



**ADM Institute for the
Prevention of Postharvest Loss**
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



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Postharvest Loss Reduction Innovation Lab (PHLIL) - Bangladesh

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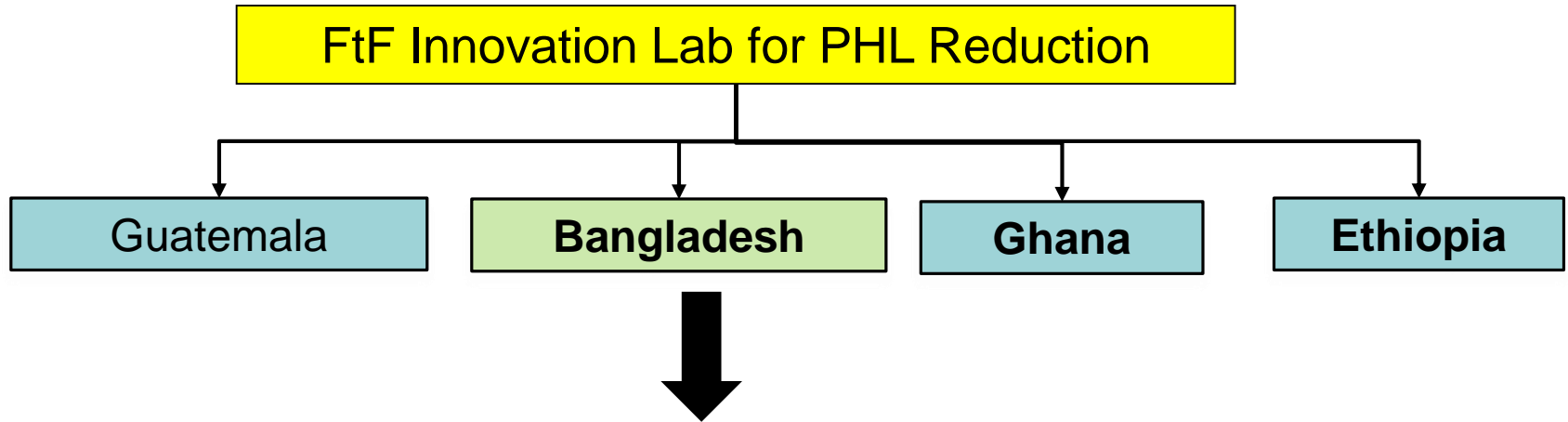


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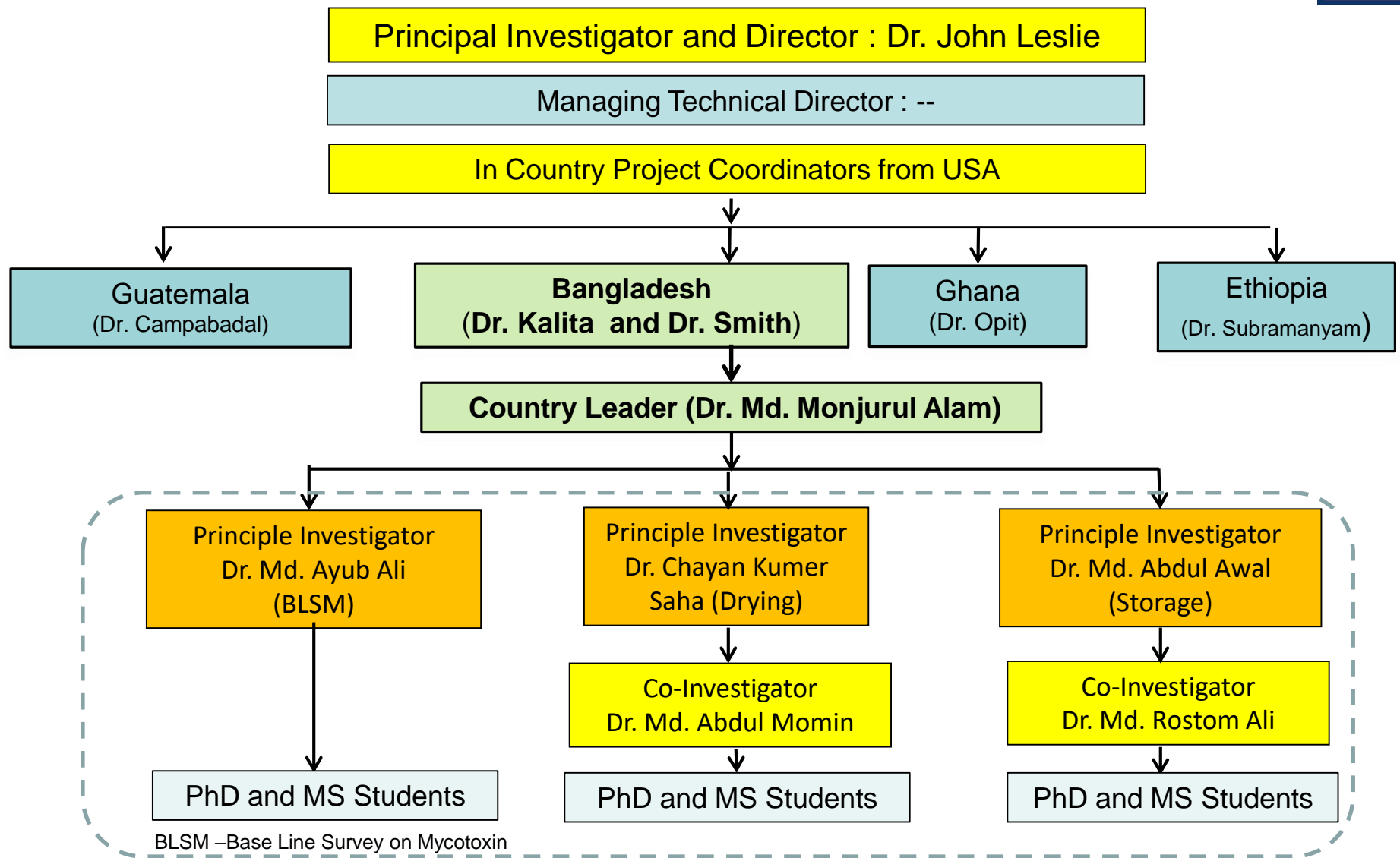
BAU



