

## INSECT CONTROL FOR ORNAMENTALS GROWN IN COMMERCIAL GREENHOUSES

**Note:** The following list of pesticides is labeled for the uses listed. However, there are different formulations of particular compounds, and you must make sure the pesticide used is properly labeled. All pesticides must be handled and applied in strict accordance with the label on the pesticide container. The plant being damaged and the site where the plant is located (greenhouse) must be listed on the label. The pests that a compound is registered for are also listed on the label. The pesticides below are listed by common name and by a formulation name, which is used as an example of the formulations available. Many insecticides are now off patent, and there are new trade names available for these active ingredients. There are also mixtures of active ingredients plus synergists available that are not listed. For example, there are several formulations of pyrethrum combined with other active ingredients and synergists available in spray concentrates, aerosols and space-release canisters for the control of several pests. Some chemicals are labeled for use in low-volume spray equipment. Proper rates must be determined by applying the proper amount of active ingredient for the area treated. The rates given below are for high-volume spray equipment. Many insects are developing resistance to pesticides available on the market. Practice resistance management and rotate the insecticides used to manage a pest. With most pesticides, you should rotate the compounds used at least once during a generation time for that insect. In addition, it is desirable to rotate mode of action of compounds used. A guide to rotating modes of action is the Insecticide Resistance Action Committee (IRAC) classification of the different mode of action sites and a letter for subgroups. In resistance management rotations, these number/letter codes can be used to determine which compounds have different modes of action. These are listed in the table under the column heading "Mode of Action Number" (un = unknown).

Some of the insecticides listed are extremely toxic. Handle with caution and use protective equipment required by the label. A minimum interval between application and reentry has been established. Make sure the proper reentry period for the insecticide has been observed before allowing people without label-prescribed personal protective equipment to enter the treated area. These are listed in the table under the column heading "REI."

Phytotoxicity (damage to the plant as a result of the application of a chemical) is an important consideration in controlling pests of ornamentals. Phytotoxicity is generally expressed as damage to the leaves, flowers, or stems and is observed as "burn" (browning of tissue), "chlorosis" (yellowing or bleaching of tissue), or modification of growth by deformation or stunting. There are many species and cultivars of ornamental plants with varying sensitivity to chemicals. Other environmental conditions, such as your particular growing conditions, will also affect phytotoxicity. You are encouraged to evaluate a pesticide for phytotoxicity on a few plants under your particular conditions before treating all plants.

Insect or Mite	Insecticide and Formulation	Amount Per 100 Gallons of Water	REI	Mode of Action Number	Comments
Aphid	abamectin Avid 0.15EC	8 oz	12 hours	6	Apply as needed and repeat application at 7-day intervals or as necessary. DO NOT apply more than 16 fl oz per acre. Use in sufficient water to obtain uniform plant coverage. Phytotoxicity has been observed in certain species of ferns.
	acephate Orthene TT&O 75 WSP PT 75 PT 1300 TT&O 97	2/3 lb  aerosol 8 oz	24 hours	1B	<b>Caution:</b> Phytotoxicity has occurred on the following plants: <i>Blechnum gibbum</i> , <i>Cissus antarctica</i> , <i>Ficus triangularis</i> , <i>Fittonia verschaffeltii</i> , <i>Maranta leuconeura kerchoveana</i> , <i>Pachystachya lutea</i> , <i>Placetranthus australis</i> , <i>Polypodium aureus</i> , <i>Polystichum</i> , <i>Pteris ensiformis</i> , <i>Tolmiea menziesii</i> . Before treating large plantings, spray only a few plants and observe 2 weeks for varietal phytotoxicity.
	acetamiprid TriStar 70WSP TriStar 30SG	1 soluble bag 1.3 oz	24 hours 12 hours	4A	Apply as a full-coverage foliar spray. The use of a nonionic spreader-sticker adjuvant may improve control.
	azadirachtin Azatin 3.0% XL, Align-XL Neemazad 4.5 EC Ornazin 3%	10-16 oz 2.25-4.5 oz 8 oz	4 hours 12 hours 12 hours	18B	Must get full coverage for control but avoid excess runoff. Use fine spray; can also be applied as drench.  Addition of 0.5%-1.0% nonphytotoxic oil will enhance efficacy. Wait 48 hours before applying fungicides.
	<i>Beauveria bassiana</i> Naturalis-O BotaniGard ES	30-100 fl oz 16-32 fl oz	4 hours 12 hours		
	bifenthrin Talstar T&O, Attain 10 WP 7.9% 0.67 F Attain	6-32 oz 25-50 fl oz 8-40 oz aerosol	12 hours	3A	Apply as a full-coverage foliar spray.

