Leafminer Pests of Greenhouse Crops

Leafminer larvae damage crops by mining between the upper and lower leaf surfaces. Leafminers can create either winding or serpentine leaf mines or blotch type leaf mines.

Figure 1 & 2: Linear winding or serpentine mines (on left) compared to blotch type mines in the on the right. Photos by L. Pundt

Small flies in the family Agromyzidae are common insect pests of greenhouse crops and herbaceous perennials. The American serpentine leafminer (*Liriomyza trifolii)*, caused serious problems in the greenhouse cut floral mum industry in the 1980's because it was so difficult to control with overuse of certain insecticides resulting in resistance developing.

Leafminer species are often host specific. (Other leafminer species reported include the serpentine leafminer (*Liriomyza brassicae*), pea leafminer (*Liriomyza huidobrensis*) and the vegetable leafminer (*Liromyza sativae*).

Leafminer feeding damage is generally aesthetic, and plants are rarely killed. Damage may be more severe on seedlings and young plugs. If severe, it can affect the salability of plants.

Identification, Biology and Life Cycle

American serpentine leafminer adults resemble small houseflies and are 1/4-inch-long with shiny black bodies with yellow markings on their abdomen. (This helps distinguish leafminer adults from shore fly adults.)

Adult females pierce young leaves with their ovipositor (egg-laying structure), and feed on the liquid that exudes from this wounded leaf tissue. Females insert their eggs into leaves. The small larvae are typically bright yellow to brown. As larvae feed within the leaf tissues, they create serpentine or winding mines.


Figure 3 & 4: Leafminer adults and serpentine or winding leaf mine. Photos by L. Pundt.

In general, leafminer females lay approximately 100 eggs during their 2 to 3-week lifespan. Eggs hatch in 5 to 6 days, and larvae feed beneath the leaf cuticle for about two weeks. The final larval instar creates an opening in the leaf and then falls to the ground. Larvae burrow into the growing medium or soil under the benches to pupate. Leafminers need complete darkness to pupate. Pupae are brown, and adults emerge within a two-week period. The length of the life cycle depends on the leafminer species, host plant and temperature. For example, it takes 64 days to complete the life cycle at 59°F but only 14 days at 95°F. There can be multiple generations each growing season.

Scouting

Inspect incoming plants for signs of leafminer activity. When visually inspecting plants, look for any egg-laying punctures, which appear as white spots on the tops of leaves.

Use yellow sticky cards to monitor leafminer adult populations, especially in susceptible crops such as chrysanthemum, Gerbera daisy, asters, and other members of the composite family.

Adults may be observed walking on plant leaves and flowers. Yellow markings on their bodies are helpful to distinguish certain species of leafminer adults from shore fly adults.

Cultural Controls

Avoid over fertilizing plants, particularly with nitrogen. Over fertilized plants are more attractive to adult females for egg laying. Remove weeds, plant debris and infested leaves or highly infested plants before leafminers pupate. Hopper tape may be used to mass trap adults, if no winged biological control agents are being used in the greenhouse.

Biological Control

Commercially available biological control agents for leafminers include the parasitic wasps, *Diglyphus isaea* and *Dacnusa sibirica* for suppression of serpentine and related leafminers.

Diglyphus isaea is a small (1/25 to 1/11 inch or 1.0 to 2.3 mm long) black wasp with short antennae. It is an ectoparasitoid; females paralyze the host before laying one or more eggs next to the leafminer larvae. Adult females attack second instar leafminer larvae within the leaf mines. It also hosts feeds on host fluids of the larvae. This small parasitic wasp works best at high temperatures (above 68◦ F) and when pest populations are high.

When scouting, look for short mines with the dead leafminer larvae inside the mines. Look for signs of parasitism: round holes in the leaf mine where the parasitic wasp adults have emerged

Dacnusa sibirica is a small (1/11 to 1/9-inch (2.5 to 3.0 mm long) braconid wasp with long, extended antennae. It is an endoparasitoid; females lay eggs directly into leafminer larvae. This wasp uses odors emitted from leafminer droppings or frass to locate larvae within damaged plant tissue. *Dacnusa* is better adapted to lower temperatures (60° F), short days, and lower light levels than *Diglyphus*.

Both wasps are best used preventively and have been used in long term crops such as cut flowers. Release the adult parasitic wasps in the morning or evening. Apply weekly. Consult with your supplier for release rates. Remove yellow sticky cards or tape before making releases. Replace the cards 3 to 4 days after making releases. *Diglyphus isaea* has been used in greenhouse grown chrysanthemums and gerbera daisy.

Chemical Controls

Using insecticides to control leafminer populations may be difficult because several species have developed resistance to insecticides. Applications of pyrethroid-based insecticides may be required every 3–4 days to kill adults as they emerge from pupae in the growing medium. Apply insecticides in the morning, when females are actively laying eggs, for the wet sprays may disrupt their ability to deposit eggs in leaf tissue. Several pyrethroid-based insecticides have repellent properties that may deter adult females from laying eggs, minimizing damage to plant leaves. Insecticides with translaminar properties, including several insect growth regulators, may also be effective in killing the larvae within leaf mines.

See the New England Vegetable Management Guide for information on spinach and beet leafminers on chard, beet and spinach transplants.

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References

Capinera, J.L. 2017. University of Florida Featured Creatures: American serpentine leafminer. EENY- 254. http://entnemdept.ufl.edu/creatures/veg/leaf/a_serpentine_leafminer.htm

Cloyd, R. 2012. Leafminers. Greenhouse Management. November 2012.

Cranshaw, W. and D. Shetlar. 2018. Garden Insects of North America. The Ultimate Guide to Backyard Bugs. 2nd edition. Princeton University Press, Princeton, N.J. 704 pp.

Frank, S. D. 2015. The low-down on leafminers. Greenhouse Management. https://www.greenhousemag.com/article/the-low-down-on-leafminers/

Jandricic, S. 2016. Leafminer Control in Ontario's Greenhouse Crops: What's working? https://onfloriculture.wordpress.com/2016/09/15/leafminer-in-fall-crops-what-you-can-do-about-it/

Li, J., and D. Seal, 2018. Parasitoids of dipteran leafminers. University of Florida Featured Creatures. http://entnemdept.ufl.edu/creatures/beneficial/wasps/diglyphus.htm

Murphy, G., and G. Ferguson. 2014. Leafminers Attacking Greenhouse Crops. OMAFRA Fact sheet. Updated 2022. https://www.ontario.ca/page/leafminers-greenhouse-crops