

# ***BAU-STR Dryer: A Solution for Reducing Post-harvest Loss of Paddy in Bangladesh***

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# Outline of the Presentation



- **Background**
- **Objective**
- **Materials and Methods**
- **Results**
- **Succes Stories**
- **Scaling up**
- **SWABO Video**

# Background



- Bangladesh is an agriculture based country in which majority of the people earn their livelihoods from farming and agriculture-related activities.
- Paddy is the main staple crop of Bangladesh accounting for 76% of total cropped area and 95% of cereals production.
- Drying of paddy is a major problem in Bangladesh due to rain and gloomy weather in Boro (April – June) and short day and foggy weather in Aman (October – December) season.
- Sun drying is a traditional and common practice in Bangladesh.

Traditional Sun Drying



- Improper or delayed drying leads to loss in grain quality, in addition to the estimated 14% postharvest loss which includes **drying loss 1.56 to 5%** (Bala et al., 2010).
- To reduce post-harvest losses and increase quality of storage paddy, it is necessary to adapt low cost drying technology for paddy at small scale farmers' and traders level

# Objective



## Overall Objective

Bangladesh Agricultural University (BAU) adapted BAU-STR dryer with an objective to introduce an effective paddy drying technology alternative to traditional sun drying.

- To improve and investigate techno-economic performance of BAU-STR dryer at the lab and field level of Bangladesh.