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<b>Aphid</b> (cont.)	chlorpyrifos (Dursban) 50WP	0.5 lb	12 hours	1B	
	4E DuraGuard 20% ME	0.5-1.0 pt 0.25-0.5 oz/gal			
	cyfluthrin Decathlon 2E 20WP	1-2 oz 1.9 oz	12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader-sticker may enhance control of insects on some plants.
	dinotefuran Safari 20SG	1/4-1/2 lb for foliar 3/4-1 1/2 lb for drench	12 hours	4A	For drench, apply 4 fl oz finished solution per 6-inch pot. See label for ebb and flood rates.
	endosulfan 50W 3E	1 lb see label	24 hours	2A	Apply when insects first appear and repeat as necessary. DO NOT exceed a maximum of 6 lb/acre per year. Coverage of upper and lower leaf surface is essential.
	fenpropathrin Tame 2.4EC	10 2/3 oz	24 hours	3A	
	flonicamid 50 WDG Aria 0.7 oz package	1-3 packets 0.7-2.1 oz	12 hours	9C	Repeat application every 7-28 days as necessary.
	fluvalinate Mavrik 2E	2-5 oz	12 hours	3A	
	horticultural oils Sunspray ultrafine Saf-T-Side Triact	1-2 gal	4 hours		Care must be taken because some plants are sensitive to oils. Thorough coverage is necessary, but do not over apply and get excessive runoff. Use fine spray.
	imidacloprid Marathon 1G, 60WP Marathon II	9-15 oz/1,000 sq ft 1.7 fl oz	12 hours	4A	Use 60WP as drench.
	insecticidal soap 1%-2% M-Pede Olympic	1-2 gal 1-2 gal	12 hours		Repeat spray in 2 or 3 days. Thoroughly wet both surfaces of infested leaves. Use soft water when possible.
	lambda-cyhalothrin Scimitar GC	1.5-5.0 oz	24 hours	3A	
	methiocarb MesuroI 75W	0.5-1.0 lb	24 hours	1A	
	neem oil (various)	follow label	4 hours	un	Follow label directions.
	permethrin (Astro, others)	follow label	12 hours	3	Follow label directions.
	pymetrozine Endeavor 50WG	2.5-5.0 oz	12 hours	9B	

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<b>Aphid</b>	pyrethrum X-Clude Pyrenone, Natural Plus	follow label directions	12 hours	3A	Follow label directions.
	pyrifluquinazon (Rycar)	follow label directions	12 hours	un	Follow label directions.
	s-kinoprene Enstar II 5EC	8-20 oz	4 hours	7A	Complete coverage of foliage is essential for control. Phytotoxicity has been observed under certain conditions.
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spirotetramat Kontos 2F	1.7 fl oz	24 hours	23	See label for drench instructions.
	thiamethoxam Flagship 25WG Flagship 0.22G	2-4 oz follow label directions	12 hours	4A	Medium treatment may take 1-2 weeks for activity; do not leach for 7 days.
	tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.
<b>Armyworm</b>	acetamiprid TriStar 30SG	2.7-5.3 oz	12 hours	4A	Apply as a full-coverage foliar spray. Use of a nonionic spreader-sticker adjuvant may improve control.
	azadirachtin Azatin 3.0% E Neemazad 4.5 EC Oranzin 3%	10-16 oz 2.25-4.5 oz 8 oz	4 hours 12 hours 12 hours	18B	Must get full coverage for control but avoid excess runoff. Use fine spray; can also be applied as drench. Spray when pests first appear.
	<i>Bacillus thuringiensis</i> Dipel Thuricide MVP Sok-Bt Biobit	1-4 qt	4 hours	11B2	
	<i>Beauveria bassiana</i> Naturalis-O	30-100 fl oz	4 hours		Wait 48 hours before applying a fungicide.
	bifenthrin (Talstar)	follow label directions	12 hours	3A	Apply as a full-coverage foliar spray.
	chlorpyrifos (Dursban) 50WP 4E DuraGuard 20% ME	1 lb 0.5-1.0 pt 0.5 oz/gal	12 hours	1B	
	chlorfenapyr (Pylon)	2.6-6.4 fl oz	12 hours	13	
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	Follow label directions.
	cyfluthrin (Decathlon)	follow label directions	12 hours	3A	Follow label directions.
	diflubenzuron Adept 25W	1/2-1 lb	12 hours	15	Apply on chrysanthemums when larvae appear and repeat at weekly intervals as required.

