

Thrips

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Species & Identification

The most common thrips species to infest greenhouse crops is the western flower thrips. The banded greenhouse thrips, greenhouse thrips, tobacco thrips, *Echinothrips americanus*, melon thrips, onion thrips, Florida flower thrips, and chili thrips can all be encountered on ornamental crops during the growing season. While all thrips cause direct damage to leaves and flowers through feeding, some thrips species also vector viruses, e.g., the western flower thrips vectors impatiens necrotic spot virus and tomato spotted wilt virus.

Adults of most thrips species are 1 to 1.5 mm in length. Body color varies among thrips species. Western flower thrips, melon thrips, onion thrips, and Florida flower thrips have light yellow to brown bodies. Chili thrips bodies are mainly yellow in color. Banded greenhouse thrips, greenhouse thrips, tobacco thrips, and *Echniothrips americanus* have dark brown to black bodies. Differentiation of thrips species can only be achieved through proper microscopic slide preparation. For example, differentiation of western flower thrips and flower thrips requires comparing setae (hairs) on the thrips' body just behind the head. An independent or University diagnostic lab may be able to properly identify thrips species.

Damage & Symptoms

Thrips are piercing and sucking insects that feed on leaves, flower petals, and growing tips of plants. Their feeding leaves irregularly shaped spots or stippling on the damaged plant tissues. Additionally, cells at growing points damaged by thrips feeding are unable to expand, resulting in distorted new growth. Flowers damaged by thrips feeding can be discolored, distorted or drop early. Leaf damage will also present as silvery streaking or stippling across leaves. Feces may be visible on infested leaves and flowers as well. In addition to the direct feeding damage to plant tissues, thrips can vector plant viruses.

Life Cycle

The life cycle of thrips is highly dependent upon temperature. A thrips can complete its life cycle from egg to adult in about 12 to 14 days at 86°F. Adult female thrips will lay eggs in leaf tissue. Once hatched, nymphs will begin feeding on leaf tissue. Nymphs can take about 11 days to reach the 'pupal' stage. Nymphs of some species (e.g., western flower thrips) pupate in the soil but others (e.g., *Echinothrips*) may pupate on the leaves or concealed places aboveground or in plant canopy. Adults emerge from pupae after 3 to 4 days and move back onto leaves or flowers. Adult thrips can survive for as long as 40 days in warm weather, again depending on species. Multiple generations occur each year due to the short life cycle of thrips.

Scouting

Yellow or blue sticky cards placed in a greenhouse, especially near doors, vents, sidewalls, and new plants, can provide information about presence and movement of thrips. Randomly select 10 plants per 1000 ft^2 of greenhouse space to inspect for the presence of adults and nymphs on leaves and flowers thoroughly. Also examine leaves and flowers for feeding damage and feces. Thrips presence can also be monitored by holding white paper under a plant and tap three flowers per plant to dislodge any thrips onto the paper for counting.



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Cultural Control

Cleanliness and sanitation are the first line of defense against thrips. Regularly remove weeds, plant debris, and growth medium inside and around greenhouses. Eliminate unwanted stock plants and flowers by placing the materials into a sealed bag or container and immediately disposing of it away from greenhouses. Placing insect exclusion screens with a mesh size < 0.88 mm in vents, sidewalls, and doors to exclude thrips adults. Flowering trap plants, such as marigold, can also be placed in empty greenhouses before introducing new crops to trap and remove thrips emerging from the soil.

Biological Control

Predatory mites and minute pirate bugs can be used in a banker plant system or applied to plant foliage to control thrips nymphs and adults. Pupae and older nymphs can be controlled by releasing rove beetles or predatory mites to the soil. Multiple entomopathogenic fungi, nematodes, and bacteria are commercially available for foliar applications to control thrips. Start biological control program preventatively, i.e., before thrips enter terminal or flower buds. Existing populations of thrips generally are not effectively controlled by biological control programs.

Chemical Control

Starting chemical control as soon as thrips are detected is key to successful control. Warm weather and high thrip populations may necessitate applications intervals of 3 to 5 days to successful control thrips. Good control of thrips on foliage can typically be achieved through a medium drench with systemic insecticides. Persistent foliar applications of insecticides are needed to protect flowers. Thrips have been shown to develop insecticide resistance, so modes of actions should be rotated every one to two applications.



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Table 1. Selected insecticides for thrips control

Active Ingredient(s)	Trade Name(s)[1]	REI (h)[2]	Use Site(s)[3]	IRAC Code(s)[4]
Alpha-cypermethrin	Fendona CS	N/A	L	3A
Abamectin	Avid; Lucid; Minx 2	12	G N L	6
Abamectin + bifenazate	Sirocco	12	G N L I	6 + 20D
Acephate	1300 Orthene TR	12/24	G	1B
	Orthene T&O	24	G N L	
	Ace-Jet	N/A	L	
Acephate + imidacloprid	Avatar PLX	24	G N L	1B + 4A
Acetamiprid	TriStar 8.5 SL	12	G N L	4A
Alpha-cypermethrin	Fendona CS	N/A	L	3A
Azadirachtin	Azatin O; Azatrol EC; Molt-X	4	G N L I	Unknown
	Azatin XL	4	G N I	
	Ornazin 3% EC	12	G N L I	
Beauveria bassiana	BotaniGard ES; BotaniGard 22 WP	4	G N L I	UNF
	Naturalis-L	4	G N L I	
Beauveria bassiana GHA + pyrethrins	BotaniGard MAXX	12	G N L I	UNF + 3A
Beta-cyfluthrin	Tempo Ultra WP; Tempo SC Ultra	N/A	L I	3A
Bifenthrin	Ascertain TR	12	G	3A
	OnyxPro	12	N L I	
	Talstar S Select	12	G N	
Bifenthrin + clothianidin	Aloft GC SC; LC SC	12	L	3A + 4A
Bifenthrin + novaluron + pyriproxyfen	DuraFlex CS	12	G L I	3A + 15 + 7C