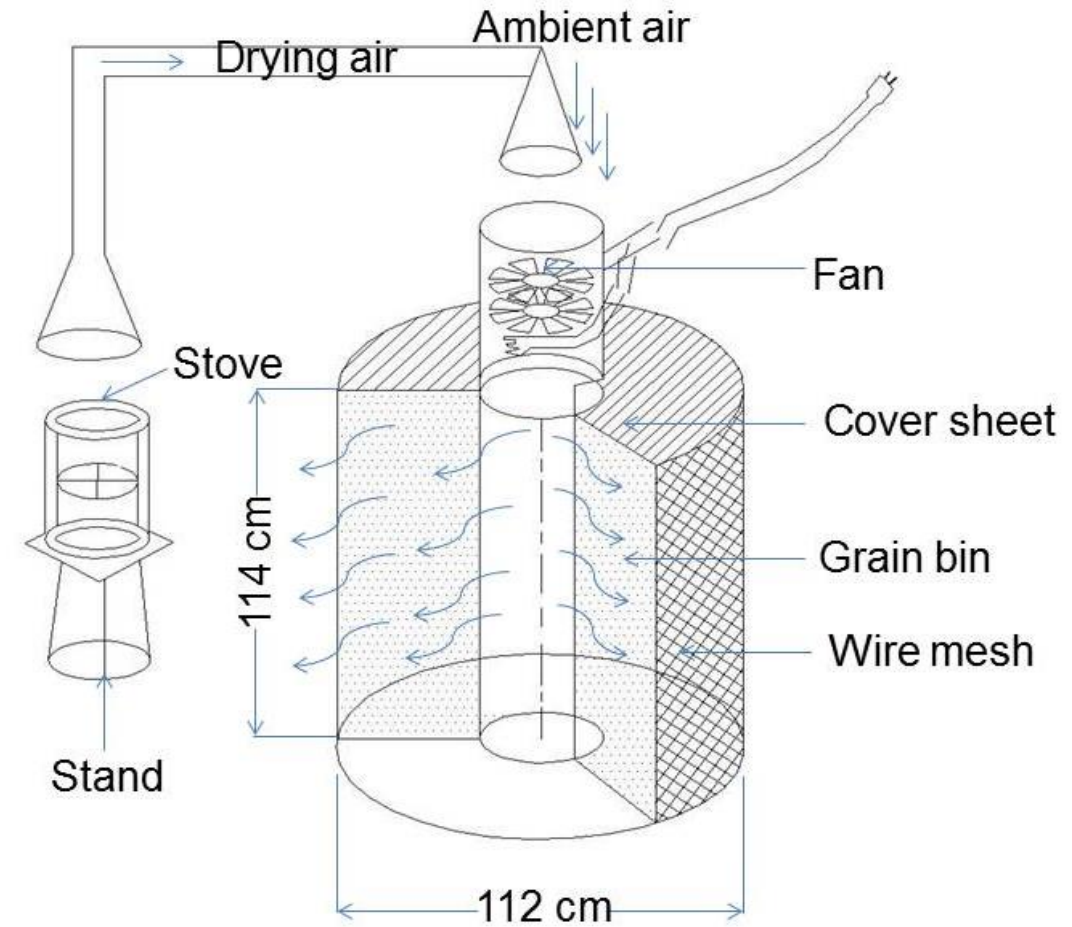
# Materials & Methods



## BAU-STR Dryer



Pictorial View



Schematic View

# Materials & Methods

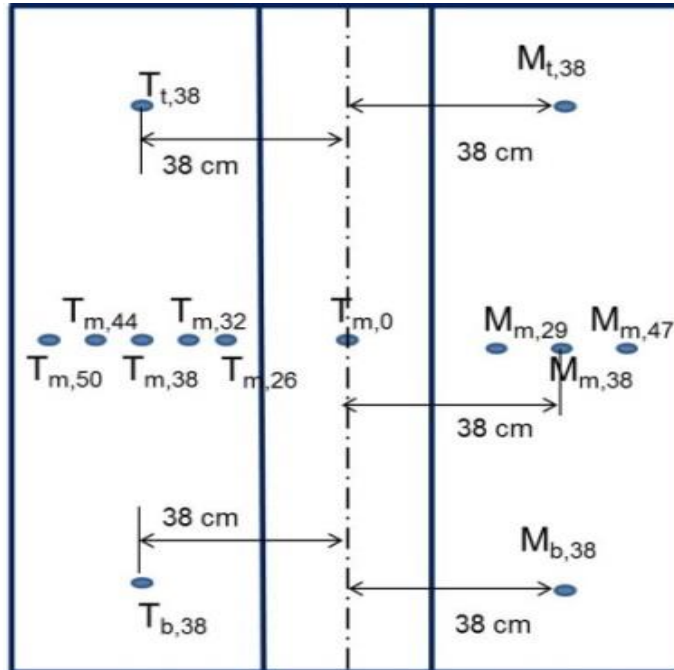


Season	Place	Method	Treatment/Dryer capacity
Boro 2015	Lab	BAU-STR dryer	S <sub>300</sub> , S <sub>400</sub> and S <sub>450</sub>
Aman 2015	Lab	BAU-STR dryer	BRR1 dhan34, BRR1 dhan49 and BRR1 dhan62
Boro 2016	Lab	BAU-STR dryer	S <sub>300</sub> , S <sub>400</sub> , S <sub>500</sub> and S <sub>600</sub>
	Field	BAU-STR dryer	BRR1 dhan28, Hybrid SL 8 and Taj
Aman 2016	Field	BAU-STR dryer	BRR1 dhan49, Gutisorna and Punja
Boro 2017	Field	BAU-STR dryer	BRR1 dhan28 (6 districts)
Aman 2017	Field	Open sun drying	10 m <sup>2</sup> out of 50 m <sup>2</sup> with 3 replication

