



Current Report

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Management of Insects and Mites in Greenhouse Floral Crops

Eric J. Rebek

Extension Entomologist and Associate Professor
Oklahoma State University

Raymond A. Cloyd

Extension Horticultural Entomologist and Professor
Kansas State University

Insect and mite pests of greenhouse crops present unique challenges with respect to their management. Plants are frequently moved in and out of the greenhouse, creating opportunities for repeated introductions of pests. In addition, crops may be grown year-round in a protected environment that is favorable for pest development. Furthermore, greenhouse pests are often present in the absence of their natural enemies unless predators and parasitoids are intentionally introduced.

Many greenhouse pest populations can be dealt with by implementing a comprehensive integrated pest management (IPM) or plant protection program that includes the following:

- Regular pest monitoring coupled with careful record-keeping.
- Implement exclusion techniques (e.g., insect screening) and sanitation practices such as; removal of all weeds, and plant material and growing medium debris.
- Thoroughly clean greenhouses after each crop production cycle.
- Implement proper cultural practices such as; watering and fertility.
- Introduce and/or conserve biological control agents when appropriate.

Pesticides may be a component of an IPM or plant protection program, but should not be a substitute for good horticultural practices, or be used preventatively against insect or mite pests. Such practices are not economically or environmentally justifiable, and may lead to insect or mite pest populations developing resistance to commonly used

pesticides. Pesticides should be applied using specified application methods to ensure optimal suppression of pest populations. Moreover, always follow all safety precautions when applying pesticides in a greenhouse due to being an enclosed environment. Follow ALL label directions, especially Worker Protection Standards. Pesticide recommendations in this publication are accurate as of the "Modified Date." However, always check the label of a purchased pesticide for the most current application directions and restrictions. Additional information on greenhouse pest management can be found in the following Oklahoma State University and Kansas State University extension publications:

- HLA-6707: Pesticide Use and Safety in the Nursery and Greenhouse
- HLA-6710: Integrated Pest Management in Commercial Greenhouses: An Overview of Principles and Practices
- HLA-6711: IPM- Scouting and Monitoring for Pests in Commercial Greenhouses
- E-1011: Arthropod Pest Management in Greenhouses and Interiorscapes
- MF-3094: Insect Growth Regulators for Use in Greenhouses
- MF-3001: Mealybug: Management in Greenhouses and Nurseries
- MF-2937: Fungus Gnats: Management in Greenhouses and Nurseries
- MF-2922: Western Flower Thrips: Management on Greenhouse-Grown Crops
- MF-2938: Broad Mite and Cyclamen Mite: Management in Greenhouses and Nurseries

<i>Pest</i>	<i>Pesticide Common Name</i>	<i>Pesticide Trade Name</i>	<i>Pesticide Class</i>	<i>REI**</i>	<i>Comments</i>
Aphids	Abamectin	Avid/Minx 2	6	12/12	Has translaminar properties.
	Acephate	Orthene	1B	24	Has translaminar properties. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. May be more effective when tank mixed with other insecticides.
	<i>Beauveria bassiana</i>	Botanigard/Mycotrol	M	4/4	Beneficial fungus. May require three to five applications per cropping cycle. Maintain relative humidity around 80% to maximize effectiveness.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties.
	Bifenthrin	Attain/Talstar [†]	3A	12/12	Thorough coverage of all plant parts is important.
	Chlorpyrifos	DuraGuard	1B	24	Microencapsulated formulation.
	Chlorpyrifos + Cyfluthrin	Duraplex	1B + 3A	24	Aerosol formulation.
	Cyantraniliprole	Mainspring	28	4	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Cyfluthrin	Decathlon	3A	12	Thorough coverage of all plant parts is important.
	Dinotefuran	Safari	4A	12	Has translaminar and systemic properties with long residual activity. Very water soluble.
	Fonicamid	Aria	9C	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench. Prevents insects from feeding by blocking mouthparts.
	Fluvalinate	Mavrik	3A	12	Thorough coverage of all plant parts is important.
	Imidacloprid	Marathon/Benefit/ Mantra	4A	12/12/12	Has translaminar and systemic properties with long residual activity.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	<i>Isaria fumosoroseus</i> Apopka Strain 97	Preferal	M	4	Beneficial fungus. Maintain relative humidity around 80% to maximize effectiveness.
Kinoprene	Enstar	7A	4	Slow acting. Repeat applications will be required.	

