

Maize (greater grain) weevil (339)

Common Name

Maize weevil, greater grain weevil, greater rice weevil

Scientific Name

Sitophilus zeamais

Distribution

Asia, Africa, North, South and Central America, the Caribbean, Europe, Oceania. It is recorded from Australia, Fiji, New Caledonia, Papua New Guinea, Solomon Islands, and Tonga.

Hosts

Maize, rice, sorghum, wheat, cassava and yam, and also dried stored products, including pasta. CABI says that "*Sitophilus zeamais* is predominantly found associated with maize grain, whereas *Sitophilus oryzae* is associated with wheat".

Symptoms & Life Cycle

A very destructive weevil, with the adults attacking sound grain, and the adults and the larvae feeding inside them, leaving large cavities and emergence holes. The maize weevil is very similar to the rice weevil, *Sitophilus oryzae* (see **Fact Sheet no. 328**). During large infestations, heat and moisture are produced, leading to colonisation by moulds and mites.

Females lay up to 150 eggs placed in holes chewed into the grain and plugged with a gelatinous substance. Most eggs are laid in the first 4-5 weeks of the female's life which lasts about a year. The eggs hatch into white, legless larvae, which remain inside the grain, and pupate there. Adults are 3-4 mm long, reddish-brown to black (Photos 1&2), with four light reddish to yellowish spots at the corners of the wing cases (Photo 3&4). Development is about 35 days under optimal conditions.

The maize weevil has fully developed wings, and is a stronger flyer than the rice weevil, *Sitophilus oryzae*, and spreads more widely this way. Infestations can start in the field, but most damage occurs in storage. The female has a sex pheromone to attract males.

Impact

Commonly, loss of weight is up to 5%, but severe infestations increase the losses up to 40%. Secondary damage is caused by moulds, insects and mites.

Detection & inspection

It is difficult to detect the weevil unless populations are high as it spends most of its life inside grain. Look for a dull red-brown to nearly black weevil, with faint yellowish or reddish spots on its back, at the corners of the wing cases (Photos 3&4). Look for the characteristic large emergence holes in the grain with irregular edges. Look for the adults, with long snouts (about 1 mm). Note that identification of *Sitophilus zeamais* is difficult because of its similarity with *Sitophilus oryzae*, and needs to be done by a taxonomist.



Photo 1. Maize weevil, *Sitophilus zeamais*; adult side view.



Photo 2. Maize weevil, *Sitophilus zeamais*; adult, view from above.



Photo 3. Maize weevil, *Sitophilus zeamais*, clearly showing four light reddish to yellowish spots at the corners of the wing case.



Photo 4. Maize weevil, *Sitophilus zeamais*; another view of the four (very) faint, reddish spots at the corner of the wing case.

Management

CULTURAL CONTROL

It is most important to dry the grain properly, to keep the storage area clean, and to monitor the grain often and regularly. Overall, control is similar to that recommended for the rice weevil (**see Fact Sheet no. 338**).

Before storage:

- Harvest maize as soon as it is mature.
- Dry the grain as soon as possible after harvest, and re-dry during storage if necessary. Moisture levels should be about 12% (most stored product pests required moisture levels of 13-18% to reproduce).
- Keep grain storage rooms, sheds, houses, or 'cribs' clean. Remove old kernels, and sweep floors, walls, doors, and vents to collect seeds, grain powder and dust, and burn them before storing the new harvest.
- Collect and dispose of spilled grain in or around the storage area.
- If using bins, remove any grains that remain (and, if possible, spray with insecticide). If using sacks, do not reuse those that stored previous harvests.
- For small amounts, store maize, rice, wheat, and other cereals, in plastic containers.

During storage:

- If there is an infestation, locate the source by putting sticky traps around the room or warehouse where it occurred. Usually, the greater the number of weevils the nearer the source. Once located, destroy the source by wrapping the maize in heavy plastic bags or in sealed containers, and burn or bury deeply in the soil. Note, toys can sometimes be filled with grain and act as a source of infestation; so too can dried flowers.
- For small infestations, freezing for several days and then heating for 24 hours is effective. Perhaps a method to avoid if seed is for growing.
- Sieving has been used as a method of removing adult weevils, but it is very labour intensive.

CHEMICAL CONTROL

If pesticides are needed, use the following:

Routine hygiene treatments

- Malathion: apply to walls, floors, and inside of bins used to store the grain.

Treatment of seed for sowing

- *Synthetic pyrethroids*: e.g., deltamethrin or cypermethrin. Note care must be taken to ensure that the treated seed does not contaminate that used for human consumption. It must not be used for animal consumption, poultry feed or mixed with animal feed.
- *Neonicotinoids*: e.g., imidacloprid. Similar cautions apply as for pyrethroids (above).

Treatment of grains for human consumption or for animal feed [make sure the product is labelled for use on rice, maize and small grains (barley, oats, wheat)].

- *Pyrethrins*: Used as a grain protectant (sometimes with piperonyl butoxide). Pyrethrins are manufactured from chrysanthemum flowers. There is a withholding period of 1 day before treated grain can be used for human or stock consumption.
- *Malathion*: (i) as a spray; treat grain and do not use for food within 90 days of treatment; (ii) as a dust; treat grain and do not use for food within 14 days of treatment. Note that many storage pests are resistant to malathion.
- *Neem*: The repellent effect of neem may keep grains free from infestations for several months.
- *Bt*: Some success has been reported using Bt, *Bacillus thuringiensis*.
- *Beauveria bassiana*: It is used against the weevil on maize.
- *Phosphine*: Used as a fumigant; grain is covered by a tarpaulin or in other ways sealed for the duration of the fumigation. The procedure is carried out by certified operators.

Always check whether the product is for treating equipment, bins, and buildings, or for treating grain for human use and animal feed. Read the instructions.

When using a pesticide (even a biopesticide), always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticide to use should always be sought from local agricultural authorities.

AUTHOR Grahame Jackson

¹Information from Swaine G (1971) *Agricultural Zoology in Fiji*. Her Majesty's Stationery Office. London; and CABI (2019) *Sitophilus zeamais* (greater grain weevil). Crop Protection Compendium. (<https://www.cabi.org/cpc/datasheet/10926>); and BioNET-EAFRINET Keys and Fact Sheets. (http://keys.lucidcentral.org/keys/v3/eafrinet/maize_pests/key/maize_pests/Media/Html/Sitophilus_zeamais_Motschulsky_1855_-_Maize_Weevil.htm); and from Maize weevil. Wikipedia. (https://en.wikipedia.org/wiki/Maize_weevil). Photos 1,2&4 MAF Plant Health & Environment Laboratory (2011) Maize Weevil (*Sitophilus zeamais*): PaDL - <http://www.padl.gov.au>. Photo 2 Georg Goergen, ITA-Benin.

Produced with support from the Australian Centre for International Agricultural Research under project PC/2010/090: *Strengthening integrated crop management research in the Pacific Islands in support of sustainable intensification of high-value crop production*, implemented by the University of Queensland and the Secretariat of the Pacific Community.



Australian Government
Australian Centre for
International Agricultural Research



Web edition hosted at <https://apps.lucidcentral.org/ppw>