Sub-Projects

- Baseline survey of mycotoxin in Paddy
- Appropriate Paddy Drying Technologies
- Appropriate Paddy Storage Technologies
- Gender status in postharvest activities in Bangladesh

Feed the Future Innovation Lab for Postharvest Loss Reduction - **Management**



Sub-project - Baseline Survey of Mycotoxin Production in Paddy



Major Objective: Survey and national database preparation on Mycotoxin in Paddy and capacity building for Mycotoxin detection

- Study was conducted in the 200 farm households of two districts, Jessore and Mymensingh of Bangladesh during Boro 2014-15
- Moisture contents were determined at the time of sample collection
- 72 randomly selected samples were tested for Aflatoxin detection. Likewise another 72 samples were tested for Fumonisin
- **Romer Lab AgraVision** test kits were used for Mycotoxin detection



Sub-project - Baseline Survey of Mycotoxin Production in Paddy



Table: Grain quality of samples from 200 households in 8 villages of Phulpur, Bangladesh (after 2 month Storage by Farmers)

Range of M.C. (%)	No. of Samples	Grain Discoloration (%)			Insect Population (Number of insects)	
		Brownish	Spotted	Moldy	Moth	Weevil
10-12	44	1	2	4	2	0
12.1-14	37	1	3	7	5	6
14.1-16	61	2	2	11	7	8
16.1-18	14	4	2	15	12	9
18.1-20	07	5	3	16	19	11
>20	30	7	3	18	23	15

- 18% moldy grains in high moisture paddy compared to 4% in low moisture
- Insect population higher in the samples with high moisture content
- 38% germination in samples with >18% moisture content compared to 94% in the samples with moisture content <12%

Sub-project - Baseline Survey of Mycotoxin Production in Paddy



Table: Aflatoxin level sin 72 selected Samples



Number of samples		Aflatoxin (ppb)
Jessore (36 Samples)	Mymensingh (36 Samples)	
6	9	> 20
10	6	10-19
7	11	5-9
13	10	< 5



- 20 ppb is the maximum tolerance limit for consumption contaminated grains in USA
- Aflatoxins concentration was as high as 54.65 ppb in paddy samples

Sub-project - Baseline Survey of Mycotoxin Production in Paddy



Table: Fumonisin level sin 72 selected Samples



Number of samples		Fumonisin (ppm)
Jessore (36 Samples)	Mymensingh (36 Samples)	
3	0	> 2
1	0	0.75-1.99
10	1	0.5-0.74
22	35	<0.5

- Fumonisin was detected in all test samples, however, the concentrations were low
- 2 ppm is the maximum tolerance limit for consumption contaminated grains in USA
- Only about 4% samples had Fumonisin levels more than 2 ppm



On Going and Future Activities

- Testing Aman 2015-16 samples
- Testing Boro 2015-16 samples
 - Germination
 - Moisture Content
 - Detection of Aflatoxin and Fumonisin, their stability on grains before and after milling and boiling
- Creating mycotoxin data base of three years results.

Sub-project - Appropriate Paddy Drying Technologies

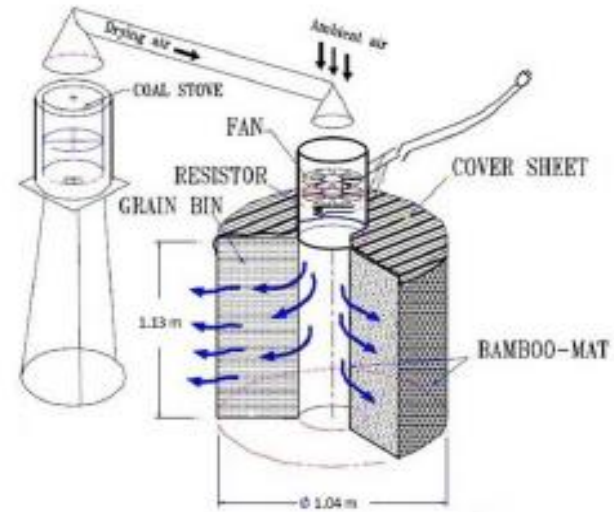


Major Objective – Adaption and dissemination of STR Dryer and Hohenheim Solar Bubble Dryer (SBD) for paddy at farmers and small traders' level