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<b>Armyworm</b> (cont.)	fenpropathrin Tame 2.4EC	10 oz	24 hours	3A	
	lambda-cyhalothrin Scimitar GC	1.5-5 oz	24 hours	3A	
	novaluron Pedestal 10% SC	6-8 fl oz	12 hours	15	DO NOT apply more than once every 30 days or more than 2 applications per crop. DO NOT apply to poinsettias.
	pyrethrum X-Clude Pyrenone Natural Plus	follow label directions	12 hours	3A	Follow label directions.
	pyridalyl Overture 35WP	8 oz	12 hours	un	2 oz soluble packets; do not get wet.
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spinosad (Conserve)	follow label directions	4 hours	5	Follow label directions.
	tebufenozide Confirm T/O	4-8 fl oz	4 hours	18A	For best results, begin applications when larvae are first observed or at first sign of feeding.
	tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.
<b>Broad Mite and Clycamen Mite</b>	abamectin Avid 0.15EC	4 oz	12 hours	6	Apply as needed and repeat as necessary.
	chlorfenapyr (Pylon)	2.6-5.2 fl oz	12 hours	13	
	fenpyroximate (Akari)	24 fl oz	12 hours	21A	
	pyridaben Sanmite 75WP	2-4 oz	12 hours	21A	
	spiromesifen (Judo)	1-4 fl oz	12 hours	23	
	sulfur (elemental sulfur)	follow label directions	12 hours		DO NOT tank mix with oils.
	<b>Cabbage Looper</b>	acetamiprid TriStar 30SG	2.7-5.3 oz	12 hours	4A
azadirachtin Azatin		10-16 oz	4 hours	18B	Must get full coverage for control but avoid excess runoff. Use fine spray; can also be applied as drench. Spray when pests first appear.
Neemazad		2.25-4.5 fl oz	12 hours		
Ornazin 3%		8 oz	12 hours		
<i>Bacillus thuringiensis</i> Dipel Thuricide MVP Sok-Bt Biobit		1-4 qt	4 hours	11B2	Follow manufacturer's suggestions.
bifenthrin (Talstar)		follow label directions	12 hours	3A	Apply as a full-coverage foliar spray.

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<b>Cabbage Looper</b>	chlorfenapyr (Pylon)	2.6-6.4 fl oz	12 hours	13	
	cyfluthrin (Decathlon)	follow label directions	12 hours	3A	Follow label directions.
	fluvalinate (Mavrik)	follow label directions	12 hours	3A	Follow label directions.
	insecticidal soap		12 hours		Repeat spray weekly for 2 or 3 weeks. Thoroughly wet both surfaces of infested leaves. Use soft water when possible.
	M-Pede	1-2 gal			
	Olympic	1-2 gal			
	novaluron (Pedestal)	follow label directions	12 hours	15	Follow label directions.
	pyrethrum		12 hours	3A	Follow label directions.
	X-Clude	aerosol			
	Pyrenone	2-12 oz/acre			
	pyridalyl		12 hours	un	2 oz soluble packets; do not get wet.
	Overture 35WP	8 oz			
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spinosad		4 hours	5	
Conserve SC	6 fl oz				
tebufenozide		4 hours	18A	For best results, begin applications when larvae are first observed or at first sign of feeding.	
Confirm T/O	4-8 fl oz				
tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.	
<b>Cutworm</b>	<i>Bacillus thuringiensis</i>	1-4 qt	4 hours	11B2	Follow manufacturer's suggestions.
	Dipel				
	Thuricide				
	MVP				
	Sok-Bt				
	Biobit				
	carbaryl		12 hours	1A	Follow label directions.
	Sevin SL	1 qt			
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	Follow label directions.
	cyfluthrin		12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader/sticker may enhance control of insects on some plants.
	Decathlon				
	2EC	1-2 oz			
	20WP	1.3 oz			
	lambda-cyhalothrin		24 hours	3A	
	Scimitar GC	1.5-5.0 oz			
spinosad		4 hours	5		
Conserve SC	6 fl oz				
spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.	
tebufenozide		4 hours	18A	For best results, begin applications when larvae are first observed or at first sign of feeding.	
Confirm T/O	4-8 fl oz				
tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.	

