Advanced of Stored Products Insects- 2024- Lec. 5- Master grad-

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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

7-Groundnut bruchid:

Scientific name, classification: ***Caryedon sserratus***

Family: Chrysomelidae

are known to infest mainly groundnut commonly but are also reported on tamarind and four species of Fabaceae.

Life history:

Egg:

-`Small translucent milky white eggs laid on pods. Females can lay up to 60-70 eggs and the incubation period of eggs is 4 days. Irrespective of the egg density, only 2 adults emerge out of one-sided pod/kernel and 4 to 5 adults from 2-3 seeded pods.

Larvae: Larvae upon hatching started scraping the pod/kernel surface and penetrating the pod to feed on kernels. The larvae have four instars and the larval period is approximately 50 days.

Pupae: The fully grown grub emerges by making an exit hole and constructs a tough silken cocoon on the surface of pods/kernels. Grubs pupate inside silken cocoons, having a pupal period of 12 days.

Adult: Adults are dark brown having sexual dimorphism. The posterior part of the abdomen (Pygidium) is explored in females. Adult longevity is 15-20 days. Females are more short-lived than males.

Distribution and status: These are common in almost all groundnut-growing countries.

Host range: Groundnut, apart from it, also attacks four genera of Fabaceae. Tamarind is considered as most suitable host.

Damage/injury: The first sign of attack is the appearance of windows cut into the pod wall by larvae. The larvae burrow through the pod wall and eat seeds. They damage both qualitatively and quantitatively. Increase in temperature because of higher metabolism rate. Indirectly also contaminated by aflatoxin spreading.

8-Flat grain beetle: rain beetle:

Scientific name, classification: ***Cryptolestes pusillus***

Family: Laemophloeidae

These insects are reddish brown, most commonly in stored cereal, especially wheat. Adults and larvae feed mostly on the germ portion of grains. Severe infestation causes an increase in grain temperature contaminates the grains with feces and also spreads the fungal spores. Though the adults are winged but rarely fly.

Life history:

Egg: The female lays eggs in seed/grain cracks or even drops them loosely upon the farinaceous material. Eggs are white in color and hatch within 5-6 days.

Larvae: Larvae are generally active in feeding and after hatching, they search the damaged grains. The larvae also feed on dead insects. Larvae are cigar-like yellowish white having a larval period of 21 days.

Pupae: Fully grown larvae form like gelatinous cocoons adhering to the food materials, pupation is inside these cocoons.

Adult: Adults are reddish brown beetles smallest of all stored grain insects, approximately 1.5 to 2.0 mm. The total life cycle is 40-46 days.

Distribution and status: Worldwide present.

Host range: Almost all grain and grain products including oilseed cakes, dried fruits, etc.

Damage/injury: Both adults and grub. They are secondary pests, Since the grubs a very minute, and are unable to be detected with the naked eye if less in number. However, an adult is free moving in the grain and is rapidly multiplying, which leads to trapping easily with any probe traps.

9-Rusty grain beetle:

Scientific name, classification: ***Cryptolestes ferrugineus*** **((Stephens)**

Family: Laemophloeidae

Life history:

Egg:

- Each female can lay up to 200 to 500 eggs & Eggs are laid loosely on or among the grains. Hatching in 3 to 5 days under favorable temperature (30°C).

Larvae: The larvae are worm-like and are white with two projections at the tail end. Feeding on germ portion and pupate inside the grain.

Pupae: Pupation is inside the grains after feeding the germ portion.

Adult: Adult is a shiny reddish brown beetle about 2 mm long. It moves rapidly in warm grain and lies within a temperature above 25°C

Distribution and status: Worldwide distribution and is more resistant to cold than other flat grain beetles.

Host range: cereal grains, oilseed cakes, tobacco, and dried store products.
Damaging stage: Both adults and grub.

10. Grain weevils

1- Rice Weevil: *Sitophilus oryzae* (L.)