STR Dryer

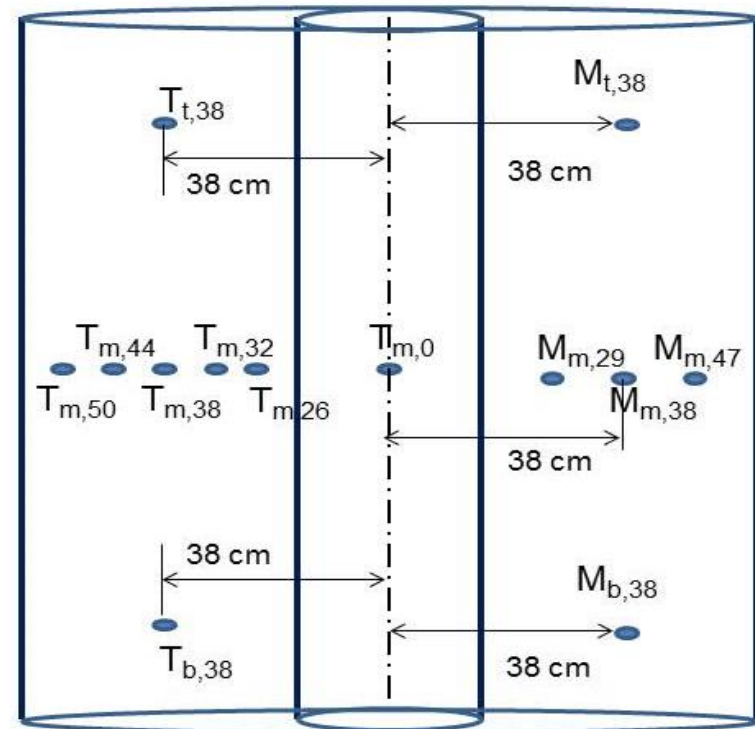


- Local material can be used and the dryer can be built locally
- Manufacturing Cost - \$500 for 0.5 ton capacity
- Advantages of high drying rates
- Animal or farm waste can be used as heating source



STR Dryer

- Dryer with **capacity of 0.5 ton** was built and tested at Bangladesh Agricultural University
- Locally available **rice husk briquettes** were used as fuel in stove

