

On-Farm Grain Storage Solutions for Smallholders in Bangladesh

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February 05, 2020



General Background



Successes

- Bangladesh is the 4th largest rice producer, 3rd largest vegetable and inland water fish producer and 5th largest aquaculture fish producer in the world.
- Since independence, the production of paddy has increased over three folds (55.5 million tons in 2015; BBS, 2016) compared to double the population growth and attains self-sufficiency in paddy production.

Challenges

- Agricultural land is decreasing by 0.5% per year (FAO, 2014).
- At present, on-farm labor employment is about 43% of rural labor force and expected to be reduced to about 36% by 2020 and 20% by 2030 (FAOSTAT, 2017).
- There is potential yield gap between research and on-farm production.
- Postharvest loss of paddy at farm level is about 14% of which drying and storage losses are 3.5% and 6.2%, respectively (PHLIL, 2018).

Potential Solutions

- Reduction of postharvest losses and value addition by processing would have been the potential solutions of the challenges.

Objective



Major Objective of PHLIL-BD

One of the major objective of the study is to identify and scale up appropriate storage technology for small holder farmers and build capacity about safe storage of paddy for farmers (men and women) to reduce post-harvest loss and improve grain quality.

Storage of Paddy



Dole



Auri



Gola



GrainPro



Motka



Plastic drum



Plastic Bag



PICS

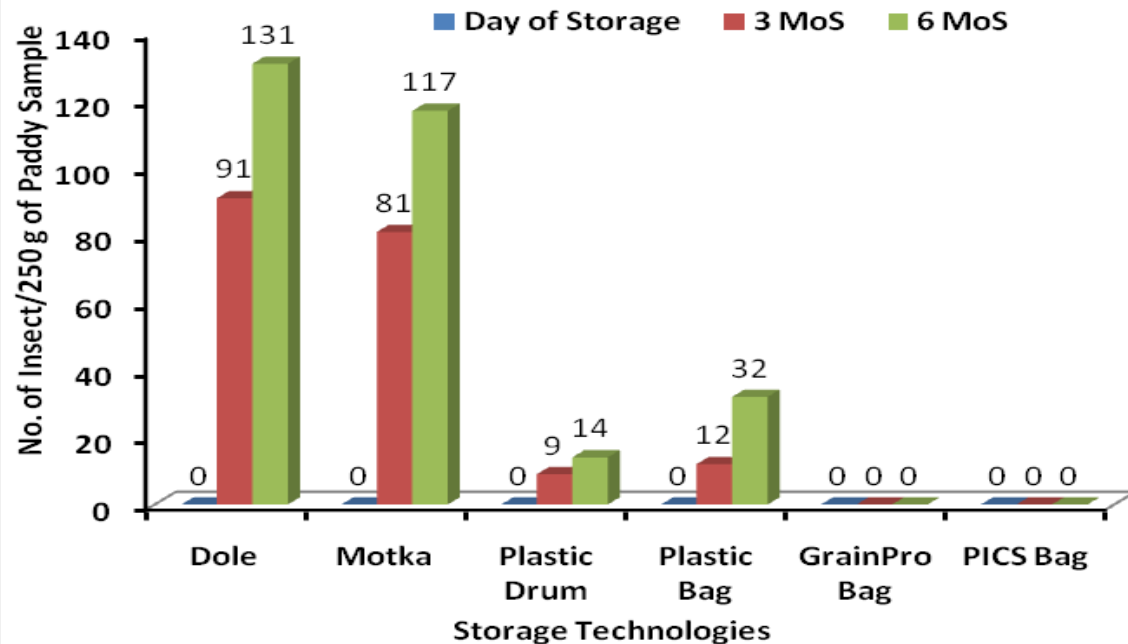
Traditional storage structures

Hermetic storage bags

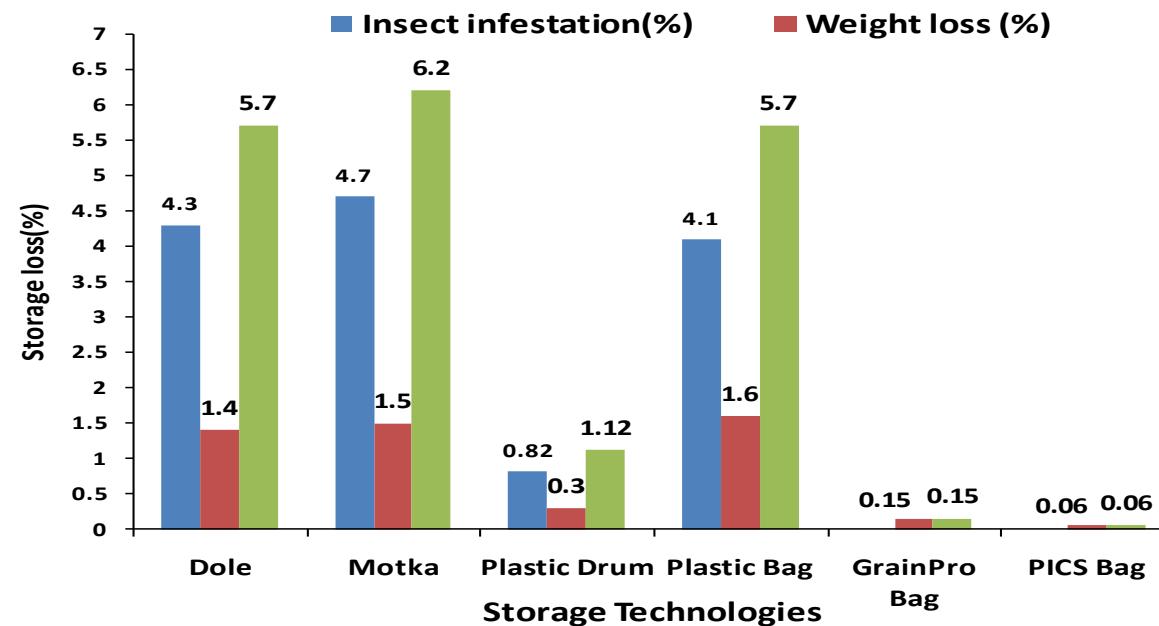
Storage of Paddy



Insect infestation at storage



Storage loss



No. of insect infestation/250g



Rice moth



Lesser meal worm larvae and adult



Rice weevil



Red flour beetle

Storage loss(%)

