two-day training	AAU	5	5	25	144
Three-day training	AAU	4	4	25	127
Season-long training	AAU	2	2	25	50
Training in national and international	ATMA/AAU	2	2	25	50
Hands on training on Mat nursery	AAU	40	11	30	384 (approx.)
Exposure visit (Within district)	ATMA	12	12	20	360
Exposure visit (Within Assam)	ATMA	2	2	20	51
Exposure visit (Outside Assam)	ATMA	4	4	12 (10+2)	48* (* indicate combine visit with postharvest)

Exposure visits

- **Objective 3**
  Strengthening post harvest management by introducing improved post harvest mechanization and rice value chain.

Sustainable solutions with improved mechanisation

Activities under Objective 3:

Activities	Imple-menting agency	No of trainings planned	Trainings complet-ed	Participants in each activity	No. of Partici-pants
Training on PH machines	AAU	25	25	30	656
Demonstration on PH ma-chines	AAU	25	25	30	648
Training on Rice value chain machines	AAU	8	8	30	216
Demonstration of Rice Value chain technologies	AAU	24	24	30	658
Identification of Progressive farmers for Postharvest technology	AAU	11	11	25	316
2-days training	AAU	10	9	25	212
3- days training	AAU	10	10	25	246
Exposure visit outside Assam	AAU/ ATMA	2	2	5	10
Training of extension func-tionaries within country	AAU/ ATMA	2	2	5	10
Training of extension func-tionaries outside country	AAU	1	1	5	5
Round table conference on post- harvest mechanization	AAU	1	1	40	46

Round table conference on policy intervention for post-harvest machin-ery at AAU, Jorhat

Exposure visit of progressive farmers outside Assam (DoA-ATMA): Field visit to see mechanical transplanter at Gop, Odisha

Two-days training for the extension functionaries of Golapara district at HRS Kahikuchi: Demonstra-tion of Solar Bubble drier

Solar Bubble Dryer

Suryakanta Khandai and Kanwar Singh

Generally, the post harvest rice value chain starts with the cleaning of paddy, where the impurities like weed seed, straw, inert matter, soil particles etc. are removed from the paddy and the cleaned paddy is sold at higher prices. Another way of value addition is removing the husk layer from the paddy though de-husking where the farmers could obtain a higher price by selling rice rather than paddy.

In Assam, due to more humidity the moisture content in paddy at the time of harvesting is generally 20-25 per cent which causes deterioration in the paddy quality immediately after harvest. Improper drying or delay in drying of paddy causes more infestation by insect pests, moulding, fissuring, discolouration, germination of the moist seeds which further deteriorate the quality of rice in terms of breakage of grains, reduced flavour/aroma, and the poor appearance of rice. The moisture content needs to be reduced to approximately 14 per cent or less for safe storage of paddy up to 8-12 months and to decrease the breakage of paddy grains during milling. One of the most important parameters for rice value chain is reducing the moisture content in the paddy grain after harvest.

The broken percentage in milled rice is always higher due to improper drying. Farmers generally dry paddy in open areas by sun drying method either on road or on pavement. The only advantage which the paddy growers generally opt in this method is the use of available free energy and low capital investment. But the other associated risks like abrupt changes in the weather, like rainfall, high wind speed, damage caused by animals, more labour requirement etc. are generally overlooked. Due to direct sunlight and uneven drying cracks develop on the grains, causing breakage. The farmers have to avoid uneven drying of the paddy and solar bubble drier is one of the better options to reduce uneven drying.