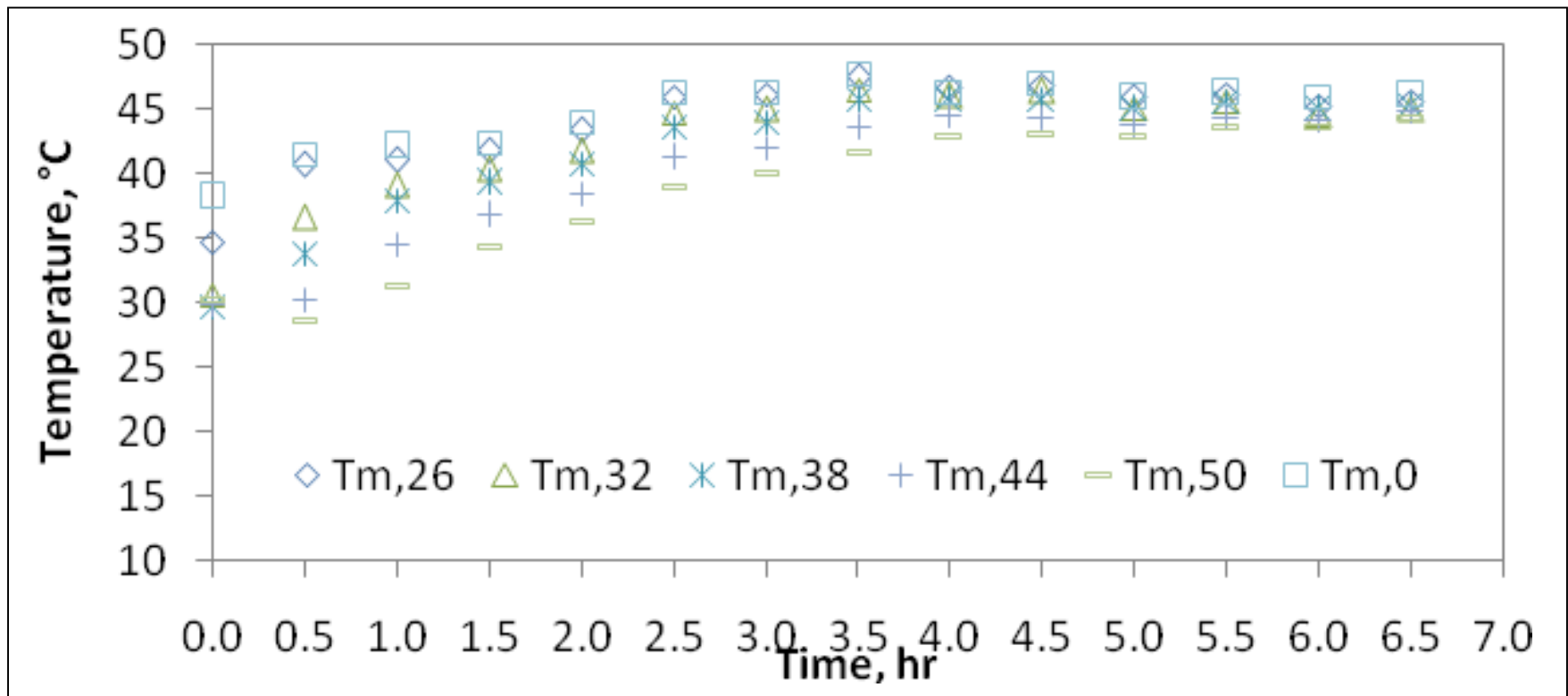


Temperature sensor location & Moisture collection point in Dryer



STR Dryer

- Horizontal temperature distribution was uniform throughout the dryer

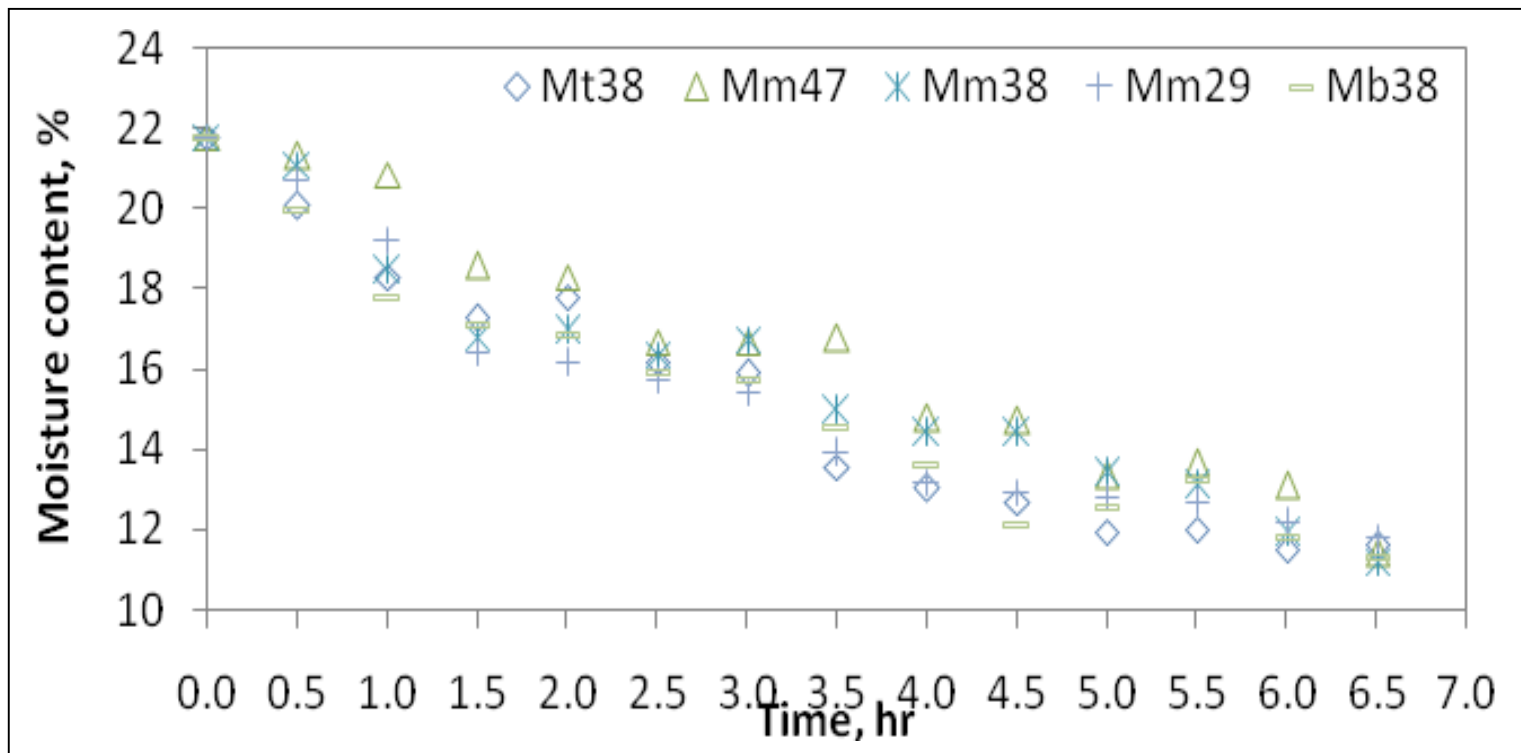


Horizontal drying air temperature variation at different point of middle layer of dryer for BRR1 dhan62 paddy



STR Dryer

- Dryer was able to dry 500 kg of paddy to moisture content of 12% in less than 5 hours





STR Dryer

Challenges

- Controlling of heat source is quite difficult since it depends on operator's experience
- Steady electricity supply is needed to operate the blower
 - To overcome this problem, BAU successfully tested the dryer using **diesel generator** instead of using electricity for blower
- Smoke from burning waste can deteriorate the quality of grains, especially those for human use



