

Wheat Midge: *Sitodiplosis mosellana* Monitoring Protocol

Host Plants: All conventional wheat varieties are susceptible to wheat midge, but some are more seriously affected than others. Midge tolerant wheat varieties are now available as a varietal blend (90% of one variety that is midge tolerant and 10% of another variety that is midge susceptible). Although the midge also attacks other members of the grass family, including barley, couch grass, intermediate wheat grass and rye, infestations on these plants are usually not serious enough to warrant control.

Identification, Life Cycle and Damage:

Adult: The female midge is a tiny, fragile fly about 3 mm long with a salmon pink body (Figure 1). The male is smaller. The head is light brown with two large black eyes. Legs are light brown and antennae are dark brown. Wings are dusky and fringed with hairs. Adult midges emerge from the pupal stage in the soil over a 5-6 week period, from mid-June to mid-July. This is about the time when the wheat heads are emerging from the sheath and beginning to flower.

During the day, the midge remains within the humid crop canopy. During warm (>15°C), calm (wind speed is less than 10 km/h) evenings, the female midges lay eggs on the wheat kernels singly or in groups of 3-5. Egg laying takes place just prior to or at anthesis, over their 4 or 5 day lifespan.

Eggs: The tiny, orange-coloured eggs are barely visible to the human eye. Plants are most vulnerable to attack if the eggs are laid during the time the heads are about one-half emerged from the boot to half-flowering.

Larvae: Eggs hatch in 5-7 days and the larvae move to the surface of the developing kernels and feed for 2-3 weeks. The newly hatched larvae are white; the mature larvae are oval-shaped and are orange-red in colour (Figure 2). Larval feeding will cause the kernels to shrivel. A few kernels may be aborted entirely. Others will not fully develop and will be so small and light. Damage will not be visible unless the developing kernels are inspected. The mature larvae remain in the wheat head, enclosed in a transparent skin, until activated by rain or damp weather conditions. Then, these larvae drop to the soil surface, burrow down into the soil (up to 10 cm down) and pass the winter in a resting stage enclosed in cocoons which are smaller than canola seeds (Figure 3).



Figure 1: Adult



Figure 2: Larva

Pupa: In the following spring, if the soil is moist enough, the larvae pupate near the surface. Overwintering larvae may remain dormant until conditions are favourable for development in the following spring or years later. The adult midges emerge about 2 weeks later.



Figure 3: Canola seeds (top) and wheat midge cocoons (bottom)

Monitoring

Field Inspection for Adults:

Inspections should be carried out in the evening (preferably after 8:30 pm.) when the female midges are most active. On warm (at least 15°C), calm evenings, the midge can be observed in the field, laying their eggs on the wheat heads. Midge populations can be estimated by counting the number of adults present on 4 or 5 wheat heads. Inspect the field daily in at least 3 or 4 locations during the evening.

Soil Sampling for Monitoring of Overwintering Populations

Monitoring of overwintering populations can be conducted in fall after the wheat has been harvested. To obtain soil cores, a metal tube, with an inside diameter of 2.54 cm, is inserted into the soil to a depth of 15 cm and the resulting core, which has a surface area of 5.06 cm², is the basic sampling unit. Five cores will be taken at random at three locations within the field. Cores will be placed in individual plastic bags and stored at 2°C until they could be processed. The cores will be processed by wet sieving as described by Doane et al. (1987), and cocoons, larvae, and pupae counted. The larvae will be dissected to determine if they are parasitized.

Reference: Doane, J.F., O. Olfert & M.K. Mukerji. 1986. Extraction precision of sieving and brine floatation for removal of wheat midge, *Sitodiplosis mosellana* (Diptera: Cecidomyiidae), cocoons and larvae from soil. J. Economic Entomology 80: 268-271.

Economic Thresholds:

To maintain optimum grade: 1 adult midge per 8 to 10 wheat heads during the susceptible stage.

For yield only: 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled.

Inspect the developing kernels for the presence of larvae and the larval damage.