

HOW TO CONTROL

Citrus

WFA

Leafminers

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The citrus leafminer, *Phyllocnistis citrella*, was first documented in Dade County, Florida, in 1993 and has since spread to Georgia and states along the Gulf of Mexico. Leafminer damage to foliage can stunt the growth of young trees and make trees more susceptible to citrus canker where the pathogen is present. Mature trees can better tolerate the damage although heavy infestations may reduce production.

Adult citrus leafminers (Figure 1) are small, silvery moths with a wingspan of 4 millimeters. The wings have several black and tan spots with a small black dot on the wingtips. The adults are seldom seen and are active in the mornings and evenings. Female moths lay eggs singly on the underside of new foliage. When the egg hatches, the larvae (Figure 2) enter the leaf and meander through the leaf causing damage and malformed foliage (Figure 3). The larvae then pupate before the adult moth emerges. The adults only live a few days. The life cycle can take from 13 to 52 days depending on conditions. In Florida the life cycle is about 21 days, and populations peak in summer and early fall. In southern Georgia and northern Florida the life cycle is interrupted by winter. The leaf damage from the larvae is usually the first indication of their presence. However, pheromone-baited traps can be deployed beforehand to assess the presence of leafminers before damage appears. In southern Georgia and northern Florida, the spring foliage flush is not significantly attacked, but flushes from May until fall may be damaged.

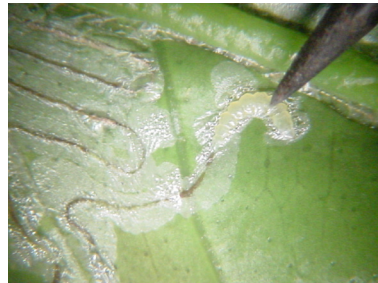
Figure 1



The adult citrus leafminer is a small, silvery moth with a wingspan of 4 millimeters.

Photo: Jack Kelly Clark, University of California, Statewide IPM Program

Figure 2



When a leafminer egg hatches, the larva enters the leaf.

Photo: Jake Price, UGA Extension, Lowndes County

Figure 3



When the larva meanders through the leaf, it causes damage and malformed foliage.

Photo: Jake Price, UGA Extension, Lowndes County

CHEMICAL CONTROL:

Soil drench (young trees less than four years old)—Leafminers can be tough to control because they are inside the leaf. Soil-applied imidacloprid products (group 4a) such as Admire Pro 4.6F, Admire 2F, Alias 4F, Alias 2F, or numerous generics are the best controls for preventing leafminer damage and have minimal effects on natural predators. Verimark, which contains cyantraniliprole (group 28), can also be used as a drench. Rotating pesticide groups is recommended. In general, the best time to apply imidacloprid or cyantraniliprole is after bloom and prior to the second growth flush, which usually occurs in May. Avoid spraying surrounding weeds that may have a different flowering time. Because bees can be exposed to imidacloprid through nectar and pollen, be sure to apply to young trees after bloom. Apply soil drenches to the base of the tree to provide up to two months of control. Injection through irrigation will be less effective if the material is spread beyond the root zone.

Foliar sprays (mature trees)—If needed, apply follow up foliar applications of products such as methoxyfenozide (Intrepid 2F), spinetoram (Delegate), diflubenzuron (Micromite), or abamectin (Agri-Mek). These work best if mixed with petroleum oils. Foliar sprays of imidacloprid may also be used before or after bloom. Avoid applications of malathion, pyrethroids, and carbaryl as they will kill beneficial insects that can result in a flare up of mites, scales, aphids, and whiteflies. Avoid spraying neonicotinoids (imidacloprid) if it has been applied as a soil drench.

NONINSECTICIDAL CONTROL:

Mating disruption: A system based on mating disruption has been developed for citrus leafminer control. The system works by emitting high quantities of sexual pheromones that disrupt mating and the males' ability to find females. Monitoring leafminers is important to develop a program of mating disruption. A product called "SPLAT-CLM" that releases a high quantity of pheromones is commercially available and can be applied on citrus. A reduction in mating causes a reduction of fertilized eggs and results in fewer larvae.

Attract and kill: Attract-and-kill systems do not eliminate the need for pesticides, but using these systems lowers necessary quantities and minimizes the risk of drift. Attract and kill for citrus leafminer (MalEx™) uses the sexual pheromone as an attractant and imidacloprid to kill males and prevent further mating.

HOME CONTROL:

Use products containing imidacloprid, such as Bayer Advanced Fruit, Citrus, and Vegetable Insect Control, as a drench or foliar spray. Foliar sprays of natural materials such as azadirachtin (Safer BioNEEM) or spinosad (Green Light Insect Spray) have some efficacy but will need to be repeated. Applying horticultural oils 10 to 14 days apart as soon as new shoots begin to develop may help reduce leafminers. Stop use when the leaves harden off. Do not apply when temperatures rise to above 85 degrees Fahrenheit to prevent phytotoxicity. None of these materials will harm beneficial insects.

For the latest information on controls and biology:

Grafton-Cardwell, Elizabeth E., Godfrey, Kris E., Headrick, David H., Mauk, Peggy A., & Peña, Jorge E. Citrus Leafminer and Citrus Peelminer. University of California, Riverside. Retrieved from <http://anrcatalog.ucdavis.edu/pdf/8321.pdf>

Heppner, J. B. Citrus leafminer, *Phyllocnistis citrella* Stainton, (Insecta: Lepidoptera: Phyllocnistinae). Retrieved from http://entnemdept.ufl.edu/creatures/citrus/citrus_leafminer.htm

Sprague D., & Martini, X. (2018) Understanding flush cycles for citrus leafminer management. Panhandle AG e-news. Retrieved from <http://nwdistrict.ifas.ufl.edu/phag/2018/06/29/understanding-flush-cycles-for-citrus-leafminer-management>

Stansly, P. A., Qureshi, J. A., Stelinski, L. L., & Rogers, M. E. 2017-2018 Florida Citrus Production Guide: Asian Citrus Psyllid and Citrus Leafminer. Retrieved from <http://www.crec.ifas.ufl.edu/extension/pest/PDF/2017/ACP%20and%20Leafminer.pdf>

Carefully scout new foliage for Asian citrus psyllids (ACP) and nymphs. Refer to the University of Florida Extension publication #EENY-033 at <http://edis.ifas.ufl.edu/in160> to learn about this pest. If found or located nearby, spray schedules should be targeted toward ACP control rather than citrus leafminers.

References

- Vanaclocha, P., Jones, M. M., Monzó, C., & Stansly, P. A. (2016). Placement density and longevity of pheromone traps for monitoring of the citrus leafminer (Lepidoptera: Gracillariidae). *Florida Entomologist*, 99.2: 196-202.
- Stelinski, L. L., Lapointe, S. L., & Meyer, W. L. (2010). Season-long mating disruption of citrus leafminer, *Phyllocnistis citrella* Stainton, with an emulsified wax formulation of pheromone. *Journal of Applied Entomology* 134.6: 512-520.
- Lapointe, S. L., et al. (2015). Disruption of the leafminer *Phyllocnistis citrella* (Lepidoptera: Gracillariidae) in citrus: effect of blend and placement height, longevity of disruption and emission profile of a new dispenser. *Florida Entomologist* 98.2: 742-748.

Always use products according to label directions. Other control options may be available. Refer to the latest edition of the Florida Citrus Production Guide.

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