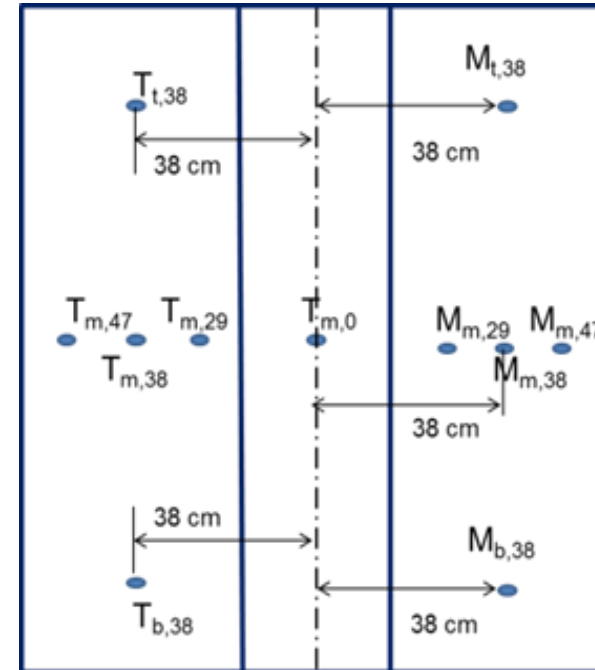
# Materials & Methods



## Temperature sensor locations & Moisture sample collection points in BAU-STR Dryer



Sensors setting at the Lab



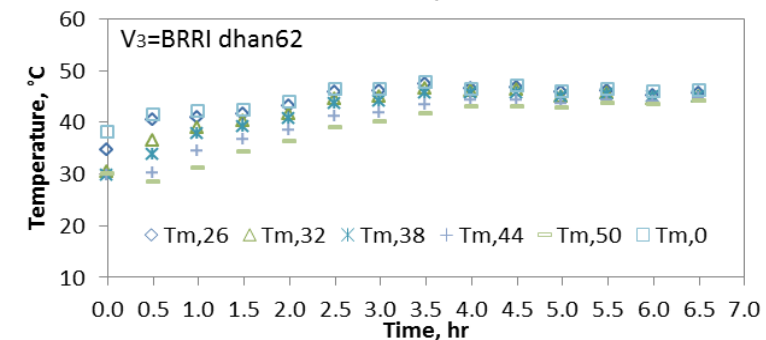