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Aphids (cont'd)	Methiocarb	Mesurol	1A	24	Thorough coverage of all plant parts is important.
	Mineral oil	Ultra-Pure Oil/ SuffOil-X	HO	4/4	Has short residual activity. Avoid applying too frequently. See note 2 below.
	Neem oil (clarified hydrophobic extract of neem oil)	Triact	UN	4	Has short residual activity. See note 2 below.
	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Has short residual activity. Avoid applying too frequently. See note 2 below.
	Permethrin	Astro	3A	12	Thorough coverage of all plant parts is important.
	Pymetrozine	Endeavor	9B	12	Has translaminar and systemic properties. Prevents insects from feeding by blocking mouthparts.
	Pyrethrins	Pyreth-It/Pyrethrum	3A	12/12	Thorough coverage of all plant parts is important.
	Pyrifluquinazon	Rycar	UN	12	Has contact, ingestion, and translaminar properties. Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.
	Pyriproxyfen	Distance/Fulcrum	7C	12/12	Only active on nymphs.
	Spirotetramat	Kontos	23	24	Has systemic properties with movement both up and down the plant.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Has translaminar and systemic properties.
	Thiamethoxam	Flagship	4A	12	Has translaminar and systemic properties with long residual activity. Do not make more than two applications per cropping cycle.
	Tolfenpyrad	Hachi-Hachi	21A	12	Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.

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Caterpillars	Acephate	Orthene	1B	24	Check label for phytotoxicity information.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. Some formulations may be used on greenhouse-grown vegetables.
	<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i>	Dipel	11A	4	Insects must consume material to be affected. May be used on greenhouse-grown vegetables.
	<i>Beauveria bassiana</i>	Botanigard/ Mycotrol	M	4/4	Beneficial fungus. May be more effective when mixed with other insecticides. May require three to five applications per cropping cycle.
	Bifenthrin	Attain/Talstar†	3A	12/12	Thorough coverage of all plant parts is important.
	Chlorfenapyr	Pylon	13	12	Has translaminar properties. Do not make more than two applications in a sequence, or more than three applications per cropping cycle. Check label for phytotoxicity information.
	Chlorpyrifos	DuraGuard	1B	24	Microencapsulated formulation.
	Chlorpyrifos + Cyfluthrin	Duraplex	1B + 3A	24	Aerosol formulation.
	Cyantraniliprole	Mainspring	28	4	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Cyfluthrin	Decathlon	3A	12	Thorough coverage of all plant parts is important.
	Fenpropathrin	Tame†	3A	12	Thorough coverage of all plant parts is important.
	Fluvalinate	Mavrik	3A	12	Do not make more than two applications per cropping cycle. Thorough coverage of all plants parts is important.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	Novaluron	Pedestal	15	12	Slow acting, but has translaminar properties. Thorough coverage of all plant parts is important. Apply when caterpillars are small.
	Permethrin	Astro	3A	12	Thorough coverage of all plant parts is important.
	Pyridalyl	Overture	UN	12	Has translaminar properties. Do not make more than three applications per cropping cycle. Apply when caterpillars are small.