Family: Curculionidae

Rice weevils are prolific breeders and can build up huge populations in stored grains to the point where the grain has little value as a food product. During heavy infestations, heat, and moisture are produced, leading to colonization by molds and mites. Attacks from *Sitophillus oryzae* can start in the field when the moisture content is about 20%.

Life history:

Egg: Translucent white, plugs the egg hole with gelatinous secretion, laid singly on grains. Female weevils will deposit 300- 575 eggs in grains over a 6-8 month life span. Eggs hatch in about three days.

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

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

Adult: These small beetles are reddish brown, about 2.5 mm long, and have 4 yellowish patches. They have distinctively long snouts and numerous round pits on the thorax. These weevils can fly.

Distribution and status: Worldwide and is found practically throughout India. It is the most destructive pest of stored grain. The rice weevil may be found in the paddy fields as well.

Host range: Wheat, oats, barley, rice, and maize.

Damage/injury: Both the adult and larva (grub). The adults attack whole grains. Both adults and grubs feed inside grains, leaving large cavities and emergence holes. The adults also attack damaged grains. The eggs, larvae, and pupae are not normally seen because they develop inside intact grains. The larvae chew large, irregular holes in the germ and endosperm of the kernel. Adult emergence holes (about 1.5 mm diameter) with irregular edges are apparent some weeks after the initial attack. Two rice weevils may develop simultaneously on two sides of a single kernel. Adults can be found wandering over the surface of grain. In a heavy infestation, the only part of a grain that remains is the kernel shell perforated by adult feeding and emergence holes.

2- Granary weevil: *Sitophilus granarius* (L.)

Granary weevil is small and moderately polished. The insect resembles the rice weevil and is commonly confused. It prefers a temperate climate. Both the adults and larvae feed voraciously on a great variety of grains. Females make a scoop in grain and then deposit an egg and cover it with a gelatinous fluid. In warm weather, the granary weevil develops from the egg to the adult stage in about 4 weeks. Cold weather greatly prolongs the developmental period. The life cycle is similar to rice weevil.

3- Maize weevil: *Sitophilus zeamais* (Motschulsky)

It is distributed in tropical and temperate areas, warm humid areas where corn is grown but can be found in colder climates like Canada. The weevil has a major host range of maize, rice, sorghum, wheat, and also dried stored products, including pasta. Both the grubs and adults are damaging stage. The life cycle is similar to rice weevil.

11-Lesser grain borer:

Rhyzopertha dominica (Fabricius)

Family: Bostrichidae

The lesser grain borers a commonest grain boring beetle in the country. It is small and was also commonly known as wheat borer. The insect can be easily distinguished by its reflexed head, which is a typical character of its family. This beetle is tropically originated and most commonly encountered in India in cereal grains stored under a temperature range of 20-30 °C, and can able to survive 47°C.

Life cycle:

Egg: The female lays her eggs one at a time or in batches of up to 30 and can lay up to 500 eggs over 3 or more months.

. **Larvae:** The larva is white, and as it matures, it becomes C-shaped and immobile. White, apodous with a brown head, free-living up to 3rd instars.

Pupae: Grub enters the grain after 3rd instar for pupation

Adult: The adult beetle is dark reddish brown with a cylindrical body about 3 mm long. The adult may live up to 240 days and is a strong flier

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

Host range: Paddy, rice, wheat, maize.

Damage/injury: Both adults and grubs bore the grains and feed voraciously. Severe infestation leads to only leaving with frays. Insects are not swift movers and can easily hide in the cracks and underneath damaged flour. The insects can be either detected based on random sampling and records for the holes in the grains or by adults moving on the grain. Grubs and adults completely feed on internal material and leave the husks and flour with a sweet smell/fungus smell at severity. The insect outside the grain can be detected by sieving which discharges the adults to fall from the grain. Morphologically adults are dark reddish brown. Female insects lay eggs in single or in groups. Grubs are whitish and are funneling inside the grains.