Stored products pests-2nd lecture- stage 3

Arthropod;

Arthropods infested stored products are grouped into insects (beetles, moths) and non-insects (mites).

The larvae of these moths and beetles are all pale-white or cream in colour and may be difficult to distinguish, but the adults are easier to identify. The adult beetles will mostly be found with their grubs, feeding on the stored products, but the adult moths do not feed and will only lay eggs. Mites are very minute and will need magnification to be detected. Large infestations can create favourable conditions for growth of secondary fungal and bacterial pathogens. However, under optimum conditions many of the species can complete their life cycles in less than 30 to 35 days and lay many eggs. Most stored product insects are either beetles or moths, both have complete metamorphosis, they have four distinct developmental stages: egg, larva, pupa and adult. The. Major damage was mainly caused by insects, which account for an average of 10-20 per cent of storage. In general, stored products of agricultural and animal origin are attacked by more than 600 species of coleopterans, 70 species of lepidopterans and about 355 species of mites. They are causing both quantitative and qualitative losses.

Stored product insects characteristic and success

1. Diapause rarely occur, thus can reproduce all the year around and infest stored grains.
2. Mostly with short development periods of life cycle so they have several generations per year.
3. High fecundity, rapid increase in their fecundity
4. Negative photo taxis are common characteristic, they are avoiding bright light and hide in grain inside stores.
5. Insects generally small size enables to hide and move within and between food particles.

6-The hard exoskeleton that made of chitin and called cuticle has several benefits.

Insect pests of stored grains can be divided into three groups according to the type of infestation:

1-Primary insect pests or Internal Feeders – Attack whole grains, larvae feed and develop within the kernel like wheat, barley, rice &corn. Primary pests tend to have a more restricted host.

Lesser grain borer

Cadelle beetle

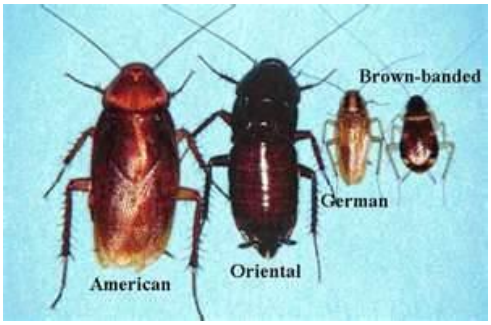
Angoumois grain moth

2-Secondary insect pests or External Feeders – Feed on grain dust and broken kernels – Cannot damage whole grain – Follow internal feeders. Larvae are free living during development. Secondary pests attack a very wide range of materials of both animal and plant origin

Red flour beetle

Indian meal moth

3-Tertiary insect pests (tertiary feeders)/ rarely causing direct damage to grains & stored materials by contamination.



4-Fungal feeders. Are often present in poorly stored grain or in grain heavily infested with other insects.

5-Predators. Many storage pests will prey on other insects present, including members of their own species. Obligate predators only feed on other insects

6-Parasitoids. A number of parasitoid wasps attack beetles and moths. Larvae of these wasps develop in or on their host, eventually killing it. These are potential 'beneficial' insects as they can control pest populations.

7-Scavengers. Some scavenger species feed on bodies of insects and other dried material of animal origin. Many are important pests of stored products of animal origin such as wool, skins and dried fish.

Types of larvae (Coleopteran order)

Larvae of beetles found in stored products have one of five distinct body forms, which are described and illustrated below.

1-Apodous – legless, immobile and lives internally within foodstuff

2-Scarabaeiform – effectively immobile when mature, legs partly or fully developed. Lives internally within foodstuff for all or all but initial stage of life.

3-Campodeiform – elongate flattened body with well-developed legs, usually pale and head capsule and/or last abdominal segment may be pigmented. Active, lives freely within commodity.

4-Elateriform – body is long and cylindrical, cuticle leathery, legs relatively short. Active, lives freely within commodity

5-Eruciform – oval or elongate and hairy. Active, lives freely within commodity.

Apodous

Scarabaeiform

Campodeiform

Elateriform

Eruciform

Main sources for insect infestation:

1-Field infestation/ Some of stored product insects can flight and move from place to another searching for foods. Thus infestation might occur to seeds while it's growing on the plant or before their harvest then would cause major damages in stores via increasing their numbers. Field infestation usually happens in tropical and semi-tropical area because cold condition usually decreases insects' activity. Examples of pests that starts seed infection in the fields are *Sitophilus oryzae* and bruchid beetles.

2-Farm storage/The percentages of seed infestation would increase as long as remained in the contaminated area for long period of time and consider a major source of infestation when transfer to warehouses.

3-Storage of animal feeds/if the animal feed store was close to the food warehouse, the latter would be highly infected by insects.

4-Combines/After harvesting, grains might remain inside combiners that would be a source for further insect infection when used in the following season. Also inside transportation means like trains and ships might hide. Thus, the infected seeds with insects would be transferred to the stores and warehouses.

5-Sacs and containers/Previously used sacs and containers for seeds transporting would provide shelters for stored product insects. Hence, different life stage of insects e.g. eggs, larvae, pupae and even the adult might hide in it. Insects would survive inside sacs because could resist unsuitable condition such as food shortage and high temperature by going through diapause period.

6- Warehouses, silos and flour mills/ Consider main sources for insect infestation especially when neglected and not equipped with required modern technology ventilation. Insects would hide either inside the hole and cracks or inside the mechanical conveyer that used for transportation.