Storage of Paddy

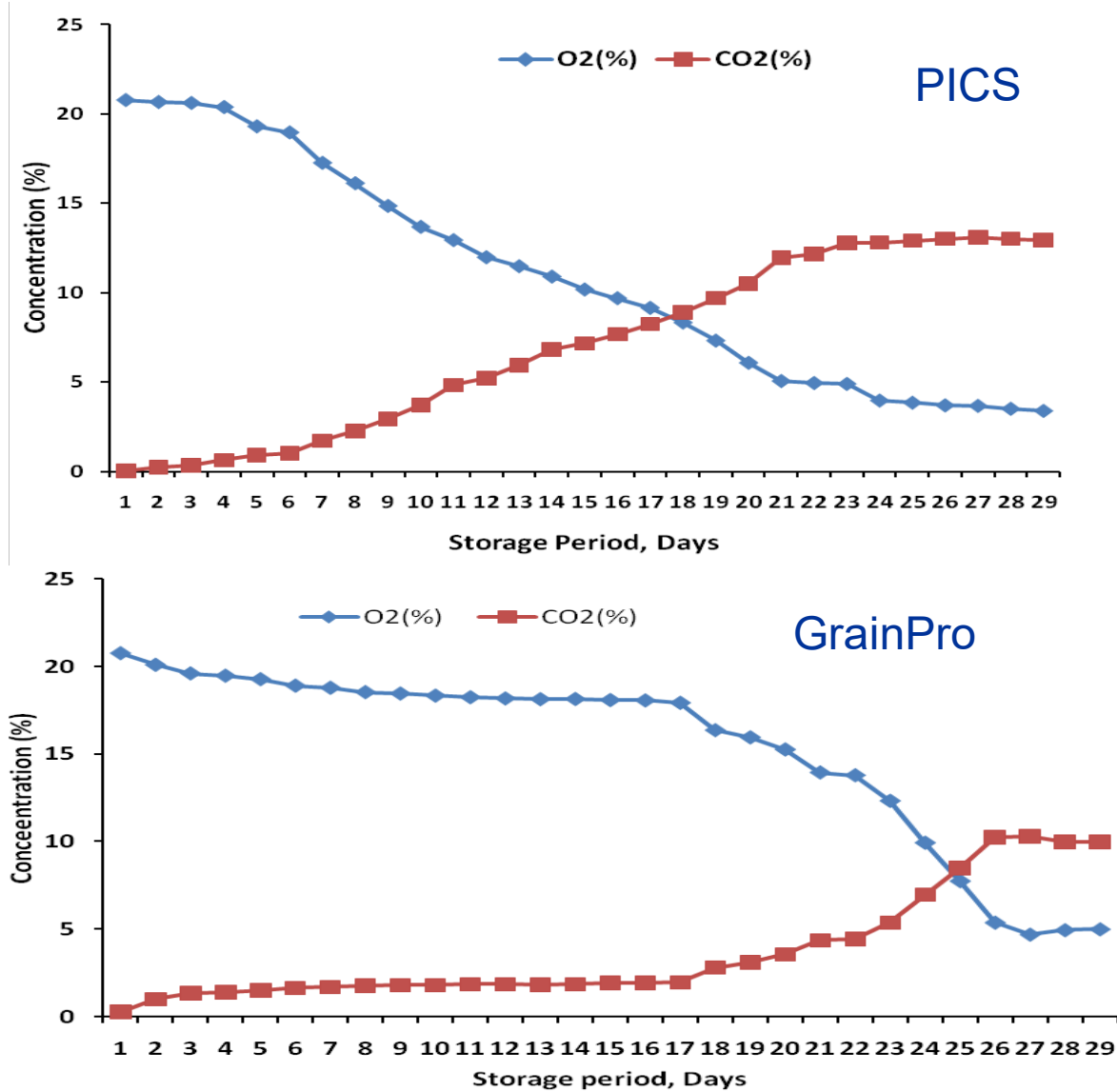