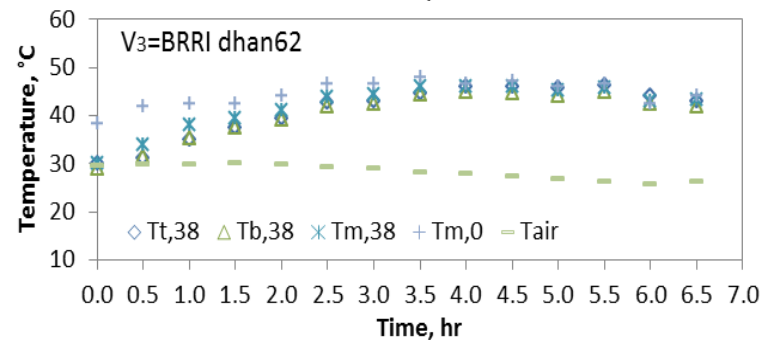
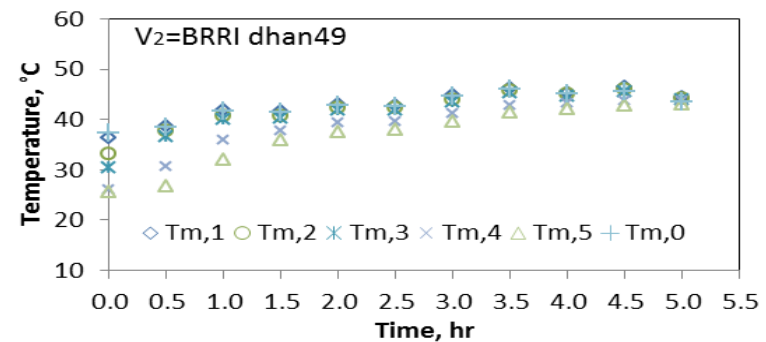
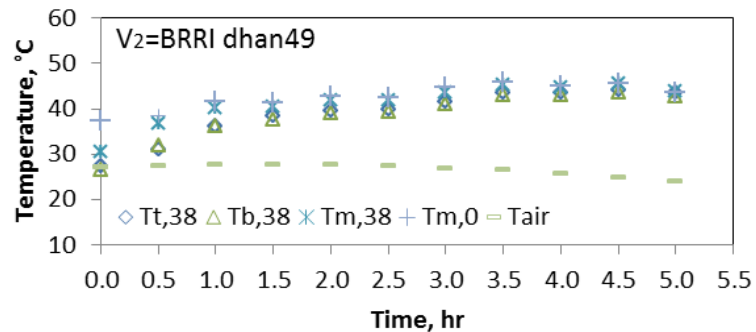
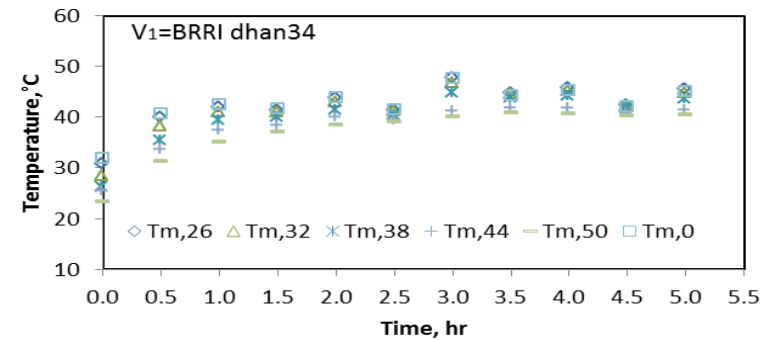
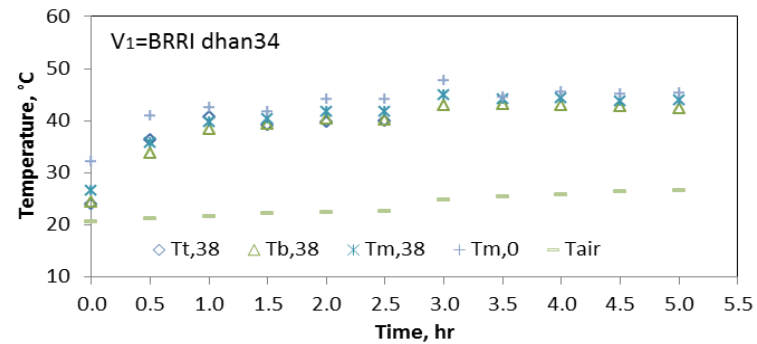
Sensors setting at the field