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Caterpillars (cont'd)					
	Spinosad	Conserve	5	4	Has contact, ingestion and translaminar properties. More effective on small caterpillars.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Apply when caterpillars are small. Has similar mode of action as Conserve (spinosad).
	Tolfenpyrad	Hachi-Hachi	21A	12	More active on small caterpillars.
Fungus Gnats (Adults)					
	Bifenthrin	Attain/Talstar [†]	3A	12/12	Target sprays at the surface of the growing medium.
	Cyfluthrin	Decathlon	3A	12	Target sprays at the surface of the growing medium.
	Fenpropathrin	Tame [†]	3A	12	Target sprays at the surface of the growing medium.
	Fluvalinate	Mavrik	3A	12	Do not make more than two applications per cropping cycle. Do not apply to poinsettia.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Target sprays at the surface of the growing medium.
	Permethrin	Astro	3A	12	Target sprays at the surface of the growing medium.
Fungus Gnats (Larvae)					
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties. Apply as a light spray to the growing medium.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. Some formulations may be used on greenhouse-grown vegetables.
	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i>	Gnatrol	11A	4	Slow acting. May be used on greenhouse-grown vegetables. Apply early in the cropping cycle.
	Chlorfenapyr	Pylon	13	12	Do not make more than two applications in a sequence, or more than three applications per cropping cycle. Check label for phytotoxicity information.
	Chlorpyrifos	DuraGuard	1B	24	Microencapsulated formulation.
	Cyromazine	Citation	17	12	Slow acting.
	Diflubenzuron	Adept	15	12	Slow acting, but has long residual activity. Do not use on poinsettia, hibiscus and/or Reiger begonia.
	Kinoprene	Enstar	7A	4	Slow acting. Repeat applications are required.

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Fungus Gnats (Larvae) (cont'd)	Pyriproxyfen	Distance/Fulcrum	7C	12/12	Slow acting. Read label for precautions when using on poinsettia.
	<i>Steinernema feltiae</i>	Nemasys	BLO	0	Beneficial nematode that attacks fungus gnat larvae. Apply early in the cropping cycle before fungus gnat populations are high and causing plant damage.
Leafminers	Abamectin	Avid/ Minx 2	6	12/12	Has translaminar properties.
	Acephate	Orthene	1B	24	Has translaminar and systemic properties. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. Some formulations may be used on greenhouse-grown vegetables.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties.
	Cyromazine	Citation	17	12	Has translaminar properties.
	Dinotefuran	Safari	4A	12	Has translaminar and systemic properties with long residual activity. Very water soluble.
	Imidacloprid	Marathon/ Benefit/Mantra	4A	12/12/12	Has translaminar and systemic properties with long residual activity.
	Novaluron	Pedestal	15	12	Slow acting, but has translaminar properties.
	Spinosad	Conserve	5	4	Has translaminar properties.
	Thiamethoxam	Flagship	4A	12	Has translaminar and systemic properties with long residual activity. Do not make more than two applications per cropping cycle.

<i>Pest</i>	<i>Pesticide</i>	<i>Pesticide</i>	<i>Pesticide</i>		<i>Comments</i>
	<i>Common Name</i>	<i>Trade Name</i>	<i>Class</i>	<i>REI**</i>	
Mealybugs	Acephate	Orthene	1B	24	Has translaminar and systemic properties. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. Some formulations may be used on greenhouse-grown vegetables.
	<i>Beauveria bassiana</i>	Botanigard/ Mycotrol	M	4/4	Beneficial fungus. May be more effective when mixed with other insecticides. May require three to five applications per cropping cycle.
	Bifenthrin	Attain/Talstar [†]	3A	12/12	Works best on crawlers.
	Buprofezin	Talus	16	12	Slow acting. Works best on crawlers.
	Cyfluthrin	Decathlon	3A	12	Works best on crawlers.
	Dinotefuran	Safari	4A	12	Has translaminar and systemic properties with long residual activity. Very water soluble.
	Fenpropathrin	Tame [†]	3A	24	Works best on crawlers.
	Fonicamid	Aria	9C	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench. Prevents insects from feeding by blocking mouthparts.
	Fluvalinate	Mavrik	3A	12	Works best on crawlers.
	Imidacloprid	Marathon/ Benefit/Mantra	4A	12/12/12	Has translaminar and systemic properties. Slow acting with long residual activity.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	<i>Isaria fumosoroseus</i> Apopka Strain 97	Preferal	M	4	Beneficial fungus. Maintain relative humidity around 80% to maximize effectiveness.
	Kinoprene	Enstar	7A	4	Slow acting. Repeat applications are required.
	Mineral oil	Ultra-Pure Oil/ Suffoil-X		4/4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
Neem oil (clarified hydrophobic extract of neem oil)	Triact	UN	4	Has short residual activity. Thorough coverage of all plant parts is important.	