Hohenheim Solar Bubble (HSB) Dryer OR SBD

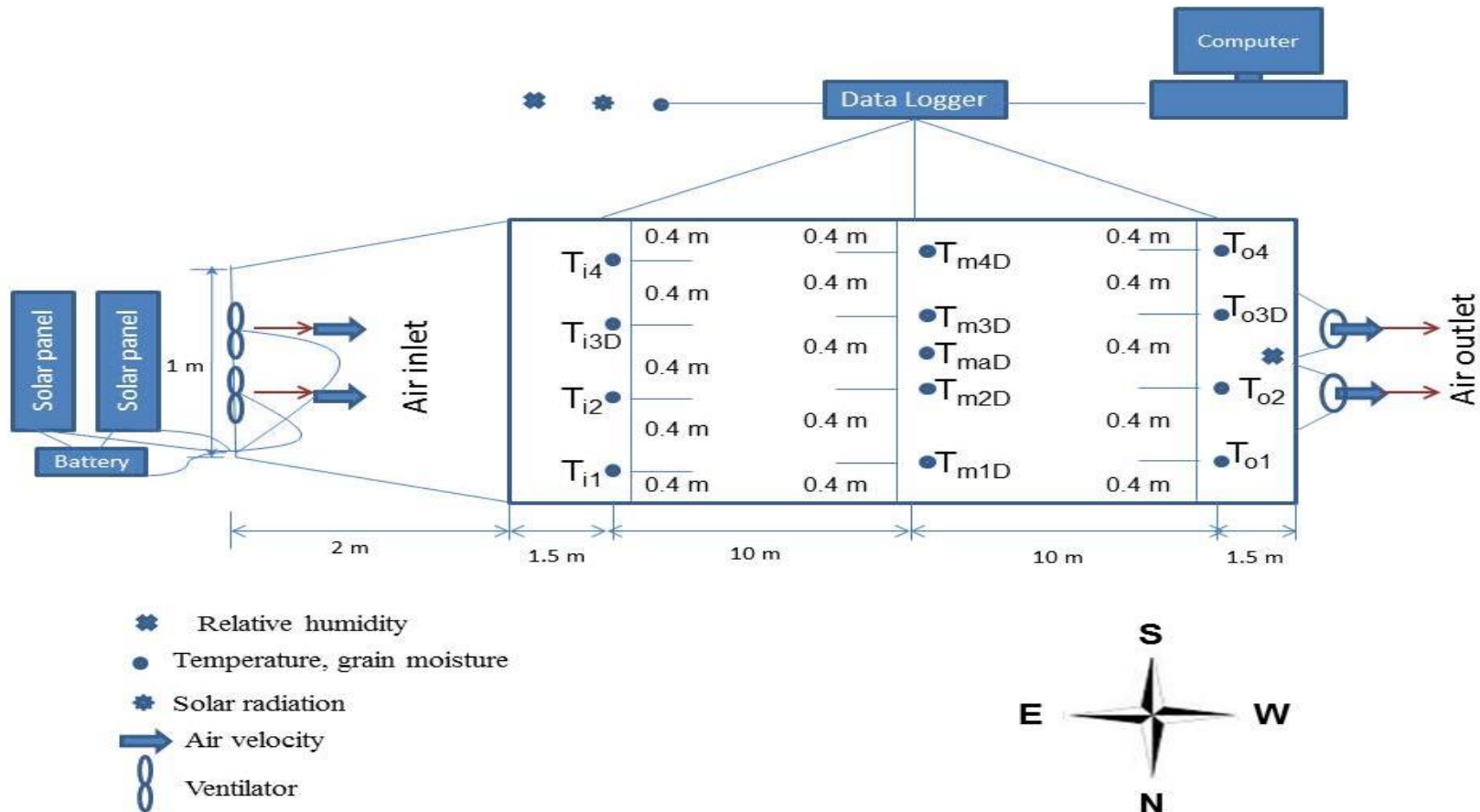
- Low energy dryer using solar energy
- Ideal for rural areas without electricity supply





SBD Dryer

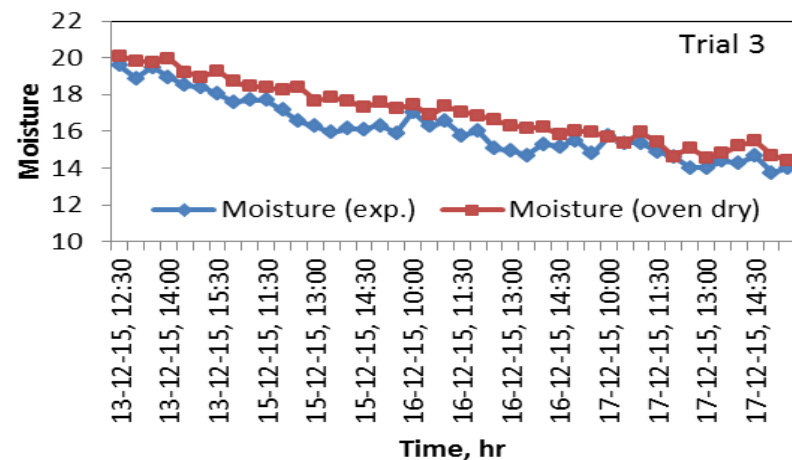
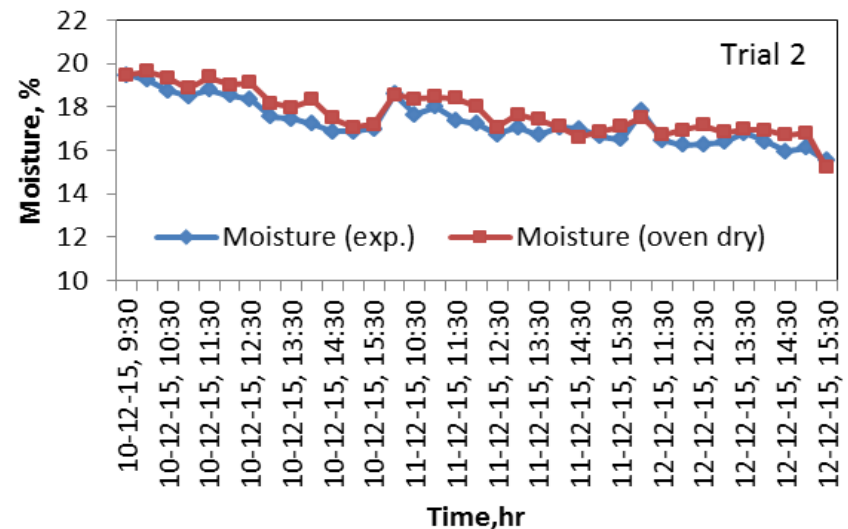
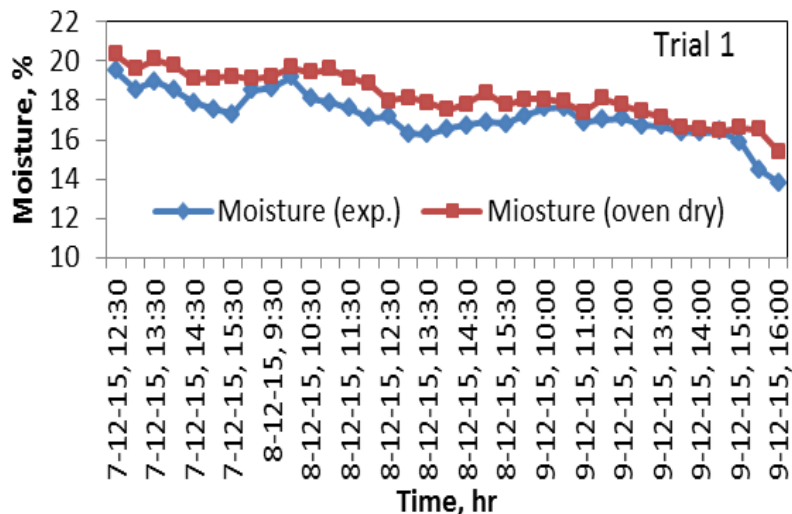
➤ Dryer with capacity of 1 ton was tested at Bangladesh Agricultural University



