Stored Products Pests-Lecture 5 – stage 3

4-Family;Tenebrionidae

1-**Rust-red flour beetle:** *Tribolium castaneum* (Herbst)

Life cycle:

Egg: White, translucent, sticky, slender and cylindrical. The insect breeds from April to October The females lay white for 25 days.

Larvae: The young larva is yellowish-white and measures 1 mm in length.

Pupae: The pupa is yellowish and hairy. The pupal stage lasts 5-9 days.

Adult: Insect breeds from April to October The females lay white for 25 days. Oblong, flat, brown. The development period from egg to adult is 26-30 days in summer

Distribution and status: Cosmopolitan, but more common in warmer regions. This pest occurs in temperate areas, where it survives winters in protected places, especially with central heating.

Host range: Wheat flour, dry fruits, pulses, and prepared cereal foods, such as cornflakes.

Damaging stag: Both adults and larvae.

Damage symptoms: Both the larvae and adults cause damage. The greatest damage is during the hot and humid monsoon season. The larvae are always found hidden in the food. The adults, however, are active creatures, but mostly found concealed in flour. Adults construct tunnels as they move through flour and other granular food products. In severe infestation, the flour turns greyish making it unfit for human consumption.

Figure: Rust flour beetle: *Tribolium castaneum* (Herbst) (Coleoptera : Tenebrionidae)

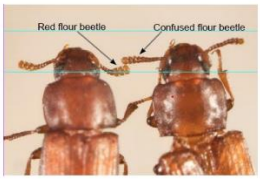
Figure: Rust flour beetle: *Tribolium castaneum* (Herbst)

(Coleoptera : Tenebrionidae)

2- Confused flour beetle: *Tribolium confusum*

(Coleoptera :Tenebrionidae)

These insects are similar to rust-red flour beetles and are confusing. These insects are comparatively established well in lower temperatures than preferred by rust-red flour beetle and antenna with four terminal clubs or equal segments while rust-red flour beetle antenna with three terminal gradually wider segments. The life cycle is almost similar for both of the species. Insects are generally prolonged with their life cycle in winter and generally finish their total life cycle in 6 weeks under favorable conditions.



5- Family: Dermistidae

Khapra beetle: ***Trogoderma granarium*** (Coleoptera:Dermestidae)

Life cycle:

Egg: The insect breeds from April to October and hibernates in the larval stage from November to March in cracks and crevices. Female begins to lay white translucent eggs on the grains, singly or sometimes in clusters of 2 -5. The eggs are rather cylindrical, rounded at one end and narrow at the other. A female may lay 13 - 35 eggs in 1 - 7 days at the rate of 1 - 26 eggs per day. The egg period varies from 3 -10 days.

Pupa: Pupation takes place in the last larval skin among the grains or on the surface and overlaps with the storage bags.

The pupal period is 4-6 days.

Larvae: The larvae are straw color, having a dark brown hair band. The larval period is approximately 20-40 days.

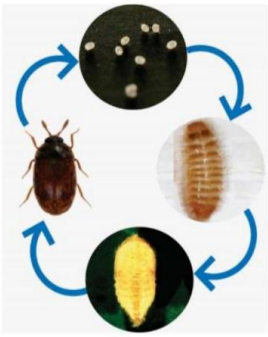
Adult:. The adults are incapable of flying. There are 4-5 generations in a year. The fresh yellowish-white larva grows 4mm long and turns brown. The adult is a small dark-brown beetle, convex, and oval 2-3 mm long, with a retractile head and clubbed antennae. The entire body is clothed in fine hairs.

Distribution and status: Tropical and subtropical countries are mainly found in hot and dry regions. It prefers lower humidity and higher temperature.

Damaging stag: Grubs are the voracious feeders. Adults are mainly involved in breeding.

Host range: The khapra beetle will attack any dried plant or animal matter. It prefers grain and cereal products, mainly wheat, barley, oats, rye, maize, rice, flour, malt, and noodles. It can also feed on animal products such as dead mice, dried blood, and dried insects.

Damage symptoms: The greatest damage is done in summer from July to October. The grubs eat the grain near the embryo or at any other weak point and from there proceed inwards. They usually confine themselves to the upper 50 cm layer of grains in a heap or to the periphery in a sack of grains. They can reduce the grain to a mere frass.



