



Millet stem borer

Coniesta ignefusalis

SUMMARY: Stem borers are a major pest of millet in the Sahelian and sub-Saharan regions. The larvae (caterpillars) of this moth tunnel into the stems causing them to fall over (lodging), 'dead hearts' and poor grain development. The use of chemicals is rarely justified due to difficulty in timing the application and cost. A combination of cultural practices, such as early planting, practicing intercropping or the 'push-pull' system, and managing crop residues are the most effective approaches to controlling the pest.

KEY SIGNS

The stem borer is an important pest of pearl millet, especially in West Africa. The larvae of the stem borer attack the growing points and leaves of millet, and bore into the stem of the crop causing 'dead hearts'. In wet regions, there are three generations or cycles of the pest per year; two cycles in the drier regions. Millet that is planted early is susceptible to attacks by the first generation of larvae, which cause damage to the young plants and dead-hearts. Late-sown millet is susceptible to the second and third generations of larvae, which attack the seedlings producing tunnels in the stems that can kill the plant. In older plants, tunnelling into the stem can also cause lodging, panicles covered in chaff and inhibition of grain formation.

The eggs are laid in batches of 20-25 between the leaf sheaths and stem or on lower leaf blades. The eggs are 1 mm long, elliptical and yellowish-white in colour. Larvae are about 20 mm long when fully grown, have a reddish-brown head and a creamy white body, with distinct black spots along the body during the wet season. These spots disappear during the dry season when the larvae enter into diapause (a resting period). The pupae are yellow to reddish-brown and grow up to 15 mm long. The adult moths have a wing span of about 8 to 15 mm, golden-brown forewings and white silky hind wings. The moths are active at night; during the day they hide on leaves, stems and plant debris, with their heads pointing down towards the ground. The total life cycle takes about 30 to 40 days during the wet season.

Pheromone bait traps have been successfully used to monitor and mass trap the millet stem borer in many countries. ICRISAT has published a research brief describing how to build and use the pheromone traps (see *Further Reading*).

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: Use resistant varieties if locally available.

Plant early, with the first rains, to avoid a heavy infestation of the stem borer.

Intercropping millet with non-host crops, such as cowpeas, will confuse the moths, causing them to lay eggs on the non-host crops. The larvae are then unable to eat the non-host crops and will die.

The 'push-pull' method is effective against stem borers. In this method, *Desmodium* is intercropped with millet and acts as a repellent that 'pushes' the pest away from the millet. Around the border of the field a trap crop, such as Napier or Sudan grass, is planted to attract or 'pull' the stem borer moths away from the millet. The moths lay eggs in the trap crops; when the larvae bore into the Napier grass, the plant produces a sticky glue-like substance that traps the larvae and they die.

There are several natural enemies of the stem borer that attack during different stages of the life cycle. *Telenomus busseolae*, a parasitic wasp, is present in several countries in West Africa. The females lay eggs inside the eggs of the stem borer and develop within the egg. Another group of wasps, species of the *Syzeuctus* genus, are larval parasites and are present in many countries. Ants are also predators of stem borers. Planting strips of flowering plants in or around the field will attract and conserve the natural enemies.

Following harvest of the grain, the stem borer larvae can survive until the next rainy season in the stems and stubble of millet. It is important therefore to destroy crop residues after harvest, to prevent the pest from re-emerging in the field the following season. If the stems are to be used for building structures, they should be partially burned to kill the larvae inside the stem.

Rotate millet with a non-host crop, such as a legume, to break the pest's life cycle.

Control – what to do after signs are seen

Cultural approaches: Locally made inexpensive pheromone bait traps can be placed in and around the field to disrupt the mating cycle of the stem borers and reduce the populations. The traps are particularly beneficial if placed along fences and granaries, or other places the stem borer may hide.

Chemical approaches: The use of insecticides, such as dimethoate, is impractical, and rarely justified due to the costs and difficulty in use. The eggs of the stem borer are often covered by the leaf sheaths, and the larvae bore into the stems, therefore the pest is often protected from chemical sprays.

Neem can be effective against stem borers if used early in the season before the larvae bore into the stem of the plant; it should be applied in the evenings.

CAUSE

The moth *Coniesta ignefusalis* is the stem borer that causes the most damage to millet. The majority of the damage is caused by the larvae feeding in the stem and preventing the flow of nutrients from the roots to the upper parts of the plant. Pearl millet is the primary host plant, but sorghum, maize, sugarcane and several species of wild grasses are also hosts. Sorghum is especially susceptible when intercropped with maize.

IMPACT

There is little data that reports on crop losses from farmers' fields. Some studies have reported that yield losses can average 15%, although severe cases can result in total crop failure.

DISTRIBUTION

The millet stem borer is a major pest of millet, especially in the Sahel and sub-Saharan region of Africa. *C. ignefusalis* has been recorded in Benin, Burkina Faso, Chad, Gambia, Ghana, Guinea Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, Ethiopia and Angola as well as some parts of West Africa. It can live at altitudes up to 1000 m above sea level. Stem borers are mainly distributed from country to country or region to region by diapausing (dormant) larvae in the stems and other crop residues. Millet stems are often used for roofs, fences and other building uses; it has been reported that attacks are more severe near villages where the stems are used for this purpose.

FURTHER READING

Youm, O., Harris, K.M., and Nwan'ze, K.F. 1996. *Coniesta ignefusalis*, the Millet stem borer: a handbook of information. Information Bulletin no. 46. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. http://pdf.usaid.gov/pdf_docs/pnaby140.pdf

ICRISAT. Pheromone-based monitoring system to manage the millet stem borer *Coniesta ignefusalis* (Lepidoptera: Pyralidae) <http://www.icrisat.org/what-we-do/agro-ecosystems/aes-rb-monitoring-system.htm>

FiBL (2013): African Organic Agriculture Training Manual. Version 2.0 July 2013. Edited by Gilles Weidmann and Lukas Kilcher. Research Institute of Organic Agriculture FiBL, Frick. http://www.organic-africa.net/fileadmin/documents-africanmanual/training-manual/chapter-09/Africa_Manual_M09-03.pdf

AgriGuide <http://www.agriguide.org/index.php?what=agriguide&id=148&language=wo>