

*Review Article*

## **STORAGE LOSSES IN FEED INGREDIENTS BY BIOTIC FACTORS AND ITS CONTROL**

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### **Introduction**

In feed mill godown loss in raw material in terms of quantity is due to 1. Moisture shrinkage losses, 2. Losses due to pest and rodent and 3. Improper bagging materials. Control of losses is very important to improve the profitability of feed production. In feed mill godown the biological factors responsible for storage losses in feed ingredient are: Insects, Rodents, Birds and Microorganisms.

### **Biological Factors**

Post harvest losses in food grains has estimated the total loss about 9.33 per cent owing to unscientific storage wherein rodents, insects and micro organisms destroy food grains (Government of India, 1971). It is estimated that roughly 6.6 per cent of foodgrains is lost in storage. Of this amount, 2.25 per cent is attributed to insects, 2.50 per cent to rodents and the remainder to birds and moisture (Moore *et al.*, 1973). Biological losses of foodgrains is due to insects, rodents, mites, birds and properties of grains (Girish and Nayer, 1979).

#### **1. Insects:**

Insects feed on most feed ingredients and contaminate them with faeces, webbing, body parts, foul odours and micro organisms. Feeds are attractive places for insects, which include various species of moths, weevils and beetles, which consume the feed. They grow well at normal temperature in stored feed and at 26-37°C they can reach epidemic proportions. Insects thrive better on ground materials. Whole cereals or oil cakes can therefore be stored longer than meals made from them.

Nearly one thousand species have been found associated with stored products in various parts of the world. The majority of insects and pests belongs to the order of Coleoptera and Lepidoptera, which account for about 60 per cent and 8-9 per cent respectively of the total number of species of stored product insects and pests (Girish, 1977).

## 2. Rodents:

Among the various pests, detrimental to the well being of man is rodents, because of its economic importance. It consumes the stored material and contaminate with excreta, hair and dead materials. Each rat void 10,000 droppings and 4 litre of urine annually. Each rat eats 8.5% of its body weight/day. The losses caused by rats are 2.5% of total stored products.

## 3. Mites:

Mites are distinct from insects as at the adult stage they possess eight legs and their bodies are not divided into a head, thorax and abdomen. They are generally much smaller than insects. Mites are generally not a problem in India because they require low temperature but, when they become active, they spoil 2-3 per cent of annual produce. Mites are usually seen, if they are large in number and visible as dust on the surface of bags.

## 4. Birds:

In storage about 0.85 per cent is lost by birds. Pigeons and sparrows consume roughly about 25 and 5 gm of grains in a day. Damage occurs by birds when grains are being sun dried and are in storage. Pigeon (*Columba livia*), crow (*Corvus splendens*), weaver bird (*Ploceus philippinus*), sparrow (*Passer domesticus*) and black bird (*Acridotheres tristis*) causes damage to the grains. They destroy grains by making holes in stacks and feed on grains as well as contaminate the grains through droppings and feathers.

## 5. Micro-organisms:

It is the biological contaminants of natural environment. Fungi and bacteria are mostly seed born. The micro-organisms (fungi, yeasts, bacteria) which attack grains are very dangerous as they can not be easily seen with naked eyes and their harmful influence spreads very quickly and renders whole grains waste. Most common fungi causing spoilage of grains are *Aspergillus* sp. And *Penicillium* sp.

### Control

- Hermetic storage: It is also known as sealed storage or airtight storage. It is used in developing countries due to its effectiveness and avoidance of the use of chemicals and pesticides. The method creates an automatic modified atmosphere of high carbon dioxide concentration using sealed waterproof bags or structures (silo). In the airtight structures, the biotic portion of the grains (insects and aerobic microorganisms) creates a self-inhibitory atmosphere over time by increasing carbon dioxide concentration (oxygen decreases) due to its respiration metabolism (Kumar and Kalita, 2017). Aflatoxin production ability of *Aspergillus flavus* is also reduced at high concentrations of CO<sub>2</sub> (Adler *et al.*, 2000; Tefera *et*

*al.*, 2011). The hermetic storage units were themselves very efficient in killing the pests and insects without any use of phosphine fumigation (Costa, 2014).

- Control of moisture of material to be stored, aeration of storage silo's to reduce moisture migration and keep the material dry, avoiding broken kernels and cooling pelleted feed adequately before storage.
- By use of contact insecticide viz., malathion, fenitrothion, carbamates are used when the godown is empty.
- Rodents can be controlled by keeping the store clean-remove any spilt grain.
- Store feed in a cool, dry, well ventilated area.
- Rotate stock to use old feed first. "First in, first out" principle.
- Keep bags stacked neatly on pallets to prevent feed from being in direct contact with damp floors.
- Bags should be stacked to allow at least 18 inches between walls and upright supports.

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