

## Commercial Foliage and Woody Ornamental Arthropod Pest Management <sup>1</sup>

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Pest management on foliage and woody ornamentals requires an integrated approach. Integrated pest management (IPM) involves using a combination of management approaches (e.g., biological, cultural, and chemical) to reduce pest problems below levels of economic and ecological damage. No single pest management method will be completely successful.

Monitoring is an essential aspect of an IPM strategy. Regular scouting (once or twice a week) for pest activity, abundance, and amount of damage caused, is necessary to determine optimal treatment timing. Yellow sticky cards placed near plants will quickly indicate the presence of pests, such as whiteflies, aphids, or thrips. Without monitoring, poorly timed, or regularly-scheduled, treatments may be ineffective at controlling the target pest or kill natural enemies. The mere presence of a pest seldom justifies a widespread pesticide treatment.

Understanding insect and mite biology is important to managing infestations. Immatures (e.g., larvae or nymphs) are often the most damaging stage; however, the adults of some insects may also cause damage. Deciding how to control infestations depends on which insect is causing the damage, its life stage, and where or how it is feeding on or damaging the plant. Chewing insects may be easily controlled by contact insecticides, whereas sucking insects, mites, and thrips may be controlled with either contact or systemic materials.

This publication contains pesticide recommendations that may change at any time, as labels and product registrations change. These recommendations are provided only as a guide, and are not endorsements for the products mentioned, nor is criticism meant for products not mentioned. It remains the pesticide applicator's legal responsibility to read and follow all the label instructions on the container of the specific pesticide being used. The labels that may be accessed through this publication

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### Another Product By Members of the State Major Program FL112

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. All chemicals should be used in accordance with directions on the manufacturer's label. Use pesticides safely. Read and follow directions on the manufacturer's label.

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are specimen labels and do not take precedence or supersede the pesticide container in your possession.

*Federal and Florida Laws state that all pesticides must be handled and applied in strict accordance with the label and worker protection standards (re-entry times, protective clothing, etc.). For complete information pertaining to worker protection standards, visit the EPA website.*

**For more information, please refer to the following publications:**

Integrated Pest Management in the Commercial Ornamental Industry (ENY-336)

Pesticide Information Office (RF-SR012)

Insecticide Safety (ENY-416)

Applications of Insecticides and Miticides (Commercial Ornamental Plants) (ENY-337)

Insect Attractants and Traps (ENY-277)

Beneficial Insects and Mites (ENY-276)

Natural Enemies and Biological Control (ENY-822)

**NOTE : The recommended pesticides (Table 1) are available in many different formulations, only a few of the more common are listed. Other formulations may be available. Be sure to read and follow all label directions and precautions closely. By clicking on the highlighted pesticides, the reader will be linked to a site that contains the label for that particular material. Some sites also have MSDS sheets available in a PDF format.**

Labeled Use Code:

(F) non-greenhouse - shadehouse and field only.

(G) greenhouse use.

When multiple products are listed, these letters may refer to one or more of the materials listed, but not necessarily all.

**Table 1.** Insect and Mite Control Suggestions for Commercial Foliage Plants (Be sure specific crop and site is listed on the label.)

