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Control of stored food insects

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Dried fruit and milled cereal products have been subject to insect attack ever since humans began to store food in excess of their immediate needs. The control of insect pests of such stored products is difficult because these pests generally live inside the food product they attack.

To combat them one must understand their life cycle and habits.

This Gardennote describes some common storage insects and their control. It also alerts to a potential exotic storage pest, the khapra beetle, which is not present in Australia.

Figure 1. Storage insects are attracted to pantries

Grain weevils

True weevils can be distinguished from other grain insects by their long snouts, at the end of which are their mouth-parts.

The female weevil chews a small hole into the grain or other solid food material, deposits an egg, then seals the hole with a gelatinous substance. The larvae hatch and feed within the foodstuff until they pupate, eventually emerging as adults. This segment of the life cycle takes four to six weeks and the adults can live up to eight months, laying 300 to 400 eggs in this time.

Figure 2. Granary weevil

Western Australia has two common grain weevils, the rice weevil *Sitophilus oryzae* and the granary weevil *Sitophilus granarius*. Rice weevil adults can fly. They are 2.5 to 3.5 mm long and reddish-brown with four paler brown spots on the wing covers. Granary weevils are flightless, 2.5 to 4.0 mm long and shiny dark brown to black.

Figure 3. Rice weevil

Figure 4. Rice weevil damage

Flour beetles

Flour beetles lack the typical weevil snout, are 3 to 4 mm long and reddish-brown. Unlike the weevils they are secondary pests, which means they are unable to attack sound kernels.

They generally infest products such as flour, oatmeal and bran, but occasionally can be found in dried fruits, spices and chocolate. Each female lays up to 400 eggs loosely among food materials. Larvae hatch and feed on fragments of food along with the adults. The life cycle takes four to eight weeks and adults may live as long as 12 months.

The two most common species in Western Australia are the rust red flour beetle *Tribolium castaneum* and the confused flour beetle *Tribolium confusum*. Apart from some minor differences, these two species look very similar. However, unlike the rust red flour beetle, the confused flour beetle does not fly.

Figure 5. Rust red flour beetle

Cigarette beetle

The cigarette beetle *Lasioderma serricorne*, as its name suggests, is primarily a pest of stored tobacco. However, it occasionally breeds in milled cereal, stored grain and some most-unlikely commodities such as curry powder, cayenne pepper and paprika.

The beetles are oval, reddish-yellow and 2 to 3 mm long. They live for two to four weeks. In a side view they look humped, with a hood-like thorax and the head set beneath it. Each female may lay up to 100 eggs. The entire life cycle takes one to four months.

Figure 6. Cigarette beetles on Chrysanthemum tea

The emerging adults often chew out through plastic, paper and cardboard packaging, leaving small circular holes.

Sawtoothed grain beetles

The sawtoothed grain beetle *Oryzaephilus surinamensis*, so named because of the saw tooth-like projections around its thorax, is a cosmopolitan pest of stored grain and grain products.

Adult beetles may live for more than three years, in which time each female lays up to 300 eggs. Development from egg to adult takes three to four weeks. Large numbers can develop unnoticed in undisturbed household foodstuffs.

Figure 7. Sawtoothed grain beetle

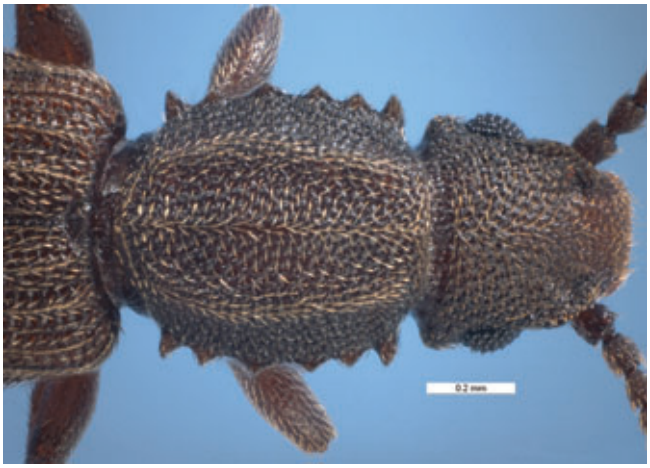

Figure 8. Sawtooth-like projections around thorax

Warehouse beetle

The adult beetle is 2 to 3 mm long, oval, brown and the wing cases have an irregular pale marking They are strong fliers. The larvae are very hairy and infestations are often first noticed by clusters of cast larval skins.