T- Temperature sensor; M-Moisture sensor; t – top; m –middle and b - bottom

# Results



## Temperature distribution in BAU-STR dryer during Aman 2015 season at laboratory



Vertical location

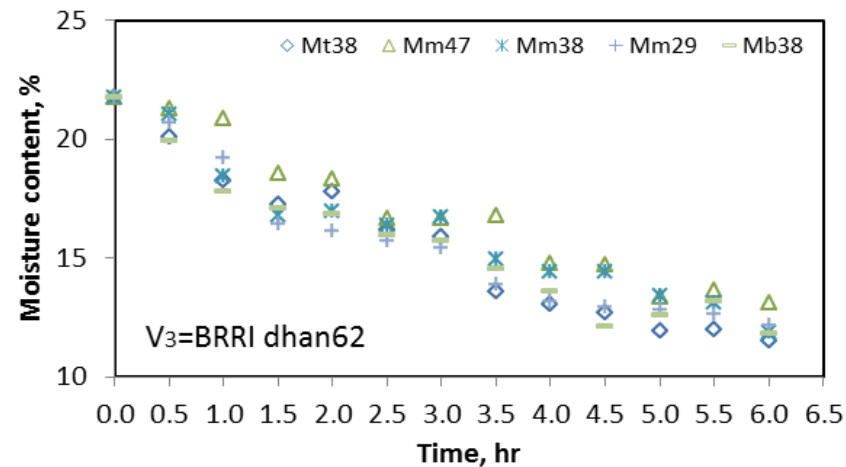
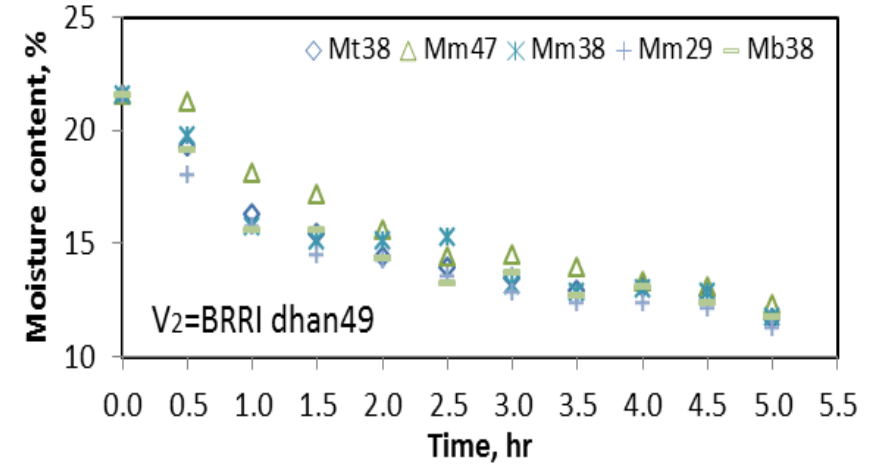
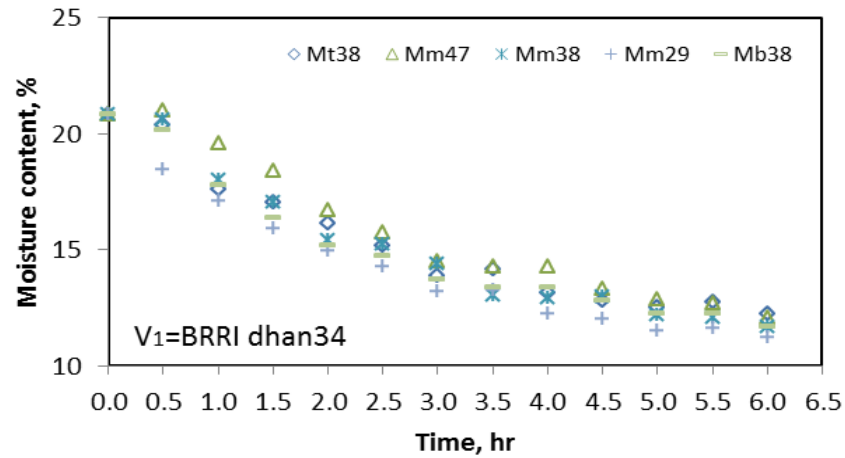
Horizontal location



