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POST HARVEST MANAGEMENT OF PULSE

Popular Article

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ABSTRACT

Pulses form an integral part of Indian diets. Being are rich source of protein, their major importance lies as supplement to cereal based diets. Pulses not only add to the quantity of protein in the diet but also improve its qualities by balancing the essential amino acid pattern in the mixed diets. India is a major producer of pulses in the world. Various post harvest technique should be used to minimize post harvest losses. Efficient post harvest management techniques includes pre-drying to reduce moisture level followed by threshing and again drying to further reduce the moisture. The selection of a suitable drying system is also very important aspect for desired outcomes.

Introduction

Pulses are the cheapest source of protein which can be considered as lifeline for vast vegetarian population of India. Apart from being the good source of protein, pulses also contain substantial quantity of minerals, vitamins, crude fibre etc. Amino acids components of pulses are complementary to that of cereals. Mixed diet of cereals and pulses, which form staple diet in majority of Indian population, is of the superior biological value than either taken separately. In India pulses are second major dietary protein (27%) after cereals. In addition to meeting the protein needs of human population, pulses are also essential for good health of the soil. Each plant of the pulse crop fixes atmospheric nitrogen in their root system, which enables the plant to meet their own nitrogen requirement. Benefits of this nitrogen fixation percolate to the succeeding cereals crops. By products of pulses plant are excellent fuel and feed. Besides providing human nutrition and soil recuperation, pulses are important for sustainable agriculture.

Post harvest losses

Post harvest losses means a measurable qualitative and quantitative loss in a given product occurred during the various phase of the post-harvest system. In economic terms sum of losses in quantity and quality of products inevitably leads to loss of money. In addition to direct economic losses, some losses result from poor management of post harvest systems.

Seeds of poor quality, inappropriate farming practices and insect infestation in the field can obviously cause loss of produce before harvest. From the harvest onward, the gain undergoes a series of operations during which quantitative and qualitative losses may occur. Table 1. indicates the types of losses that takes place at prevailing conditions at various stages of post harvest system.

The extent of losses that takes place at different stages of post harvest chain differ from grain to grain. The extent of losses may fluctuate considerably depending upon the weather condition, varieties location, processing and storage technique employed. however according to rough estimates made by different workers (Kurien *et al*.,1972; Birewar, 1982; Kulkarni, 1986; Jeswani and Baldev, 1990) total post harvest losses in case of pulses is 25-30% (table). The major loss is caused at the stage of storage and milling. As per the estimated 15 million tones (mt) of pulse production, 75% i.e. 11.25mt goes to milling. Taking 15% milling losses into account, 1.69mt of produce loss in milling alone, which if saved by adopting improved milling methods and machineries, will

marginalise the import requirement of pulses and saves significant amount of foreign exchange.

Table 1. Type of losses at different post harvest stages

Stage of operation	Types of losses
Late harvest	shattering losses, losses due to attack of birds and other pests
Insufficient drying of grain	Losses due to development of moulds and insects
Improper threshing	Broken grains and threat of insect development at a later stage
Poor storage	Losses caused by combined action of insects, moulds, rodents and other pests
Improper milling	Broken and powdering loss
Transport	Quantitative loss
Defective packaging	Quantitative and qualitative loss

Management

Pre drying

Pre drying is the stage of post harvest system during which the harvested product is dried in order to undergo next operation of threshing, under the best possible conditions. Pre drying is essential because at the time of harvesting cut portion of the plant may contain too much green plant matter and all the grains may not have reached the uniform degree of maturity and may have moisture contain high.

Pre drying can be done in two ways:

1.Once maturity has been reached, allow the crop to pre dry, standing in the field, before harvesting.

2.Placed the newly-harvested crop piles, in the field or on drying floor. Prolonged exposure to the air (in the sun and shade) reduces the moisture content of the grains to the desired level. The shape and size of these piles can vary according to the crop to be pre-dried.

Threshing

Threshing is the operation of separating grains from the plants. These operations may be carried out in field or on the treshing floor, by hand or with the help of threshing machines. whatever the system used it is important that threshing be done with care. Care should be done while transporting the harvested crops from the field to threshing floor to avoid any loss. Threshing can be done by following methods:

1. **Hand threshing**: Hand threshing can be done in case of pigeon pea. One of the simplest method of threshing of pigeon pea is to strike the sheaves of the crop spread over threshing floor with a flail or stick. By using the method of hand threshing, a worker can obtain 15- 40 kg of product per hour.