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<b>Fungus Gnat</b>	acetamiprid TriStar 30SG	2.7-5.3 oz	12 hours	4A	Apply as a directed spray to thoroughly wet the upper 1/2 to 1 inch of soil medium.	
	azadirachtin Azatin 3.0% E	8 oz	4 hours	18B		
	<i>Bacillus thuringiensis</i> H-14 Gnatrol	1-8 pt 0.5-4.0 pt	4 hours	11B2	Apply as a soil drench or spray for larvae. Thoroughly wet the first 3 to 4 cm of soil. Under benches should also be treated.	
	chlorfenapyr (Pylon)	5.2-10 fl oz	12 hours	13		
	chlorpurifos DuraGuard 20% ME	0.25-0.5 oz/gal	24 hours	1B	Shake concentrate well before diluting.	
	cyromazine Citation 75WP	follow label directions	12 hours	17		
	diflubenzuron Adept 25W	follow label directions	12 hours	15	DO NOT use on poinsettias, Rieger begonias and hibiscus.	
	dinotefuran Safari 20SG	3/4-1 1/2 lb	12 hours	4A	Drench applying 4 fl oz finished solution per 6-inch pot. See label for ebb and flood rates.	
	pyriproxyfen (Distance)	2-6 fl oz (see comments)	12 hours	7C	New supplemental label changes rates to a 2 oz drench and 3-6 oz drench.	
	resmethrin 2EC resmethrin PT 1200	1-2 pt aerosol	12 hours	3A	Spray soil surface until thoroughly wet. Repeat at 10-day intervals if necessary. Aerosol for adults only.	
	s-kinoprene Enstar II	1 oz/5 gal	4 hours	7A	Drench by submersion in solution until no more air bubbles escape.	
	<i>Steinernema feltiae</i> Entonem NemaShield Nemasys ScanMask	follow label directions	4 hours		Apply when small larvae first appear. Moisture and temperature are critical.	
	thiamethoxam Flagship 25WG	4-8.5 oz	12 hours	4A	Reapply as needed but no sooner than every 7 days. DO NOT exceed 17 oz/acre per crop or year.	
	<b>Leafminer</b>	abamectin Avid 0.15EC	8 oz	12 hours	6	Apply as needed and repeat application at 7-day intervals or as necessary. DO NOT apply more than 16 fl oz or less than 8 fl oz per acre. Use in sufficient water to obtain uniform plant coverage. Phytotoxicity has been observed on certain species of ferns.
		acephate (Orthene)	follow label directions	24 hours	1B	May be used in greenhouse, landscape and nursery applications.
acetamiprid TriStar 30SG		6.7-8.0 oz	12 hours	4A	Rotate with other insecticides. Apply as a full-coverage foliar spray. The use of a nonionic spreader-sticker adjuvant may improve control.	
azadirachtin Azatin 3.0% E Neemazad		10-16 oz 2.25-4.5 fl oz	4 hours 12 hours	18B	Must get full coverage for control but avoid excess runoff. Use fine spray; can also be applied as drench. Spray early. Make 2 applications in rotation with adulticides such as pyrethroids.	
Ornazin 3%		10 oz	12 hours			

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<b>Leafminer</b>	chlorpyrifos (Dursban) 50WP	2 lb	12 hours	1B	Shake concentrate well before diluting.
	DuraGuard 20% ME	0.25-0.5 oz/gal			
	cyromazine Citation 75WP	2.66 oz/acre	12 hours	17	Labeled only for chrysanthemums. Apply to wet in minimum of 100 gallons of water when stippling first appears. Harvesters must wear long-sleeved shirts, long pants, and rubber gloves when harvesting.
	dinotefuran Safari 20SG	1/4-1/2 lb for foliar 3/4-1 1/2 lb for drench	12 hours	4A	For drench, apply 4 fl oz finished solution per 6-inch pot. See label for ebb and flood rates.
	fenoxycarb (Preclude)	follow label directions	12 hours	7B	For greenhouse application.
	imidacloprid (Marathon II, others)	follow label directions	12 hours	4A	Follow label directions.
	lambda-cyhalothrin Scimitar GC	1.5-5.0 oz	24 hours	3A	Use for adults only.
	novaluron Pedestal 10% SC	6-8 fl oz	12 hours	15	DO NOT apply more than once every 30 days or more than 2 applications per crop. DO NOT apply to poinsettias.
	permethrin Pounce 3.2EC	20 fl oz	24 hours	3A	Registered for use on chrysanthemums.
	spinosad Conserve SC	22 fl oz	4 hours	5	
thiamethoxam Flagship 24WG	4-8.5 oz	12 hours	4A	Reapply as needed but no sooner than every 7 days. DO NOT exceed 17 oz/acre per crop or year.	
<b>Leafroller</b>	acephate Orthene TT&O 75SP	2/3 lb	24 hours	1B	
	TT&O 97	8-12 oz			
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	Follow label directions.
	cyfluthrin Decathlon 2EC	1-2 oz	12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader/sticker may enhance control of insects on some plants.
	20WP	1.9 oz			
	pyrethrum X-Clude	aerosol	12 hours	3A	Follow label directions.
Pyrenone Natural Plus	2-12 oz/acre				
spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.	
<b>Mealybug</b>	acephate Orthene TT&O 75SP	2/3 lb	24 hours	1B	See <b>Aphid</b> .
	TT&O 97	8-12 oz			
	acetamiprid TriStar 70WSP	2-4 soluble bags	24 hours	4A	Tank mix with surfactant or pyrethroid may improve control of adults. Apply as a full-coverage foliar spray. Use of a nonionic spreader-sticker adjuvant may improve control.
TriStar 30SG	2.7 oz	12 hours			