Pest	Pesticide	Common name	Trade Name and Formulation
Aphids	F,G	acephate	1300 Orthene TR, Acephate Pro 75 or WSP, Orthene Turf, Tree & Ornamental Spray or 97
	F,G	acetamiprid	Tristar
	F,G	bifenthrin	Talstar Flowable, Attain TR, Talstar Nursery Flowable
	F,G	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
		clothianidin	Celero 16 WSG
	F,G	cyfluthrin	Decathlon 20 WP
	G	cyfluthrin + chlorpyrifos	Duraplex TR
	F	cyfluthrin + imidacloprid	Discus
		dinotefuran	Safari
	F,G	endosulfan	Endosulfan 3 EC, 50WP
	F,G	fenpropathrin	Tame 2.4 EC
		flonicamid	Aria
	F,G	fluvalinate	Mavrik Aquaflo
	F,G	horticultural oil	Sunspray Ultra Fine, Ultra-Fine Oil
	F,G	imidacloprid	Marathon II, 1% G, 60 WP
	G	insecticidal soap	M-Pede, Insecticidal Soap 49.52 CF
	G	kinoprene	Enstar II
	F	malathion	Malathion 57% EC
	F,G	pymetrozine	Endeavor
	F,G	pyrethrin	1100 Pyrethrum TR
F,G	thiamethoxam	Flagship	
Bagworms	F,G	acephate	Acephate Pro 75 or WSP, Orthene Turf, Tree and Ornamental Spray or 97
	F,G	azadirachtin	Azatin XL
	F,G	<i>Bacillus thuringiensis</i>	Dipel DF
	F	carbaryl	Sevin 80 WSP
	F,G	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50W
	F,G	spinosad	Conserve SC
		tebufenozide	Confirm T&O

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Pest	Pesticide	Common name	Trade Name and Formulation
<b>Beetles (including weevils)</b>	F,G	acephate	Acephate Pro 75 or WSP, Orthene Turf, Tree & Ornamental Spray or 97
	F,G	azadirachtin	Azatin XL
	F	bifenthrin	Talstar Nursery Granular, Talstar Flowable, Onyx... other Talstar labels
	F	carbaryl	Sevin 80 WSP
	F,G	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
	F,G	cyfluthrin	Decathlon 20 WP
	F	diazinon	Diazinon 50W, 50 WSB
	F,G	fenpropathrin	Tame 2.4 EC
	F,G	imidacloprid	Marathon II, 1% G, 60 WP
	F,G	permethrin	Astro
	F,G	spinosad	Conserve SC
<b>Beet Armyworm</b>	F	<i>B. thuringiensis</i>	Javelin
	F,G	fenpropathrin	Tame 2.4 EC
	F,G	permethrin	Pounce 3.2 EC, Astro
	F,G	spinosad	Conserve SC
<b>Other Caterpillars</b>	F,G	acephate	1300 Orthene TR, Acephate Pro 75 or WSP, Orthene Turf, Tree & Ornamental Spray or 97
	F,G	<i>B. thuringiensis</i>	Dipel DF, XenTari, XenTari DF
	G	bifenthrin	Talstar Flowable, Attain TR
	F	carbaryl	Sevin 80 WSP
	F	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
	F,G	cyfluthrin	Decathlon 20 WP
	G	cyfluthrin + chlorpyrifos	Duraplex TR
	G	diflubenzuron	Adept
	F,G	spinosad	Conserve SC
F,G	tebufenozide	Confirm T/O	
<b>Remarks:</b> Apply when larvae are small. They are more difficult to control as they approach maturity. It is especially important to use a spreader-sticker with <i>B. thuringiensis</i> ; this material is not suggested for armyworms beyond the second instar. To reduce phytotoxicity, apply bendiocarb <b>only</b> to point of glisten.			

**Table 1.** Insect and Mite Control Suggestions for Commercial Foliage Plants (Be sure specific crop and site is listed on the label.)

