

Common pantry insects

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BACKGROUND

Have you ever opened your pantry to find something crawling or webbing in your rice or flour?

Pantry stored food items such as dried fruit, cereal and flour have the potential to be attacked by insects.

Where did they come from?

Infestations can be introduced at processing plants, storage facilities, at home by purchasing infested products or through open doors, windows or cracks in the walls.

Common susceptible food products

Insects can not only infest opened products, but can chew through unopened paper, thin cardboard or plastic packages.

Susceptible food products include:

- Cereal products
- Powdered milk
- Seeds
- Spices
- Nuts
- Cured meats
- Dried fruit
- Dry pet food

Signs and common pantry insects

A sign of infestation can be seeing insects crawling or flying around the kitchen. Signs can also include holes, larvae or webbing on the outside of packaging, in food spillages, on shelves or in corners of the pantry.

All insect stages (egg, larva, pupa and adult) can be present at the same time.















Figure 1 Adult Indian meal moth and larvae

Common insects found in households and pantries include:

- Beetles
- Carpet beetles
- Weevils
- Moths

Beetles:

Common names	Scientific name	Adult size (mm)	Mature larva size (mm)
Confused flour beetle	<i>Tribolium confusum</i>	3-4 	6 
Rust-red flour beetle	<i>Tribolium castaneum</i>	3-4 	6 
Cigarette beetle	<i>Lasioderma serricorne</i>	2-3 	4 
Drugstore/biscuit beetle	<i>Stegobium paniceum</i>	2.25-3.5 	3-4 
Sawtoothed grain beetle	<i>Oryzaephilus surinamensis</i>	2.4-3 	3-4 
Flat grain beetle	<i>Cryptolestes pusillus</i>	1.5-2 	3 


 Line indicates the actual maximum size



Figure 2 *Confused flour beetle*



Figure 3 *Rust-red flour beetle*



Figure 4 *Rust-red flour beetle elateriform larva*

The eggs of all these beetle species are laid amongst the foodstuff. The larval form varies and can be classified into three groups: the elateriform or 'worm-like' larvae, the scarabaeiform or 'grub-like' larvae and the campodeiform or elongated and flattened larvae.

Elateriform or 'worm-like' larval group

The Rust-red flour and Confused flour beetles are elateriform, are mobile and live amongst the foodstuffs. As larvae and adult flour beetles are generalist feeders, damage to foodstuff cannot be readily identifiable as being specifically caused by this pest. However, infestations can lead to strong odours in the food products, caused by the secretion of benzoquinones.

Unlike the Rust-red flour beetle who can fly readily under warm conditions, the Confused flour beetle relies on humans for distribution. Under optimal conditions, growth of both populations are among the most rapid of stored product insect pests. An adult female Rust-red flour beetle may lay up to 1000 eggs over its 2–3 year lifetime in temperate conditions.

Scarabaeiform or 'grub like' larval group

The Cigarette and Drugstore beetles have scarabaeiform larvae, with fully functional legs, but are immobile when mature and they feed internally in the foodstuff. These beetles come from the Anobiinae family of beetles which are generally wood borers however the Cigarette and Drugstore beetles are commonly found infesting a range of stored products including

dried herbs and spices. In addition, as the name suggests, the Cigarette beetle is a pest of cured tobacco. Signs of these pesky insects include irregular holes in foodstuff and packaging. Infested material becomes contaminated with pupal cocoons and dead bodies of the short-lived adults.

Both species typically lay 100 eggs over their lifespan of, on average, 25 days. The Drugstore beetle can breed in cooler conditions with a range of 15–34°C compared to 20–38°C of the Cigarette beetle.



Figure 5 *Cigarette beetle*



Figure 6 *Cigarette beetle scarabaeiform larva*



Figure 7 *Drugstore/biscuit beetle*

Campodeiform or elongated and flattened larval group

The Sawtoothed grain and Flat grain beetles are not from the same beetle family but both have campodeiform larvae which are mobile, feed externally on foodstuff and generally follow infestations from primary pests as they have difficulty penetrating whole grains but can easily enter with only the slightest imperfections. Both beetles attack grain and grain products, nuts and oilseeds. The adults are long lived and feed on the commodity with the Sawtoothed grain beetle able to lay several hundred eggs over its lifetime. It generally lives for several months but could live up to several years in cool temperate conditions.



Figure 8 *Sawtoothed beetle*



Figure 9 *Sawtoothed beetle campodeiform larva*



Figure 10 *Flat grain beetle*

Carpet beetles:

Common names	Scientific name	Adult size (mm)	Mature larva size (mm)
Australian carpet beetle	<i>Anthrenocerus australis</i>	2.2-2.5	7
Varied carpet beetle	<i>Anthrenus verbasci</i>	2-4	4-6
Black carpet beetle	<i>Attagenus unicolor</i>	3-5	7
Furniture carpet beetle	<i>Anthrenus flavipes</i>	2-3	6
Museum beetle	<i>Anthrenus museorum</i>	2-2.8	3

Line indicates the actual maximum size

Carpet/Museum beetles can be found infesting pantry items, as well as feeding on carpets and other dead plant or animal products – look for bare areas on carpets especially near windows, damage to fur or wool clothing/hangings.

The eggs of these carpet beetle species are laid amongst the commodity and their larvae are all eruciform (caterpillar like), mobile and live amongst the commodity. They burrow into infested material, moulting many times as they develop. Multiplication is slow, varying between species, but in optimum conditions the Furniture carpet beetle’s shortest development period is around 100 days and in unfavourable conditions, development can take between one to two years.

Signs that you may have a carpet beetle infestation include holes in infested material and packing material and large numbers of cast skins left scattered through the infested material.

