

Advanced of Stored Products Insects- 2024- Lec. 7- Master grad-

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Dr. Gazang Taher Omar

Pests may enter storage or food processing facilities in two ways:

(1) Penetration through ineffective pest-proofing of walls, doors, windows, and roof.

(2) Entry with commodities, ingredients, or other raw materials and/or supplies.

Five areas of pest activity must be controlled:

1-Grounds, the building exterior, and the area around the plant.

2-Receiving and storage area for incoming materials.

3-Processing area.

4- Packaging area.

5-Finished product warehouse and shipping area.

Both chemical and non-chemical controls are important in these areas.

Grain Handling:

Pre-Harvest Preparation

The following steps are necessary for proper storage in grain bins and elevators:

1-Bins and adjacent structures should be thoroughly cleaned of old grain, grain residues, dust, and any other material that may harbor stored grain insects and be a source of infestation of new grain.

2-Clean up spilled grain outside of the building.

3-Properly dispose of the above materials so they will not infest any stored grain or products near the disposal site.

4-Repair, replace, plug, or otherwise correct conditions that allow entrance of rodents, birds, or other pests into the buildings.

5-Clean grounds of weeds, debris, and other materials that may provide shelter for insects, rodents, or birds. Store equipment properly.

6-Install temperature monitors.

7- Apply residual insecticidal spray to interior walls and ceilings of adjacent structures (that have been thoroughly cleaned)

8-It may be necessary to fumigate the empty structure to eliminate hidden infestations such as those below perforated floors where cleaning is impractical.

Harvest Operations:

During harvest, do the following:

1- Keep harvesting and conveying equipment properly adjusted to minimize breakage which can open up otherwise sound grain to invasion by a broader range of stored grain pests.

2-Do not store the first few bushels of grain passing through harvesting equipment. This grain scours out hidden infestations attacking residual grain left over from the last harvest.

3- Visually check incoming grain for the presence of stored grain insects. Be alert for previously stored grain that may come in as though it were “new grain.”

4-If deemed necessary, incorporate a fumigant or grain protectant into the newly received grain as it goes into storage.

5-Regularly clean up around dump pits and conveying equipment.

6- Use separate bins for “dry” and “wet” grain. Splitting wet grain into “wet” and “very wet” may be necessary to keep grain in condition and make effective use of dryers and aeration equipment.

7-Watch for evidence of rodent or bird invasion when harvest approaches completion.

Post-Harvest Operations

Inspect grain thoroughly and regularly for signs of insect infestation. Inspect every 2 months when grain temperatures are below 55 to 60°F, and monthly when grain temperatures are warmer first, sample the top-center of grain in the bin. Insert the probe or grain trier horizontally about or less than 4 inches deep. Then take more surface probes around the bin about 1 foot from the walls. Finally, probe vertically at various locations in the bin to as great a depth as possible. Carefully sieve and examine each sample. Not all insects and the presence of any damaged grain, flour, or other signs of infestation. Remember, the earlier the infestation is detected, the more damage can be prevented.

1-Monitor all bins of stored grain by appropriate means. Temperature increase may indicate insect activity.

2- Immediately inspect grain if snow melts quickly from the roof of unheated storage structures. Heating may be caused by insect or mold growth.

3-Check “hot spots” for insect activity by using sampling probes. This may not be practical for deep bins.

4- Use “turning” to break up hot spots due to mold or bacterial activity. sample grain at bin discharge for possible insect infestation.

5-If insect infestation is found or suspected, use fumigants to control the infestation. See the section on “Fumigation of Stored Products.”

6- Inspect transport equipment before loading out grain for shipment. Railroad cars often need cleaning to prevent contamination of grain by other materials with resulting in grading and financial loss.

7-Under some circumstances, it may be desirable to fumigate grain in rail cars while in transit.

8- Have regular checks of pest bait stations and/or traps

9-Check at regular intervals for evidence of rodent, bird, or pest invasion. Make regular inspections of buildings and grounds for possible access points.

Safety considerations:

1- Personnel must have proper clothing and equipment.

2- Personnel exposed to the pesticides should thoroughly wash hands, face, and exposed skin after the application is completed.

3- If pesticides have recently been applied. A filtered air supply should be used.

4-Be aware of accidental exposure of pets, livestock, or people who may be in the vicinity of the structure.

5- Solvents may be equally or more hazardous than the pesticide being used.

Grain Protectants

Protectants are insecticides that are designed to remain on the grain as a protective shield of toxic residues and are designed to be applied directly to the grain. The purpose of these products is to prevent infestation of stored grain. They are not as effective as fumigants in killing stored grain insects which already exist in the grain mass. Fumigants penetrate infested grain kernels but also diffuse out of grain and structure in a relatively short time leaving no protective residue

Control of stored product insects;

For successful and effective control of stored grain insects, a combination of the following practices has to be followed. An important method that can help in the safe storage of food grains is

A/ Prophylactic control

Prophylactic methods are intended to prevent the possible infestation of grains. They are of considerable importance in the war against stored grain pests as they prevent stored grains' infestation and prevent deterioration in their quality and weight loss. There are many prophylactic methods such as:

1-Bag storage system.

In most parts of Asia, grain is stored in 40-80kg bags made from either jute or woven plastic. These bags are normally formed into a stack.

When using bag storage consideration needs to be given to the following:

1- The bags should not be stacked higher than 4m and plastic bags are more slippery making the stacks less stable

2-Bags should be stacked under cover e.g. under a roof, in a shed or under waterproof covers.

3- A one-meter gap should be left between and around stacks and 1.5 meter clearance between the top of the stack and the roof

4- Bags should be stacked on pallets or on an above-ground structure to avoid the possibility of absorbing moisture from the floor.

5- Bags should be stacked so that fumigation can be undertaken easily. The dimensions of the stacks should be set to facilitate sealing with a single fumigation sheet.

6- The efficiency of bag storage can be improved if a plastic liner bag is used inside the existing storage bag, especially for seed and milled rice

2- Bulk storage:

At farm level, grain is often stored in bulk in containers made from wood or metal. These storages vary in capacity from 200-1000kg. The large mills and collection houses sometimes use metal or concrete silos. These silos range in size from 20 to 2,000 ton capacity. Silos have the advantage that they can be more easily sealed for fumigation and less grain is wasted.

3- Storage Hygiene:

Keep storage areas clean. This means sweeping the floor and removing dust.

- storage rooms after emptying may include spraying walls, crevices, and wooden pallets with an insecticide before using them again. Placing traps in storage areas helps to control pests.
- Inspect the storage room regularly to keep it vermin-proof
- Inspect the stored seeds once a week for signs of insect infestation.

When necessary and only under the direction of a trained pest control technician, the storage room or the seed stock may be sealed with tarpaulin and treated with fumigants.

4- Use of abiotic factors:

These factors prevent infestation or check the development of insects and mites. Such as:

1-Moisture/ is a critical factor in the safe storage of food grains. Grain stored at around 9% moisture content usually escapes from the attack of insects.

2-Insects and mites are poikilothermic (animals without constant body temperature). The optimal temperature range for developing most insect pests is from 25°C to 35°C. cooling and storing grains at 10°C-12°C is one of the important measures.