Western Flower Thrips Management in Ornamentals

Western flower thrips (WFT, Frankliniella occidentalis Pergande) has become a major pest in greenhouse and nursery grown ornamentals. Originating in western North America, it has spread across the US and to other countries around the world. WFT are difficult to detect because of their small size and tendency to hide in protected plant parts. Early signs are distorted terminals, deformed young leaves, stippled or scarred petals, buds, or leaves, and tiny greenish-black fecal specks on leaves or petals.

WFT are small (1-2 mm long), slender, soft-bodied insects that are yellow to light brown in color; adults have distinctive fringed wings. WFT can develop quickly, going from egg to adult in 1 to 2 weeks under greenhouse conditions. Adult WFT overwinter in plant debris, crevices, etc. Adult females insert eggs into plant tissue under the epidermis. Larvae and adults feed on flowers, buds, terminals, leaves, and fruit. They feed by rasping open plant cells and sucking up the cell contents. The damaged cells collapse, leaving silvery streaks or blotches. When mature, larvae drop to the soil to go through the prepupal and pupal stages, and finally return to the plants as adults. Adults can move long distances on air currents to find new food; adults and larvae can also be transported on transplants. Natural enemies such as minute pirate bugs (Orius spp.) and predatory mites (Amblyseius spp., Neoseilus spp., and Hypoaspis spp.) can provide significant control of WFT populations.

WFT damages a wide range of annual and perennial ornamentals. Feeding on flowers causes white or silvery streaks on dark-colored flowers and tan or brown streaks on light-colored flowers. Infested flowers may senesce prematurely and damaged flowers or leaf buds may abort. WFT feeding on young leaves causes puckered or twisted growth as the leaves expand. WFT vectors impatiens necrotic spot virus (INSV), a very serious disease that infects almost all greenhouse grown plants. INSV is also known as tomato spotted wilt virus (TSWV). Symptoms vary by plant species and with environmental conditions, but infected plants may show one or more of the following symptoms: concentric ringspots (initially yellow or purple, then turning brown or tan); brown, black, or white leaf spots; discoloration or necrosis of leaf veins or petioles; mosaic or zonal patterns, or yellow mottling on leaves; cupped leaves; brown or black cankers, or purple streaks on stems; elongated stems; death of young plants, death of terminal meristems, defoliation, or stunting of older plants. Many weed species are alternative hosts for both WFT and INSV.

WFT has already become resistant to several classes of insecticides. Having effective WFT insecticides in the future will depend on how well we manage the use of current insecticides to prevent resistance development. Repeated use of one mode of action (MOA) removes susceptible WFT from the population, leaving resistant WFT to reproduce and pass on resistance traits to their offspring. Ultimately, resistant WFT will dominate the population and product effectiveness will decrease. How quickly resistance develops is determined by “selection pressure,” and selection pressure depends mainly on the intensity of product use (rate, number, and frequency of applications).

Resistance management is up to you. The key to managing resistance is to reduce selection pressure by rotating between insecticides with different modes of action and reducing the number of insecticide applications. This means it may be necessary to use non-chemical control methods and rotate to insecticides that may not provide the highest levels of control. The choices you make about which products to use and how often to use them directly impacts selection pressure and determines whether resistance develops and how quickly it develops. If you encounter poor WFT control after an insecticide application, DO NOT simply spray the same product again at a higher rate or shorter spray interval and hope for better control! Determine if poor control resulted from application error, equipment failure, or unfavorable environmental conditions during or after application. If none of these occurred, contact your local agricultural adviser and the product manufacturer so that they can determine if your WFT population is becoming resistant.

Best Management Practices for Western Flower Thrips

In addition to using insecticides, proper cultural practices can minimize chances for initiation and build up of WFT infestations. WFT are able to survive between harvest or plant removal and the start of the next crop. Cultural controls are a primary defense against WFT infestation. Make greenhouse workers aware of this, so they will understand the importance of following these practices.

