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Unit 3 – Topic 4

Direct and indirect types of damages

Destructive Agents in Storage

Storage of agricultural products is essential to avoid Minimization of losses, during storage of grains, due to rats, insects, diseases etc. it is essential to maintain good quality. Insect pests form one of the most important factors responsible for losses in agricultural production at various stages. Living organisms and the environment interact to bring about spoilage of stored products. Living organisms may be plant, insects, pests, man, animal, bacteria, fungi etc.

The number of insect species may be nearly one million, but only one per cent of the species may perhaps be harmful to man by consuming and contaminating the food. Insects have the capacity to adapt to any environmental condition. Several species can live in stored grain having very low moisture content. They enter into any hard-to-get-to places because of their small size. Some insects can live in darkness while some other live in light.

It is estimated that 5 to 10% of the world food production is damaged by insects during storage. The estimated losses due to insects in India, have been estimated to be around 3% of the country's production. Insects feed on the germ and endosperm causing loss in weight as well as nutrients. Besides, they cause contamination with their excreta and dead bodies. The damages can be grouped into, (1) direct damages, and (2) indirect damages.

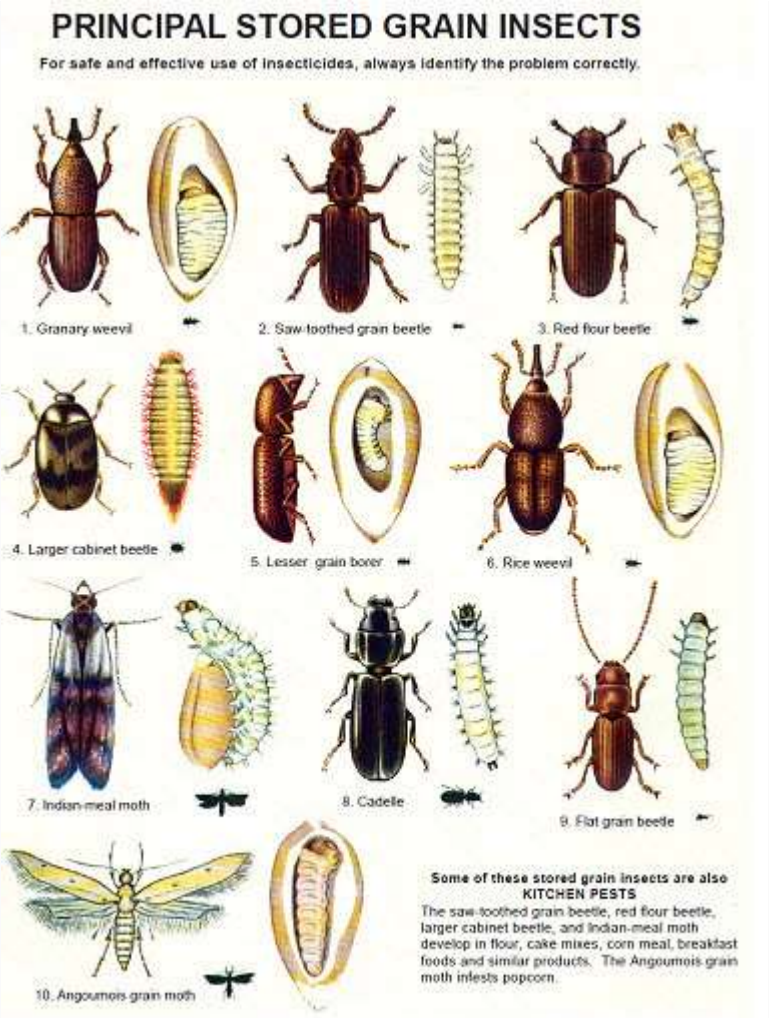

Fig. 30.1 Different types of Destructive Insects in Grain Storage

Direct damages

(i) Some insects consume germ, some endosperm and the others eat away both. This results in loss of weight, loss or conversion of nutrients, loss of germination power, loss in gradation, and consequently fall in market value.

(ii) The contamination may be with the dead bodies, cast skin, excreta, obnoxious Odour and/or webbings.

(iii) Structures and containers 'may also be damaged by causing tunnelling in wooden parts resulting in the weakening of the structure/container.

Indirect damages

(i) It may create heating and migration of moisture.

(ii) It may create distribution of parasites to man. Certain tape worms use stored grain insects as intermediate hosts.

(iii) It causes customer's resistance/repulsion which may lower the prestige.

30.2 Agents Causing Grain Spoilage

The major physical, chemical & biological factors affecting the storage of bio-materials include:

- Micro organisms
- Insects, mite and pests
- Rodents
- Environmental factors

30.2.1 Micro organisms

Major micro organism associated with storage includes:

- Fungi
- Bacterial
- Yeast

The activities of micro organism result in:

- Color degradation
- Off flavor
- Moisture upgrading, wet spot & moldiness
- Loss of viability, etc

30.2.2 Insects, Mite and Pests

The activity of Insects, Mite and Pests affects the storage by following ways

- Insects, mites and pests attack both the stored material and wooden components of the storage structure

- Weevils are the commonest insects in grains. They attack seeds and bore through them, and lay eggs in the seeds and storage structures
- They reduce seed weight, quality, nutritional value and viability

30.2.3 Rodents

The Rodents affect the storage by following ways

- Rodents are mammals that parasite on stored materials and attack storage structures
- They eat germs of grains and waste the remaining parts
- They are vectors. They also contaminate stored materials with their faeces, urine and carcasses

30.2.4 Environmental Factors

The environmental factors that mostly associated with stored products include:

- Temperature
- Relative humidity
- Equilibrium moisture content

30.3 Sources of infestation

There are mainly five sources of infestation namely, the field itself, infested gunnies,

Infested transport, infested godown and infested stocks.

- **Field**

Insects may attack the crop in the field itself. Grains affected by these insects when brought to the storage centres. will be subjected to their continuous attack. The infestation may be visible or invisible. Their stocks should, therefore, be fumigated immediately on receipt.

- **Infested gunnies**

Even if sound and new gunnies are used for packing the newly harvested grains, the insects hiding in the seams of the gunnies will attack the freshly harvested stocks. The gunnies should be fumigated before packing the freshly harvested grains:

- **Infested transport**

The transport used for carrying the newly harvested stocks should invariably be sprayed with DDVP or malathion. If the transport like bullock cart or tractor trolley has been used for carrying infested stocks on the " previous occasion, the left over insects may attack the stocks now loaded into them.

- **Infested godowns**

Even if the stocks are moved to a freshly taken over godown, it is not free from trouble. The insects present in the cracks and crevices of the wall or that hibernate in the structures, may emerge out and attack the grains. Hence the cracks and crevices should be plugged and empty godowns should be thoroughly cleaned and fumigated.

- **Infested stocks**

In case sound stocks are brought to a godown where infested stocks are in storage, cross infestation takes place

Fig. 30.2 Infested gunnies, go down and stock

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4. Handling and Storage of Food Grains by S.V.Pingale