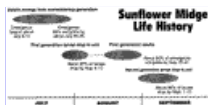


# Sunflower Midge

E-800, December 1997 (revised)

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**Fig. 1. Life cycle of the sunflower midge, *Contarinia schulzi* Gagne.**

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## Description

The adult sunflower midge, *Contarinia schulzi* Gagne, is a tan-colored delicate fly 2 to 3 mm long which is a pest in cultivated sunflower. Females are slightly larger and more robust than the males and have a long telescoping ovipositor.

Larvae reach 2 mm in length, are creamy-white in color and appear somewhat flattened. Larvae often feed in clusters underneath the bracts surrounding the sunflower head and also in the center of the developing sunflower bud.

Adults (Fig. 2) from the overwintering generation emerge from the soil in early to late July, move to sunflower, and oviposit first generation eggs. Some larvae of the first generation complete development and emerge as adults from mid August to early September to produce a partial second generation. Each adult lives one to two days. Adult emergence occurs in abrupt peaks, and there may be multiple emergence peaks during these intervals. The relationship among midge emergence, rainfall, and soil moisture is not clear. However, it does seem that wet soil conditions favor larger emergence.



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Eggs (Fig. 3) are usually laid in clusters on developing sunflower buds, either underneath bracts or in the center of the bud. Females prefer laying eggs on buds 1 to 2 inches in diameter but will oviposit on buds and heads of any size, as well as in leaf axils.



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On the second day, eggs hatch and larvae (Fig. 4) crawl to the base of the bracts or into the center of the bud to begin feeding. Larvae develop in the bud for 7 to 10 days after which they drop to the ground. Larvae complete development in the soil for a second generation or they overwinter in the soil where they form cocoons, to pupate and emerge the following summer. The impact of the partial second generation in mid August is thought to be minimal.



**Fig. 4. Larva of sunflower midge, *Contarinia schulzi* Gagne.**

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## Damage (Figs. 5 and 6)



Fig. 5. Cross section of sunflower bud damaged by sunflower midge larval feeding.

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Fig. 6. Severe cupping of sunflower head resulting from sunflower midge infestation during the bud stage.

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The abnormal shape and size of midge infested sunflower heads is a result of larval feeding activity. If damage is confined to scarring at the base of the bracts, there will be little if any economic loss. Damage becomes measurable when there is a crease in the face of the head or the petiole is noticeably thickened. More severe damage includes a reduction in head size, head folding, development of a central dead area or hole, and lack of seed production. There can be large variation in extent of damage from sunflower head to head within a field.

If midge damage is restricted to field margins or small portions of fields, economic losses for the field will be minimal. When midge populations are very heavy, damage will extend into the field and substantial economic losses can occur.

## Distribution



Fig. 7. 1997 sunflower midge survey for infestations.

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The sunflower midge can be found on wild sunflower throughout the northern Great Plains and south to Texas. It is most abundant in the areas of southern Manitoba, Minnesota, North Dakota, and South Dakota where cultivated sunflower has been grown for the longest period of time, particularly in the Red River Valley of the North. Sunflower midge can be found throughout much of the Red River Valley each year, yet the areas where populations are high enough to cause yield loss to sunflower can move annually.

In the past, midge distribution and abundance have been associated primarily with heavy soil types and high soil moisture conditions. These conditions allow more larval midges to survive the winter and permit a larger portion of soil inhabiting larvae to emerge the next summer than under drier conditions. However, midge damage is not restricted to areas of heavy soils or to wet, rainy seasons. Most recently, the range of the sunflower midge has expanded west, out of the Red River Valley.

## Sunflower Midge Management

### Insecticides

At present, the sunflower midge cannot be controlled by conventional insecticidal approaches. Larvae crawl into the bud soon after hatching and are protected from topically applied insecticides. Adult midges are much more exposed in the environment, but since they are present for only a day or two there is usually not enough time after observing them to initiate controls before they lay eggs. Sampling for midge is difficult because both adults and eggs are very small and present for such a short time. Because the plant is susceptible throughout the bud stage, and because there can be several emergence events of adult midges, correct timing of insecticides for adult midge control is very difficult.

Both foliar and systemic insecticides have been used in attempts to control the midge. Neither has given consistent, adequate control of adults or larvae. Multiple applications of insecticides have also proven inadequate

and not economical. At this time, it is known that chemical insecticides do NOT consistently reduce losses, making it difficult to justify the cost of application.

### Planting Date

Grower observations and university tests have shown that significant reductions in midge damage can be achieved in the lower Red River Valley when sunflowers are planted in late May to early June. When practiced, sunflower development lacks synchrony with the midge life cycle by delaying the early bud stage of the plant until after most of the adults have emerged. In some years, delayed planting will result in much smaller yield losses from midge damage when they are present in large numbers. Unfortunately, the optimal planting time to reduce midge damage will vary between years, depending on spring temperatures and the timing of adult midge emergence.

A better strategy is to spread out budding dates over a wider window, since risk of infestation and damage should differ by planting date. The bud stage, the growth stage most attractive and susceptible to midge injury, lasts approximately 21 days. Unfortunately, for most hybrids, the time from seedling emergence to early bud stage is the same, regardless of relative maturity rating. Therefore, staggering planting dates to produce a real difference in budding times may require a seven to 10 day waiting period between planting dates.

### Hybrid Selection

Selection of a hybrid sunflower seed which is tolerant to midge damage can also help reduce losses. Several commercial hybrids that have tolerance at light to moderate midge infestation levels are available, but no present hybrid can tolerate heavy midge infestation levels. Studies are currently under way to identify midge tolerant hybrids. Check with your local extension agent for a list of evaluated hybrids rated during the most recent midge resistance screening tests.

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