



Sorghum stem borers

Busseola fusca, *Chilo partellus*, *Sesamia calamistis*



Photo: Georg Goergen/IITA Insect Museum, Cotonou, Benin

African maize stalk borer moth.



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Spotted stem borer moth.

SUMMARY: Stem borers are major pests of sorghum throughout Africa. The stem borers tunnel into the stem of the plant feeding on the internal tissues and causing the plant to weaken. The pest can be controlled through a combination of cultural practices, most notably intercropping and the 'push-pull' system. Pesticides can also be effective, but must be applied in the early crop stage before the larvae bore into the stem.

KEY SIGNS

There are three types of stem borers that attack sorghum: the spotted stem borer, the African maize stalk borer (also called the sorghum stem borer) and the African pink stem borer. Stem borer adult moths mate and the females deposit eggs on the underside of leaves near the funnels. The young larvae feed on leaf funnels leaving holes, and also the growing points preventing flowering. The older larvae bore into the stems of the sorghum, weakening them and causing chaffy heads. The central shoot withers and dries (known as 'dead heart'). The pink stem borers do not usually feed on the young leaves, so are less likely to cause the holes and scars symptoms that are typically associated with the spotted stem borer and African maize stalk borer.

The African maize stalk borer eggs are round, flat on top, creamy-yellow in colour and about 1 mm diameter. The larvae have no distinct features, lacking notable hairs or markings. The larvae are creamy-white in colour often with a grey or sometimes pink tint, the head is dark brown, and they grow up to 40 mm long. Pupae are up to 25 mm long, and shiny yellow-brown to dark brown in colour. The adult moths have a wing span of about 25-33 mm; the forewings are light to dark brown with dark patterns and the hind wings are light to greyish-brown. There is some variation in the colouring depending on location and season.

The spotted stem borer larvae are creamy white to yellowish-brown with dark conspicuous spots and four purple stripes lengthwise across the back. The pupae are shiny, light yellow-brown to dark red-brown and 15 mm long. The adult moths are 7-17 mm long with a wingspan of 20-25 mm. The forewings are light yellow-brown with darker horizontal patterns, and the hind wings are white. The eggs are creamy-white, scale-like and laid in overlapping batches on the underside of leaves near the midrib.

The African pink stem borer eggs are creamy-white when laid, but get darker as they develop. The larvae are smooth and shiny, creamy-white with a distinctive pink colouring, a brown head and are 30-40 mm long when mature. The pupae are yellowish-brown and 18 mm long. The adult moths are slightly smaller than the other two species of stem borers. They have yellowish-brown forewings, white hindwings, with a wingspan of 20-30 mm.

Monitor fields to look for symptoms of stem borers: feeding marks on the funnel leaves, 'dead hearts' and holes in the stems. Cut open the stems of a few selected plants that show symptoms to look for larvae and pupae.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: Plant early to avoid a serious infestation of stem borers.

Applying nitrogen, either a commercial product or manure or compost, enhances the crops tolerance to an attack.

Implement a 'push-pull' system in which *Desmodium*, a repellent plant, and Napier grass, a trap crop, are intercropped with maize to lure the insect away from the maize.

Intercropping with non-host plants, such as cowpeas or cassava, will also reduce the damage. Adult moths will lay eggs on the non-host plants, but the larvae are unable to feed on them and will die.

Destroy crop residues after harvest to reduce populations and limit the pest the following season. Stems should be burned, fed to livestock or dried on the ground under full exposure of the sun's heat.

Rotate sorghum with a non-host plant, such as a legume, to prevent the build-up of the pest in the field and to increase the nitrogen in the soil which will make the next sorghum crop hardier and less susceptible to an attack.

Control – what to do after signs are seen

Cultural approaches: Two parasitic wasps, *Cotesia flavipes* and *Xanthopimpla stemmator*, attack the spotted stem borer. *C. flavipes* attacks the larvae while they are feeding in the stem, and *X. stemmator* attacks the pupae. Both parasites have been released in several countries. In coastal Kenya, studies have shown that *C. flavipes* has reduced the populations of spotted stem borers by 70%.

Several parasitic wasps attack the African pink stem borer, the most effective of which are *Cotesia sesamiae*, *Descampsina sesamiae*, *Pediobius fuvvus*, *Sturmiopsis parasitica*, *Telenomus busseolae* and *T. isis*. *C. sesamiae* attacks the larvae, *D. sesamiae* and *S. parasitica* attack both the larvae and pupae, *P. fuvvus* attacks the pupae and *T. busseolae* and *T. isis* are egg parasites. *C. sesamiae* has been released and established in Mauritius and Madagascar to control the African pink stem borer.

Ants and earwigs are also important natural enemies of stem borers and efforts should be made to maintain habitat to conserve parasitoids and predators.

Chemical approaches: Chemical control should only be used when the infestation is severe. Since sorghum is more densely planted compared to maize, applying granules to the leaf funnels is too labour intensive. Spraying a pesticide early over the plants might be more effective; however, once the larvae have bored into the stem of the plant, pesticides are no longer effective. Neem products can be effective against stem borers.

CAUSE

Busseola fusca, the African maize stalk borer is also commonly known as the maize stem borer and sorghum stalk/ stem borer.

Chilo partellus is commonly known as the spotted stem borer.

Sesamia calamistis, the African pink stem borer, is also known as the African pink borer of sugarcane, Mauritius pink borer of sugarcane, pink stalk borer of sugarcane, southern pink borer of sugarcane. The pink stem borer is similar to the purple stem borer (*Sesamia inferens*).

IMPACT

The African maize stalk borer and spotted stem borer cause more damage to cereal crops than any other pests in sub-Saharan Africa. Stem borers can build up from year to year in fields where sorghum or maize is continually cropped, making the problem progressively worse and resulting in serious crop losses for sorghum and other grain crops. The African pink stem borer is not as important as the spotted stem borer or African maize stalk borer, but is still present throughout the region.

DISTRIBUTION

The occurrence of one species over another is dependent on location. The spotted stem borer is native to Asia, but spread to East Africa in the 1950s and then into Central Africa. The spotted stem borer is predominant in warmer, lower altitudes, or at high altitudes where rainfall is below 500 mm per year.

The African maize stalk borer is native to the region of sub-Saharan Africa and is present throughout the region from sea level to 2000 meters altitude.

The African pink stem borer is not as common as the other two species, but is present throughout sub-Saharan Africa.

Stem borers are often spread through the transport of dry stems, grains, and grasses that contain diapausing larvae. Primary hosts of stem borers are cereals, notably sorghum, maize and pearl millet, and sugarcane and several grass species, as well as wheat and rice.

FURTHER READING

Plantwise Knowledge Bank www.plantwise.org/knowledgebank

BioNET-EAFRINET <http://keys.lucidcentral.org/keys/v3/eafrinet/index.htm>