

# Lesson - 29. Storage of Grains

## 29.1 Storage

Storage is an interim and a repeated phase during transit of agricultural products from producer to processor and its products from processor to consumer. Food grains are stored until their transit from producer to processor and further, their products from processor to consumer. Man has been storing grain and its products for a long time. It is of all time concern for man to reserve food supply to mitigate hunger at a future date. Over the long years man has learned, primarily by his own experience, that dry grain can be stored for long periods and can be protected against attack of various deteriorative agents such as pests, molds, fungus etc

Storage of grain and control of quality occur in three locations; on the farm, at collection points serving a number of farms, and at terminal points where grain is processed or moved forward in larger bulks. There are costs involved for loading and unloading of grains at each stage of storage, for transportation between storages and for storage itself. Additional costs are involved in conditioning of grains, mainly cleaning and drying, and for the control of quality.

Improper post harvest handling of grains is responsible for losses in the grains to an extent of about 7%, which has far reaching effect on the rural economy owing to 70% of the total food grain production being stored at the farm level. All farmers store food grains for their own use as seeds or food. This quantity stored for the above purposes varies between 22 and 71 % of the total production.

Conventional storage methods employed for storage of grains, seem to be totally inadequate for the preservation of the quality and prevention of their wastage. Storage of food grains and oilseeds in the traditional structures or in jute bags does not provide longer storage period. Proper scientific methods for their storage and also controlling insect infestation in these grains are vital necessity. Safe storage of agricultural products is essential to avoid losses due to rats, insects, diseases and to maintain good quality for a longer period.

### 29.1.1 Storage Types: Classification

Classification of storage types can be based on the following factors:

- **Duration of Storage**
- **Size or Scale of Storage**
- **Principle of Storage**

#### 29.1.1.1 Duration of Storage

Storage systems are classified in terms of duration of storage as:

- Short Term Storage
- Medium Term Storage
- Long Term Storage

#### **29.1.1.1.1 Short Term Storage**

- Stored products in short term storage mostly do not last beyond 6 months
- Highly perishable products (such as egg, meat, fish and dairy products) are naturally stored for short term
- High loss of quality is associated with highly perishable crops in this storage except controlled systems are used

#### **29.1.1.1.2 Medium Term Storage**

- Medium term storage involves keeping the quality of stored products without appreciable deteriorations for up to 12 months
- The quality of such stored products may not be guaranteed after 18 months

#### **29.1.1.1.3 Long Term Storage**

- Long term storage can guarantee the quality of stored products beyond 5 years
- Germ banks and some storage systems are known to preserve viability and proximate characteristics of stored materials for decades

#### **29.1.1.2 Size or Scale of Storage**

Storage systems are classified in terms of size or scale of storage as:

- Small Scale Storage
- Medium Scale Storage
- Large Scale Storage

##### **29.1.1.2.1 Small Scale Storage**

- Small scale storage systems have capacity for up to 1 ton, but not beyond
- They are mostly used at domestic and farmer levels
- They are associated with peasant farmers with small farm holdings

##### **29.1.1.2.2 Medium Scale Storage**

- Medium scale storage can accommodate up to a hundred tons of stored products
- Most of such storage systems are in the capacity range of 2 – 50 tons, with very few having capacity beyond 50 tons
- Some are used in breweries for temporary storage of spent grains

##### **29.1.1.2.3 Large Scale Storage**

- Large scale storage can accommodated stored material in 100s and 1000s of tons

- It is used either for temporary or permanent storage of very large quantity of various products
- It has a very high initial cost but eventually reduces overall unit cost of production

### **29.1.1.3 Principle of Storage**

Storage systems can be classified in terms of principle of operation. These include:

- Physical Storage
- Chemical Storage
- Biological Storage

#### **29.1.1.3.1 Physical Storage**

- Physical storage utilizes physical principles to achieve storage and preservation the quality of stored products
- The physical environment (in terms of moisture content, temperature and relative humidity) within the storage system is mostly controlled or manipulated to retard the activities of agents of deterioration or prevent deterioration. E.g. cold storage or controlled environment

#### **29.1.1.3.2 Chemical Storage**

- Chemical storage utilizes chemicals to stop or retard the activities of agents of deterioration
- The use of chemicals such as wax, methyl bromide or phosphine tablet to prevent insect infestation in stored produce are examples
- Some chemicals are however poisonous and their uses must be highly monitored

#### **29.1.1.3.3 Biological Storage**

- Biological storage utilizes biological agents, especially micro organism, to stop or retard the activities of agents of deterioration or enhance the shelf life of stored products
- This is a very good area of the application of bio-technology in agriculture

### **29.1.2 Need of Storage:**

- Feeding ever growing human population
- Fluctuation in price and market demand or shortage and famines
- Agricultural products need to stored for season to season and year to year demand
- Off season requirements i.e., potatoes, onion, fruits etc.
- When a bumper production of particular commodity then storage is required
- Pilling/ provision for large scale processing
- Prevention of original varieties from extinction (Germ Bank)
- Preservation of nutritional quality

### 29.1.3 Who Stores ?

#### **Farmers :**

For small farmers the main purpose in storing grains is to ensure household food supplies. Farm storage also provides a form of saving, to cover future cash need through sale, or for barter exchange or gift-giving. Grain is also stored for seed and as inputs into household enterprises such as beer brewing, or the preparation of cooked food. When there are significant inter-seasonal price variations, small farmers often store for speculative gain, that is to say they 'play the market'.

#### **Trader Storage**

In Asian countries, traders have a much larger role in inter seasonal storage. The two major cereals are rice and wheat and both of these must be milled before reaching the consumer. This is unlike the situation in most of Africa where coarse grains such as maize, millet and sorghum are the main staples. Typically African consumers buy these grains whole, and either grind them at home or take them to be ground at small custom-mills.

Large millers who become involved in the marketing chain tend to have good banking connections and can obtain capital at reasonable cost. Studies by the Natural Resources Institute (NRI) in Indonesia and Pakistan indicate, that wherever Government policy is conducive, millers enter the storage business on a large scale. In Indonesia, traders and millers store about 50% of that part of the rice crop which is carried over from the first harvest (Ellis et al., 1992). Indeed it is common for them to store beyond the point when storage is profitable in its own right. This is because storage is only part of a business activity which involves milling and distribution of milled rice; millers must store in order to keep the mills running out of season, and to maintain supplies to regular customers. Losses on storage are more than compensated for by the gains on other operations.

#### **Government Storage**

As already mentioned, **Government** may become involved in storage for the purpose of stabilising prices and revenues to farmers. Related to this is Governments' overriding concern for national food security, which is fundamental to political stability. Governments therefore use storage to balance national supply and demand over time, and to minimise the risk of politically embarrassing shortages. They are thus attempting to supplement, and in some cases to replace, market mechanisms, on the assumption that the market can only achieve the balance with an unacceptable degree of supply and price fluctuation.

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