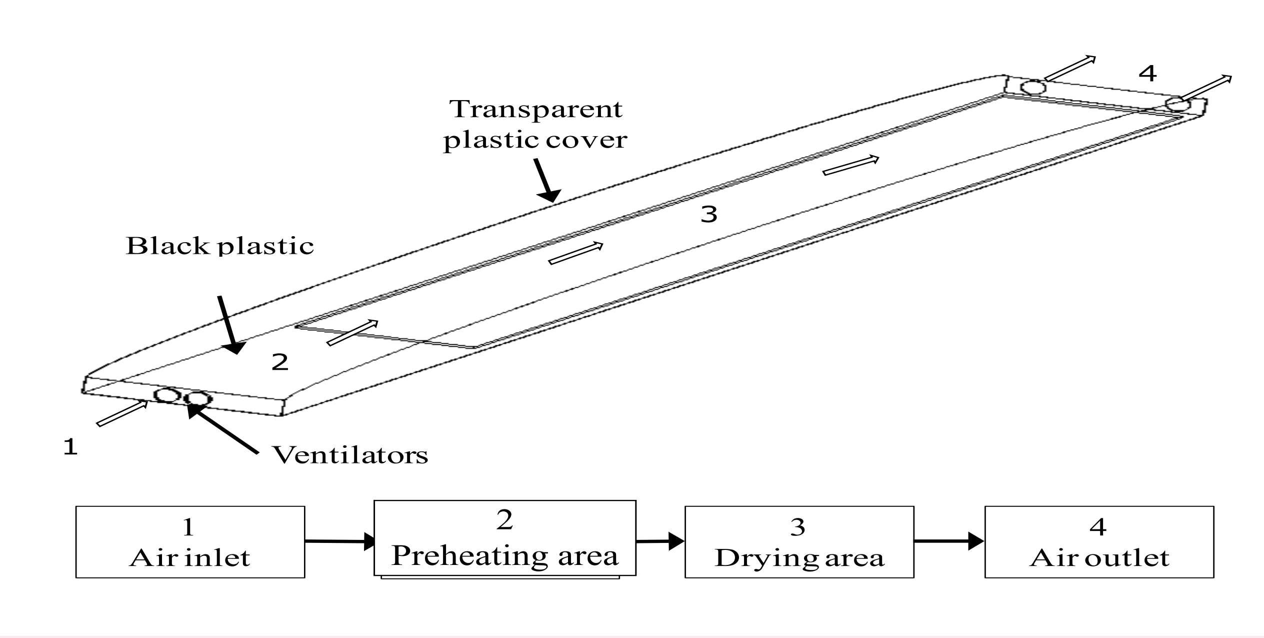
The Solar Bubble Dryer (SBD) is one of the low-cost drying technologies that aims to provide a simple and flexible alternative to sun drying. The construction of SBD is very simple, easily transportable to any place and completely independent of fuel and is therefore very cheap to operate. It comes in different sizes, with current models having a 0.5 or 1-ton batch capacity. The SBD improves qualitatively and quantitatively the traditional sun-drying process and eliminates all losses due to spillage, animals, weather, and vehicles running over the grains. During sunny days, the drying time is comparable to that of sun drying. Usually, a batch can be dried within a day. During cloudy days or when it rains, drying time might take up to two days. The typical average drying rate is 0.5% moisture reduction per hour. The main purpose of solar bubble drier is to protect grains from rain, transform solar energy into heat, and lead the drying air over the grains.

The SBD uses solar energy from the sun in two ways:

- The drying tunnel serves as a solar collector to convert energy from the sun's rays (entering through the transparent top of the drying tunnel) to heat, therefore increasing the temperature of the air for faster drying.
- The SBD is equipped with a photovoltaic system that consists of solar panels for generating electricity - a rechargeable deep cycle battery for use at night and one or two small blowers to inflate the drying tunnel and move air through it. The air also removes water evaporating from the grains inside the tunnel.

A simple roller with ropes attached to both of its ends is periodically dragged underneath to mix the grains without the need to open the tunnel. A rake for internal mixing is also available.

