

Pests of Stored Food

Insect pests of stored food products are troublesome and cause a lot of food damage in your food storage area. Worldwide, the storage and handling of such foodstuffs requires considerable attention to protecting these goods from the many species of small beetles and moths that would otherwise attack and destroy them.

PROBLEMS CAUSED BY STORED PRODUCT PESTS

The beetles and moths that infest stored grains and other such products cause severe losses both directly and indirectly. Problems that they may create include the following:

1. Direct damage where the kernels are hollowed or otherwise damaged.
2. Contamination of the stored products with live or dead insects (at all stages of growth), cast skins and droppings.
3. Damage to wooden structures and various types of wooden packaging.
4. Moulding and caking of stored products.

Stored grains are attractive to a range of insect pests. Approximately 100 species have been recorded.

MAJOR PESTS OF STORED FOOD

Rice Weevil

The **rice weevil** is probably the most important pest species infesting stored grain in Queensland. It is the common weevil that attacks the small grains including wheat, oats, barley, rice and sorghum. Usually it does not attack maize.

Adults are dark brown and are 2.0mm to 3.5mm long. They have characteristic elongated snout of the true weevils. Generally, they have four lighter coloured areas on the back, two on each wing. Most live for two to three months but a few live much longer. Females produce from 200 to 300 eggs.

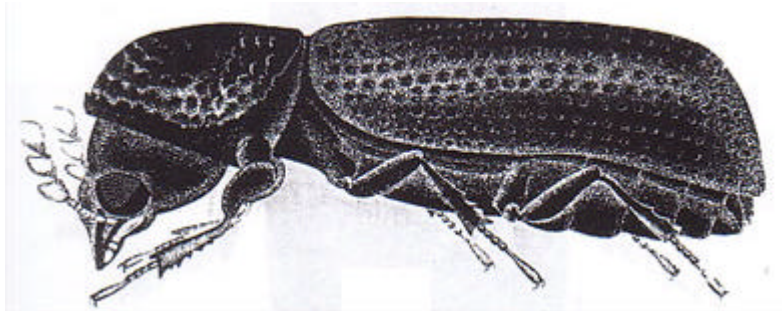
Adults do not fly readily, so field infestation is not common. They feign death for a short time after they have been disturbed. Bumping the outside of bagged grain or walking on the surface of bulk grain will cause adults to appear at the surface a few minutes later. This habit may be used to help detect an infestation.



The **maize weevil**, as its name implies, is the common species attacking maize. It is similar in general appearance to the rice weevil, and this makes it difficult to distinguish on external

appearances. While the life cycle is also similar, adults fly readily and field infestation is common.

The **granary weevil** is a pest of cooler areas and is not common in Queensland. Its life cycle is generally similar to that of the **rice weevil** but adults lack the four lighter areas on the back. Also it cannot fly.



Lesser Grain Borer

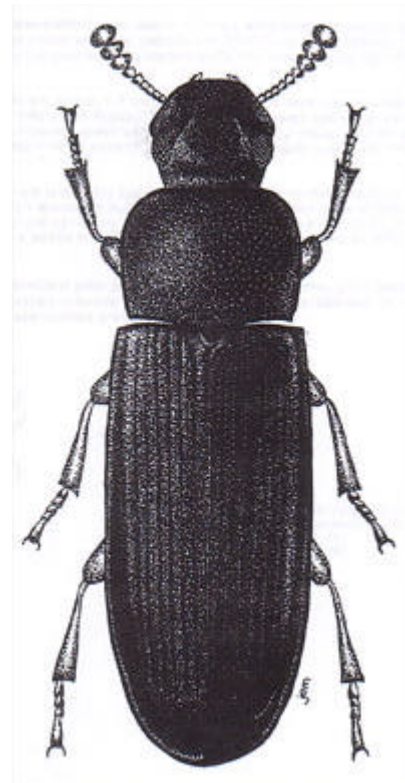
The **lesser grain borer** is a very serious pest, capable of infesting all small grains. It will attack whole grains but development is more rapid in damaged material. Adults are dark brown and range from 2.5mm to 3.0 mm in length. The body is cylindrical and the head is turned down to give the adults a characteristic appearance. Adults live for 2 to 3 months and females produce 200 to 400 eggs depending on conditions. Adults fly readily but field infestation is not important because conditions are rarely suitable for the establishment of young stages.