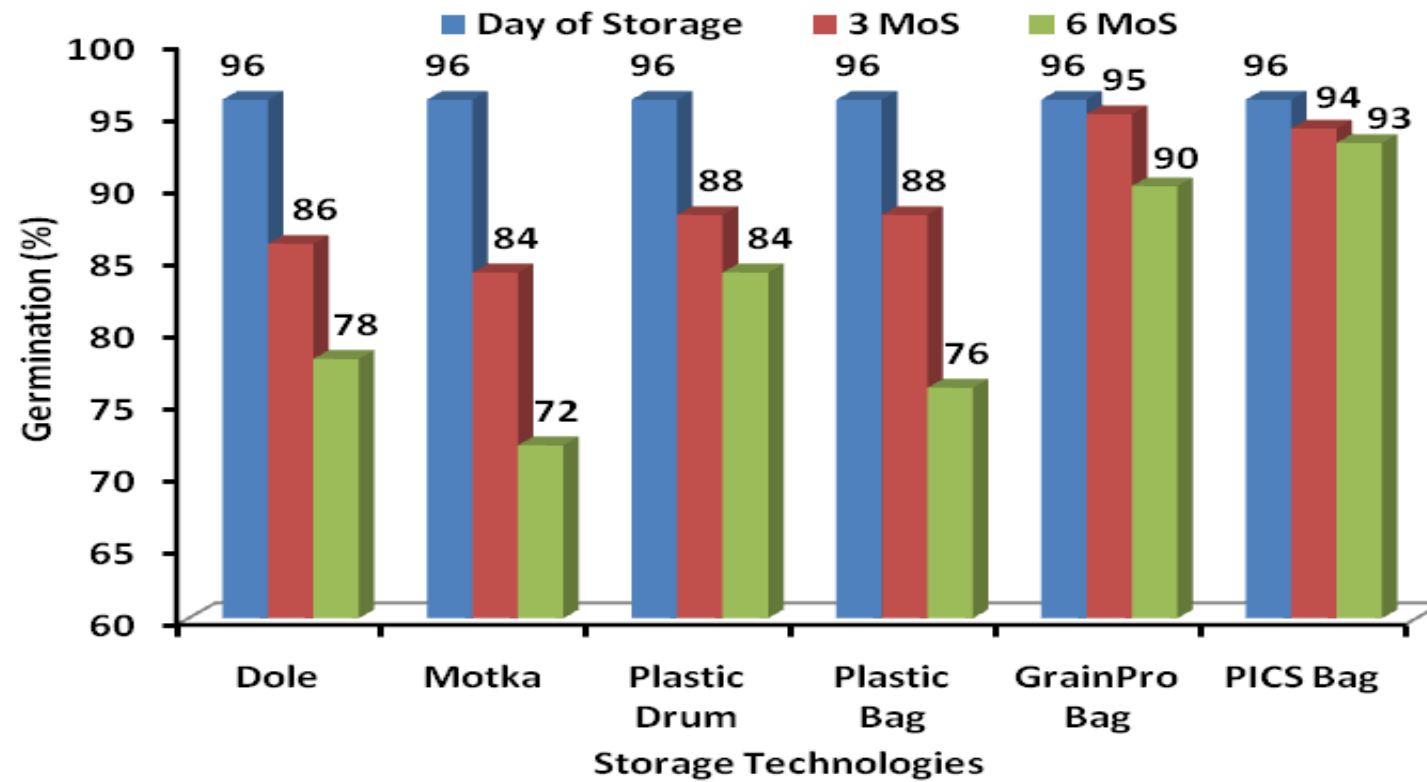