Schematic diagram- Solar Bubble drier



Solar bubble dryer

STORIES FROM THE FIELD

BAHADUR-SUB1 SAVIOR OF FARMERS IN FLOOD-PRONE AREAS

Assam Agricultural University, Jorhat with the technical support of International Rice Research Institute (IRRI) has implemented the World Bank-funded APART in 16 (undivided as of 1st April, 2016) districts of Assam. The main objective of the project is to *add value and improve the resilience of selected agricultural value chains focusing on smallholder farmers and agro-entrepreneurs in targeted districts of Assam*. Development of rice value chain with the inclusion of climate resilience technologies is one of the main components and Krishi Vigyan Kendra, Sivasagar has started demonstrations of climate resilience technologies among the farmers, affected by floods during the last few years. In APART, the participation of women farmers to create opportunities is an important component. Mrs. Aroti Chetia, a woman farmer from the Hanhchara Chetiagaon village, of Sivasagar district has shared her experience on the performance of Stress Tolerant Rice Varieties' (STRV) survival under floods. Her rice field is situated in a low lying area, where every year due to subsequent floods there is water submergence, which is a major problem. Many a times, she has either completely lost the rice crop or got very low yield from these fields in the past few years. But, during the *Sali* season 2018, she approached KVK, Sivasagar and expressed her problem, in turn, KVK advised her to go for a demonstration with the new submergence variety "*Bahadur- Sub1"*,

Aroti Chetia in her field

introduced as one of the climate resilient technology under APART. Initially, she was not convinced on the performance of the variety and assurance of the scientists, but later she transplanted this variety for the first time in her low lying fields. As usual, after 15 days of transplanting of seedlings, the crop was submerged with flood water. Her crop was under flooded water for almost 15 days. She lost all her hopes on the survival of the rice crop. But after flood water receded, she was surprised to see her rice crop rejuvenating its re-growth and it survived completely and also attained its full growth after a few days and gave a good harvest. According to her, '*It was a miracle. My crop was submerged in water for 15 days after 15 DOT. When the crop encountered the unfavorable water logging situation, I was thought that the crop will be completely damaged and I have to re-sow or transplant the crop. But I was totally surprised when the crop got its complete growth. I would like to thank to all the concerned organizations for bringing such a need-based climate resilient variety for us. I hope this will create a revolution in Assam."*

SWARNA – SUB 1 CARRYING THE HOPE OF DELIGHTFULNESS TO THE FARMERS IN GOLAGHAT DISTRICT

Krishi Vigyan Kendra, Golaghat under Assam Agricultural University, Jorhat with the technical support of IRRI had supplied the quality seed of Stress Tolerance Rice Varieties (STRV), Swarna-Sub1, Ranjit-Sub1, and Bahadur-Sub1 during the Sali season 2018. Mr. Debojit Kaman is a farmer from the village 2 no Porongoniagaon, Golaghat, whose paddy crop survived under submergence for three times with an interval of 5 days, 7 days and 3 days respectively, during the rainy season. According to him, he has transplanted Swarna Sub 1 variety in the month of July 2018 and his crop got submerged after 20 days of transplanting withstanding flood water for 5 days, 7 days and 3 days at three interval periods. As per Debojit, the flood occurrence was so frequent that the crop had not even revived from the previous shock of the flood. When the rice field was submerged, he had lost all hopes of rejuvenation of the crop and he was sure that he would have to re-sow the nursery and re-transplant the field. But to his utmost surprise, after the water receded, he found that the crop was still surviving and it attained good health after few days. He was very happy. He thanked the KVK and IRRI officials, who have brought such a wonderful variety to his doorsteps. He is hopeful that such technologies introduced by IRRI, will bring a ray of hope for the farmers who are losing a substantial quantum of their crops due to flood every year, particularly in the low lying areas.

The demonstration was head-to-head in which the *Swarna sub-1* was compared with a local variety named *Dumbor.* The farmer had done the gap filling of the rice variety, Dumbor, with the nursery available with him, after 30 days after the first flood water receded from his fields. For doing this gap-filling the farmer had to bear an additional expenditure both for raising seedling in nursery and labor for re-transplanting the field. Both the demonstrated varieties were evaluated in the presence of officials from KVK, Golaghat, farmers from the surrounding villages and officials from IRRI. The aim of this evaluation was to showcase the yield advantage of 3.0 q/ha in *Swarna sub-1* variety over the local variety *Dumbor,* which was transplanted on the same day under similar conditions.

Published by:

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