<b>Pest</b>	<b>Pesticide</b>	<b>Common name</b>	<b>Trade Name and Formulation</b>
<b>Fungus Gnat Larvae</b>	F,G	azadirachtin	Azatin XL
	F,G	<i>B. thuringiensis</i>	Gnatrol
	F,G	cyfluthrin	Decathlon 20 WP
	G	cyfluthrin + chlorpyrifos	Duraplex TR
	G	cyromazine	Citation 75 WP
	G	diflubenzuron	Adept
	F,G	fenoxycarb	Precision 25 WP, Preclude TR
	G	kinoprene	Enstar II
	F,G	pyrethrum	1100 Pyrethrum TR
	F,G	pyriproxyfen	Distance IGR
	F,G	resmethrin (adult gnats only)	SBP-1382
	F,G	thiamethoxam	Flagship
<b>Gall Insects</b>	F	carbaryl	Sevin 80 WSP, Sevin SL
	F,G	chlorpyrifos	Dursban 50W
	F	deltamethrin	DeltaGard GC 5SC
	F,G	spinosad	Conserve SC
<b>Grasshoppers</b>	F	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
	F,G	cyfluthrin	Decathlon 20 WP
<b>Lacebugs</b>	F,G	acephate	1300 Orthene TR, Orthene Turf, Tree & Ornamental Spray
		acetamiprid	TriStar
	F,G	bifenthrin	Talstar Flowable, Attain TR
	F	carbaryl	Sevin SL, 80 WSP
		dinotefuran	Safari
	F,G	imidacloprid	Marathon II, 1% G, 60 WP, Merit 75 WP, WSP
	F	malathion	Malathion 57% EC
	F,G	permethrin	Astro
	F,G	thimethoxam	Flagship
<b>Leafminers</b>	F,G	abamectin	Avid 0.15 EC
	F,G	acephate	Orthene Turf, Tree and Ornamental Spray
	F,G	azadirachtin	Azatin XL
	F,G	bifenthrin	Talstar Flowable, Attain TR
	F,G	chlorpyrifos	Dursban 50W
	F,G	permethrin	Astro
	F,G	spinosad	Conserve SC

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<b>Pest</b>	<b>Pesticide</b>	<b>Common name</b>	<b>Trade Name and Formulation</b>
<b>Leafrollers, Leaf Tiers</b>	F,G	azadirachtin	Azatin XL
	F,G	<i>Bacillus thuringiensis</i>	Dipel DF, XenTari, XenTari DF
	F	carbaryl	Sevin 80 WSP
	F,G	chlorpyrifos	Dursban 50W
	F,G	permethrin	Astro
	F,G	spinosad	Conserve SC
<b>Mealybugs</b>	F,G	acephate	1300 Orthene TR, Acephate Pro 75 or WSP, Orthene Turf, Tree & Ornamental Spray or 97
	F,G	acetamiprid	Tristar
	F,G	azadirachtin	Azatin XL, Ornazin 3% EC
	F,G	bifenthrin	Talstar Flowable, Attain TR
	F,G	buprofezin	Talus
	F	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
		clothianidin	Celero 16 WSG
	F,G	cyfluthrin	Decathlon 20 WP
	G	cyfluthrin + chlorpyrifos	Duraplex TR
	F	dimethoate	Dimethoate 400
		flonicamid	Aria
	F,G	imidacloprid	Marathon II, 1% G, 60 WP
	F,G	insecticidal soap	M-Pede, Insecticidal Soap 49.52 CF
	G	kinoprene	Enstar II
	F	malathion	Malathion 5EC
	F,G	neem oil	Triact 70
	F,G	other oils	Organocide, Sunspray Ultra Fine, Ultra-Fine Oil
	F,G	pyriproxyfen	Distance IGR
F,G	thiamethoxam	Flagship	