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<b>Mealybug</b> (cont.)	azadirachtin			18B	Must get full coverage for control, but avoid excess runoff. Use fine spray; can also be applied as drench. Addition of 0.5%-1.0% nonphytotoxic oil will enhance efficacy.	
	Azatin	10-16 oz	4 hours			
	Neemazad	2.25-4.5 oz	12 hours			
		Ornazin 3%	8 oz	12 hours		
		<i>Beauveria bassiana</i>				Wait 48 hours before applying a fungicide.
		Naturalis-O	30-100 fl oz	4 hours		
		bifenthrin		12 hours	3A	Apply as a full-coverage foliar spray.
		Talstar T&O, Attain				
		10 WP	8-40 oz			
		7.9%	25-50 fl oz			
		0.67 F	8-40 oz			
		Attain	aerosol			
		buprofezin (Talus)	follow label directions	12 hours	16	Apply no more than 2 applications per growing cycle.
		chlorpyrifos (Dursban)		12 hours	1B	
			50WP			
			4E			
		cyfluthrin		12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader/sticker may enhance control of insects on some plants.
		Decathlon 2EC	1-2 oz			
		dinotefuran	1/4-1/2 lb for foliar	12 hours	4A	For drench, apply 4 fl oz finished solution per 6-inch pot. See label for ebb and flood rates.
		Safari 20SG	3/4-1 1/2 lb for drench			
		fenpropathrin		24 hours	3A	
		Tame 2.4EC	10 oz			
		flonicamid 50 WDG		12 hours	9C	Repeat application every 7-28 days as necessary.
	Aria 0.7 oz package	3-6 packets (2.1-4.3 oz)				
	fluvalinate		12 hours	3A		
	Mavrik 2EC	2-5 oz				
	horticultural oils 1%-2%		4 hours		Care must be taken because some plants are sensitive to oils. Thorough coverage is necessary, but do not over apply and get excessive runoff. Use fine spray.	
	Sunspray ultrafine	1-2 gal				
	Saf-T-Side	1-2 gal				
	imidacloprid		12 hours	4A		
	Marathon 1G	9-15 oz/1,000 sq ft				
	Marathon II	1.7 fl oz				
	insecticidal soap 1%-2%		12 hours		Repeat spray after 2 or 3 days. Thoroughly wet both surfaces of infested leaves. Use soft water whenever possible.	
	M-Pede	1-2 gal				
	Olympic	1-2 gal				
	methiocarb		24 hours	1A		
	Mesurool 75 WP	0.5-1 lb				
	neem oil (various)	follow label directions	4 hours	un	Follow label directions.	



