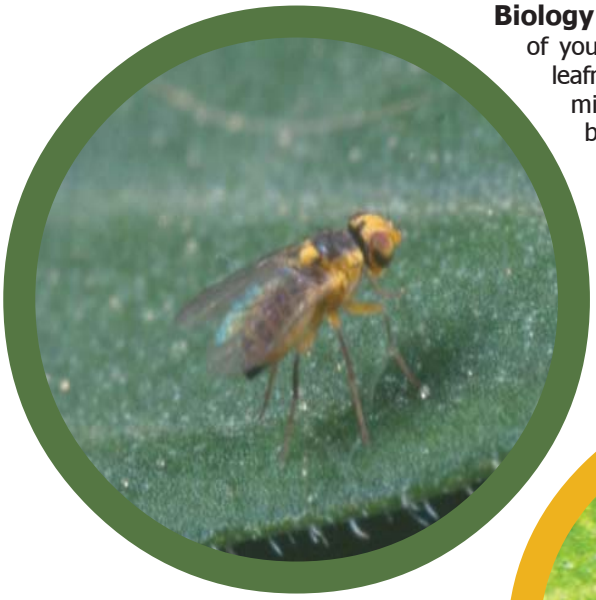
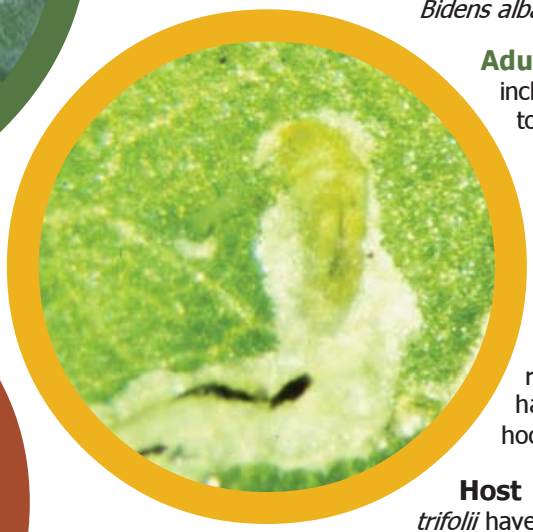
Vegetable Leafminer: *Liriomyza sativae*
American Serpentine Leafminer: *Liriomyza trifolii*



Biology & Lifecycle: Female adults insert eggs individually in the upper surfaces of young leaves. Hatching larvae feed within the leaves, forming serpentine leafmines **(Figures 2 & 3)**. Mature larvae exit through a slit at the end of the mines and drop to the soil or plastic mulch surface, where they form orange-brown, barrel-shaped pupariae. Adults emerge about 9 days later. Females also use their ovipositors to make larger holes **(Figure 4)** and feed on the exuding cell contents. The egg to adult period lasts about 2-3 weeks at temperatures of about 80°F. *L. trifolii* predominates in Florida.

Environmental Factors: Leafminers are present year round, but are usually more abundant March-June. The insect over summers on volunteer crop plants and weeds, especially American black nightshade, *Solanum americanum* and Spanish needles, *Bidens alba*.



Adult: Adults are small flies about 1/8 inch in length and are black on the top and yellow on the head, sides and undersides **(Figure 1)**. The upper surface of the black thorax of *L. sativae* adults is shiny while that of *L. trifolii* is matte. Adults occur on the upper surfaces of leaves on the tops of plants.

Larvae: Yellowish maggots that reside inside the leaves and that have black, sickle-shaped mouth hooks for feeding **(Figure 2)**.

Host range: Both *L. sativae* and *L. trifolii* have wide host ranges including crop hosts and weeds. Vegetables that are attacked include bean, celery, eggplant, pepper, potato, squash and tomato. Tomato is usually more heavily attacked than pepper in Florida.

Damage: While feeding punctures (also called stippling) can be unsightly, economic damage is inflicted through leafmining **(Figure 4)**. Heavy leafmining can reduce photosynthesis and cause leaf desiccation and leaf drop, which can result in sun scalding of fruit **(Figure 3)**. Leafmines also can serve as entry points for bacterial and fungal diseases.

Figure 1. Adult leafminer. Photograph by: Jeff Brushwein.

Figure 2. Leafminer larvae on a tomato leaf. Photograph by: David Schuster.

Figure 3. Tomato damage from leafminer feeding. Photograph by: David Schuster.

Actual Size:

Adult
1/8 inch

Larvae
<1/8 inch

Monitoring:

Traps: Adults are attracted to yellow and commercially available yellow sticky traps can be used to monitor changes in leafminer adult densities. Traps should be placed at the middle to lower portions of the plants and should be checked twice a week.