# Results



## Change of moisture content in grain bin of BAU-STR dryer during Aman 2015 at laboratory



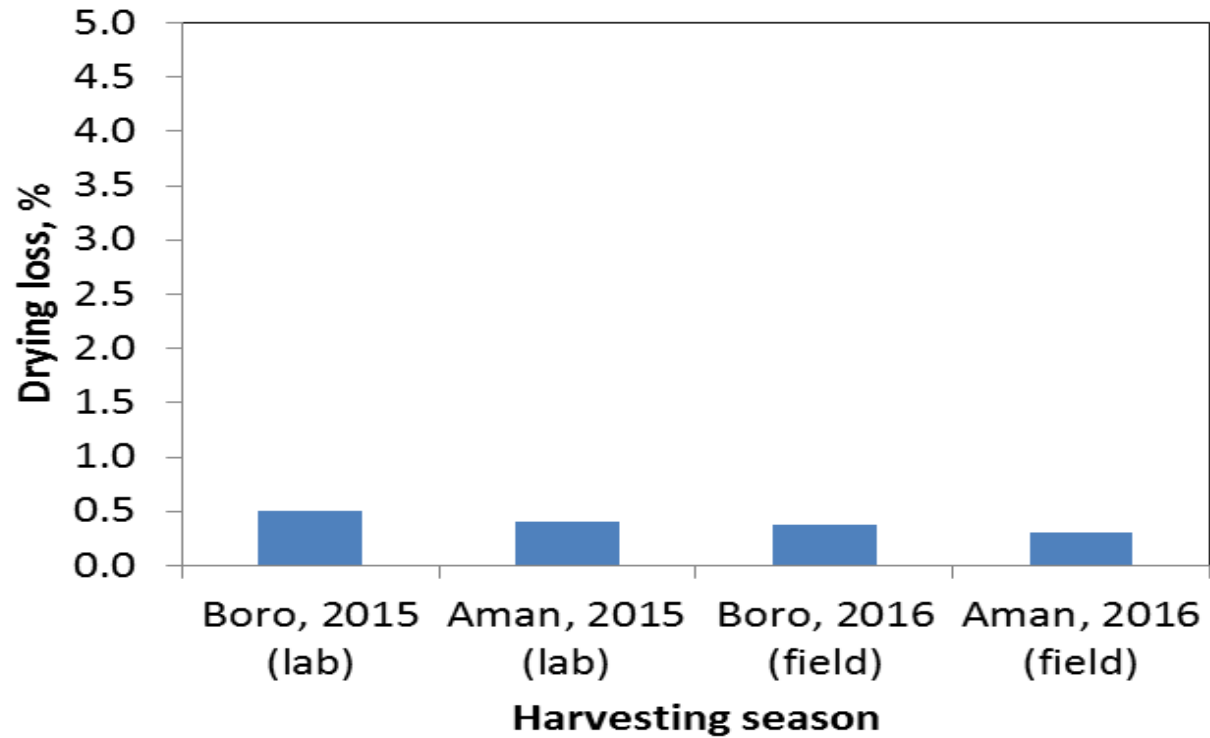
# Results



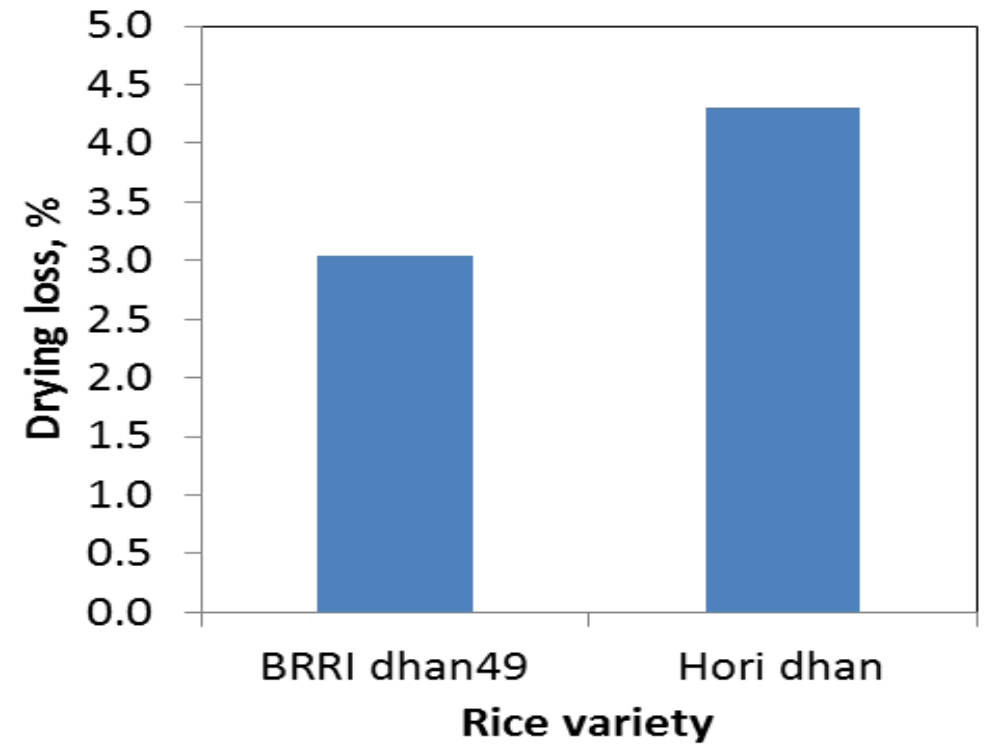
## Technical performance of BAU-STR dryer