Sub-project - Appropriate Paddy Drying Technologies



- The SBD dryer was evaluated with 3 trials (1 ton per batch)
- Depending upon the weather conditions, the **SBD** dryer was able to dry 1 MT of paddy in 2-4 days





SBD Dryer

Challenges

- High drying times (up to 4 days)
- Large footprints (required large plain area)
- Temperature inside the dryer was very much dependent on solar radiation/sunlight hour, which is a big challenge during boro season.
- Condensation in the bottom part of the grain layer due to improper mixing



- STR dryer was found better suitable for grain drying than the SBD
- STR dryer can be used all the time for drying paddy even if there is no sufficient sunshine hour
- STR dryer can be locally manufactured
- Drying cost:
 - STR dryer (with diesel generator) - 1.14 Tk/kg
 - STR dryer (with electricity supply) – 0.79 Tk/kg
 - SBD dryer - 1.48 Tk/kg
 - Traditional drying methods - 1.0 Tk/kg
- **The payback period of STR dryer was calculated less than one year whereas for SBD dryer, it was more than three years**



On Going and Future Activities

- Piloting of STR dryer at Farmers' fields in Jessore and Mymensingh
- Identification of custom-hire service providers (CHSP) for the dryer
- Identification of potential workshops for manufacturing STR Dryer



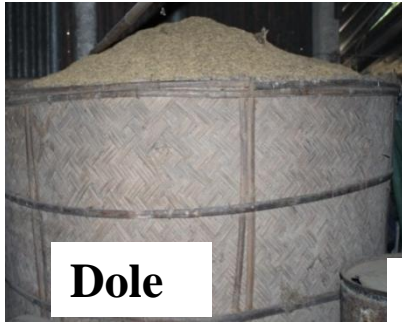
Sub-project - Appropriate Paddy Storage Technologies



Major Objective – Study of traditional and hermetic storage technologies (PICS bags, GrainPro) and dissemination of appropriate storage technologies at farm households



Sub-project - Appropriate Paddy Storage Technologies



Dole



Plastic drum



Motka



Plastic bag



Plastic bag



Auri



Gola



Motka

- Dole (47.6%) is most commonly used storage container
- Plastic bags are becoming popular among the farmers due to its low cost, light weight and availability

Sub-project - Appropriate Paddy Storage Technologies



- Traditional storage methods are not adequate to maintain inside environment & avoid insect infestation and mold growth

