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Leafminers in sugarbeets

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▲ **Figure 1. Adult fly of beet leafminer.**

The beet leafminer *(Pegomya betae)* and spinach leafminer *(Pegomya hyoscyami)* sporadically infest sugarbeets in northern production areas of North America, including the Red River Valley. Pockets of damaging infestations developed in the central and southern valley factory districts from mid- to late-June of the 2001 growing season. Since then, leafminers have been observed at varying levels in sugarbeet fields throughout the production area from the Fargo, N.D./Moorhead, Minn., vicinity to as far north as Cavalier, N.D.

Description and Life History

Beet and spinach leafminers are similar in appearance at each life stage. Adults are small (0.25 inch long), clear-winged flies with dark gray to greenish gray bodies. They look like small hunchbacked house flies with numerous hairlike spines and finer-textured hairs on their backs. They hold their wings above their backs while at rest (Figure 1).

Beet and spinach leafminers also are very similar in their biology, life cycles and the damage they cause in sugarbeets. Both species overwinter as pupae in the soil and emerge as adults in late May to early June. Mating typically occurs four to seven days after adult emergence. Females lay tiny (0.04 inch long) white cigar-shaped eggs, often in neatly arranged rows in groups of two to 10, on the undersides of sugarbeet leaves (Figure 2).

Most of the leafminer egg laying that causes economic concern for sugarbeet production typically occurs during the first two weeks of June. Eggs hatch into tiny (0.03 inch long) larvae four to 10 days after being deposited. The timing of their hatching depends on prevailing air temperatures. Larvae are legless maggots and initially are translucent white. They quickly burrow into the leaf surface from which they hatched and gradually become pale to lime green as they feed on host plant tissues (Figure 3).

Feeding continues until the larvae are fully grown (0.3 to 0.38 inch long). They then molt into pupae and drop to the soil immediately below the plant canopy. Pupae are brown and have a somewhat hardened outer covering. They molt once more and emerge as adults. This begins another generation. Leafminers can produce up to three generations per year in the Red River Valley, although first-generation larvae are more likely to cause economic damage than later generations. This is may be due to plants being smaller and more vulnerable to attack when first-generation larvae are causing mining injury. Also, predators and parasites probably build up later in the season and help keep leafminer populations at subeconomic levels.

▲ **Figure 2. Leafminer eggs on leaf.**

◀ **Figure 3. Full-grown leafminer larva and mining damage.**

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Plant Injury and Symptoms

Leafminer feeding injury first appears as individual, bleached light green to white mines that result from young larvae burrowing tiny tunnels into the mesophyll zone between upper and lower surfaces of leaves. The winding mines expand as larvae grow and may merge with prolonged feeding. Older larvae continually feeding in a concentrated area leads to the development of larger tan to dark brown necrotic leaf blotches (Figure 4). Extensive mining damage on multiple leaves can inhibit the plant's photosynthetic activity and reduce yield.

◀ Figure 4. Leafminer pupa and necrotic blotch on sugarbeet leaf.

Management

Cultural Control: Destruction of alternate weed hosts, including common lambsquarters, redroot pigweed and other related *Amaranthus* species, may reduce the likelihood and severity of leafminer problems in sugarbeets.

Chemical Control: Although chemical control of leafminers rarely is necessary in the Red River Valley growing area, foliar insecticides are effective management tools if applied within a few days of the first appearance of mines or before most eggs hatch. Applying insecticide shortly after most larvae have tunneled into leaves also can achieve favorable performance. Planting-time application of systemic soil insecticides, a common practice used by growers for protection from soil insect pests, probably provides incidental control of early season leafminer infestations. Experts do not recommend this practice for leafminer management because economically damaging infestations are rare and the insects can be controlled easily with a curative foliar insecticide treatment.

Insecticide products without specific labeling for leafminer control or suppression in sugarbeets can be applied to manage these insects as long as they are *registered for foliar application to the crop.* However, manufacturers cannot be held liable for losses or unsatisfactory performance associated with control failures if the label does not explicitly offer leafminer control in sugarbeets.

Damaging leafminer infestations can coincide with the need for postemergence control of weeds in sugarbeets. Tank-mixing the insecticide for leafminer control with herbicides for weed management is an attractive option in this scenario because it saves time and input costs associated with an additional pass across the field. Combining an oil-based insecticide with a conventional rate of a postemergence herbicide can result in considerable crop injury and yield reductions in sugarbeets, especially if the crop is at an early (seedling to four-leaf) stage of development. Microrate herbicide combinations will be safer to tank-mix with oil-based foliar insecticides for application to younger sugarbeet fields. Six-leaf and older beets should be tolerant to tank mixtures that include herbicides at conventional rates.

Scouting: Scouting is an important practice because leafminer infestation levels can vary within and among fields. Early detection of a leafminer infestation will increase the likelihood of successful control. Mines and eggs are visible readily with the unaided eye. To see leafminer larvae and pupae inside leaf layers easily, hold the leaf toward the sun. To scout a field, sample several sets of 10 plants each in several representative areas within a field. The more samples taken, the more reliable the estimate will be. Sampling in a manner that represents the whole field, and not just field edges, is important.

Treatment threshold: An insecticide application may be justified if the combined number of eggs and live larvae exceeds the square of the number of true leaves on plants. For example, a field with most plants in the four-leaf stage would need to average more than 16 eggs and larvae per plant before the insecticide treatment would be necessary.

Photo credits: Deleplanque & Cie© (Figs. 1 & 2) and M. Boetel (Figs. 3 & 4).

Reference: Gratwick, Marion (ed.). 1992. Crop Pests in the U.K. pp. 233-236. In Collected Editions of MAFF Leaflets. Chapman and Hall, London.

For more information on this and other topics, see: www.ag.ndsu.edu

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