



Western Flower Thrips: *Frankliniella occidentalis*

Biology & Lifecycle: Thrips insert individual eggs into the developing flower buds and fruit pods of pepper and tomato. The eggs hatch in about 6 days. Larval development in the flowers and small fruits requires 6 to 8 days depending on temperature. The adults live about 3 weeks and feed primarily on flower tissues and pollen. Pollen-feeding increases fecundity 2 to 4 fold.

Environmental Factors: Reproduction occurs year-round. Populations are greatest from April to June in northern Florida and from February to May in southern Florida. Generational cycles take about 20 days in hot weather and as long as 60 days in the winter in northern Florida.

Adult: Very small ($\frac{1}{10}$ inch), light yellow with fringe wings and 8-segmented antennae (**Figure 1**). Adults aggregate in the flowers, and are rarely found on the terminal, unexpanded leaves.

Larvae: Minute and white, both larval instars aggregate in the flowers and small fruit (**Figure 2**). Pre-pupae move to the soil surface and pupate beneath the soil surface under the plant.

Host range: Reproduction occurs on peppers (*Capsicum spp.*), tomatoes and a wide range of crops, weeds and native plant species. Adults feed on the flowers of plant species that are not reproductive hosts as well.

Economic Importance: A key pest of tomato, pepper and other crops in northern Florida and is less important in central and southern Florida. Cosmetic damage on fruits from feeding (**Figure 4**) is an economic problem under some conditions in all areas of the state.

Damage: Adult females lay individual eggs on the small fruit inside of the flower resulting in halo spots. Feeding by the adults and larvae can result in flecking on the surface of fruit and under heavy infestations, fruit deformity. *F. occidentalis* is the primary vector of *Tomato spotted wilt virus* (TSWV) which renders fruit unmarketable (**Figure 3**).

Monitoring:

Scouting: The total number of thrips of all species can be estimated in the field by beating individual flowers onto a white plastic board. Thrips must be placed in vials of alcohol and examined at 40X magnification using a stereoscope in order to determine western flower thrips from the other flower thrips species.

Action Thresholds:

In tomato, > 0.5 adults per flower. If tomato spotted wilt incidence exceeds 5% in the field, once per week applications of an insecticide for control of the larvae reduces spread of the disease in susceptible cultivars.

In pepper, 2 to 3 larvae or adults per flower is tolerable. A reduced-risk insecticide that does not suppress natural populations of predatory minute pirate bugs can be used to suppress adults and larvae.

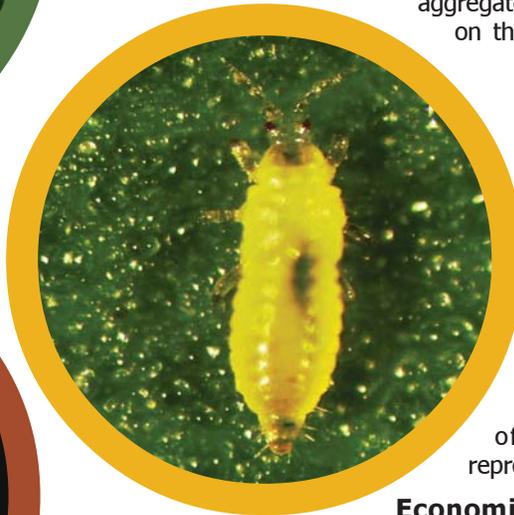


Figure 1. Western flower thrips adult female. Photograph by: Joe Funderburk.

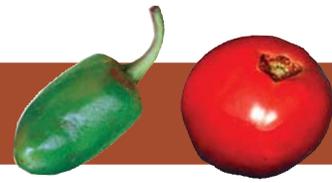
Figure 2. Western flower thrips larva. Photograph by: Joe Funderburk.

Figure 3. Halo spots on fruit due to egg laying into the tomato. Photograph by: David Schuster.