Season	Treatment	Drying air temp., °C mean±std	Initial moisture content %	Final moisture content %	Drying time hr	Drying rate % mc/hr	Drying efficiency %
<i>Boro</i> (April-May)	S <sub>300</sub>	44.8±2.6	18.1	11.6	2.7	2.4	36.4
	S <sub>400</sub>	44.6±3.8	17.1	11.5	2.0	2.8	42.5
	S <sub>500</sub>	45.7±2.2	19.2	11.9	3.5	2.1	48.8
	S <sub>600</sub>	42.5±4.9	18.5	12.3	3.7	1.7	35.0
<i>Aman</i> (Nov-Dec)	BRR I dhan34	39.7±0.4	20.8	11.7	5.7	1.6	44.6
	BRR I dhan49	40.4±0.9	21.5	11.7	5.0	1.8	48.7
	BRR I dhan62	44.5±3.0	21.8	11.6	5.7	1.9	54.5

# Results



**Drying loss of paddy in BAU-STR dryer**



**Sun drying loss of paddy**

# Results



## Germination rate of BAU-STR dried paddy

Season	Treatment	Sprouted seed, %	Dead seed, %	Abnormal seedlings, %	Normal seedlings, %
<i>Boro</i> (April-May)	S <sub>300</sub>	3	5	3	89
	S <sub>400</sub>	2	3	2	93
	S <sub>500</sub>	3	2	5	90
	S <sub>600</sub>	4	3	7	86
	Sundry	5	4	4	87
<i>Aman</i> (Nov-Dec)	BRRI dhan34	6	5	6	83
	BRRI dhan49	7	3	5	86
	BRRI dhan62	3	3	7	87
	Sundry	6	4	5	85

# Results



## Rice quality of BAU-STR dried paddy

Dryer	Treatment	Milling recovery, %	Broken rice, %	Head rice yield, %	Hardness, N
BAU-STR	BRRI dhan34	72.9±0.9	5.4	67.5	32.4
	BRRI dhan49	72.8±1.4	6.8	66.0	28.8
	BRRI dhan62	71.8±1.2	5.9	65.9	27.4



# Drying of Paddy (Phase I)



## Sun-drying to Mechanical drying



### BAU-STR Dryer

- ❖ Capacity: 500 kg/batch
- ❖ Drying time: 4-5 hours/batch
- ❖ Market Price: USD 700
- ❖ Cost saved: 26% over sun drying
- ❖ Loss saved: 2.5-4.0%
  
- ❖ Operating cost
  - 0.74 Tk/kg (with electricity supply)
  - 0.87 Tk/kg (with diesel generator)
  - 1.0 Tk/kg (sun drying)
  
- ❖ Payback period: < 1 year



Source: PHLIL-BD, 2017

# Drying of Paddy (Phase II)



## Sun-drying to Mechanical drying



### BAU-STR Dryer (LPG)

- ❖ Capacity: 500 kg/batch
- ❖ Drying time: 4-5 hours/batch
- ❖ Market Price: USD 850 (LPG + Modified blower)
- ❖ Operating cost
  - 0.99 Tk/kg (LPG + local blower)
  - 1.06 Tk/kg (LPG + imported blower)
  - 1.01 Tk/kg (Briquette + local blower)
  - 1.10 Tk/kg (Sun drying)
- ❖ Payback period: < 1 year

Source: PHLIL-BD, 2019

# Success Stories (Entrepreneur Development)



**Md. Humayun Kabir**  
(A paddy seed trader of Atiti, Comilla)

*--Motivated to acquire a BAU-STR dryer by television report*

*--Dried 2.5 ton of paddy seed in Aus, 2017 experimentally and later dried 4.0 ton of Aus paddy seed in 2018  
--Found his business more competitive*



# Success Stories (Entrepreneur Development)



## Locally made blower & Temperature Monitor (Amin Electric; PHLIL-BD)



# Scaling up







## Postharvest Loss: Paddy Drying Using a BAU-STR Dryer in English (accent from USA)

<https://www.youtube.com/watch?v=4Xl5gh-sLo4>

# Acknowledgement



## FEED THE FUTURE

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



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Post-Harvest Loss Reduction

## KANSAS STATE UNIVERSITY



## ILLINOIS

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## ADMI

ADM Institute for the Prevention of Postharvest Loss



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