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Mealybugs (cont'd)	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Pyriproxyfen	Rycar	UN	12	Has contact, ingestion, and translaminar activity. Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.
	Spirotetramat	Kontos	23	24	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Has translaminar and systemic properties.
	Thiamethoxam	Flagship	4A	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
Mites (Twospotted Spider)	Abamectin	Avid/Minx 2	6	12/12	Has translaminar properties.
	Acequinocyl	Shuttle O	20B	12	Has contact activity only.
	<i>Beauveria bassiana</i>	Botanigard/ Mycotrol	M	4/4	Beneficial fungus. May require three to five applications per cropping cycle. Thorough coverage of all plant parts is important.
	Bifenazate	Floramite	UN	4	Has contact activity only. Do not make more than two applications per cropping cycle per year.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties. Do not make more than two applications per cropping cycle per year.
	Bifenthrin	Attain/Talstar†	3A	12/12	Thorough coverage of all plant parts is important.
	Chlorfenapyr	Pylon	13	12	Has translaminar properties. Do not make more than two applications in a sequence, or more than three applications per cropping cycle.
	Clofentezine	Ovation	10A	12	Has activity on mite eggs.
Cyflumetofen	Sultan	25	12	Has activity on mite eggs, larvae, and nymphs.	

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Mites (Twospotted Spider) (cont'd)	Etoxazole	TetraSan	10B	12	Has activity on mite eggs, larvae, and nymphs. Do not apply more than two times per cropping cycle.
	Fenazaquin	Magus	21A	12	Do not make more than one application per cropping cycle. Do not rotate with Akari, Sanmite, Shuttle and/or Floramite.
	Fenpropathrin	Tame†	3A	24	Thorough coverage of all plant parts is important.
	Fenpyroximate	Akari	21A	12	Has contact activity only. Do not rotate with Sanmite, Magus, Shuttle and/or Floramite.
	Fluvalinate	Mavrik	3A	12	Thorough coverage of all plant parts is important.
	Hexythiazox	Hexygon	10A	12	Has activity on mite eggs, larvae and nymphs.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	<i>Metarhizium anisopliae</i> Strain F52	Met52	M	4	Beneficial fungus. Apply as a foliar spray and thoroughly cover all plant parts, especially leaf undersides. Repeat applications will be required.
	Mineral oil	Ultra-Pure Oil/ SuffOil-X	HO	4/4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Neem oil (clarified hydrophobic extract of neem oil)	Triact	UN	4	Has short residual activity. Thorough coverage of all plant parts is important.
	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Pyridaben	Sanmite	21A	12	Do not rotate with Akari, Magus, Shuttle and/or Floramite.
	Spiromesifen	Judo	23	12	Has translaminar properties with long residual activity.
	Spirotetramat	Kontos	23	24	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.

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Mites (Broad)	Abamectin	Avid/Minx 2	6	12/12	Has translaminar properties.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties. Do not make more than two applications per cropping cycle per year.
	Bifenthrin	Attain/Talstar†	3A	12/12	Thorough coverage of all plant parts is important.
	Chlorfenapyr	Pylon	13	12	Has translaminar properties. Do not make more than two applications in a sequence, or more than three applications per cropping cycle. Check label for phytotoxicity information.
	Fenpyroximate	Akari	21A	12	Do not rotate with Sanmite.
	Pyridaben	Sanmite	21A	12	Do not rotate with Akari.
	Spiromesifin	Judo	23	12	Has translaminar properties with long residual activity.
Mites (Cyclamen)	Abamectin	Avid/ Minx 2	6	12/12	Has translaminar properties.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties. Do not make more than two applications per cropping cycle per year.
	Chlorfenapyr	Pylon	13	12	Has translaminar properties. Do not make more than two applications in a sequence, or more than three applications per cropping cycle. Check label for phytotoxicity information.
	Fenpyroximate	Akari	21A	12	Thorough coverage of all plant parts is important.
	Spiromesifin	Judo	23	12	Has translaminar properties with long residual activity.
Scales (Soft and Armored)	Acephate	Orthene	1B	24	Has systemic and translaminar properties. Works best on crawlers. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	Slow acting. Works best on crawlers.
	Bifenthrin	Attain/Talstar†	3A	12/12	Works best on crawlers.
	Buprofezin	Talus	16	12	Slow acting. Works best on crawlers.
	Cyantraniliprole	Mainspring	28	4	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.