1. WFT feed on a large variety of plant species, keep production areas free of weeds, which can serve as hosts for WFT populations. Eliminate weeds from inside and outside the greenhouse, including areas underneath benches, behind vents, and in pots.
2. Maintain a clean, closely mowed 30 foot perimeter around fields and greenhouses or other structures to reduce pests that can develop in areas of rank weed growth.
3. WFT can migrate into greenhouses through side vents, ridge vents, sidewalls, and entryways. Covering openings to the greenhouse with fine screens (145 microns) can exclude most thrips.
4. Start with a WFT-free crop. Carefully inspect plants brought in to start a new crop to ensure that these are free of WFT and other pests. Keep plants in a holding area for 11 to 12 days so that plants can be inspected for pests.
5. Discard WFT-infested material. At the end of the growing cycle, remove all plants and plant debris from fields, greenhouses, or other growing areas. Clean greenhouses, hoophouses, or other structures thoroughly after each production cycle.
6. Remove all unsellable blooms from plants, these provide food and refuge for WFT.
7. Avoid wearing yellow, blue, or white clothing. These colors attract WFT and other insect pests which can be carried on clothing into the greenhouse from outside.
8. Rotate insecticides with different modes of action (are in different insecticide groups). See table below for possible rotation partners.
9. Use recommended label rates of insecticide. Consult your local extension agent, consultant, PCA, or Dow AgroSciences representative for proper recommendations.
10. Avoid sequential sprays of the same insecticide on sequential plantings. Use an area wide program approach to reduce the chances of continuous spraying of pests that move from one planting to the next.

Rotate Products Used for Western Flower Thrips Control

Spinosad (Conserve® insect control, Entrust® Naturalyte® insect control) has been very effective for controlling WFT. Based on its mode of action (MOA), spinosad is classified by the Insecticide Resistance Action Committee (IRAC) as a Group 5 insecticide.

In order for spinosad to remain effective against WFT, it is absolutely necessary to follow resistance management requirements listed on the product labels: Do not make more than two consecutive applications of Group 5 insecticides. If treatment is required after two applications of Group 5 insecticides, rotate to another class of effective insecticides for at least two applications. Alternative products for control of WFT are listed in the table below. These products may not be as effective as spinosad, but by using these in rotation with spinosad, you will prolong the effectiveness of all products against WFT. Do not rotate products that are in the same MOA group.

Make insecticide applications when larvae or adults are present; sprays will not reach eggs inside plant tissue or pupae in the soil at the base of the plants. Monitoring WFT populations with blue or yellow sticky traps will help time sprays for maximum control. The product suggestions in the table are based on the results of efficacy trials reported in Arthropod Management Tests, published by the Entomological Society of America. Other information in the tables comes from the product labels as reported by CDMS (www.cdms.net).

These suggestions are consistent with the resistance management recommendations developed by IRAC. Dow AgroSciences is a member of IRAC International and IRAC-US. For more information, visit www.irac-online.org.

Products	Active Ingredient	IRAC MOA Group	Rate (lb. ai. per 100 gal.)	Special Consideration
Avid	abamectin	6	0.009	Outdoor nursery and indoor greenhouse, suppression only
Dimethoate	dimethoate	1B	0.55	Outdoor nursery only
Dursban®	chlorpyrifos	1B	0.5	Outdoor nursery only
Mavrik	tau-fluvalinate	3	0.062 - 0.156	Outdoor nursery and indoor greenhouse
Mesurol	methiocarb	1A	0.375 - 0.75	Outdoor nursery and indoor greenhouse
Pedestal	novaluron	15	0.038 - 0.051	Outdoor nursery and indoor greenhouse
Preclude	fenoxycarb	7B	2 oz. can/3,000 sq. ft. - 6 oz. can/9,000 sq. ft.	Commercial greenhouses only
Pylon	chlorfenapyr	13	0.16 - 0.32	Commercial greenhouses only

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