

# Sorghum midge

*Stenodiplosis sorghicola* / *Contarinia sorghicola*



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*Adult midge on sorghum bloom.*



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*Damaged sorghum heads.*

**SUMMARY:** The sorghum midge is one of the most important pests of sorghum. The larvae of the midge feed on developing seeds causing malformation of the grain and empty or chaffy heads. Cultural controls are the best approach; chemical sprays have to be carefully timed since the pest spends the majority of its life cycle protected inside the spikelets. Using resistant varieties, planting early and planting varieties that flower uniformly are the most important methods that can be used to reduce damage to the crop.

## KEY SIGNS

The sorghum midge is one of the most important pests of sorghum worldwide. The adult midge lays eggs into the flowering spikelets of sorghum. When the larvae hatch they feed on the developing seeds, causing poor grain development and resulting in empty grains or chaffy spikelets.

Adult midges have a mosquito-like appearance, are small (about 3 mm long), with a bright orange body, transparent wings and very long antennae. The eggs are very small, cylindrical and a transparent light-red colour. The young larvae are colourless, but turn dark-orange as they develop. The larvae feed on the young soft ovary of the developing grain, which causes the grain to shrivel and prevents normal seed development. Populations of midge begin to build-up at the start of flowering. A long flowering period (due to staggered planting dates or planting varieties that flower at different times) can significantly increase the midge population in an area. Two or three generations of midge can develop during a season, resulting in higher populations and therefore more damage to late flowering sorghum.

Symptoms include shrivelled or flat grains that result in empty or chaffy spikelets and blighted or blasted looking panicles (or heads). Damaged spikelets can be squeezed between fingers to see if they produce red ooze (the larva or pupa being crushed). A small empty, clear or white pupa casing (or skin) is left attached to the tip of the spikelet and can be seen with the naked eye. Adult midges can be observed in the mornings during flowering.

## MANAGEMENT

**Prevention** – what to do before signs are seen

*Cultural approaches:* Resistant varieties are one of the most effective ways of controlling the insects and keeping the population of midge below the threshold level. Use resistant varieties if they are available in the region. If resistant varieties are not available, select varieties that flower early or all flower at the same time.

Timing of planting is also an important measure for reducing the damage. Uniform planting (i.e. planting on the same day and at the same depth) to ensure even flowering, and planting early, will reduce exposure to high infestations and reduce the damage caused by the sorghum midge.

Remove alternative hosts, such as wild sorghum, Johnson grass and Sudan grass, from in and around the field to prevent midge population build-up early in the season.

It is reported that midge populations are higher in fields with a low plant density. Planting at a high density reduces the number of insects per plant or area and can reduce damage.

Damage can also be reduced by intercropping sorghum with a legume.

Rotate sorghum with non-host crops or leave the field fallow the next season to break the build-up of the pest in the field.

Destroy crop residues after harvest to prevent the pest from carrying over to the following season.

### **Control** – what to do after signs are seen

*Cultural approaches:* Chaffy spikelets should be removed and destroyed to stop the spread of the pest.

There are four groups of parasites that are natural enemies of the sorghum midge: the *Eupelmus*, *Eupelmidae*, *Tetrastichus* and *Aprostocetus* families – all are small black parasitic wasps. Efforts should be made to conserve habitat (e.g. flowering plants on the borders of field) to build-up populations of these natural enemies.

*Chemical approaches:* In the field, chemical control of the midge can be difficult because the larvae, pupae and eggs remain protected inside the spikelets. Pesticide use has to be carefully timed to occur when the adults emerge in the morning during flowering or else it will be ineffective.

After harvest, sorghum grains can be fumigated with phosphine to kill the larvae in the spikelets. This will reduce the chance of the pest spreading to new areas.

### **CAUSE**

*Stenodiplosis sorghicola* is also classified as *Contarinia sorghicola*. It is commonly known as the sorghum midge, but is also known as dura gall midge and jola earhead fly. It was formerly classified as *Allocontarinia sorghicola* Solinas, *Contarinia andropogonis* Felt and *Contarinia palposa* Blanchard.

Sorghum is the main host, but wild varieties of sorghum (*Sorghum arundinaceum* and *Sorghum dochna*) as well as Johnson grass (*Sorghum halepense*) and Sudan grass (*Sorghum sudanense*) are also hosts. The symptoms caused by the midge are sometimes confused with poor seed setting, bad weather, or other insects such as the head bug (*Calocoris angustatus*).

The adults emerge from diapause (a resting period) in the morning and mate within an hour. The females lay 1 to 5 eggs in each spikelet, with each female laying a total of 50-100 eggs in their 1 day lifespan. The eggs hatch 2 or 3 days after being laid and the larvae begin feeding on the young soft ovary of the developing grain. The larvae continue to feed on the grain for 10-15 days, after which they pupate inside the grain for 3 to 5 days before emerging from the flower as an adult to start the cycle over again. The total life cycle is 15-20 days. Following harvest, larvae that are still in the grain enter into diapause where they can remain resting for up to 3 years. When the temperatures and humidity rise, usually triggered by the beginning of the rain season, the adults come out of diapause to emerge from the grain and mate.

### **IMPACT**

Sorghum midge is considered to be the most important pest of sorghum in Africa, destroying 10-15% of the sorghum crop each year. It is reported that one adult midge can destroy 1.4 grams of grain. Where susceptible varieties are used, high populations can completely destroy the crop.

### **DISTRIBUTION**

Sorghum midge has been recorded in almost all sorghum producing regions of the world. It is present in Africa, Asia, the Americas, the Pacific Islands, Australia and Europe. It is typically found in tropical and subtropical areas, and is more prevalent during the rainy season. The midge is spread between countries and regions by the transport of sorghum grain that contains larvae.

### **FURTHER READING**

Plantwise Knowledge Bank [www.plantwise.org/knowledgebank](http://www.plantwise.org/knowledgebank)

Stuebaker, G., Lorenz, G., and S. Akin. Grain Sorghum Insect Control. University of Arkansas, Cooperative Extension, FSA 2066. <http://www.uaex.edu/publications/pdf/FSA-2066.pdf>