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Scales (Soft and Armored) (cont'd)					
	Cyfluthrin	Decathlon	3A	12	Works best on crawlers.
	Dinotefuran	Safari	4A	12	Has translaminar and systemic properties. May be effective against both soft and armored scales.
	Imidacloprid	Marathon/ Benefit/Mantra	4A	12/12/12	Has translaminar and systemic properties. Only effective against soft scales.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	Kinoprene	Enstar	7A	4	Slow acting. Works best on young crawlers. Repeat applications are required.
	Mineral oil	Ultra-Pure Oil/ SuffOil-X	HO	4/4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Neem oil (clarified hydrophobic extract of neem oil)	Triact	UN	4	Has short residual activity. Thorough coverage of all plant parts is important.
	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Pyriproxyfen	Distance/ Fulcrum	7C	12/12	Slow acting. Only active on crawlers.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Has translaminar and systemic properties. Thorough coverage of all plant parts is important.
	Thiamethoxam	Flagship	4A	12	Has translaminar and systemic activity. Apply as a foliar spray or soil drench.
	Tolfenpyrad	Hachi-Hachi	21A	12	Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.

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Slugs	Iron phosphate	Sluggo	UN	0	Bait formulation.
	Metaldehyde	Deadline	UN	12	Bait formulation.
	Methiocarb	MesuroI	1A	24	Bait formulation.
Thrips	Abamectin	Avid/Minx 2	6	12/12	Has translaminar properties. Use in rotation programs with Pylon, Overture and/or Conserve.
	Acephate	Orthene	1B	24	Has translaminar properties. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties. Mix with a surfactant to enhance effectiveness.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	More effective when mixed with other insecticides. Some formulations may be used on greenhouse-grown vegetables.
	<i>Beauveria bassiana</i>	Botanigard/ Mycotrol	M	4/4	Beneficial fungus. May be more effective when mixed with other insecticides. May require three to five applications per cropping cycle. Thorough coverage of all plant parts is important.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties.
	Bifenthrin	Attain/Talstar [†]	3A	12/12	Thorough coverage of all plant parts is important.
	Chlorfenapyr	Pylon	13	12	Has translaminar properties. Effective against both western flower thrips and chilli thrips.
	Chlorpyrifos	DuraGuard	1B	24	Microencapsulated formulation.
	Cyantraniliprole	Mainspring	28	4	Has translaminar and systemic properties. Apply as a foliar spray or soil drench. Only effective against thrips feeding on foliage, not flowers.
	Cyfluthrin	Decathlon	3A	12	Thorough coverage of all plant parts is important.
	Fonicamid	Aria	9C	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Fluvalinate	Mavrik	3A	12	Thorough coverage of all plant parts is important.
	<i>Isaria fumosoroseus</i> Apopka Strain 97	Preferal	M	4	Beneficial fungus. Maintain relative humidity around 80% to maximize effectiveness. Apply early in the cropping cycle.

