

ORNAMENTALS

ORNAMENTALS (INCLUDES FLOWERS, SHRUBS AND GROUND COVERS) HOME INSECT CONTROL

Will Hudson, Extension Entomologist

INSECTS	INSECTICIDE & FORMULATION*	AMOUNT/GALLON OF WATER	REMARKS AND PRECAUTIONS
Aphids	Insecticidal soap pyrethrins pyrethrum horticultural oils imidacloprid 1.47% (Bayer Advanced) acephate (Orthene, etc.) 75S	1-2 oz. 2 tsp.	Per label directions. Per label directions. Per label directions. Per label directions. See note below.
Azalea leaf miner	acephate (Orthene TTO) imidacloprid 1.47% (Bayer Advanced)	1 tsp.	Per label directions.
Bagworm	malathion 57EC <i>Bacillus thuringiensis</i> (Biotrol WP, Thuricide, Sok-Bt) Various pyrethroids	2 tsp.	In winter, hand-pick and burn if only a few bagworms are present. Per label directions. See note below.
Borers (various kinds)	permethrin imidacloprid (Bayer Advanced)	per label	Apply to trunk and lower limbs in Spring as per label directions. Imidacloprid is effective against flat-headed borers and some clear-winged moths only.
Boxwood leaf miner	acephate (Orthene, etc.) 75S imidacloprid 1.47% (Bayer Advanced)	2 tsp.	Per label directions.
Caterpillars (Misc. leaf feeders)	carbaryl (Sevin) 50 WP <i>Bacillus thuringiensis</i> (Biotrol WP, Thuricide, Sok-Bt) Various pyrethroids	2 Tbs.	Treat as needed. Per label directions. See note below.
Holly leaf miner	imidacloprid 1.47% (Bayer Advanced)		Spray in late spring to kill larvae in mines. Per label directions.
Japanese beetle (adults)	carbaryl (Sevin) 50WP imidacloprid (Bayer Advanced)	2 Tbs.	Treat as needed. Repeat applications as necessary.
Lace bugs	acephate (Orthene, etc.) imidacloprid 1.47% (Bayer Advanced)	1 tsp.	Apply in early spring when nymphs of first generation are present. Per label directions.
Scale Insects	malathion 57EC car- baryl (Sevin) 50WP Horticultural oils Insec- ticial soap imidacloprid (Bayer Advanced) dinotefuran (Safari from Greenlight)	2 tsp. 2 Tbs. 1-2 oz.	Apply in spring to control crawlers. Make applications at 2 week intervals. Per label directions. Per label directions. Per label directions.
Spider mites	Horticultural oils Insecticidal soap bifenthrin disulfoton 1.00% (Bayer Advanced)	1-2 oz.	Per label directions. Per label directions. Per label directions.

NOTE: A number of pyrethroid materials are available in a variety of homeowner formulations for use as broad-spectrum contact insecticides. Common names include bifenthrin, cyfluthrin, cypermethrin, deltamethrin, lambda-cyhalothin, permethrin and tralomethrin. Active ingredients are listed on the label.

Most of the materials listed in the Commercial Landscape Insect Control section of this handbook are not Restricted Use Pesticides, and so are available for homeowner use. They are not marketed for homeowners, in small quantities at retail garden centers, but they could provide options for some homeowners. Consult your county Cooperative Extension Agent for advice on alternatives.

ORNAMENTALS (INCLUDES FLOWERS, SHRUBS AND GROUND COVERS) HOME INSECT CONTROL (continued)

INSECTS	INSECTICIDE & FORMULATION*	AMOUNT/GALLON OF WATER	REMARKS AND PRECAUTIONS
Slugs and snails	metaldehyde mesurool 2B iron phosphate (Slug-Go)		Follow label directions. Follow label directions.
Thrips	carbaryl (Sevin) 50WP malathion 57EC disulfoton 1.00% (Bayer Advanced) Various pyrethroids	2 Tbs. 2 tsp.	Apply as needed. Per label directions. See note below.
Whitefly	Insecticidal soap pyrethrins pyre- thrums bifenthrin imidacloprid 1.47% (Bayer Advanced) disulfoton 1.00% (Bayer Advanced) dinotefuran (Safari from Greenlight)		Per label directions. Per label directions. Per label directions. Per label directions. Per label directions.