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<b>Mealybug</b>	pyrifluquinazon (Rycar)	follow label directions	12 hours	un	Follow label directions.
	s-kinoprene Enstar II 5EC	6-20 oz	4 hours	7A	See <b>Aphid</b> . Registered for root mealybug.
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spirotetramat Kontos 2F	1.7 fl oz	24 hours	23	See label for drench instructions.
	thiamethoxam Flagship 25WG Flagship 0.22G	4-8.5 oz follow label directions	12 hours	4A	Medium treatment may take 1-2 weeks for activity; do not leach for 7 days.
<b>Scale (Armored)</b> Check label to be sure it lists scale to be treated.	acephate (Orthene)	follow label directions	24 hours	1B	Follow label directions.
	acetamiprid (TriStar)	follow label directions	12 hours	4A	Follow label directions.
	bifenthrin (Talstar)	follow label directions	12 hours	3	Follow label directions.
	buprofezin (Talus)	follow label directions	12 hours	16	Follow label directions.
	dinotefuran (Safari)	follow label directions	12 hours	4A	Follow label directions.
	horticultural oil (various)	follow label directions	4 hours		Follow label directions.
	kinoprene (Enstar II)	follow label directions	4 hours	7A	Follow label directions.
thiamethoxam (Flagship)	follow label directions	12 hours	4A	Follow label directions.	
<b>Scale (Soft)</b> Check label to be sure it lists scale to be treated.	acephate (Orthene)	follow label directions	24 hours	1B	Follow label directions.
	acetamiprid (TriStar)	follow label directions	12 hours	4A	Follow label directions.
	bifenthrin (Talstar)	follow label directions	12 hours	3	Follow label directions.
	buprofezin (Talus)	follow label directions	12 hours	16	Follow label directions.
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	For greenhouse application.
	dinotefuran (Safari)	follow label directions	12 hours	4A	Follow label directions.
	horticultural oil (various)	follow label directions	4 hours		Follow label directions.
	imidacloprid (Marathon II, others)	follow label directions	12 hours	4A	Follow label directions.
	kinoprene (Enstar II)	follow label directions	4 hours	7A	Follow label directions.
	neem oil (various)	follow label directions	4 hours	un	Follow label directions.
	pyriproxyfen (Distance)	follow label directions	12 hours	7C	Follow label directions.
thiamethoxam (Flagship)	follow label directions	12 hours	4A	Follow label directions.	
<b>Slugs and Snails</b>	iron phosphate (bait)	follow label directions		un	Follow label directions.
	metaldehyde Deadline B 15D	follow label directions	24 hours		
	methiocarb Mesuroil 75 WP	1/2-1 lb	24 hours	1A	Spray plants and foliage until wet. DO NOT use in conjunction with foliar fertilizer.

**INSECT CONTROL FOR ORNAMENTALS GROWN IN COMMERCIAL GREENHOUSES**

<b>Insect or Mite</b>	<b>Insecticide and Formulation</b>	<b>Amount Per 100 Gallons of Water</b>	<b>REI</b>	<b>Mode of Action Number</b>	<b>Comments</b>
<b>Spider Mite</b>	abamectin Avid 0.15EC	4 oz	12 hours	6	Apply as needed and repeat as necessary.
	acequinocyl Shuttle 15 SC	6.4-12.8 fl oz	12 hours	20B	DO NOT apply through any type irrigation. Wetting agent can be used.
	bifenazate (Floramite)	2-4 oz	12 hours	un	DO NOT apply in successive applications. Use at least two alternative products between Floramite treatments.
	bifenthrin Talstar T&O or Attain 10WP 7.9% Attain	6-32 oz 25-50 fl oz aerosol	12 hours	3A	Apply as a full-coverage foliar spray.
	chlorfenapyr (Pylon)	2.6-5.2 fl oz	12 hours	13	
	clofentezine (Ovation)	2 oz	12 hours	10A	Limited number of plants (see label).
	cyflumetofen (Sultan)	13.7 fl oz	12 hours	25	DO NOT exceed the maximum seasonal use rate of 27.4 fl oz of Sultan per crop growing cycle. DO NOT make more than 2 applications of Sultan per crop growing cycle.
	etoxazole TetraSan 5WDG	8-16 oz	12 hours	10B	Limit to 2 applications per crop cycle.
	fenazaquin (Magus)	12-24 oz	12 hours	21	
	fenbutatin-oxide Vendex 50WP	8-16 oz	48 hours	12B	DO NOT add oil to spray solution.
	fenpropathrin Tame 2.4EC	8-16 oz	24 hours	3A	
	fenpyrozimate Akari 5 SC	16-24 fl oz	12 hours	21A	
	fluvalinate Mavrik 2E	2-5 oz	12 hours	3A	
	hexythiazox Hexygon DF	1-2 oz	12 hours	10A	
	horticultural oil Sunspray ultrafine Saf-T-Side Triact	1-2 gal 1-2 gal 1-2 gal	4 hours		
	insecticidal soap 1%-2% M-Pede Olympic	1-2 gal 1-2 gal	12 hours		Repeat spray weekly for 2 or 3 weeks. Thoroughly wet both surfaces of infested leaves. Use soft water whenever possible.
	lambda-cyhalothrin Scimitar GC	1.5-5 oz	24 hours	3A	
	methiocarb MesuroI 75W	1/2-1 lb	24 hours	1A	

