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GROWER FACT SHEET: Western Flower Thrips Management Guide

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INTRODUCTION

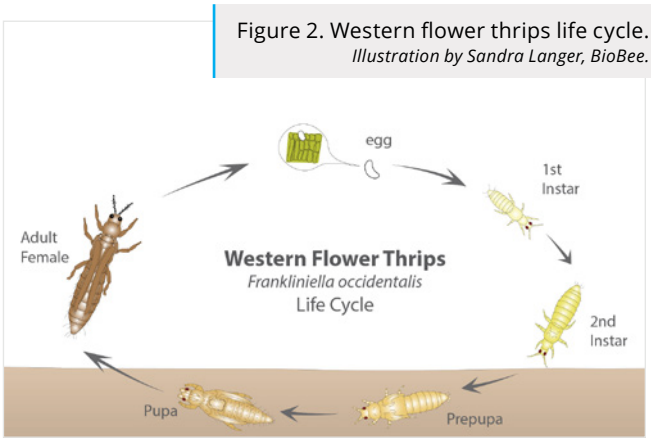
Western flower thrips (*Frankliniella occidentalis*) are native to western North America but have become a global pest. They are found in a wide range of habitats, including greenhouses, nurseries, and landscapes. They thrive in warm, dry conditions and feed on a wide variety of plants. They can cause substantial economic losses due to the damage they inflict and their ability to carry and transmit plant viruses.

Figure 1. Adult western flower thrips.
Jack T. Reed, Mississippi State University, Bugwood.org

IDENTIFICATION OF WESTERN FLOWER THRIPS

Adult western flower thrips are tiny, slender insects and are typically less than 2 millimeters in length. They range in color from pale yellow to brown and have fringed wings (Fig. 1). The larval stages of the insect are smaller and lack wings. Both larvae and adults feed on plant tissue with their rasping-sucking mouthparts.

Figure 2. Western flower thrips life cycle.
Illustration by Sandra Langer, BioBee.



LIFE CYCLE

Western flower thrips have a high reproductive rate, and their life cycle can be continuous in a greenhouse environment. They develop in six stages: egg, two larval instars, prepupa, pupa, and finally, the adult insect (Fig. 2). The eggs are small and oval and inserted in leaves, flower petals, and soft stems. The first two larval stages feed on plant tissues and are opaque or yellowish to orange-yellow, with a large head and bright-red eyes. Western flower thrips usually pupate in the ground. The prepupa and pupa instars can be recognized by their developing wing buds. Compared to the prepupa, the pupa has longer, more developed wing buds and longer antennae that are curved back over the head. The prepupal and pupal instars do not feed. In the adults, both pairs of wings are fringed and fully developed.

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Figure 3. The silvery appearance of thrips damage on verbena.
Chazz Hesselein, Alabama Cooperative Extension System, Bugwood.org

PLANT INJURY

Western flower thrips prefer to feed on developing plant tissues, such as growing tips and flower buds. Larvae and adults rupture the leaf surface with their rasping mouthparts and feed on plant juices. Feeding damage results in a silvery appearance of the leaf surface, which later turns brown (Fig. 3). The presence of dark fecal specks indicates a thrips occurrence. The vigor of the plant is reduced by the loss of chlorophyll. When infestations become serious, the leaves can shrivel. Adult thrips are attracted by flower odors. Once in flowers, they feed on pollen and on developing petals, causing blemishes that reduce the value of cut flowers. Some flower varieties and colors are more prone to damage than others.

Figure 4. Symptoms of impatiens necrotic spot virus (INSV) on coleus.
Elizabeth Bush, Virginia Polytechnic Institute and State University, Bugwood.org

Western flower thrips are also responsible for the transmission of numerous virus diseases to plants, the most important of which are tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV) (Figure 4), both affecting a wide range of ornamental crops (Fig. 5). Virus diseases are generally acquired by first-instar larvae feeding on infected leaf tissues. These larvae are unable to transmit the virus until they become adults. Later larval stages and adults are unable to acquire the virus, but infected adults can transmit the virus to fresh, uninfected plants, thus spreading the disease from plant to plant within the crop and into new crops.

Figure 5. Damage to a gerbera flower.
Whitney Cranshaw, Colorado State University, Bugwood.org

HOSTS

Western flower thrips have a wide range of hosts, including ornamental annuals, perennials, shrubs, and trees. They are also found in vegetable plants, fruit trees, and native plants.

MANAGEMENT PROGRAM

Scouting/Monitoring

Early detection of thrips in a crop depends on inspection and detection. Inspection of flowers is one of the simplest and fastest ways to check for the presence of thrips and their population. To determine the presence of thrips, place a sheet of white paper underneath a flower or infected branch. Gently shake the flower or branch to dislodge the insects onto the white paper. Inspect the thrips more closely on the paper with a magnifier.