2-Order: Lepidoptera

Family: Pyralidae

1- Indian meal moth ***Plodia interpunctella***

Life cycle:

Egg: Eggs are laid singly or in clusters and hatch in 4-20 days.

Larvae: Larvae have 5-7 instars. Newly hatched larvae feed on grain while mature larvae feed on grain germ. White color larvae have polychrome in pink, brown, and greenish. Fully grown larvae can spin webs and leave silk threads in their path of travel.

Pupae: The fully grown larvae make threaded cocoons and pupate inside. Sometimes pupa is often seen on grain surfaces and walls of bins. The pupal period is 4-10 days

Adult: Adults mate immediately after emergence and start the life cycle. Female moths can lay 30-350 eggs in a minute. Adults generally do not feed. In summer, the life-cycle is completed in 5 or 6 weeks and there are about 4-6 generations in a year.

Distribution and status: A native to America, but now a cosmopolitan species. Adapted to a wide range of climates around the world.

Host range: The wider host range includes stored grains and pulses, dried fruits and nuts, dried vegetables and processed foods, dead insects, et

Damaging stage: Larva

Damage symptoms: Only the larva causes damage. Larvae create more severe problems by feeding and contaminating produce through feces. Larvae feed by webbing. The webbing may also cause condensation which leads to damaging molds. Crawling caterpillars completely web over the surface of the heap of grains with silken threads. The adults fly from one bin to another and spread the infestation.

2-Family: Pyralidae

Almond Moth / Fig moth: *Ephestia cautella*

Distribution and status: Worldwide

Host range: It is a serious pest of dried fruits such as currants, raisins, dried apples, dates, berries, figs, almonds, walnuts, tamarind seeds, etc. It has also been recorded on malted milk, dried mango garlic bulbs, various cereal grains, and grain products.

Bionomics: The adult moth has greyish wings with transverse stripes on the outer region and the wing expanse is about 12 mm. The female lays whitish eggs indiscriminately in cracks and crevices of the receptacles or on the foodstuff. While feeding, the larvae spin tubes in the food material and are full-grown in 40-50 days. The full-grown larva is white with a pinkish tinge and measures 1.5 cm. The larvae pupate inside the cocoons and the pupal stage lasts about 12 days. The life cycle is completed in about two months and there are 5-6 generations in a year.

Damage symptoms: The caterpillars make tunnels in the food materials. The number of silken tubes is sometimes extremely high and these clog the mill machinery where the infested grains have been sent for milling.

Fig moth: *Ephestia cautella*

3-Rice moth: *Corcyra cephalonca* (Stainton)(Lepidoptera: Pyralidae)

Adult insects do not feed and live for only 1 or 2 weeks. These are external feeders, which feed on grains by webbing them together. Rice moth is widely used for rearing natural enemies in the laboratory and in the field against crop pests.

Distribution and status: The rice moth is distributed in Asia, Africa, North America, and Europe. In the larval stage, it is an important stored-grain pest in both India and Pakistan. Distributed well in all rice-growing areas.

Host range: Paddy, rice, wheat, maize, sorghum, millet, dried stored product.

Damaging stage: Larva

Life cycle:

Egg: Eggs are whitish, oval in shape, (0.5) mm long, and have an incubation period of 4-5 days.

Larvae: Full-grown larva is pale whitish 15 mm long with short scattered hairs and no markings on the body

Pupae: The pupal period is about 10 days but may extend to 40-50 days to tide over winter.

Adult: Adults light greyish-brown in color, and 12 mm long. The wing span of about 15 mm.

Detection: Detection Larvae cause damage by webbing together grains forming lumps and feeding from inside it. Larvae leave a lot of webbing in the grains before pupation, causing excessive lumping, which reduces the marketing quality of the grains. *C. cephalonica* adults can be seen resting on store surfaces and have a peak of flight activity at dusk. The larvae crawl over the stored food and in the last instar construct cocoons that may be found within the stored food, on sack surfaces and store structures. Infestations cause a bad smell.

Figure: Rice moth: *Corcyra cephalonca* (Stainton) (Lepidoptera: Pyralidae)