NOTE: A number of pyrethroid materials are available in a variety of homeowner formulations for use as broad-spectrum contact insecticides. Common names include bifenthrin, cyfluthrin, cypermethrin, deltamethrin, lambda-cyhalothin, permethrin and tralomethrin. Active ingredients are listed on the label.

Most of the materials listed in the Commercial Landscape Insect Control section of this handbook are not Restricted Use Pesticides, and so are available for homeowner use. They are not marketed for homeowners, in small quantities at retail garden centers, but they could provide options for some homeowners. Consult your county Cooperative Extension Agent for advice on alternatives.

* Numerous products containing insecticide are available to homeowners. Products containing the same insecticide may vary in the concentration of the active ingredient. Always consult the product label for information on rate of application.

FLOWERS – HOMEOWNER OUTDOOR WEED CONTROL

Mark A. Czarnota, Extension Horticulturist – Weed Science

USE STAGE AND HERBICIDE	FORMULATION	AMOUNT OF FORMULATION/ GAL. PER 1000 SQ. FT.	REMARKS AND PRECAUTIONS
HERBACEOUS FLOWERS			
PREEMERGENCE ^{1,2,3,4}			
benefin + oryzalin (Amaze 2G)	2.0% granular	4.6 - 6.9 lb.	Can be applied over-the-top of several established bedding plants (see label). Provides broad spectrum control of many broad leaf and annual grass weeds.
oryzalin (Surflan 4AS)	4.0 lb/gal	1.5 - 3.0 fl oz	Controls annual grasses and some broadleaf weeds. Can be applied over-the-top to certain established flowers. One-half inch of rainfall or irrigation water immediately after application will aid in weed control. Do not use on Coleus or Begonia species.
trifluralin (Preen 1.47G)	1.47% granular	6.25 lbs. ¹	Apply to established flowers to control annual grasses and some broadleaf weeds from seed. Optimum weed control is obtained when rainfall or irrigation occurs within a few hours of application. DO NOT apply to seedbeds or to non-rooted plants. Preen is also available on a dry fertilizer carrier.
POSTEMERGENCE			
clethodim (Envoy Plus)	0.97 lb/gal	0.3 - 0.7 fl oz	Apply to actively-growing grasses, which are not drought stressed. Make sure to add a crop oil concentrate at 1% V/V to the spray solution. Refer to label for recommended list of ornamentals. Envoy will not control broadleaf weeds or nutsedges.
fluazifop-p (Grass-B-Gon and others)	See label.	See label.	Apply to actively-growing grasses, which are not drought stressed. Refer to label to determine if the addition of a surfactant is necessary. Refer to label for recommended list of ornamentals. Fluazifop will not control broadleaf weeds or nutsedges.
sethoxydim (Segment)	1.0 lb/gal	0.8 - 1.4 fl oz	Apply to actively growing grasses, which are not drought stressed. DO NOT add a crop oil concentrate or surfactant to Vantage (the formulation contains an adjuvant). Vantage will not control broadleaf weeds or nutsedge(s).
AREAS ADJACENT TO ORNAMENTAL FLOWERS (POSTEMERGENCE)			
glufosinate (Finale 1.0L)	1.0 lb/gal	2.2-4.4 fl oz	Apply glufosinate to control emerged weeds. DO NOT allow spray mist to contact ornamental foliage or severe injury will occur. Glufosinate is poor on well established perennial weeds with extensive underground storage structures (Florida betrony, bermudagrass, nutsedge, etc.)
glyphosate Various trade names and formulation available	See label.	See label.	Apply glyphosate to control most emerged weeds. DO NOT allow spray mist to contact ornamental foliage or severe injury will occur. Avoid applications to drought stressed weeds.
halosulfuron (Sedgehammer 75DF) (Manage 75 DF)	75DF	0.9 grams (spray weeds to runoff)	Apply as a post-directed application to control yellow and purple nutsedge in established woody ornamentals. Apply with 1/3 fluid ounce of nonionic surfactant. DO NOT allow the spray to contact foliage of desirable woody ornamentals. Wait three months after transplanting before application. On areas scheduled to be planted in woody ornamentals wait 4 weeks between application and transplanting.

¹ All preemergent herbicides require a rain or irrigation event in order for herbicide activation to occur (approximately 0.5 to 1.0 inch of water). If no rain event occurs and no supplemental watering is provided after a preemergent herbicide application, weed control can be extremely poor or totally fail.

² Most preemergent herbicides will only control germinating weed seed. Generally, they will not control weeds after they have become established (1st or 2nd true leaf), and most preemergent herbicides will not control weeds coming from vegetative structures (i.e. yellow and purple nutsedge).