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<b>Spider Mite</b>	spinosad Conserve SC	22 fl oz	4 hours	5	
	spiromesifen Judo 4 F	1-4 oz	12 hours	23	Effective on nymphal and egg stages.
	spirotetramat Kontos 2F	1.7 fl oz	24 hours	23	See label for drench instructions.
<b>Thrips</b>	abamectin Avid 0.15 EC	8 oz	12 hours	6	Apply as needed and repeat application at 7-day intervals or as necessary. DO NOT apply more than 16 fl oz or less than 8 fl oz per acre. Use in sufficient water to obtain uniform plant coverage. Phytotoxicity has been observed in certain species of ferns.
	acetamiprid TriStar 30SG	4-8 oz	12 hours	4A	Apply as a full-coverage foliar spray. Use of a nonionic spreader-sticker adjuvant may improve control.
	acephate Orthene TT&O 75 SP TT&O 97	2/3 lb 8 oz	24 hours	1B	Aerosol may also be used as for aphid control.
	azadirachtin Azatin 3.0% E Neemazad 4.5% Ornazin 3%	12-16 oz 2.25-4.5 oz 8 oz	4 hours 12 hours 12 hours	18B	Must get full coverage for control, but avoid excess runoff. Use fine spray; can also be applied as drench. Addition of 0.5% to 1.0% nonphytotoxic oil will enhance efficacy.
	<i>Beauveria bassiana</i> Naturalis-O BotaniGard ES	30-100 fl oz 32-64 fl oz	4 hours 12 hours		
	bifenthrin (Talstar)	follow label directions	12 hours		Follow label directions.
	chlorfenapyr (Pylon)	10-20 fl oz	12 hours	13	
	chlorpyrifos (Dursban) 50WP 4E DuraGuard 20% ME	1 lb 0.5-1.0 pt 0.25-0.5 oz/gal	12 hours	1B	
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	For greenhouse application.
	cyfluthrin Decathlon 2EC 20WP	1-2 oz 1.9 oz	12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader/sticker may enhance control of insects on some plants.
	dinotefuran Safari 20SG	4-8 oz for foliar 12-24 oz for drench	12 hours	4A	Suppression only. For drench, apply 4 fl oz finished solution per 6-inch pot. See label for ebb and flood rates.
	flonicamid 50 WDG Aria 0.7 oz package	3-4 packets (2.1-2.9 oz)	12 hours	9C	Repeat application every 7-28 days as necessary.

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<b>Thrips</b> (cont.)	fluvalinate Mavrik 2E	2-5 oz	12 hours	3A	
	horticultural oil (various)	follow label directions	4 hours		Follow label directions.
	imidacloprid Marathon 1G 60WP	9-15 oz/1,000 sq ft	12 hours	4A	Use 60WP as drench.
	insecticidal soap 1%-2% M-Pede Olympic	1-2 gal 1-2 gal	12 hours		Repeat spray weekly for 2 or 3 weeks. Thoroughly wet both surfaces of infested leaves. Use soft water whenever possible.
	lambda-cyhalothrin Scimitar GC	1.5-5 oz	24 hours	3A	
	novaluron Pedestal 10% SC	6-8 fl oz	12 hours	15	DO NOT apply more than once every 30 days or more than 2 applications per crop. DO NOT apply to poinsettias.
	pyrethrum X-Clude, Natural Plus Pyrenone	aerosol 2-12 oz/acre	12 hours	3A	Follow label directions.
	pyridalyl Overture 35WP	8 oz	12 hours	un	2 oz soluble packets; do not get wet.
	resmethrin SBP-1382 2E PT 1200	1 pt aerosol	12 hours	3A	Use on begonia, fuchsia, salvia, poinsettia, coleus, chrysanthemum, geranium, petunia, aster, calendula, marigold, rose, azalea, and ivy.
	s-kinoprene (Enstar II)	follow label directions	4 hours	7A	For greenhouse application
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spinosad Conserve SC	6 fl oz	4 hours	5	
	thiamethoxam Flagship 25WG	4-8.5 oz	12 hours	4A	For leaf-feeding thrips.
	tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.
	<b>Whitefly</b>	abamectin Avid 0.15EC	8 fl oz	12 hours	6
acephate Orthene TT&O 75SP PT 1300 TT&O 97		2/3 lb aerosol 8 oz	24 hours	1B	
acetamiprid TriStar 70WSP TriStar 30SG		2-4 soluble bags 2.7-5.3 oz	24 hours 12 hours	4A	Tank mix with surfactant or pyrethroid may improve control of adults. Apply as a full-coverage foliar spray. Use of a nonionic spreader-sticker adjuvant may improve control.