Rust Red Flour Beetle

The **red rust flour beetle** is a very common pest in Queensland. Although it is capable of infesting sound grain it is more serious in grain products such as stockfeed and flour. It also attacks oilseeds, nuts and dried fruit.

Adults are reddish-brown and from 2.3mm to 4.4mm in length. They are long lived with an average life of 200 days. Some live for more than two years. Females can lay 10 to 20 eggs per day over an extended period producing more than 1000 eggs.

Adults fly readily under warm conditions, usually above 25 degrees but not below. Eggs are laid freely in the commodity. The cream coloured young larvae which develop remain external to the grain. Under crowded conditions cannibalism occurs. When fully developed the larvae pupate to give the brown pupal stage. Newly emerged adults are pale coloured but darken to the characteristic reddish-brown in a few days.



Saw Toothed Grain Beetle

The saw-toothed grain beetle infests a wide range of commodities including grains, stock feeds, processed cereal products, peanuts and dried fruits. The species does not breed readily in whole grain but most samples contain sufficient broken grains for infestation to become established.

Adults are brown 2.5mm to 3.5mm long and have the characteristic tooth-like projections on either side of the thorax. They are active insects and move rapidly through an infested commodity. Although under warm conditions they fly readily, they generally walk on the commodity. Adults may live for several years and under optimum conditions female produce an average of 375 eggs.

Eggs are laid freely and larvae feed and develop throughout the foodstuff. Larvae are 5mm long and when full grown pupate by forming a fragile cell made of fragments of the foodstuff. Newly emerged adults are pale coloured but darken within a few days. A complete generation takes 3 to 4 weeks at 30 to 35 degrees Celsius but extends to 17 weeks at 20 degrees. Development ceases below 17.5 degrees.

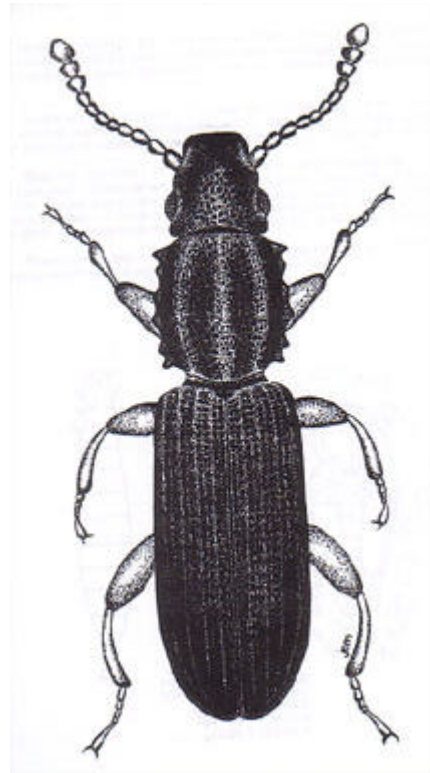
The **merchant grain beetle** resembles the saw-toothed grain beetle but it is a more tropical species. It prefers oilseeds although is not restricted to them and its life cycle is similar to that of the saw toothed grain beetle.

Flat Grain Beetle

Several species of **flat grain beetles** infest a wide range of grains and legumes as well as their products. While the species cannot attack undamaged grain, sufficient damage can occur in normal handling to permit infestation. Usually, infestations follow damage by some other pest species.

Adults are reddish brown, flat, beetles, ranging from 1.5mm to 2.0mm long. They have a curious swaying manner of walking. Adults fly readily to infest new commodities. They live for several months and under optimum conditions females produce more than 300 eggs.