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<b>Pest</b>	<b>Pesticide</b>	<b>Common name</b>	<b>Trade Name and Formulation</b>
<b>Mites, Spider</b>	F,G	abamectin	Avid 0.15 EC
		acequinocyl	Shuttle
	G	bifenthrin	Talstar Flowable, Attain TR
	F,G	bifenazate	Floramite 50% WP
		chlorfenapyr	Pylon 2% EC
	F,G	clofentezine	Ovation SC
	G	cyfluthrin + chlorpyrifos	Duraplex TR
	F,G	etoxazole	Tetrasan
	F,G	fenbutatin-oxide	Vendex 50WP
	G	fenpyroximate	Akari 5% SC
	F	hexythiazox	Hexygon
	F,G	horticultural oil	Sunspray Ultra Fine, Ultra-Fine Oil
	F,G	insecticidal soap	M-Pede, Insecticidal Soap 49.52 CF
	F,G	neem oil	Triact 70
	G	pyridaben	Sanmite 75 WP
	F,G	spinosad	Conserve SC
G	sulfotepp	Plantfume 103	
<b>Mites, Broad &amp; Cyclamen</b>	F	chlorfenapyr	Pylon
	G	endosulfan	Endosulfan 3 EC, 50WP Thiodan 3 EC
<b>Scales</b>	F,G	acephate	1300 Orthene TR, Acephate Pro 75 or WSP, Orthene Turf, Tree & Ornamental Spray or 97
	F,G	azadirachtin	Azatin XL
	F,G	buprofezin	Talus
	F,G	chlorpyrifos	Chlorpyrifos Pro 2 or 4, Dursban 50 W, DuraGuard ME
	G	cyfluthrin + chlorpyrifos	Duraplex TR
		flonicamid	Aria
	F,G	horticultural oil	Sunspray Ultra Fine, Ultra-Fine Oil, Organocide
	F,G	imidacloprid	Marathon II, 1% G, 60 WP
	F,G	insecticidal soap	M-Pede, Insecticidal Soap 49.52 CF
	G	kinoprene	Enstar II
	F	malathion	Malathion 5EC
	F,G	pyriproxyfen	Distance IGR
	F,G	thiamethoxam	Flagship

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Pest	Pesticide	Common name	Trade Name and Formulation
<b>Shoreflies</b>	G	cyfluthrin + chlorpyrifos	Duraplex TR
	G	cyromazine	Citation 75 WP
	G	diflubenzuron	Adept
	F,G	fenoxycarb	Precision 25 WP, ME, Preclude TR
	F,G	pyproxifen	Distance IGR
<b>Silverleaf (Sweetpotato) Whitefly and Other Whiteflies</b>	F,G	abamectin	Avid 0.15 EC
	F,G	acetamiprid	Tristar
	F,G	azadirachtin	Azatin XL
	G	bifenthrin	Talstar Flowable, Attain TR
		buprofezin	Talus
		clothianidin	Celero 16 WSG
	F,G	endosulfan	Endosulfan 3 EC, 50WP Thiodan 3 EC
	F,G	fenpropathrin + acephate	Tame 2.4 EC + orthene
	F,G	horticultural oil	Sunspray Ultra Fine, Ultra-Fine Oil
	F,G	imidacloprid	Marathon II, 1% G, 60 WP
	F,G	insecticidal soap	M-Pede, Insecticidal Soap 49.52 CF
	G	kinoprene	Enstar II
	F,G	pymetrozine	Endeavor
	F,G	pyriproxyfen	Distance IGR
	G	sulfotepp	Plantfume 103
F,G	thiamethoxam	Flagship	
<b>Remarks:</b> Unlike other whiteflies, the silverleaf whitefly is very difficult to control. To minimize additional resistance problems, one of the above insecticides should be applied two times per week throughout one life cycle (3 weeks) to control an established infestation. (Does not apply to Marathon granules). Insecticidal soap is also effective; however, phytotoxicity may occur when applied repeatedly. Monitor the population to determine if the particular insecticide being applied is reducing whitefly numbers. Some populations may be resistant to one or more of these insecticides. If the infestation persists, use another compound from the above, following the same schedule. Do not apply tank mixes, (except Tame + orthene) as they may enhance resistance. If low numbers of whiteflies persist, apply one of the above insecticides once per week for 3 weeks, then switch insecticides. Undersides of leaves must be covered thoroughly to achieve satisfactory control. Phytotoxicity of these insecticides has not been extensively evaluated. Plants may be damaged, sometimes severely, with any pesticide. Be sure the pesticide is labeled for your particular crop, and closely follow all label directions.			
<b>Slugs and Snails</b>	F,G	methiocarb	Mesurool 75 W
	F,G	metaldehyde	Deadline Bullets or M-Ps, Metaldehyde 3.5G or 7.5G
<b>Springtails</b>	F,G	insecticidal soap	Insecticidal Soap 49.52 CF
	F,G	malathion	Malathion 5EC