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<b>Whitefly</b>	azadirachtin			18B	Must get full coverage for control, but avoid excess runoff. Use fine spray; can also be applied as drench. Ensure good coverage to top and bottom of leaves.
	Azatin 3.0% E	10-16 oz	4 hours		
	Neemazad	2.25-4.5 oz	12 hours		
	Ornazin 3%	10 oz	12 hours		
	<i>Beauveria bassiana</i>				
	Naturalis-O	30-100 fl oz	4 hours		
	BotaniGard ES	16-32 fl oz	12 hours		
	bifenthrin		12 hours	3A	Apply as a full-coverage foliar spray.
	Talstar T&O or Attain 10WP	6-32 oz			
	7.9%	25-50 fl oz			
	Attain	aerosol			
	buprofezin (Talus)	follow label directions	12 hours	16	Apply no more than 2 applications per growing cycle.
	chlorpyrifos		12 hours	1B	
	Dursban 50WP	0.5 lb			
	DuraGuard 20% ME	0.25-0.5 oz/gal			
	cyantraniliprole (Mainspring)	follow label directions	4 hours	28	For greenhouse application.
	cyfluthrin		12 hours	3A	Good coverage is necessary to provide most effective control. Addition of a spreader/sticker may enhance control of insects on some plants.
	Decathlon 2E	1-2 oz			
	dinotefuran		12 hours	4A	For drench, apply 4 fl oz finished solution per 6-inch pot.
	Safari 20SG	1/4-1/2 lb for foliar 3/4-1 1/2 lb for drench			
	fenazaquin (Magus)	follow label directions	12 hours	21A	May be used in greenhouse, landscape and nursery applications.
	fenoxycarb (Preclude)	follow label directions	12 hours	7B	For greenhouse application.
	fenpropathrin		24 hours	3A	
Tame 2.4EC	5 1/3-10 2/3 oz				
fenvalerate		12 hours	3A		
Pydrin 2.4EC	5-10 oz				
flonicamid 50 WDG		12 hours	9C	Repeat application every 7-28 days as necessary.	
Aria 0.7 oz package	4-6 packets (2.9-4.3 oz)				
fluvalinate		12 hours	3A		
Mavrik 2E	2-5 oz				
horticultural oils 1%-2%		4 hours		Care must be taken because some plants are sensitive to oils. Thorough coverage is necessary, but do not over apply and get excessive runoff. Use fine spray.	
Sunspray ultrafine	1-2 gal				
Saf-T-Side	1-2 gal				
imidacloprid		12 hours	4A	Use 60WP as drench.	
Marathon 1G	9-15 oz/1000 sq ft				
60WP					
Marathon II	1.7 fl oz				

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<b>Whitefly</b> (cont.)	insecticidal soap 1%-2% M-Pede	1-2 gal	12 hours		Thoroughly wet both surfaces of infested leaves. Use soft water whenever possible.
	Olympic	1-2 gal			
	lambda-cyhalothrin Scimitar GC	1.5-5 oz	24 hours	3A	
	novaluron Pedestal 10% SC	6-8 fl oz	12 hours	15	DO NOT apply more than once every 30 days or more than 2 applications per crop. DO NOT apply to poinsettias.
	pymetrozine Endeavor 50WG	2.5-5 oz	12 hours	9B	
	pyridaben Sanmite 75WP	2-4 oz	12 hours	21A	
	pyrifluquinazon (Rycar)	Follow label directions	12 hours	un	Follow label directions.
	pyriproxyfen (Distance)	6-8 fl oz	12 hours	7C	Target crawlers. Apply no more than 2 times per crop cycle. DO NOT apply to poinsettias.
	pyrethrum X-Clude, Natural Plus Pyrenone	aerosol 2-12 oz/acre	12 hours	3A	Follow label directions.
	resmethrin SBP-1382 2E PT 1200	1 pt aerosol	12 hours	3A	Use on begonia, fuchsia, salvia, poinsettia, coleus, chrysanthemum, geranium, petunia, aster, calendula, marigold, rose, azalea, and ivy.
	s-kinoprene Enstar 5EC	6-20 oz	4 hours	7A	See <b>Aphid</b> .
	spinetoram + sulfoxaflor (XXpire)	follow label directions	12 hours	4C + 5	Follow label directions.
	spiromesifen Judo 4 F	1-4 oz	12 hours	23	Effective on nymphal and egg stages.
	spirotriamat Kontos 2F	1.7 fl oz	24 hours	23	See label for drench instructions.
	thiamethoxam Flagship 25WG Flagship 0.22G	4-8.5 oz follow label	12 hours	4A	Medium treatment may take 1-2 weeks for activity; do not leach for 7 days.
	tolfenpyrad (Hachi-Hachi)	follow label directions	12 hours	21A	Follow label directions.