Eggs are laid freely in the commodity and the tiny larvae feed and develop throughout the foodstuff. These larvae have characteristic tail horns. When fully developed, larvae build a firm cocoon and pupate. After the young adult beetle has developed it chews a hole in the cocoon and emerges. A

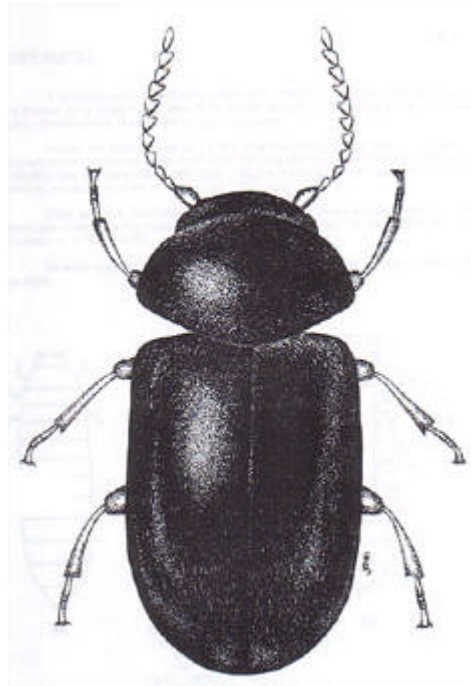


generation is complete in 4 weeks at 30 to 35 degrees Celsius, but can extend to 13 weeks at 20 degrees. Development ceases below 17.5 degrees Celsius, but is favoured by high moisture content.

Tobacco Beetle

The **tobacco beetle** affects a wide range of stored commodities throughout Queensland. Despite its common name, it is found on many grain farms. It has been recorded in crushed oats, pollard, and flour and from a range of stored seeds.

The adult tobacco beetle is oval shaped and about 2.0mm to 3.0mm long. It is dark brown and has a smooth, shiny surface. The beetle has its antennae outstretched and its head forward when walking. When at rest the head is tucked under the body. Adults live only for 2 to 3 weeks, and during this time females may produce about 100 eggs. They fly strongly and readily to infest new commodities. They are unusual among the stored product pests in that they are attracted to light.



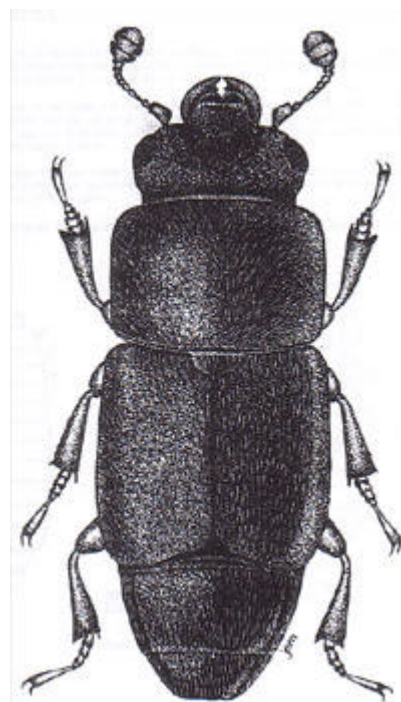
Eggs are laid singly in or near the foodstuff. Young larvae are tiny, white, hairy “C” shaped grubs. Because they move away from light, infestation does not usually develop on the outside of the commodity. Larvae continue feeding in the bulk shape of the commodity. When fully developed they form a cocoon against some firm foundation and pupate. Adults remain inside the cocoon for a few days before emerging. A generation takes about 5 week at 30 degrees Celsius but varies considerable according to the commodity infested.

Dried Fruit Beetle

The presence of significant numbers of dried fruit beetles in stored grain or grain products indicates damp conditions. Moulds or yeasts appear to be essential for them to breed successfully. Development is retarded by dry conditions.

Adults are from 2.0mm to 3.5mm long and from brown to black in colour. The wing covers are short and do not cover more than half the abdomen. Adults may live for more than a year. Females may la more than 1000 eggs. Adults fly readily and flights commonly occur outside infested storages at dusk.

Eggs are laid loosely in the foodstuff. Larvae migrate when fully developed and large numbers are sometimes recorded leaving infested commodities. A generation is



completed in about 5 weeks at 25 to 35 degrees Celsius. Related species are serious pests of dried fruit. They are also common on maize cobs in the field.

Cadelle

The **cadelle** is a widely distributed pest of grain and grain products, which prefers to attack the germ of the whole grain. Larvae also cause damage by boring into timber or through sack, or silks in flour mills. Adults are large flat insects, 5mm to 11mm long and black in colour. They typically avoid light and hide in cracks and crevices. Adults may live up to 2 years and during this time a female may produce 1000 eggs. These insects can infest grain by flying into previously clean storages.