Figure 9. Warehouse beetle grub

The warehouse beetle is a major pest of stored grain. Large quantities of cast larval skins can accumulate in and around infested material and cause allergenic reactions to workers. **It looks similar to the khapra beetle, the world's worst pest of stored grain, which is not in Australia.**

Stored product moths

There are three major storage moths in Western Australia: the Indian meal moth *Plodia interpunctella*, the Mediterranean flour moth *Ephestia kuehniella* and the tropical warehouse moth *Ephestia cautella*. The Indian meal moth is one of the most common moth pests found in home groceries.

Figure 10. Tropical warehouse moth grub

This moth, which has a wingspan of about 15 mm, is the parent of the pinkish-white grubs so often found in food such as raisins, dates and figs. The grubs also have been known to feed on biscuits, powdered milk and chocolate. They contaminate foodstuffs with webbing. The larvae grow to 17 mm long, with a dark head capsule and three pairs of legs. The moth lays eggs on or near foodstuffs. The life cycle usually takes one to three months.

Figure 11. Indian meal moth grubs

Prevention

Absolute cleanliness in and around food storage areas is essential in preventing infestation. Thoroughly clean up any spilt foodstuffs, preferably using a vacuum cleaner. Pay particular attention to cracks and crevices.

Purchasing small quantities of foodstuffs at a time, keeping them cool, and storing them in containers with close fitting lids can help prevent insect attack and spread.

Often, infestation can be traced to an old packet of dried fruit, flour or spices which has been pushed to the back of a cupboard and forgotten. Destroy all such centres of breeding by placing small quantities of infested material in plastic bags in the freezer compartment of a refrigerator for 48 hours to kill the insects.

Thoroughly clean insect-infested cupboards or pantries and spray them with surface sprays which contain insecticides. Avoid contaminating food, food preparation surfaces, utensils or humans with the spray. After using any spray, air the cupboards for 12 hours before replacing foodstuffs. Space sprays containing pyrethrins are also effective in controlling wandering adult insects in surrounding areas. This prevents them from recontaminating foodstuffs during the airing phase.

Treatment

You can treat small quantities of food if the insect damage does not require it to be destroyed. Put it in the oven for at least an hour bringing the temperature up to 55 to 60°C but no hotter. Gradual heating will raise all material to the desired temperature, but short intense heating may spoil the commodity being treated. During hot summer weather, spreading the material thinly on an iron tray and placing it in the sun for several hours will also kill the pests.

If larger quantities of food need to be treated, see a registered pest controller with a view to fumigation.

Biosecurity message

Exotic pest, not present in Australia.

If you discover this pest or its larva in any of your stored grain or grain products contact the Pest and Disease Information Service on Freecall 1800 084 881.

Khapra beetle

The khapra beetle lavae are up to 7 mm long. They are yellowish at first, then the colour darkens with each moult to red-brown in the final instar. Adults are oval, dark brown beetles about 2.5 mm long with yellow brown to red-brown markings on the wing covers.

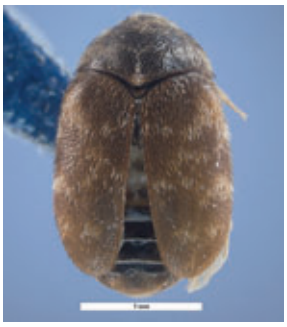

Figure 12. Khapra beetle adult

They are considered the world's most destructive pest of stored grains and grain products. Feeding is usually concentrated over the surface of infested materials and down the sides of bins, but may penetrate six metres or more into bulk storage.

Figure 13. Khapra beetle larva and cast larval skin

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