2. **Threshing with animals:** Subject to availability of draught animals, large quantity of crops can be threshed by treading the animals over about 30cm thick layer of sheaves. This operation which also called treading-out**,** can equally well be established with vehicles. Grain is obtained by running the tractor twice over sheaves of harvested and dried crops that are spread in layers on a circular threshing floor15-18m in diameter.

3. Threshing with hand driven machines: Normally hand operated machine like Olped thresher, which is basically used for threshing of paddy can also be used for cutstocks of pigeon pea.

Table 2. Threshing capacity of different thresher

Thresher	Technical details	Suitable for	Capacity (kg/h)
Sonalika	25 hp tractor, peg type, single blower	Chickpea , Lentil	300-350
Amar	7 hp motor , peg type, double blower	Pigeon pea, Chickpea, Urdbean	100-350
CIAE	7 hp motor, peg type, double blower	Chickpea , Lentil	300-450

4. Threshing with motorized thresher: The use of motorized threshers or threshers operated by tractor power has become very common for threshing of pulse crops. The thresher available in the market are basically designed for threshing of cereals crops.

Drying

After threshing, the moisture content of grains remains generally higher than the desired for safe storage of grains (13- 14%). Drying is the phase of post harvest system during which the product is rapidly dried until it reaches the safe moisture level. The aim of drying is to lower the moisture content of the grain for safe storage and further processing.

Methods of drying: for drying grain, essentially two methods, viz., natural drying and artificial drying.

Natural drying

The natural drying method consists essentially of exposing the threshed products to the air (in sun or shade). To obtain the desired moisture content, the grain is spread in thin layers on a drying-floor, where it is exposed to the air. The duration may vary depending upon the moisture content required for safe storage. To achieve uniform drying, the grain must be stirred frequently, especially if it is in direct sunlight. Furthermore, for drying to be effective, the relative humidity of the ambient air must not be higher than 70%.

Artificial drying

In artificial drying, heated air (dryers) or unheated air (dehumidifiers) is blown through a grain mass.

Forced hot-air drying

This is the most wide spread practice in semi-humid and humid conditions where natural drying cannot be used. Artificially heated air is forced to flow through a mass of grain in bulk or in bags to absorb released moisture from grain mass.

Dehumidified air-drying

In case of dehumidified air-drying, unheated dehumidified air is circulated through the grain mass, until the moisture content of the grain is reduced to the desired level. It is more commonly applied when small quantities of grain must be dried to very low moisture content for being used as seed.

Drying systems and types of dryers

For artificial drying of grains, two types of dryer are used:

1. **Static or discontinuous dryers or batch dryers**

These types of dryers are comparatively less expensive and can handle only modest quantities of grain, thus they are better suited for small and medium scale centers for the collection and processing of grains. Three following types of batch dryers are generally used:

• **Floor dryers**: Suitable for all grains of all sizes.

• **Bag dryers**: Suitable for small grain lots to be used as seed where many varieties are handled (breeder and foundation seed). All types of grains in sacks.

• **Box dryers**: Suitable for large grain lot where slow drying is required.

2. **Continuous dryers**

These are high-flow dryers that need a more complex infrastructure, complementary equipment and special planning. They are, therefore, more appropriate for big centers, silos or warehouses, where very large quantities of product are handled. Continuous dryers are generally of three types:

•**Continuously flowing vertical dryers**: Suitable for quick and normal drying and free flowing grains of single variety. Can handle large volume of grain. Not suitable for small lots of different varieties.

•**Continuously flowing belt dryers**: Suitable for quick and normal drying seeds, small to very small lots and chaffy seeds.

•**Rotary dryers**: Suitable for quick and normal drying grains, chaffy grains with moderate moisture. Suitable for large capacity drying. Not suitable for grains with high moisture.

The selection of a suitable drying system depends on the following factors:

•**Drying capacity**: Capacity of the dryer should be sufficient enough to handle the volume of grain to be dried.

•**Initial investment**: Initial cost and maintenance cost.

•**Fuel and Power**: Availability and cost.

•**Kind and chemical composition of grain**: Grains are of three types based on their tendency to release excess moisture:

- Slow drying grains (maize, rice, legumes, lupin)
- Normal drying grains (cereals)
- Fast drying grains (sugar beet, grass seed)

•**Size of the grain lot**: How the grain is to be delivered (bulk, sacks).

•**Moisture content**: Initial and the desired moisture content after drying.

•**Flowing properties of the grain**: There are two main categories: Free flowing grain and grains with poor flowing characteristics such as chaffy seeds.

•**Temperature and relative humidity of the ambient air**: Cool and damp weather will increase the drying cost, whereas same will be much less in hot and dry weather.

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