Eggs are deposited in batches in the foodstuff and the resulting larvae move and feed freely. Larvae have two pairs of black patches on the back and two horns on the final segment. Fully developed larvae leave the food and bore readily into surrounding fabrics before pupating. A generation takes from 2 to 3 months up to one year, but under favourable circumstances larvae survive much longer. The presence of substantial numbers of adults usually indicates that the commodity has been stored for a long time.

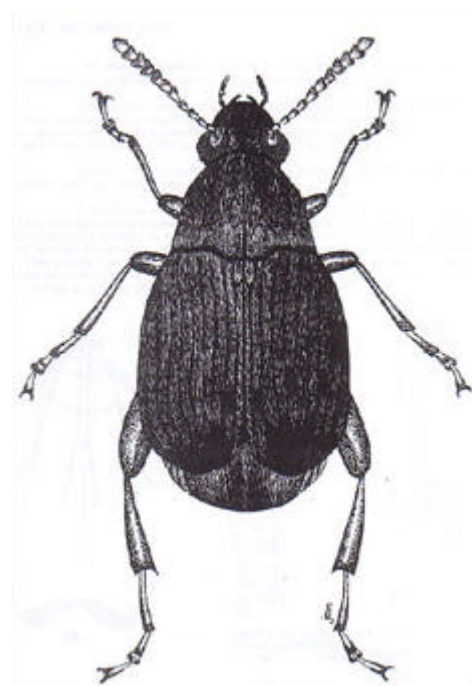
Infestations may be particularly difficult to eliminate because of the boring habits of the larvae. This renders them inaccessible to many treatments. Their inability to survive without food for long periods also makes them difficult to control.

Bean Weevil

Several species of bruchid beetles are pests of stored beans, peas and other legumes. They are included here because of the presence of these commodities on many grain farms. Damaged beans are easily recognised by the large clean circular holes caused by the pests.

The **bean weevil** attacks stored beans, peas, cowpeas, and other legume seeds. Females will lay eggs in ripening crops in the field. Infestation will continue to develop in storage.

Despite its common name, the bean weevil is a bruchid and adults do not have the elongate snout of a true weevil. Adults are from 3.2mm to 4.0-mm long, grey in colour. They have light and dark

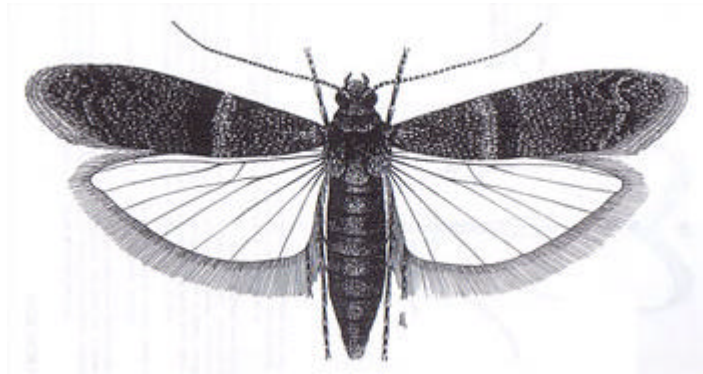


markings on the wing covers, which do not completely cover the abdomen.

Females lay eggs on the surface of the seed and newly hatched larvae bore into it. Larvae feed and develop inside the seed and pupate there when fully developed. When the adult is ready to emerge it cuts a large hole, and these holes are characteristic of the damage. A generation takes about 4 weeks at 30 degrees Celsius and development is possible in temperatures down around 15 degrees Celsius.

The **cowpea weevil** is a smaller species 2.5mm to 3.5mm long which is common in tropical areas and which prefers cowpeas and soybeans.

The **pea weevil**, a species with adults 4.0mm to 5.0mm long, attacks edible and field peas in the field but does not develop when the seed is dried.