Fig. Monitoring of O₂ and CO₂ concentration inside hermetic bag used for paddy storage

Storage of Paddy



Seed germination performance



Germination of stored seed



Experiment set up at BADC



Experimental setup for Aman rice seed (January to May, 2020) (PHLIL-BD Phase II)

| Location | Treatment | Replication | Lot Size | Capacity of bag | Variety | Setup Date |
|-----------------------------|--------------|-------------|----------|-----------------|-------------|-----------------|
| SPC, BADC Mymensingh | GrainPro Bag | 3 | 15 bags | 30 kg/bag | BRRIdhan 49 | 12 January 2020 |
| | Traditional | 3 | 30 ton | 50 kg/bag | | |
| SPC, BADC Madhupur, Tangail | GrainPro Bag | 3 | 15 bags | 30 kg/bag | BRRIdhan 49 | 21 January 2020 |
| | Traditional | 3 | 30 ton | 50 kg/bag | | |



Data collection

Data will be collected

- ✓ at 15 days interval : moisture content (%) and germination rate (%).
- ✓ other parameters:
- daily temperature (°C), relative humidity (RH, %) with TRH meter.
- 1000-grain weight (gm) for weight loss before and after storage.
- purity test before storage
- Oxygen (O₂) and Carbon Di Oxide (CO₂) concentration level upto 28 days after experiment setup

Off-Farm Hermetic Grain Storage



Experimental Set up (IFPRI-UIUC-BAU), Started: January 2020



Traditional storage



Indoor Cocoon

| Treatment (Capacity: 5 ton) | Measuring parameters |
|--------------------------------|---|
| PVC Indoor | First and opening days of storage <ul style="list-style-type: none"> ➤ Moisture content ➤ Weight of 100 rice sample ➤ Germination test ➤ Dry inspection (damaged grain, insect infestation, grain color) ➤ Relative humidity and temperature (each day 2hr interval) First 28 days <ul style="list-style-type: none"> ➤ O₂ and CO₂ monitor (every day-3 times: 8 hr interval) |
| Laminated PE indoor | |
| PE indoor | |
| Traditional practice indoor | |
| PVC exposed | |
| Laminated PE exposed | |
| Traditional practice exposed | |



Outdoor Cocoon

Capacity Building



Capacity building: Phase I

| Item | No | Participant |
|----------------------------|----|-------------------|
| Long term training | 9 | 3 (PhD), 6 (MS) |
| Training and demonstration | 74 | 1645 (M), 705 (F) |
| Workshops | 3 | 213 (M), 26 (F) |



Capacity building: Phase II

| Item | No | Participant |
|----------------------------|----|-----------------|
| Long term training | 2 | 1 (PhD), 1 (MS) |
| Training and demonstration | 8 | 151 (M), 77 (F) |



Success Stories



Khudeza Begum and Hasina Khatun
Phulpur, Mymensingh

--The PHLIL-BD project provides their
hermetic storage bags
--They becomes a model entrepreneur for
providing seed services to neighbors

-- talking about their success in
storing of rice seed.



Success Stories



Nikhil Chandra Biswas and his wife
Horina, Monirampur, Mymensingh

-- **Nikhil Chandra Biswas** proved himself as a quick learner and technology adapter in his village, Horina, Jessore. He uses Hermetic bag from 2016 and produces paddy seed successfully.

-- **Md Toimur Rahman**, a village doctor of Fedaipur, Jessore is a progressive farmer who successfully produce and use his own seed from 2016



Md Toimur Rahman and his wife
Horina, Monirampur, Mymensingh

Acknowledgement



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The U.S. Government's Global Hunger & Food Security Initiative



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FROM THE AMERICAN PEOPLE



KANSAS STATE
UNIVERSITY



ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ADMI ADM Institute for
the Prevention of
Postharvest Loss



ACI Motors

Metal
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