

Stored Products Pests-Lecture 4 – stage 3

Use of traps: various traps have been designed to exploit the activities of many species of insects.

A-Crevice traps: A trap which contains many attractive crevices will accumulate insects. Once insects enter they may be reluctant to leave even though they can. A simple crevice trap can be made from a piece of corrugated cardboard that are highly effective at detecting *Tribolium*, *Oryzaephilus* and *Cryptolestes* within stored grains

B. Pitfall traps: Designed for monitoring insect pests in bulk grains. It can be used either at the surface of grain or can be buried up to 50cm deep under the surface.

Simple pitfall traps can be made from disposable plastic drinking cups. These can be buried into grains so the top is level with the grain surface. Grains can be prevented from entering the traps by covering the opening with mesh that still allow insects to pass through. The sides are slippery and cannot climb in or alternatively a small quantity of vegetable oil (e.g. cooking oil) may be placed on the bottom to trap insects that fall in like *Oryzaephilus* spp.

Advantages of Pitfall traps:

1-These traps allow early detection of pests, even with low levels of infestation.

2-In providing information on the distribution and extent of pest problems.

3- They can also help to optimise or reduce the use of chemical treatments.

C- Bait traps: Certain foodstuffs are highly attractive to storage insects, especially which contain volatile oils. Examples include dried fruit, ground nuts and brown rice. A simple trap can be made from a mesh bag containing a mix of such materials. Insects attracted can simply be shaken out and examined

D- Light traps: Many insects are attracted to lights like

Lasioderma serricone in the tobacco industry while the Pyralid moths such as *Ephestia* and *Plodia* are not very attracted to light

E-Pheromone traps

Pheromones are chemical substances which insects release to attract mate or other members of their species. Synthetic versions of pheromones of many storage insects are commercially available as baits. Baits are packaged in a vial or membrane that permits the slow release of the volatile chemical over weeks or months. Pheromones are important to detect species which are almost impossible to detect by direct inspection. There are different types according to their function such as:

1. **Alarm pheromone/** When a family member at risk will secrete a type of pheromone to alert individuals of the same species and thus avoid the danger source.
2. **Marking pheromone/** Females of some cowpea beetles such as *Callosobruchus chinensis* will secrete a type of pheromones on eggs thus avoiding other species from depositing eggs on the same site.

3. Trail pheromone/ Some species secrete a certain type of pheromones when coming out from nests so can follow back the trace to the nest
4. Dispersal pheromone/ Some lepidopteran flour larvae such as *Ephestia Kuehniella* secrete a type of pheromones from special glands on food substrates during feeding and thus prevent other larvae going to the same source to reduce competition among larvae
5. Aggregation pheromone/ Males normally secrete a certain type of pheromone that announce the presence of plenty food in a place thus will allow eating and mating.
6. Sex attractant pheromone/ Females of some species release a pheromone that attract males for mating, many types of pheromones have been isolated from stored product pests and produce the synthetic form of it to control stored product pests

Data collection

It is important to collect basic data about each specimen, useful data to collect includes:

1. Place of collection-e.g. town, location, name of farm
2. Nature of location-e.g. silo, shed, flour mill

3. Commodity from which specimen was collected, how collected, type of trap
4. Date of collection
5. Grain temperature, moisture content, time in store
6. Person who collected it – name, phone number, email address

Classification and Biology of some stored products pests

Scientific classification;

Kingdom: Animalia

Phylum: Arthropoda

Subphylum: Mandibulata

Class: Insecta (Hexapoda)

Order:

1- Coleoptera (Beetles and weevils)

Suborder: Polyphaga

Families; The classification of the families as following

Primary storage pests :

1-Family:Curculionidae - Grain weevils

A-Rice weevils :*Sitophilus oryzae* (L.)

Life cycle

Egg: Translucent white, the rice weevil breeds from April to October and hibernates in winter as an adult inside cracks and crevices . During the active season, females lay about 400 eggs in over a 6-8 month life span on the grain by making a depression and the hole is sealed with a gelatinous secretion. Eggs hatch in 6-7 days

Larvae: The immature stage is approximately 2-3 mm long, white to yellowish in color. It has a grub like in appearance and has no visible legs.

Pupae: The pupa is naked and the pupal stage lasts an average of 6-14 days. Pupates inside the grain

Adult: These small beetles are reddish brown, 2.5 mm long and have 4 yellowish patches. They have distinctively long snouts, a smooth part and numerous round pits on the thorax, adult weevil cuts its way out of the grain and lives for about 4-5 months. At least 3 generations are completed in year.

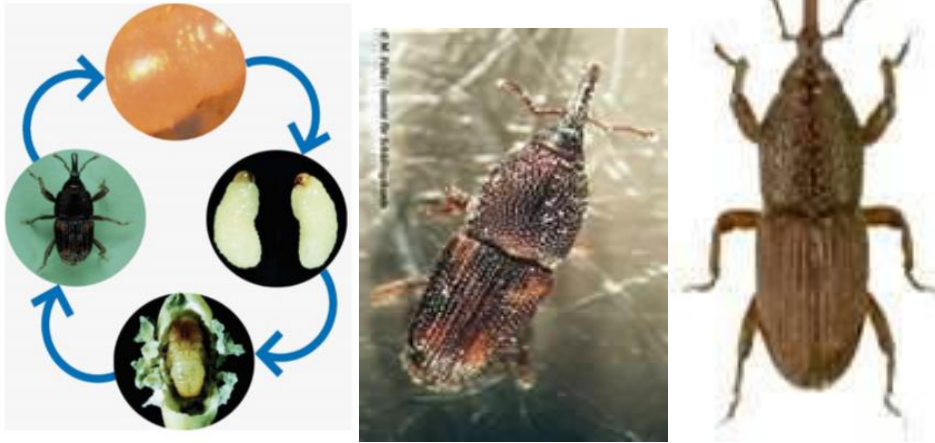
Distribution and status: World-wide and is found practically throughout India. It is the most destructive pest of stored grain.

