



Grain Storage Management

- **1. Significance of Seed Storage**
- Grains need protection from weather effects, molds and other microorganisms, moisture, huge temperatures, insects, rodents, birds, objectionable odour and contamination.
- Grain storage may be done at three levels:
- **i. At the farm level**, storage is normally inter-seasonal and helps to ensure food supplies for the farmer and the family.
- **ii. At trader level**, grain storage is done over a period of few days or weeks.
- **iii. In commercial storage**, the stock is kept for longer periods to meet demands of end users.

- **2. Cleaning of Bins:** Bins should be cleaned before filling with newly harvested grain.
- Contamination in the bin should be eliminated.
- Spraying insecticides and fungicides inside the cleaned bins helps to eliminate insect and mold spores from the previously stored grains.

3. Cooling and Drying of the Grains

- Decrease the grain moisture to the safe storage level and cooling the grain below 15°C helps to eliminate insect and mold development during storage.
- Drying can be done with properly designed systems using either ambient air or heated air.
- **4. Turn the Grains**
Turning the grains inside the bin (moving from one bin to another) brings grains to average temperature inside the bin and eliminates temperature gradients and thus moisture migration.

5. Cleaning of Grains

Remove broken seeds and foreign materials before loading in to the bin as it provides better air movement inside the bin as well as reduces insect and mold problems.

- **6. Avoid Mixing Grains:**

Mixing newly harvested grains with the grains already in the bin can create huge temperature and moisture gradients inside the bin and thus leading to increased chances of spoilage.

- **7. Monitoring**

- Regular monitoring of grain moisture and temperature will help to identify the potential hazards and take control actions in a proactively.

8. Aeration

- Aeration is the practice of moving air through stored grain to reduce the rate of grain deterioration and prevent storage losses.
- Aeration greatly improves the storability of grain by maintaining a cool, uniform temperature throughout the storage to reduce mold development and insect activity and to prevent moisture migration.

9. Storage Structures

- i. Straw storage structures
- ii. Bamboo/Reed storage structures
- iii. Masonry storage structures
- iv. Earthen storage structures
- v. Underground storage structures
- vi. Flat storage solutions
- Vi. Modular Grain Storage Structures

i. Straw Storage Structure



A traditional seed storage structure made of straw



ii. Bamboo Storage Structure



iii. Mud and Earthen Structure



iv. Flat Storage Solutions

- Grain storage is more feasible with a flat storage system compared to a vertical silo system.
- Grain trucks can be simply hooked up to the grain pump on the outside of the storage bin and with the latest grain pumps, able to relocate the grain to a number of piles within the long storage building using a series of auger type tubes that run along the roof of the structure.



v. Modular Grain Storage Structure

- It combines a concrete or tarmac ground base and uses steel barricade style panels to create a ring on the ground.
- The panels are secured in place via bolts into the concrete and then strengthened with more steel panels to fill in the gaps.
- A central aeration system is provided to cover the whole area of the temporary grain storage system.



10. Fumigation

- **i. Fumigation** is a method of using a lethal gas to exterminate pests, through suffocation or poisoning, within an enclosed space.
- In larger silos, (150 – 2000t) recirculation of fumigation gases within the sealed silo, using a small fan, ensures rapid and uniform distribution of phosphine gas.

ii. Method of Application for Fumigation

- The most commonly used fumigant is a range of phosphine products (aluminium phosphide formulations) such as tablets. Other gases for grain pest control include sulfuryl fluoride, ethyl formate and methyl bromide.
- Arrange the tablets where as much surface area as possible is exposed to air, so the gas can disperse freely throughout the grain stack.
- Spread phosphine tablets evenly across trays before hanging them in the head space or placing them level on the grain surface inside a gas-tight, sealed silo.
- Without air movement, phosphine can reach explosive levels if left to evolve in a confined space.
- One tablet treats 0.5 tons of wheat storage volume.

iii. Gas Venting

- Following fumigation, ventilate silos so that grain can be delivered free from harmful gas residues.
- Leave silos open for no less than five days, or no less than one day with aeration fans operating.
- The final step is to hold grain for a further two days after ventilation before using for human consumption or stock feed.

*Sources

- 1. Recommended books.
 - 2. Latest research articles downloaded from Google.
 - 3. Google images.
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- *Solely for academic purpose and guidance of students.