Interpreting Sticky Card Numbers

Placing blue sticky cards throughout the crop is a great tool for monitoring populations. The number of thrips observed on sticky cards may not necessarily reflect actual thrip damage to a crop or the growth of a thrips population. A sudden surge in thrips numbers on sticky cards could be the result of thrips migrating from outdoors into the greenhouse. During spring and summer, when outdoor vegetation is disturbed, such as mowing grass, cutting down weeds, and harvesting crops, thrips are disturbed and migrate in huge numbers, particularly during windy days, into greenhouses.

Cultural Control

Start with quality young plants/liners, and maintain a healthy crop throughout the production cycle. Stressed plants are vulnerable to thrips infestations. Provide proper spacing, and space plants on time. Clean up old crop residue and manage weeds in the greenhouse, nursery, and landscape, as these can be sources of western flower thrips.

Mechanical Control

Quarantine new plants and liners when received into the greenhouse/nursery and monitor for any thrips activity. Screening enclosures can help exclude thrips from entering the growing area. Installing yellow or blue sticky roller tape can be used in the greenhouse to passively capture thrips and monitor populations.

Biological Control

Biological control agents (BCA) are effective tools in a western flower thrips management program. There are several predators and pathogens that can be released preventively to regulate populations. Disrupting natural enemies with insecticides is often a cause of thrips outbreaks. Most of the biological control agents (Table 1) are commercially available. Companies that produce beneficial insects have side effects/compatibility databases to guide the use of insecticides if biological control agents are present.

Table 1. BCAs that can be used as part of the IPM program to control western flower thrips.

Biological Control Agent	Control Type
Amblyseius montdorensis	Predatory mite
Hypoaspis miles/ Stratiolaelaps scimitus	Predatory mite (soil-dwelling)
Atheta coriaria/Dalotia coriaria (Rove Beetle)	Predator
Amblyseius cucumeris	Predatory mite
Orius spp. (Minute Pirate Bug)	Predator
Amblyseius swirskii	Predatory mite
Steinernema feltiae	Infective juvenile nematodes
Amblydromalus limonicus	Predatory mite

Chemical Control

Pesticide Application and Safety

Whether spot spraying or treating the entire crop, thorough coverage of both lower and upper leaves is essential to reduce western flower thrips populations. The use of broad-spectrum insecticides should be limited because they can interfere with several natural enemies that help to manage pest populations. Insecticides of different modes of action (MOA) can be effective in managing thrips (Table 2). Monitor the plants for live thrips 7 to 10 days after the last spray to determine the need for an additional application. Read and follow all label instructions for proper use. Consult with local agricultural/product agents about the pesticide labels for targeted life stages, product rates, application information, and restrictions.

Resistance Management

- Rotate products with different MOA to limit pesticide resistance.
- Make no more than two sequential applications of any group before rotating to another MOA.
- To ensure that every application is effective, use the right dose, adequate spray volume, and ample spray coverage.

Table 2. List of insecticides as part of a western flower thrips management program.		
Active Ingredient	Trade Name	IRAC Mode of Action Group
Abamectin	Avid	6
Acephate	Orthene/Precise	1B
Acetamiprid	TriStar	4A
Azadirachtin	Azatin/Ornazin/Molt-X	
Beauveria bassiana Strain GHA	BotaniGard	20D
Beauveria bassiana Strain PPRI 5339	Velifer	
Bifenazate + Abamectin	Sirocco	20D + 6
Bifenthrin	Attain TR, Talstar	3A
Chlorfenapyr	Pylon	13
Chlorpyrifos	DuraGuard ME	1B
Cyantraniliprole	Mainspring	28
Cyclaniliprole	Sarisa	28
Cyclaniliprole + Flonicamid	Pradia	28 + 29
Cyfluthrin	Decathlon	3A
Cyfluthrin + Imidacloprid	Discus	3A + 4A
Fenoxycarb	Preclude	7B
Flonicamid	Aria	29
Isaria fumosorosea Strain FE 9901	NOFLY WP	
Kinoprene	Enstar	7A
Metarhizium brunneum Strain F52	Lalguard M52 OD (formerly Met52)	
Methiocarb	Mesurol	1A
Mineral Oil	Ultra-Pure Oil, SuffOil-X	Suffocation
Novaluron	Pedestal	15
Potassium salts of fatty acids	M-Pede	Desiccation
Pyrethrins	Pyreth-It/Pyrethrum	3A
Pyrethrins + Oil	Pycana	3 + suffocation
Pyridalyl	Overture	
Spinetoram + Sulfoxaflor	XXpire	5 + 4C
Spinosad	Conserve	5
Spirotetramat	Kontos	23
Tau-fluvalinate	Mavrik	3A
Thiamethoxam	Flagship	4A
Tolfenpyrad	Hachi-Hachi	21A