BAU-STR Dryer

Paddy Drying Technology

Drying Paddy in BAU-STR dryer saves time, labour and cost

Composition

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Introduction

Bangladesh is an agriculture based country and rice is staple food. At present Bangladesh is now producing about 55.5 million ton of paddy (FAO, 2014) to feed the growing population.Drying is the most important part after harvesting paddy. Sun drying is a traditional and common practice in Bangladesh where paddy is exposed to sun and wind in the yard or field. Paddy drying is difficult during rainy and cloudy day and causes huge losses. To solve this problem BAU-STR dryer is a low cost batch dryer. This dryer was improved by “USAID Post Harvest Loss Reduction Innovation Lab (PHLIL)”, Department of Farm Power and Machinery, Bangladesh Agricultural University.

Objectives

- Dry paddy in less time and low cost
- High quality rice and seed marketing by reducingpaddy moisture
- Reduce Post Harvest Loss
- Reduce Labour requirement and health risk

Description of BAU-STR dryer

A low cost BAU-STR dryer consists of a blower, inner bin, outer bin, hot air conveyor pipe and stove (*chula*). It also requires loading materials such as bricks or stone or soil clod, polythene sheet (covering material), bamboo and rope (binding material).

Blower

- It is an axial flow blower.
- Both diameter and height is 49 cm and operated by 1 hp (0.746 kW) motor
- RPM is 2874
- The average air flow rate of blower is 33.5 m/s

Inner bin

- Inner bin is made of two types of net (one is 18 meshes and another is 25.4 cm)
- Diameter is 40 cm and height is 113 cm

Outer bin

- Outer bin is made same as inner bin with two types of net (one is 18 meshes and another is 25.4 cm).
- Height of bin is 113 cm and diameter is 112 cm
- Outer bin is flexible to fix up depending on amount of available grain

Stove (*Chula*)

- Stove is made of iron sheet and mild steel rod with clay soil
- Diameter is 36 cm and height is 40 cm

Steel pipe

- It is the pipe which conveys the hot air from stove (*Chula*) to inner bin of the dryer
- It has two parts which can be adjusted to maintain a desirable length
- Its diameter is about 9 cm
- One side of steel pipe is funnel type so that the hot air can easily conveyed by the stove to the inner bin.

Materials required during drying operation

- Rice husk briquette (about 25 cm piece)
- Diesel (diesel engine operated blower)

Installation of BAU-STR dryer

- At first, inner bin of BAU-STR dryer should be set up on a level surface
- Then the outer bin should be set up in such a way that the annular space between the inner bin and the outer bin remain same. The diameter of the outer bin to be adjusted depending on the volume of the grain.
- Then the paddy grains should be poured in the annular space between the inner bin and the outer bin.
- The paddy grains should be poured in the annular space of the dryer in such a way that the grains distributed equally in all sides.
- The axial flow blower should be set up on the top of the inner bin of the dryer and a polythene cover to be placed at the top of the annular space to protect hot air leaking from the dryer.
- The stove should be placed in one side of the grain bin at a height of 2/1 feet and fire the stove by using rice husk briquette.
- One side of the steel pipe has to be set on the stove and other side on the axial flow blower for hot air flow from the stove.
- One third of the stove to be filled in with small pieces of rice husk briquette and fire carefully. For uniform heating, rice husk briquette must be fed into the stove every 4-5 minutes.

- After proper fire up, electricity or diesel engine should be started for running the blower.
- Temperature of hot air blowing to the dryer bins need to be monitored for maintaining quality drying of paddy. Temperature should not exceed 43^{o}C for drying paddy seeds and this temperature to be maintained by controlling supply of rice husk briquette.

Cost of STR dryer

The Price of BAU-STR dryer is approximately 55,000 BDT to 75000 BDT.

Performance of STR dryer

- BAU-STR dryer can be made easily in local workshop
- Simple trained women and men can run the dryer
- 500 kg paddy can be dried in each batch in 4 to 5 hours
- 2 to 3% moisture can be reduced per hour
- 0.6 litre diesel is required if the blower is run by diesel generator.
- Drying efficiency is 65 to 70%

Economic parameter

- Three batch paddy (500 kg each batch) can be dried in a day
- Drying cost is 0.74 BDT (if the blower is run by electricity from national grid) and 0.87 BDT (if the blower is run by diesel generator).

Conclusion

- Rice husk briquette is used for producing hot air; therefore, there is no smoke.
- BAU-STR dryer has excellent drying ability of paddy in adverse conditions, especially in depressions, heavy rain and cloudy days with low ambient air temperature and very high relative humidity
- Seed germination is more than 90%
- Rice quality is very good
- Environmental friendly and characteristics of reducing health hazard of laborers

Precautions

In case of seed drying, fuel (rice husk briquette) supply should be controlled to minimize temperature below 43 ºC. Firing should be continuous for uniform flow of hot air and ambient air mixer. Clean paddy should be used for drying to get maximum efficiency of dryer. Four to five hours tempering period is needed to get better quality rice with higher head rice recovery.

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