Traditional Storage Methods



Dole



Motka

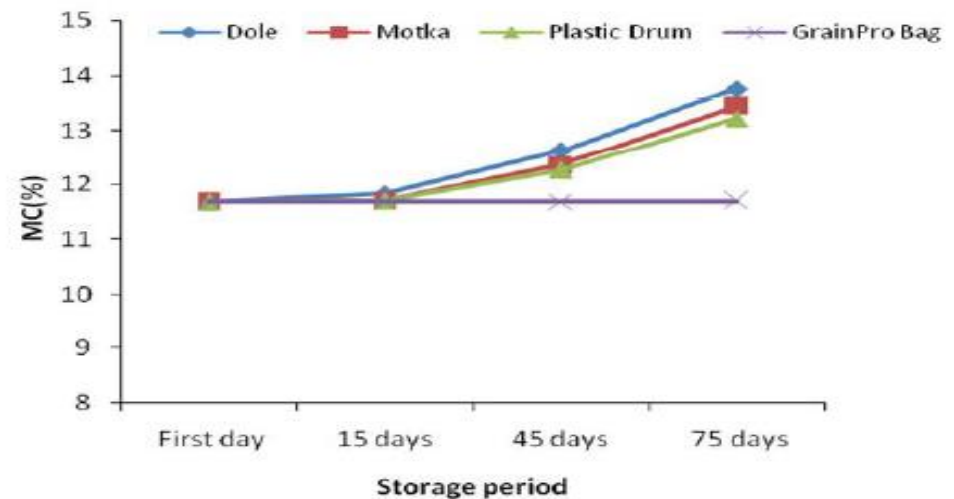


Plastic Drum



GrainPro Bags

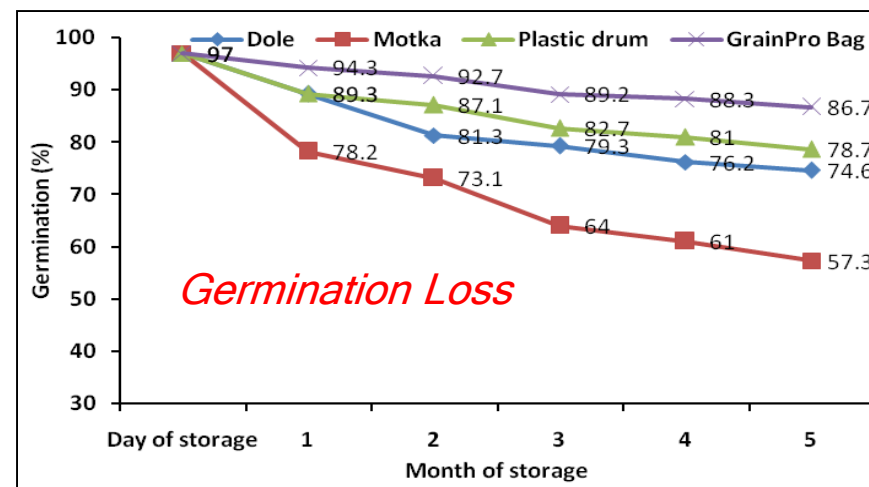
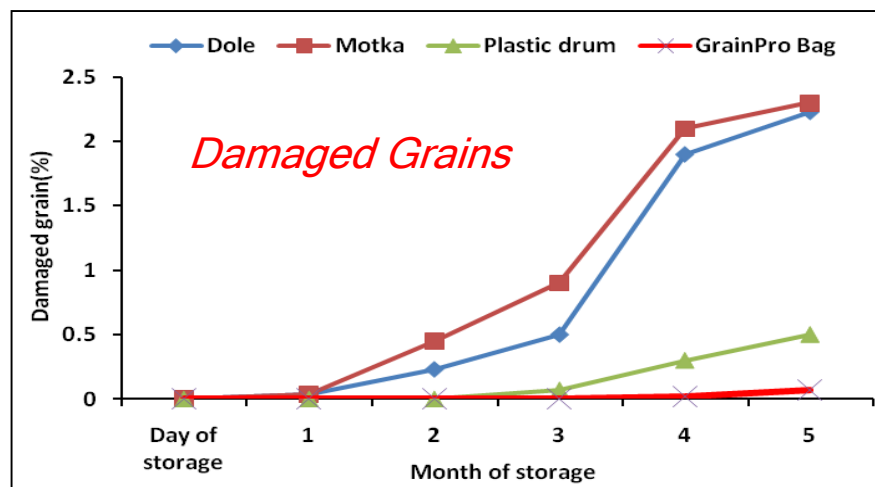
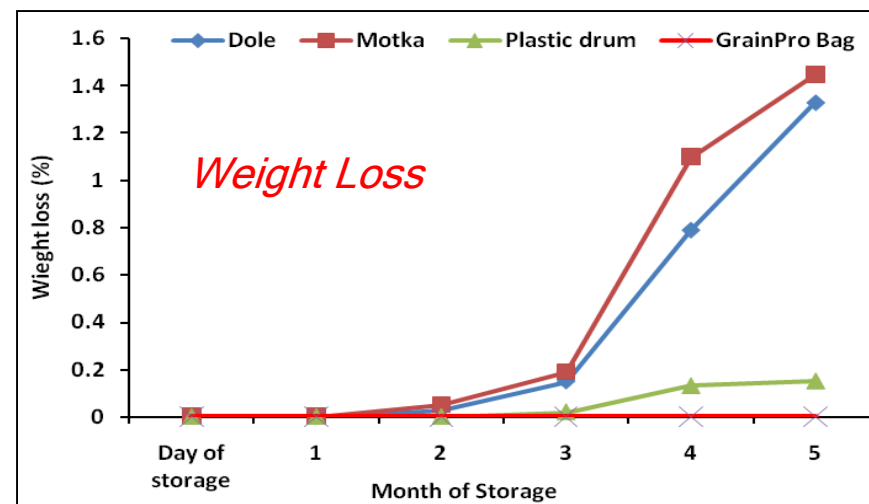
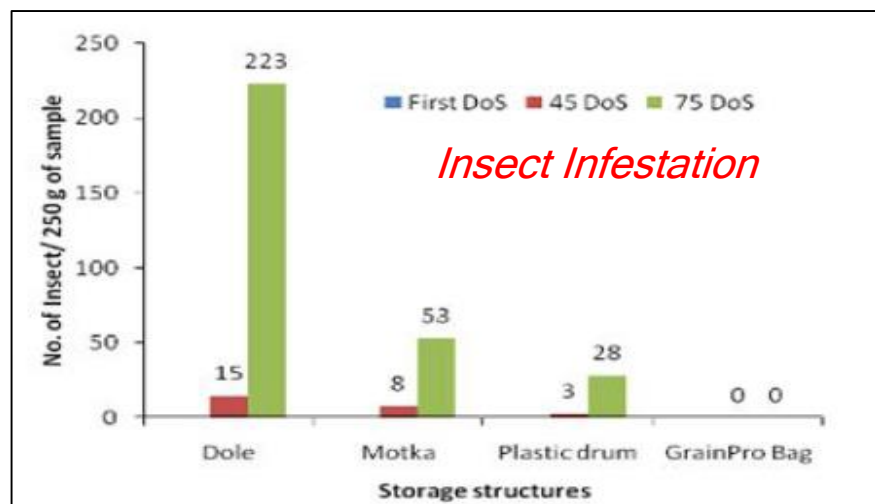
Hermetic bags can avoid the change in moisture change and minimize the losses



Sub-project - Appropriate Paddy Storage Technologies



Results from Paddy Storage Study using Traditional Methods and Hermetic Bags (GrainPro) at Bangladesh Agricultural University





Sub-project - Appropriate Paddy Storage Technologies

Results from ON FARM Paddy Storage Study in Phulpur, Mymensingh and Manirampur, Jessore, Bangladesh