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Thrips (cont'd)	Kinoprene	Enstar	7A	4	Slow acting. Only active on larval stages.
	<i>Metarhizium anisopliae</i> Strain F52	Met52	M	4	Beneficial fungus. Maintain relative humidity around 80% to maximize effectiveness. Apply early in the cropping cycle.
	Methiocarb	MesuroI	1A	24	Use in rotation programs with Conserve, Overture, Pylon and/or Avid.
	Novaluron	Pedestal	15	12	Slow acting, but has translaminar properties. Only active on larval stages.
	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Has short residual activity. Thorough coverage of all plant parts is important. Avoid applying too frequently. See note 2 below.
	Pyrethrins	Pyreth-It/ Pyrethrum	3A	12/12	Thorough coverage of all plant parts is important.
	Pyridalyl	Overture	UN	12	Slow acting, but has translaminar properties. Do not make more than three applications per cropping cycle.
	Pyrifluquinazon	Rycar	UN	12	Labeled for chilli thrips only. Do not make more than two applications per cropping cycle.
	Spinosad	Conserve	5	4	Avoid making frequent applications. Use in rotation programs with MesuroI, Overture, Pylon and/or Avid.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Has translaminar properties and a similar mode of action as Conserve (spinosad).
Tolfenpyrad	Hachi-Hachi	21A	12	Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.	

<i>Pest</i>	<i>Pesticide</i>	<i>Pesticide</i>	<i>Pesticide</i>		<i>Comments</i>
	<i>Common Name</i>	<i>Trade Name</i>	<i>Class</i>	<i>REI**</i>	
Whiteflies	Abamectin	Avid/Minx 2	6	12/12	Has translaminar properties.
	Acephate	Orthene	1B	24	Has translaminar and systemic properties. Effective against nymphs and adults. Check label for phytotoxicity information.
	Acetamiprid	TriStar	4A	12	Has translaminar and systemic properties.
	Azadirachtin	Azatin/Ornazin/ Molt-X/Azatrol	UN	4/12/4/4	May be more effective when mixed with other insecticides. Only active on nymphs. Some formulations may be used on greenhouse-grown vegetables.
	<i>Beauveria bassiana</i>	Botanigard/ Mycotrol	M	4/4	Beneficial fungus. May be more effective when mixed with other insecticides. Active on both nymphs and adults. May require three to five applications per cropping cycle. Thorough coverage of all plant parts is important.
	Bifenazate + Abamectin	Sirocco	UN + 6	12	Has translaminar properties.
	Bifenthrin	Attain/Talstar†	3A	12/12	Active on nymphs and adults.
	Buprofezin	Talus	16	12	Slow acting. Only active on nymphs.
	Cyantraniliprole	Mainspring	28	4	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Cyfluthrin	Decathlon	3A	12	Active on nymphs and adults.
	Diflubenzuron	Adept	15	12	Slow acting. Only active on nymphs. Do not use on poinsettia, hibiscus and/or Reiger begonia.
	Dinotefuran	Safari	4A	12	Has translaminar and systemic properties with long residual activity. Very water soluble.
	Fenazaquin	Magus	21A	12	Do not make more than one application per cropping cycle. Thorough coverage of all plant parts is important.
	Fenpropathrin	Tame†	3A	24	Active on nymphs and adults. Thorough coverage of all plant parts is important.
	Fonicamid	Aria	9C	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench. Prevents insects from feeding by blocking mouthparts.
	Fluvalinate	Mavrik	3A	12	Active on nymphs and adults. Thorough coverage of all plant parts is important.