[1] Trade names are provided as examples; mention of specific products does not constitute endorsement. Read label carefully for target scale insect groups, application rates, use sites, and other use restrictions and precautions.
[2] Restricted Entry Interval
[3] Use sites: G = Greenhouse; N = Nursery; L = Landscape; I = Interiorscape or interior plantscape.
[4] Insecticide Resistance Action Committee group number. UC = unclassified. Products sharing a IRAC number contain active ingredients with the same mode of action. Always rotate among products of different IRAC numbers to avoid the development of pesticide resistance.



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Carbaryl	Sevin SL	12	N L	1A
Chlorfenapyr	Pylon; Pylon TR	12	G	13
Chromobacterium subtsugae	Grandevo PTO	4	G N L	UNB
Clothianidin	Arena 0.25G	N/A	L I	4A
Cyantraniliprole	Mainspring GNL	4	G N L I	28
Cyclaniliprole	Sarisa	4	G N	28
Cyclaniliprole + flonicamid	Pradia	12	G N	28 + 29
Cyfluthrin	Decathlon 20 WP	12	G N L I	3A
Cyfluthrin + imidacloprid	Discus L	12	G N	3A
Deltamethrin	Suspend SC	N/A	L I	3A
Dimethoate	Dimethoate 400 EC	10-14 d	N	1B
Dinotefuran	Safari 20 SG	12	G N L I	4A
	Transtect; Transtect Infusible; Zylam Liquid	N/A	L	
	Mauget Dinocide	N/A	L I	
Fenpropathrin	Tame 2.4 EC	24	G N L I	3A
Fenpyroximate	Akari 5SC	12	G N I	21A
Flonicamid	Aria	12	G N L	29

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Flupyradifurone	Altus	4	G N L I	4D
Gamma-cyhalothrin	Scion	N/A	L	3A
GS-omega/kappa Hxtx-Hv1a peptide	Spear T	4	G N	32
Horticultural oil	Ultra-Pure Oil; TriTek	4	G N L I	UC
Imidacloprid	Lada 75WSP	12	G N L I	4A
	Marathon 1% G; Marathon II; Benefit 60WP	12	G N I	
	Merit; CoreTect	N/A	L I	
Insecticidal soap	M-Pede	12	G N L I	UC
Isaria formosorosea	NoFly	12	G	UNF
	Preferal	4	G N L	
Kaolin clay	Surround WP	N/A	G N L I	UC
Lambda-cyhalothrin	Scimitar GC	24	G N L	3A
Lambda-cyhalothrin + novaluron + pyriproxyfen	Proflex	N/A	L	3A + 15 + 7C
Lambda-cyhalothrin + thiamethoxam	Tandem	N/A	L	3A + 4A
Malathion	Malathion 5	12	N L	1B
	Malathion 8 Aquamul	12	N	
Metarhizium anisopliae	Met52; Tick-EX	4	G N L	UNF
Novaluron	Pedestal	12	G N	15

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Permethrin	Astro	12	G L I	3A
	Martin's Permethrin SFR	N/A	L I	
	Perm-Up 3.2 EC	12	G N L I	
Pyrethrins	Pyganic 1.4 EC; Pyrethrum TR	12	G N	3A
Pyrethrins + azadirachtin	Azera Gardening	N/A	L	3A + unknown
Pyrethrins + canola oil	Pycana	12	G N	3A + UC
Pyridalyl	Overture 35 WP	12	G	Unknown
Pyrifluquinazon	Rycar	12	G	9B
Pyriproxifen	Distance IGR	12	G N L I	7C
S-kinoprene	Enstar AQ	4	G I	7A
Spinosad	Conserve SC; Entrust	4	G N L	5
Spirotetramat	Kontos	24	G N I	23
Steinernema feltiae	NemaSys; Steinernema-System; NemaShield; EntoNem	N/A	G N L I	UC
Sulfoxaflor + spinetoram	XXpire	12	G N	4C + 5
Tau-fluvalinate	Mavrik Aquaflow	12	G N L I	3A
Thiamethoxam	Flagship 25WG	12	G N I	4A
	Meridian 0.33G; 25WG	N/A	L I	
Tolfenpyrad	Hachi-Hachi SC	12	G N L	21A
Zeta-cypermethrin + bifenthrin + imidacloprid	Triple Crown Golf	N/A	L I	3A + 4A
	Triple Crown T&O	N/A	L	

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