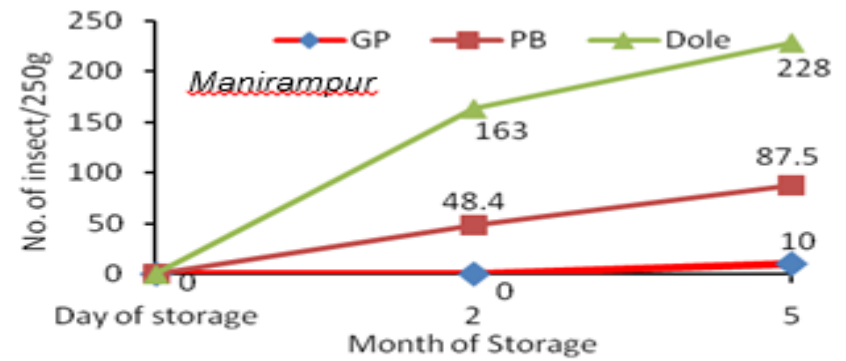
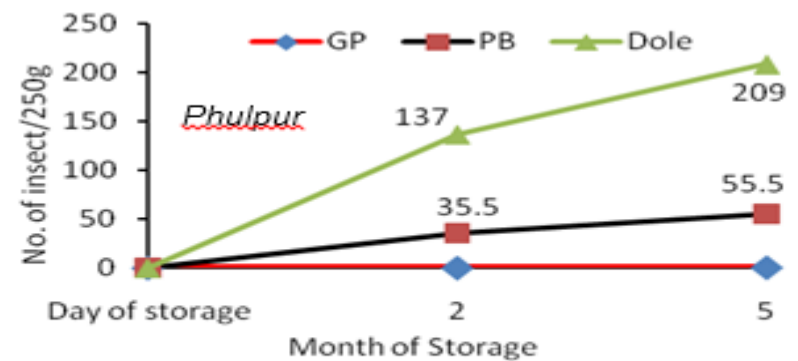


Fig. Insect infestation at different storage Technologies at farmers' level

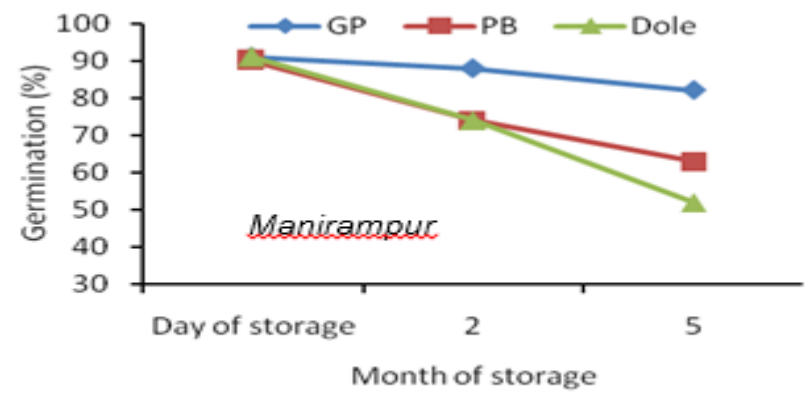
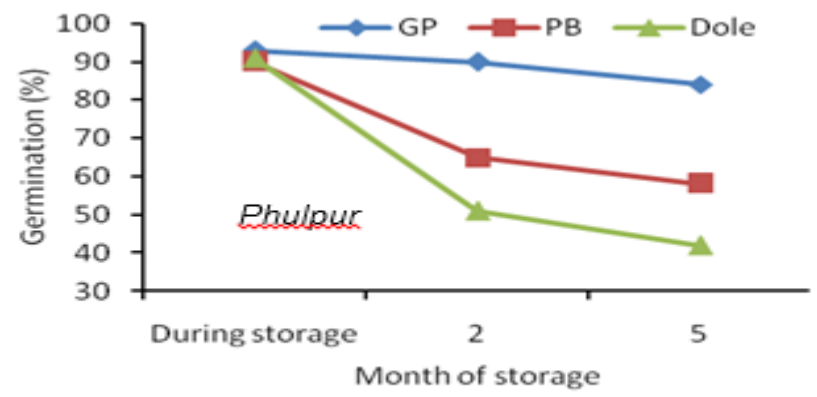


Fig. Germination (%) of stored paddy at different storage Technologies at farmers' level

- PB - Plastic bag
- GP - GrainPro bag



Challenges

- Damage by rodents is a big challenge
- Few insects can also puncture the bag and penetrate inside
- User training is necessary to properly seal the bags
- Availability and HIGH COST



Insect invaded in GrainPro bag



Damaged GrainPro bag at farmers household in Bangladesh



On Going and Future Activities

- Evaluation of financial parameters of identified storage technologies
- **Options for manufacturing hermetic bags in Bangladesh**
- Scaling up of selected storage technologies during Boro season

Gender status in postharvest activities in Bangladesh



Major Objective –To assess the current situation of rural women farmers, their roles and participation in postharvest activities their challenges related to field work and to provide the project with possible guidance for improvement related to gender issues in postharvest activities





- Gender equality study was conducted in 8 selected villages in Phulpur Upazila of Mymensingh district and Manirampur Upazila of Jessore district through 4 FGD in each district
- It was found that women play significant role in all postharvest activities but Yet they received little recognition for their contribution in agriculture
- Most of the women used simple traditional manual technologies for postharvest activities, **which are very time-consuming and labor-intensive**
- Women had insufficient time to devote to family's other tasks and to manage time, they have to shorten their sleeping time
- Women friendly postharvest technologies can reduce their labor and improve the output



- The study findings were also shared and validated with larger audience: academicians, scientists, research students from BAU, BARI, BIRRI and the lead farmers from the project areas through the annual workshop of the PHLIL project on 17 September, 2015.
- The gender training was held with the farmers and local stakeholders in both locations to have basic understanding about gender situation of men and women and gender issues in post-harvest paddy processing.



Future Activities

- Gender training curriculum development
- Policy guideline development to address the gender issues in project planning and designing
- Developing gender indicators for Monitoring & Evaluation of gender problems and impacts on postharvest losses



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