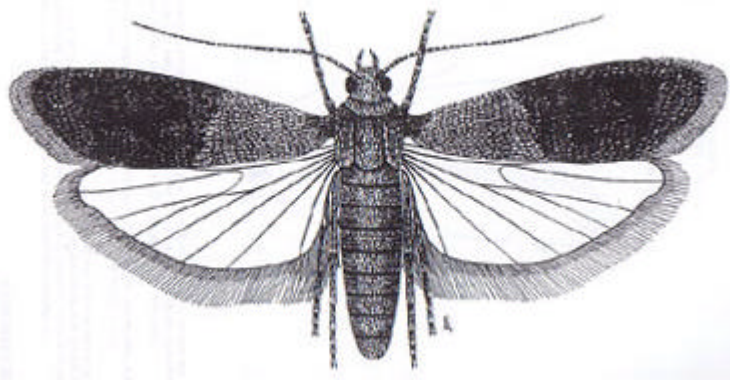


Tropical Warehouse Moth

The tropical warehouse moth is the most common moth species infesting grain and grain products in Queensland. It also attacks oilseeds and dried fruits. The adults are grey in colour with a dark band across the middle of the forewing and a less conspicuous dark band near its outer edge. They have a wingspan of approximately 15mm. Moths live only about 2 weeks but during that time the females may lay 250 eggs. Females fly over grain bulks laying eggs loosely on the surface.

Usually only the surface layers of the grain are infested. However, larvae buried in the grain mass may emerge from considerable depths. The very young larvae are tiny and cream coloured but grow to about 10mm. As they walk they spin a fine silken thread. In the early stages of an infestation this causes typical clumping on grains. In severe infestations the entire surface of the grain bulk may be covered with the silken webbing. Fully developed larvae wander, seeking a suitable pupation site.

They pupate in a silken cocoon either among the grains or in the building fabric in a sheltered position from which the adult moth can emerge easily. A generation is completed in about 5 weeks at 25 to 30 degrees Celsius but extends to 14 weeks at 15 degrees.

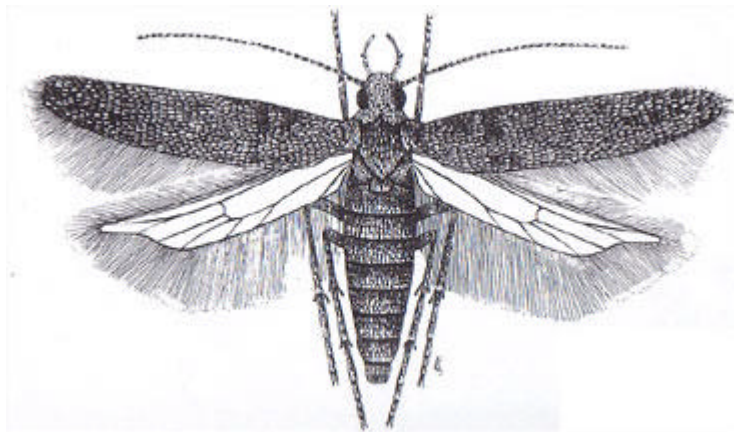


Indian Meal Moth

The Indian meal moth is a widely distributed pest which attacks a wide range of commodities including oilseeds, nuts, dried fruits, flour, bran and pollard as well as grain. It has generally not been as important in Queensland as has the tropical warehouse moth although some infestations have been serious.

Adults have a wingspan of 20mm. The outer portion of forewing is reddish-brown and the inner portion is creamy white. Adults lay the eggs freely over the surface of the grain mass and the young larvae hatch, feed and move among the grains spinning a fine silken thread. Full-grown larvae are 12mm long. When ready to pupate, larvae migrate some distance to seek a suitable site. Where heavy infestations are present this migration produces a considerable amount of webbing on the surface of the grain bulk.

Larvae pupate in a cocoon preferable in a sheltered position from which the adult moths can readily emerge. A generation is completed in 4 weeks at 30 to 35 degrees Celsius and extends to 7 weeks at 20 degrees Celsius. Some larvae enter a resting stage in the cocoon before pupating and this may considerably extend the time required to complete the life cycle.



Angoumois Grain Moth

The Angoumois grain moth can infest all grains both in the field and in storage but infestation is most common in sorghum and maize. It prefers damp grain and is most serious when these grains are harvested without threshing or shelling. It is much less important when modern combine harvesters are used.

Adult moths are small with a wingspan of 12mm. They are yellow brown in colour with a few darker markings. The hind-wings are characteristically pointed at the ends. Eggs are laid on or near grain and the tiny white larvae tunnel and complete their development inside a single grain. Just before pupating they tunnel almost to the outside surface so the adults may emerge without identity. A generation is complete in about 5 weeks at 25 degrees Celsius.