

## Reference 26 Harvest and post-harvest

### Summary

Timely harvesting, threshing and drying are essential operations to guarantee an abundant and good-quality harvest. All the efforts put forth from land preparation onward can be compromised when these operations are badly implemented. This reference gives guidelines that help avoiding large paddy losses, both in quality and quantity, during these operations.

### Harvesting date

Determining the optimal date for harvesting is the most important factor, as mistakes could lead to high losses and affect the quality of paddy.

- Harvesting too early means that a high percentage of grains will be immature: the yield will be reduced, and grains will break easily.
- Harvesting late favors lodging, and exposes the crop to birds, rats and insects. The yield will be reduced and the quality of paddy will be lower with high rates of broken rice and low processing yields.

The factors indicating the most appropriate moment for harvesting are the following:

- 80% of the panicles are yellow.
- 20% at least of the lower panicles have reached the dough (hard) stage.
- If the husk is peeled off, the grain is light-colored and hard.

### Harvesting methods

Harvesting by hand is usually done with a sickle. The plot should have been drained 15 days before harvesting, in order to facilitate moving in the field and also to prevent grains from germinating if they were in contact with water, and from being soiled by mud, both of which affect paddy quality. The cutting height depends on the post-harvest objectives of the farmer (threshing method, selling the straw, etc.) and also on the harvesting devices used. Hand-harvesting is tiresome and time-consuming: it requires 15 to 20 people with sickles to harvest one hectare. Harvesting can also be done with knives, and then only the panicles are harvested.

Mechanical devices are seldom used in inland-valley rice cropping in Africa. The 'ISA' reaper-harvester, developed by WARDA and its partners, could improve harvesting, especially on small farms.

Yield losses are usually relatively high (depending on varieties and on the crop condition), but can be significantly reduced when harvesting is done on time. When harvesting is late, losses can easily reach 15–20% of the production.

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#### Drying

The sheaves harvested are spread in the sun to dry for 24 to 48 hours. This makes threshing easier and reduces the moisture content to a convenient level (14–15%) for processing and storing.

After drying, the sheaves are stacked. To facilitate handling when threshing and reduce bird damage, the stack should be circular or rectangular, and the sheaves set so that the panicles are towards the center.

Leaving the panicles to dry for too long reduces grain quality and exposes the panicles to rat or bird damage, but if panicles are too moist threshing becomes difficult and bacteria and fungi may develop on them during storage.

#### Threshing

This is the operation that separates the grain from the panicle without damaging it. It can be done by hand or mechanically. Mostly in small farms, hand-threshing is usually done with a flail or on an empty barrel. It is hard work and requires a lot of labor.

Mechanical threshing is done with fixed threshers (Borga, Votex, ASI). It is much faster and indispensable in intensive rice cropping. However, the equipment choice must take into account the farmers' socio-economic climate in order to better insert them in their production systems (impact, after-sales service, ergonomics, cost of purchase and maintenance, etc.). During threshing, the shocks the paddy endures lead to grain cleaving and may have consequences on its germination ability.

Beyond its performance (yield threshed per hour), the 'ASI' thresher-cleaner, developed by WARDA and partners, decreases cleaving rates because of its axial flow system. Moreover, it is also equipped with a ventilation system that produces a clean product, which does not require winnowing.

#### Storing

Correctly storing paddy must follow certain rules in order to:

- Preserve viability and germination ability of seeds.
- Preserve the quality of paddy for processing.
- Avoid losses due to diseases, insects and rats.
- Avoid molding.

This operation, which is often neglected by producers, is one of the main causes of the qualitative depreciation of paddy.

The paddy harvested must be handled like any live biological product, as seeds are live organisms whose growth is temporarily suspended. The quality of paddy can be deteriorated by bacteria and fungi, for which the favorable conditions for development are: high moisture content of paddy, high

relative humidity of air, and high temperatures in the store. In order to prevent these risks, the following measures must be observed when storing paddy:

- Correctly dry the threshed paddy in the sun, until a moisture content of about 14% is obtained. This percentage is reached when the paddy is dried in the sun for 24 to 48 hours (with at least 8 hours of sun per day), and if the harvesting has been done at the right time. If too dry, the internal moisture of the grain will fluctuate and lead to high breakage percentages during processing.
- Put the paddy in jute bags (preferably new), to allow good ventilation of the product. If necessary, label the bags, including the variety name and harvest date.
- Clean the store and spray the inside with a solution of malathion 2% or any other appropriate product to protect paddy against insects. Let it dry before storing the paddy.
- Place wooden pallets directly on the ground, so as to allow good ventilation around and under the bags. Leave some space between the bags and the walls.
- Lay the paddy bags one upon the other, taking care to alternate their orientation.
- Never store chemical products (fertilizers, herbicides, etc.) with paddy.
- Check the stock once or twice per week; if insects or rats are detected, treat again, preferably with bio-pesticides like neem.
- When storing for a long time, check the moisture level of the grains; if it increases too much, dry again in the sun. To prevent this problem, once in a while put the stock in the sun for the day.

### **Transferring paddy to the factory**

This step in the rice network is often neglected by producers, although it is one of the main reasons for counter-performance in rice processing. The quality of the paddy, in particular the moisture content of the grain, is a determining factor in the processing yield and for the quality of the processed rice.

When the moisture content of the grain is too high (more than 14%), the milling recovery (weight of milled rice divided by weight of brown rice before milling) will be affected. When the moisture level is too low (below 10%), the percentage of broken grains increases.

To guarantee good yield and acceptable grain size distribution (product essentially made of whole rice grains, intermediate grains and relatively large broken grains), the moisture content at processing ought to be between 12 and 14%. This means that, after respecting all the recommendations about the last draining before harvesting, and about the drying and threshing conditions, the paddy to be processed should be taken to the factory as soon as possible.

### **Bibliography**

- Donovan, C., K.M. Miézan, M.C.S. Wopereis, B.S. Diack and B. Douthwaite, 1998. Technology transfer from Asia to Africa sets the stage for public and private sector collaboration in new technology in Senegal. *International Rice Research Notes* 23(2): 41–42.
- Wopereis, M.C.S., K.M. Miézan, C. Donovan, A.M. Ndiaye and B. Douthwaite, 1998. A new Senegalese thresher/cleaner responds to small-farmer post-harvest needs. *International Rice Research Notes* 23(2): 39–41.