Host range: Rice, Sorghum, wheat, barley, maize

Damage symptoms: Both adults and grubs cause damage. The developing larva lives and feeds inside the grain causing irregular holes of 1.5 mm diameter on grains of rice, sorghum, wheat, barley, maize before harvest and in storage. The weevils destroy

more than what they eat. There are two other species belong to the genus *Sitophilus*

Sitophilus zeamais and *Sitophilus granarum*



2. Family:Bostrichidae

Lesser grain borer: *Rhyzopertha dominica* (Bostrichidae: Coleoptera)

Life cycle:

Egg: The pest breeds from March to November and in December, it enters hibernation as an adult or as a larva. A single female can lay 300-400 eggs in 23-60 days at the rate of 4-23 eggs per day. The eggs are laid singly among the waste or are glued to the grain in batches. When freshly laid, the eggs are glistening white, but later on a pink line appears on them. The incubation period is about 5-9 days.

Larvae: White, and as it matures, it becomes C shaped and immobile. apodous with brown head, free living up to 3rd instars. Larva cuts a circular hole in the pedicel end of the eggs and comes out of it. Larval period 23 - 50 days

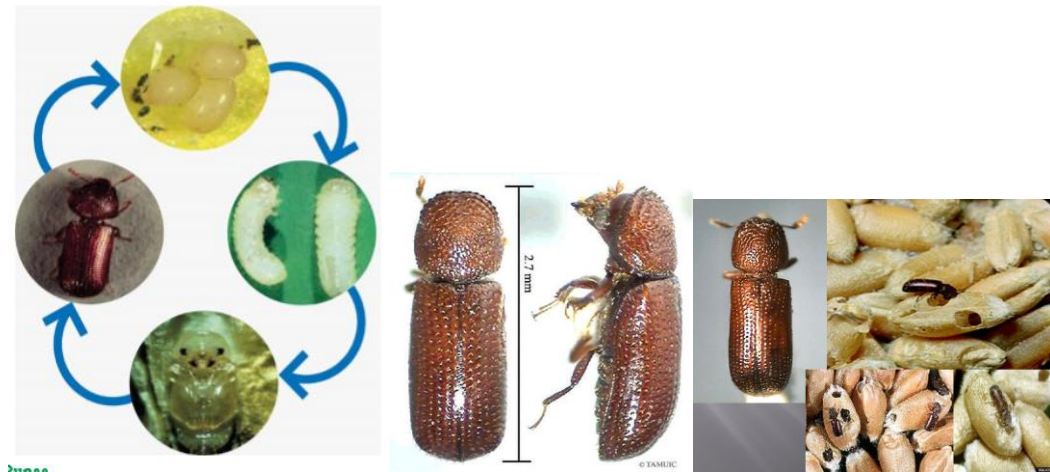
Pupae : Pupal period 4 - 6 days

Adult: Adult beetle is dark reddish brown with a cylindrical body about 3 mm long. The adult may live for about 40-80 days and is a strong flier. There are 5 -6 generations in a year.

Distribution and status: India, Algeria, Greece, United States, New South Wales (Australia), Japan and China.

Host range: Wheat, rice, maize, sorghum, barley, lentils, army biscuits, ship biscuits, stored, dried potatoes, corn flour, beans, pumpkin seeds, tamarind seeds and millets.

Damage symptoms: Both the adults and the grubs cause damage. The adults and grubs bore into the grains feed and reduce them to mere shells with many irregular holes. The adults are powerful fliers and migrate from one go down to another, causing fresh infestation. Adults produce a considerable amount of waste, spoiling more than what they eat



3-Family: Anobiidae.

Example:

Cigarette beetle: *Lasioderma serricornes*

Life cycle;

Egg: Female lays creamy white oval eggs on the surface of the stored material hatch in 9-14 days. A single female can lay about 110 eggs.

Larvae: Newly hatched larvae are less than 1 mm in length and covered with fine hairs. Head of larvae is yellowish and has a semi-transparent and white body. Larvae damage the grains by making galleries. Larval period is approximately 25-30 days.

Pupae: The fully grown larvae transformed into pupa within a cell/cocoon made of chewed food material, newly formed pupa is glossy white. Pupal period is 4-6 days.

Adult: Adult light brown round beetle with its thorax and head bent downwards and this presents a strongly humped appearance to the insect. The elytra have minute hairs on them. Antenna is of uniform thickness.

Distribution and status: Cosmopolitan but prefers warm environment.

Host range: A wide range of commodities, but prefers to feed on cigarettes and chewing tobacco, chocolate, spices

Damage symptoms: Both grubs and adults bore into tobacco products, cigarettes, and chewing tobacco. Presence

of circular pin head sized bore holes on processed tobacco is the typical symptom of attack. It also attacks the grain of wheat, peanut, cocoa, bean, cotton seed etc.



Figure: Cigarette beetle, *Lasioderma serricorne* (Anobiidae: Coleoptera)