Update on Thrips Management

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The western flower thrips (WFT), *Frankliniella occidentalis*, is of increasing concern to growers in Connecticut. Western flower thrips have spread throughout the industry on plugs, cuttings and small plants. WFT's small size and tendency to hide in enclosed places makes it difficult to detect the thrips before severe feeding damage is evident. Early thrips detection by using sticky cards is essential to limit their feeding damage and possible transmission of tomato spotted wilt virus (TSWV) to uninfected plants.

Thrips Damage

Thrips feed by piercing plant cells with their rasping mouth parts. Plant cells collapse, which results in deformed flowers and leaves. On expanded leaves, silvery, flecked areas and black "fecal" spots may be seen. Thrips feeding on greenhouse-grown tomato leaves causes brown lesions that may be easily confused with Septoria leaf spot. No black fruiting bodies (pycnidia) characteristic of Septoria will be seen on the thrips-damaged leaves.

Thrips and TSWV

WFT is the most efficient thrips vector of TSWV. Only the larval thrips can acquire the virus, and the winged adults are primarily responsible for viral transmission. TSWV persists in the adult thrips for their entire life, and the virus particles multiply in the thrips.

Life cycle of thrips

The life cycle of thrips from egg to adult is dependent upon temperature and varies between seven to 14 days at fluctuating temperatures (Table 1)

Table 1. Life cycle of adult thrips (Robb, 1988).

Stage	*Duration at temperatures between 68° to 98°F*
Egg	2-4 days
1st instar	1-2 days
2nd instar	2-4 days
Prepupal	1-2 days
Pupal	1-3 days
Adult	30-45 days

Overwintering

Recently, adult thrips have overwintered outdoors in Pennsylvania and in Canada. In Pennsylvania, researchers found adult WFTs in white clover flowers in nectarine orchards. This spring capture followed high population densities in the fall and a milder than normal winter in southern Pennsylvania. In Canada, adult western flower thrips have been found in the midwinter in ornamentals bordering greenhouses.

Table 2: Plant species found to be field susceptible to TSWV and supporting WFT oviposition.

Weed Species	*Number TSWV Positive/Number Tested*	*Symptoms*
Redroot pigweed	16/20	Necrotic local lesions, mild, systemic mottling
Mouse-ear chickweed	10/11	Mild, systemic mottling
Common chickweed	12/15	Mild, systemic mottling
Lambsquarters	15/17	Necrotic local lesions
Field bindweed	6/9	None or latent
Great burdock	8/11	None or latent
Chicory	12/16	Systemic mottling
Oxeye daisy	5/5	Systemic mottling
Bull thistle	9/13	None or latent
Joe-pye weed	5/5	Systemic mottling
Galinsoga	15/18	Systemic mottling
Pineapple weed	3/9	Systemic mottling
Nightshade	7/8	None or latent
Clearweed (*Pilea Pumila*)	5/6	None or latent
Verbena	3/6	Systemic mottling

The potential for thrips to overwinter may result in the possible spread of TSWV to perennial weed hosts. In one study, Canadian researchers collected weeds both in and near greenhouses and in vegetable fields where there was a history of TSWV. Many weeds were found to be both susceptible to TSWV and suitable hosts for thrips to lay eggs (oviposition).

Editors Note: All weed species listed in the table are oviposition hosts of WFT. Many other weed species were also susceptible to TSWV.

(Adapted from a table by L.W. Stobbs, A.B. Broadbent, W.R. Allen, and A.L. Stirling. 1992. Transmission of Tomato Spotted Wilt Virus by Western Flower Thrips to Weeds and Native Plants found in Southern Ontario. *Plant Disease* 76:23-29).

Management Options

The first and most important step in thrips management is to prevent the thrips entry into your greenhouse. Immediately after receiving a plant shipment, use sticky cards to detect any thrips activity, or tap yellow or blue flowers and young foliage over a white sheet of paper to look for adult thrips and larvae. Try to keep thrips-infected plants isolated in a separate area to avoid the spread of thrips throughout an entire range. Limit worker entry into areas with higher thrips populations until populations are reduced.

A weed-free barrier of at **least** 10 to 20 feet around the greenhouse and especially near the vents will discourage thrips entry. Thrips may more easily overwinter in sheaths of grasses than in the soil, as previously thought, so removal of grasses outside the greenhouse is very important. Thrips may enter greenhouses to search for new hosts when outdoor weeds desiccate or after weedy areas are mowed.

A few midwestern growers with long-term thrips problems and a history of low levels of TSWV have tried a summer break in production to "starve out" the thrips. Growers mentioned that they had greater success with a longer break of three months but felt that even a short break of four to six weeks was of some help in reducing, but not eliminating, thrips populations. Growers thoroughly cleaned the greenhouses, paying close attention to the removal of all weeds and, especially, bits of potting soil and other debris. During the shorter production break, greenhouse floors were kept

wet to help prevent the thrips from going into a dormant or aestivation period. Greenhouse air temperatures reached over 110°F, but soil temperatures were not monitored. To some degree, thrips populations were lowered, but thrips were not eliminated. Sticky cards can be placed horizontally just above the floor to monitor thrips populations during this period. More research is needed to determine exactly where thrips pupate and to determine if there are effective techniques in breaking their reproductive cycle.

Chemical Management

A very small spray droplet size of less than 100 microns will more effectively contact the thrips. Research at Cornell University has shown that more frequent, five-day spray intervals are more effective than seven-day spray intervals. Currently, there are no registered materials to be used against the prepupa and pupal stages.

When selecting materials, rotation between classes of insecticides may help delay the development of resistance. Resistance to certain pyrethoids, abamectin and methomyl (not registered in New England) has been documented in certain thrips populations in the field. Only use a material, or combination of materials, for one generation (two to three weeks, depending upon temperature) before switching to an insecticide in another class.

Table 3: Insecticides Registered for Thrips Control, Listed by Chemical Class. From *New England Recommends*

Chemical Class	*Insecticides*
Organophosphate	Diazinon, Dibrom, Dursban, Orthene, Sulfotepp
Carbamate	Dycarb
Macrocyclic Lactone	Avid
Botanical	Margosan-O, Azatin EC
Pyrethoid	Talstar, Decathlon, Mavrik

Get an early start on thrips monitoring and management this spring bedding plant season.

References

Anonymous. 1992. Western Flower Thrips Overwinters. *Regulatory Horticulture*, 8-16. Spring 1992 issue

Immaraju, J.A.,T.D. Paine, J.A, Bethke, K.L. Robb, and J.P. Newman. 1992. Western Flower Thrips (*Thysanoptera:Thripidae*) Resistance to Insecticides in Coastal California Greenhouses, *Journal of Economic Entomology.* 85(1) 9-14.

Robb, K.L. 1988. A*nalysis of Frankliniella occidentalis (Pergande) as a pest of floricultural crops in California greenhouses.* P.h.D. dissertion, University of California, Riverside.

Sanderson, J.P. 1990. Western Flower Thrips Biology and Control. *Long Island Horticulture News.* August 1990 1-3 pp.

Stobbs, L.W., A.B. Broadbent, A.B. Allen, and A.L. Stirling. 1992. Transmission of Tomato Spotted Wilt Virus by the Western Flower Thrips to Weeds and Native Plants in Southern Ontario. *Plant Disease,* 76:23-29.