



SEED DRYING AND DRYING METHODS

SEED DRYING

- ▶ The process of elimination of moisture from the seed is called drying
- ▶ Seed drying should reduce the seed moisture content to safe moisture limits to maintain its viability and vigour during storage, which may otherwise deteriorate quickly owing to mold growth, heating and enhanced microbial activity
- ▶ Seed drying also permits early harvesting, long term storage of seeds, more efficient use of land and manpower, the use of plant stalks as green fodder and production of high quality seed
- ▶ Lowering down the seed moisture content to safe moisture limits is very important in order to maintain seed viability and vigor, which may otherwise deteriorate fast due to mold growth and increased micro-organism activity
- ▶ The advantages of seed drying are it permits early harvest, so that land and manpower can be used efficiently, permit long term storage and maintains the seed quality

➤ **Stage of moisture elimination:**

The moisture from the seed is eliminated in 2 stages

- ▶ Surface moisture of the seed that initially removed by the drying air
 - ▶ The removal of the moisture in the surface cause an imbalance in the moisture potential in the surface of the seed and the inner portion of the seed which leads to the migration of moisture from the inner organ to the surface
- Drying temperature
- ▶ Greater the seed moisture content lesser should be the drying temperature and vice versa. 10% MC and below 110 °F (43.3°C)

10-18 % MC 100 °F (42.2 °C)

18-30 % MC 90 °F (32.2 °C)

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- **The rate of drying depends on**
 - ▶ Initial seed moisture content
 - ▶ Size of the bin and capacity
 - ▶ Depth of spread of seed
 - ▶ The rate of air blow
 - ▶ Atmosphere air temperature and relative humidity
 - ▶ Static pressure
 - ▶ Drying temperature
 - **Methods of drying**
 1. Sundrying
 2. Forced air drying

Methods of seed drying

1. **Physical drying / Natural drying / Traditional Sun drying:**

- ▶ The moisture of seed is generally reduced in the field before harvest and later by sun drying on the threshing floor
- ▶ The system involves harvesting of crops when they are fully dried in the field, leaving the harvested produce in the field for a couple of days for sun drying and later spreading the threshed and winnowed produce in thin layer on threshing floors of sun drying
- ▶ The main advantages of sun drying is no additional expenditure or special equipment is required
- ▶ The Disadvantages are delayed harvesting, risk of weather damage, and increased possibilities of mechanical admixtures
- ▶ If sun drying is done following precautions should be taken.
 1. Do not spread the produce on wet, dirty and kaccha, threshing floors
 2. Only one crop variety should be handled at a time and care should be taken to avoid mechanical mixtures.



❖ Disadvantages

1. The rate of drying is slow
2. Loss due to attack by insects, birds and animals
3. Large floor area is required
4. Involves extra labour for collecting and exposing during the day
5. Sun drying cause sun checks or hot spots due to variation in temperature from time to time. This checks or spots induce high amount of breakage while processing
6. mechanical admixtures are possible
7. Dust, dirt and other foreign materials get admixed
8. High weather risks and damage by heavy wind and rains

2. Mechanical drying or artificial drying

➤ **Forced air drying:**

- ▶ In forced air drying, natural air or air supplemented with heat is blown through a layer of seed until drying is completed
- ▶ Generally ordinary seed godowns are provided with two types of ventilators for free movement of air circulation
- ▶ In modern godowns, provisions are to be made for forcible circulation of air with the help of an electronic blower

❖ **Principle of Forced Air-Drying**

- Seeds are highly hygroscopic living material and their moisture content depends upon temperature and relative humidity of surrounding air
- Whenever the vapour pressure in the seed is greater than that of the surrounding air vapour pressure will move out of the seeds i.e. the seeds will lose moisture
- If however, the vapour pressure gradient is reversed, the moisture moves into the seeds and the seed will gain the moisture
- When the two vapour pressures are equal the moisture content of seed is in a state of equilibrium with the surrounding atmosphere
- Seed drying takes place when there is a net movement of water from the seed into surrounding air

- ▶ The rate of seed drying depends on rate of moisture migration from the center of the seeds to surface and by the speed at which surface moisture is evaporated in the surrounding air
- ▶ The temperature of the seed, physical structure of the seed, chemical composition of the seed and the seed coat permeability influence the rate of moisture migration from the center to the surface of the seed
- ▶ Surface saturation, relative humidity and temperature of drying air influence removal of the moisture from the surface

❖ **Forced Air Drying**

- There are three major drying methods for drying with forced air:
 1. Natural air drying – Natural air is used in this type of drying method
 2. Drying with supplemental heat – In this method temperature of the air is raised to about 10 to 20 o F for reducing relative humidity of the air
 3. Heated Air drying – In this method the drying air is heated to 110 o F

- The first two methods require more than 2 to 3 weeks reducing the moisture content to safe limits
- These methods are mostly used in western countries for drying grains 108 and seeds, which are stored on the farm and these methods, are rarely used in India
- Heated air-drying is mostly favored and used for seed drying. In this method the seed is dried in special drying bins or wagons using heated air
- After drying the seed is moved into processing assembly or storage bins, if processing is not done immediately
- **Heated Air Drying Systems:** The heated air drying system can be conveniently discussed under following heads:
 1. Building requirements: This involves construction of bins/storage structures for drying and air distribution system
 2. Selection of crop dryers and systems of heated air drying
 3. Management of seed drying operations.

► **Building Requirements** :The building for seed drying system depend upon:

1. Size of operation
 2. Number of different kinds of seeds to be dried
 3. Level of mechanization desirable
 4. Future expansion
- Different types of structures can be used for storage of seeds to be dried with forced air-drying. The storage structures are made of steel, wood, concrete or plywood and they may be in cylindrical or rectangular in shape

❖ **Requirements of storage bin for seed drying**

1. Adequate strength. Seeds of small grains in bulk exert large pressure against the sidewalls. A sound foundation is necessary since, the side pressure of the seed is converted into a vertical load on the foundation
2. Weather tight. The roof and walls must keep out rain and snow, which are important causes for the damage of stored seed. For drying the seeds satisfactorily the walls must be airtight
3. Easy to fill and empty. The openings for filling and removal of seed should be large enough and so situated that minimum time is lost in filling and unloading the seed. A full size entrance door is desirable

4. Convenient to inspect, fumigate and clean. For easy inspection there should be 60- 120 cms. of headspace above the seed. Cleaning and spraying are made comparatively easy if sharp corners are avoided. For fumigation the structure should be airtight, with provisions for temporary sealings of all openings

5. Multiple Use. The structure should be usable for drying and storage of more than one kind of crop

6. Good air distribution system. The air distribution system should be able to carry adequate quantities of air for the drying of seed, and distribute it as uniformly as possible through all portions of the seed bulk

7. Adequate air venting. Flow of air to the outside, after it leaves the seed should proceed rapidly enough so that back pressure do not hinder flow of drying air into the seed. For this the size of the outlet should be more than twice the cross section area of the main duct of air distribution system

Thank you