Scouting: Fresh stippling indicates adult leafminer presence. The number of leafmines with living larvae is counted either on the whole plant or the terminal three leaflets of the third or seventh leaf from the top of the plant (depending upon the size of plants). The number of leafmines with dead larvae can be used to estimate the efficacy of insecticide treatments or the success of biological control.

Action Thresholds: 0.7 larva/plant or three leaflets for timing insecticidal sprays

Prepared by: Dr. David Schuster

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CULTURAL CONTROLS:

Start Clean: Transplants should be free of eggs or larvae.

Field Manipulations: Weeds and senescent crops can be reservoirs of migrating adults. Therefore, weeds should be destroyed and crop residues plowed deeply.

New fields should not be planted adjacent to old fields.

High levels of nitrogen fertilization can increase levels of leafmining.

NATURAL ENEMIES:

- At least 14 species of parasitic wasps have been observed attacking leafminer larvae in Florida. If parasites are not disrupted with pesticides, larval parasitism can reach nearly 100%. However, growers sometimes object to the amount of leafmining that results even though economic damage usually has not occurred.
- Parasite larvae feed either on or within leafminer larvae and can be viewed by excising infested leaflets, holding them up to the sun and viewing them with a 15X hand lens.
- Parasitism of leafminer larvae in American black nightshade and Spanish needles also can reach 100%, but the parasite species in weeds are not the ones most abundant in tomato crops.
- Natural enemies can be conserved by avoiding broad spectrum pyrethroid, organophosphate and carbamate insecticides. Timed insecticide applications and applications of new, reduced risk insecticides for other pests can also enhance biological control.

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CHEMICAL CONTROLS:

- Insecticides should be applied when the action threshold is reached.
- Insecticides should be timed to control younger larvae when they are easier to control. Agri-Mek® (abamectin) also can be applied to control adults and reduce oviposition.

RESISTANCE MANAGEMENT:

- The efficacy of pyrethroid insecticides (many products, 3) has declined to very low levels in research plots in Florida. Resistance to Trigard® (cyromazine, 17) and Agri-Mek (avermectins, 6) has been documented in Florida but has been managed by rotation of chemicals of different classes.
- Applying insecticides based upon the threshold and in conjunction with biological control will reduce the number of applications.

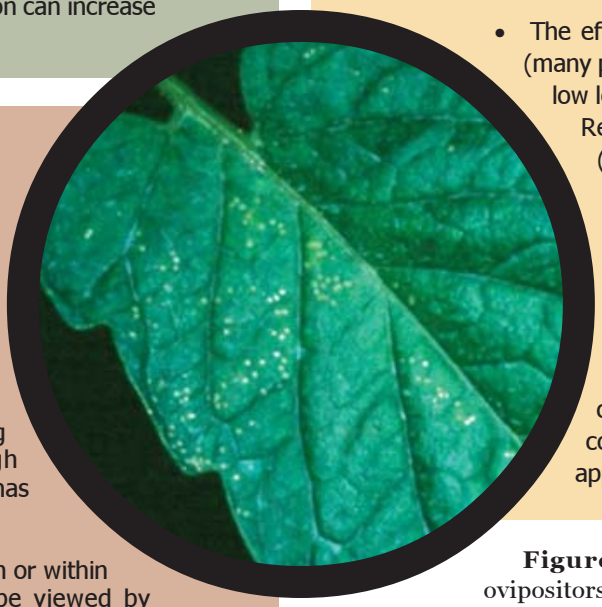

Figure 4. Females use their ovipositors to make large holes and feed on the exuding cell contents. Photograph by: Dave Schuster.

References:

Capinera, J.L. 2001. Vegetable leafminer, *Liriomyza sativae* Blanchard (Insecta: Diptera: Agromyzidae) UF/IFAS Pub. EENY-255, http://creatures.ifas.ufl.edu/veg/leaf/vegetable_leafminer.htm.

Capinera, J.L. 2001. American serpentine leafminer, *Liriomyza trifolii* (Burgess)(Insecta: Diptera: Agromyzidae) UF/IFAS Pub. EENY-254 http://creatures.ifas.ufl.edu/veg/leaf/a_serpentine_leafminer.htm.

Schuster, D.J., J.E. Funderburk and P.A. Stansly. 1996. IPM in tomatoes, pp. 387-411. *In* D. Rosen, F.D. Bennett and J.L. Capinera [eds.], Pest Management in the Subtropics, Integrated Pest Management – A Florida Perspective. Intercept, Andover, Hants UK.