<i>Pest</i>	<i>Pesticide Common Name</i>	<i>Pesticide Trade Name</i>	<i>Pesticide Class</i>	<i>REI**</i>	<i>Comments</i>
Whiteflies (cont'd)	Imidacloprid	Marathon/ Benefit/Mantra	4A	12/12/12	Slow acting but has translaminar and systemic properties.
	Insecticidal soap (potassium salts of fatty acids)	M-Pede	NS	12	Has short residual activity. Active on nymphs and adults. Thorough coverage of all plant parts is important. Avoid applying too frequently.
	<i>Isaria fumosoroseus</i> Apopka Strain 97	Preferal	M	4	Beneficial fungus. Maintain relative humidity around 80% to maximize effectiveness. Thorough coverage of leaf undersides is important.
	Kinoprene	Enstar	7A	4	Slow acting. Only active on nymphs. Repeat applications are required.
	<i>Metarhizium anisopliae</i> Strain F52	Met52	M	4	Beneficial fungus. Apply as a foliar spray and thoroughly cover all plant parts, especially leaf undersides.
	Mineral oil	Ultra-Pure Oil/ SuffOil-X	HO	4/4	Has short residual activity. Thoroughly cover all plant parts, especially leaf undersides. Avoid applying too frequently. See note 2 below.
	Neem oil (clarified hydrophobic extract of neem oil)	Triact	UN	4	Active on nymphs and adults. Thorough coverage of all plant parts is important.
	Novaluron	Pedestal	15	12	Slow acting, but has translaminar properties. Active on nymphs. May indirectly reduce egg laying by adult females.
	Paraffinic oil	Sunspray Ultra-Fine Oil	HO	4	Active on eggs, nymphs, and adults. Thoroughly cover all plant parts, especially leaf undersides. Avoid applying too frequently. See note 2 below.
	Permethrin	Astro	3A	12	Active on nymphs and adults. Thorough coverage of all plant parts is important.
	Pymetrozine	Endeavor	9B	12	Has translaminar and systemic properties. Active on nymphs and adults. Prevents insects from feeding by blocking mouthparts.
	Pyridaben	Sanmite	21A	12	Active on nymphs and adults.
	Pyrifluquinazon	Rycar	UN	12	Has contact, ingestion, and translaminar activity. Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.
	Pyriproxyfen	Distance/ Fulcrum	7C	12/12	Only active on nymphs.

<i>Pest</i>	<i>Pesticide Common Name</i>	<i>Pesticide Trade Name</i>	<i>Pesticide Class</i>	<i>REI**</i>	<i>Comments</i>
Whiteflies (cont'd)	Spirotetramat	Kontos	23	24	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Sulfoxaflor + Spinetoram	XXpire	4C + 5	12	Has translaminar and systemic properties.
	Thiamethoxam	Flagship	4A	12	Has translaminar and systemic properties. Apply as a foliar spray or soil drench.
	Tolfenpyrad	Hachi-Hachi	21A	12	Do not make more than two applications per cropping cycle. Thorough coverage of all plant parts is important.

† Restricted Use Pesticide

** REI = Restricted Entry Interval (in hours); workers not allowed to enter into treated area until the REI has elapsed.

* **The numbers associated with the pesticide class column were developed by the Insecticide Resistance Action Committee, (IRAC) to help in the selection of insecticides and miticides for resistance management. If you make multiple applications against a specific insect or mite pest or group of insect or mite pests during a growing season, select a registered insecticide or miticide with a different number for each generation (14 to 21 days). Rotate within the same number if more than one subgroup is available (Example: 2A and 2B). To further delay resistance developing in insect or mite pest populations, integrate other practices into your pest management or plant protection programs. See “MF-2905: Resistance Management” for further information. This publication can be found on the World Wide Web at <http://www.ksre.ksu.edu/bookstore/pubs/mf2905.pdf>.**

NOTES:

1. Before purchasing and using any pesticide, read the label carefully for registered use(s), rates, and application frequency. Also note the toxicity category on the label of each pesticide since toxicity ratings may affect reentry intervals (REI's) and note any ventilation requirements. Wear personal protective equipment (PPE) as recommended on the pesticide label.
2. When using horticultural oils (petroleum, mineral, paraffinic, or neem-based), it is important to not use oils with insecticidal soap (potassium salts of fatty acids) or any sulfur containing compounds. Also, do not use horticultural oils in sprayers in which fungicides have been used.
3. Insecticides and miticides with broad-spectrum activity in the chemical classes: pyrethroids, organophosphates, carbamates, and neonicotinoids may be harmful to natural enemies (parasitoids and predators). However, some broad-spectrum insecticides and miticides are more selective than others, and selectivity may depend on how, when, and where the insecticide is applied. Therefore, always check the label to determine the insect and mite pests controlled by the product, or contact your county Extension educator for information on the use of insecticides and miticides that may be used with natural enemies.

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