The adults do not feed on the commodity with the Varied and Furniture carpet beetles being short-lived. However, the Australian and Black carpet beetles are long lived and feed on the nectar and pollen of flowers.



Figure 11 Australian Carpet beetle larva



Figure 12 Varied Carpet beetle



Figure 13 Black Carpet beetle & larva



Figure 14 Furniture carpet beetle and larva



Figure 15 Museum beetle adult and larva



Figure 16 Museum beetle larva

Weevils:

Common names	Scientific name	Adult size (mm)	Mature larva size (mm)
Granary weevil	<i>Sitophilus granarius</i>	3-5	3
Rice weevil	<i>Sitophilus oryzae</i>	2.5-4	2.1
Maize weevil	<i>Sitophilus zeamais</i>	3-3.5	2.1

Line indicates the actual maximum size



Figure 17 Granary weevils



Figure 18 Granary weevil



Figure 19 Maize weevil



Figure 20 Rice weevil



Figure 21 Rice weevil larvae

Weevil adults are beetles with a distinctive snout. Adult females of these species lay individual eggs into grain by selecting a spot on the grain surface, chewing a small hole, depositing egg and then plugging with a waxy secretion. Larvae are apodous (legless) in form, immobile, and they live concealed inside the grain. After pupation, the adult may spend several days within the grain before chewing its way out. Adults continue to feed on the commodity for their lifetime.

These weevil species typically lay up to 150 eggs over their 3–6 month lifespan. However, unlike the Maize and Rice weevils, the Granary weevil relies on humans for dispersal as it cannot fly. It can also breed in slightly cooler temperatures, breeding between 11–34°C compared to 15–34°C for the Maize and Rice weevils.

Damage from weevils is distinctive. Larvae leave large cavities inside grains and adults leave ragged holes as they emerge from the kernels. Adults cause further damage by feeding on damaged grain. Infestations produce a lot of heat and moisture which can attract other insect species. Weevils attack whole cereal grains, solid cereal products and some pulses.

The Maize weevil is more commonly associated with maize and rice whereas the Rice weevil is a well-known pest of dried pasta and more often found on wheat, barley and processed cereals. The Granary weevil prefers whole grains such as wheat, corn, barley and rice but can also attack beans, nuts and bird seed.

Moths:

Common names	Scientific name	Adult size (mm)	Mature larva size (mm)
Angoumois grain moth	<i>Sitotroga cerealella</i>	5-6	4
Indian meal moth	<i>Plodia interpunctella</i>	7-9	12
Tobacco/Cacao moth	<i>Ephestia elutella</i>	7-14	15-20
Mediterranean flour moth	<i>Ephestia kuehniella</i>	7-14	15-20
Tropical warehouse/ Almond moth	<i>Cadra cautella</i>	7-14	15

Line indicates the actual maximum size



Figure 22 Angoumois grain moth



Figure 23 Angoumois grain moth larva



Figure 24 Indian meal moth

The Angoumois grain moth lay their eggs on the outside of grain. When the larvae hatch, they burrow into grain where they remain until they emerge as adults. Signs of an Angoumois grain moth infestation include large cavities in the grain and when the adults emerge, the pupal case is characteristically left sticking half out the emergence hole. Adults are short lived and up to 150 eggs are laid by each female.

The meal, flour and tobacco moths are from the Pyralid moth family and lay their eggs amongst the commodity and unlike the Angoumois grain moth, when the larvae hatch, they are mobile, external feeders. As they feed, the caterpillars produce large quantities of silk which binds together and fouls the infested commodity. Infested material becomes contaminated with silk, frass (insect poo), cast skin, pupal cases and dead moths. Unlike weevils, adult moths do not feed on the commodity, and during the day, adult moths can be seen resting on walls or the ceiling. Between 150 and 200 eggs are produced during the short lives of the adults. The Tobacco and Mediterranean flour moths can breed at lower temperatures with caterpillars able to diapause over winter in cool temperate areas. They do not cope well with high temperatures and above 30°C become infertile.



Figure 25 Tropical warehouse moth and larva



Figure 26 Tobacco moth



Figure 27 Mediterranean flour moth

Prevention and control

There are simple steps you can follow to reduce the risk and spread of insect infestations in your pantry. These include:

- Purchasing small quantities of foodstuffs
- Storing in containers with close fitting lids
- Thoroughly clean up any spilt foodstuffs
- Freeze items for up to 48 hours to kill insects that may be hidden in your new purchases
- Install a pantry moth sticky trap containing a pheromone lure to capture pests
- Clean pantry frequently

Exotic plant pests

Exotic pests have the potential to seriously impact the grains industry if they were to establish in Australia. Greater volumes of freight and mail are increasing the risk of new incursions, as stored grain pests can stowaway as hitchhikers on a wide range of cargo including plastic beads, nuts and bolts, timber flooring, foodstuffs and white goods.

Khapra beetle is a serious pest of stored grain and dry foodstuffs and ranked Australia's second highest biosecurity threat to plant industries. It is found in only a few countries but is increasingly being intercepted at borders. In August 2020, a newly purchased refrigerator was found to have beetles which were identified as khapra beetle and traced to a shipment of refrigerators from Thailand. Similarly, in October, a shipment of highchairs from Italy were found also to be contaminated with khapra beetle. Tracing, inspection and treatment of both refrigerators and highchairs, and associated packaging and premises has occurred to manage the risk associated with the detection.



Figure 28 *Khapra beetle*



Figure 29 *Khapra beetle and larva*

If you suspect khapra beetle call the:

Exotic Plant Pest Hotline on 1800 084 881

Take photos (not samples) to report suspected cases of this beetle to minimise the risk of spreading infection.

Email clear photos with a brief explanation and contact details to biosecurity@dpi.nsw.gov.au

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