Actual Size:



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CULTURAL CONTROLS:

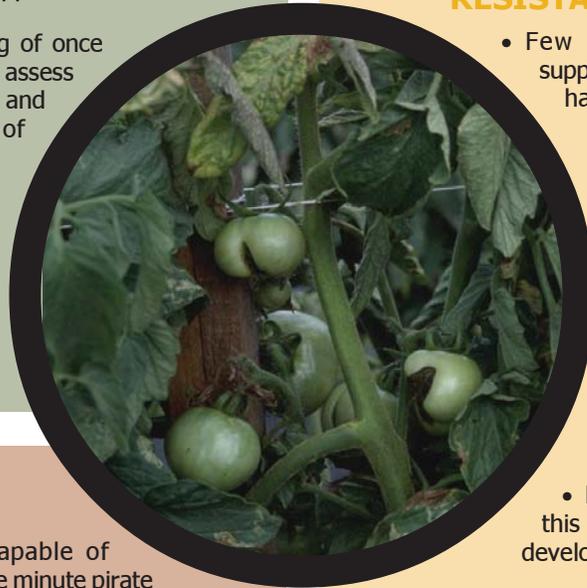
Ultraviolet-Reflective Mulch: UV-reflective (aluminum) mulch reduces the introduction of western flower thrips adults into production fields. This is the most effective tactic to control primary spread of TSWV (i.e. thrips acquire the virus when developing on plant hosts outside the field).

Do Not Over-Fertilize: Over-fertilization with nitrogen increases the number of western flower thrips and the incidence of TSWV.

Resistant Cultivars: Cultivars resistant to TSWV are available for tomatoes and peppers.

Monitor: Frequent monitoring of once or twice weekly is needed to assess western flower thrips numbers and to determine the incidence of TSWV.

Distinguishing the adults from the Florida flower thrips (*F. bispinosa*) and the eastern flower thrips (*F. tritici*) is not possible using a hand lens.



NATURAL ENEMIES:

- The key natural enemy capable of suppressing populations is the minute pirate bug, *Orius insidiosus*. These predators naturally invade fields and management programs of pepper and other crops in Florida are designed to conserve its populations.
- No natural enemies are important in suppressing western flower thrips in tomato.

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CHEMICAL CONTROLS:

- Spray tomatoes when numbers of adults or larvae exceed the action threshold.
- Use reduced-risk insecticides to conserve minute pirate bug, *Orius insidiosus*, populations in pepper. Natural infestations typically control the *F. occidentalis* for most of the production season.
- During periods in the spring of intense infestations, reducing thrips numbers below the action threshold with insecticides is not possible.

RESISTANCE MANAGEMENT:

- Few insecticides are effective in suppressing *F. occidentalis*. Resistance has developed to many products including carbamate (1A), organophosphate (1B) and synthetic pyrethroid (3) insecticides. Resistance to neonicotinoid (4A) insecticides also is reported.
- Alternative cultural control and plant resistance tactics are the best options to control thrips and to avoid the development of resistance.
- Rotate chemical classes, although this does not guarantee against the development of insecticide resistance.

Figure 4. Tomato spotted wilt damage to tomatoes. Photograph by: David Schuster.

References:

- Funderburk, J. and J. Stavisky. 2004. Biology and economic importance of flower thrips. UF/IFAS Pub. ENY682, <http://edis.ifas.ufl.edu/IN415>.
- Momol, M.T., S.M. Olson, J.E. Funderburk, J. Stavisky and J.J. Marois. 2004. Integrated management of tomato spotted wilt on field-grown tomato. *Plant Disease* 88: 882-890.
- Reitz, S.R., E.L. Yearby, J.E. Funderburk, J. Stavisky, M.T. Momol and S.M. Olson. 2003. Integrated management tactics for *Frankliniella* thrips (Thysanoptera: Thripidae) in field-grown pepper. *Journal of Economic Entomology* 96: 1201-1214.