³ As long as the treated area remains undisturbed, most pre-emergent herbicides will provide weed control for 2 to 4 months in most growing mediums.

⁴ Do not apply preemergence herbicides to seeded beds or to non-rooted plants or in greenhouses.

ORNAMENTALS

HOMEOWNER INDOOR INSECT CONTROL

Will Hudson, Extension Entomologist

Note: Many formulations of insecticides for use in the home are combinations of active ingredients. The following list of pesticides is given as a guide to determine which pests an active ingredient is effective in controlling. Many pyrethroids, and other compounds, are now off label and there may be several brand names for different chemicals. Only the active ingredient of insecticides is listed. Other compounds, especially oils, contain a mixture of oils and these are listed under the general category of oils. The trade names below are only examples of several different formulations available and are not given as recommendations. Check the label on the insecticide container to determine what plants can be treated and the active ingredients present in the product. When possible, place plants outdoors or in an area not likely to come in contact with people, pets, or food while making insecticide application. If plants cannot be moved outside for treatment follow label precautions for indoor treatment.

INSECTICIDE AND FORMULATION*		RATE	COMMENT
bifenthrin	Ortho Houseplant and Garden Insect Killer	as directed	mealybugs, mites, whitefly, aphids.
cyfluthrin	Bayer Advanced Home Pest Control	as directed	gnats, centipedes, earwigs, scorpions. Follow label directions.
dienchlor	Pentac (aerosol)	as directed	spider mites.
imidacloprid + fertilizer	Bayer Advanced Garden 2- in-1 Plant Spikes	as directed	aphids, mealybugs, whitefly.
insecticidal soap	M-Pede	1-2%	aphids, mealybugs, scale, thrips, mites, whitefly. Coverage is important, spray must contact pest to be effective.
horticultural oil	Plant Spray Oil (aerosol) Sunspray Ultrafine, Saf-T-Side	1-2%	scale, whitefly and mites. Coverage is important, spray must contact pest to be effective.
pyrethrum	Pyrethrum (aerosol)	as directed	aphids, mealybugs, thrips, whitefly.
resmethrin	Resmethrin (aerosol)	as directed	aphids and whitefly.
Tralomethrin		as directed	mites

* Numerous products containing insecticide are available to homeowners. Products containing the same insecticide may vary in the concentration of the active ingredient. Always consult the product label for information on rate of application. The following table provides the common name, brand name and lists manufacturers that package insecticides in a product(s) for homeowner use.

COMMON NAME	BRAND NAME AND COMMONLY AVAILABLE PRODUCTS
bifenthrin	Ortho products
cyfluthrin	Bayer Advanced Home Pest Control
dienchlor	Pentac; found in various Dexol products
horticultural oil	SunSpray Ultrafine, Saf-T-Side, Superior Oil, Golden Natural Spray Oil, Volck Oil; found in Green Light products and others
imidacloprid + fertilizer	Bayer Advanced Garden 2-in-1 Plant Spikes
insecticidal soap	M-Pede and Safer's Soap
pyrethrum	Pyrethrum; found in several Safer products, Garden Safe
pyrethroids	Ready to use and concentrate — Follow label directions
resmethrin	Resmethrin; found in Ortho, Dexol, Hot Shot and Rid-a-Bug products

WOODY ORNAMENTALS WEED CONTROL FOR HOMEOWNERS¹

Mark A. Czarnota, Extension Horticulturist-Weed Science

CROP AND USE STAGE	HERBICIDE FORMULATION	AMOUNT OF FORMULATION/ GAL. PER 1000 SQ. FT.	REMARKS AND PRECAUTIONS
PREEMERGENCE ^{2,3,4,5}	dichlobenil (Casoron 4G)	2.3 - 3.4 lb	<u>USE ONLY ON ESTABLISHED WOODY ORNAMENTALS.</u> Apply between November 15 and February 15. Good product for the controlling non-seed bearing plants (i.e. Bracken fern (<i>Pteridium aquilinum</i>)), winter annuals, and Florida betony (<i>Stachys floridana</i>). After application, Casoron must be watered in with ½ to 1 inch of water. <u>DO NOT</u> apply until 4 weeks after transplanting woody ornamentals.
	isoxaben + trifluralin (Snapshot 2.5 TG)	2.3 - 4.6 lb	Controls a wide range of annual weeds in certain woody ornamentals, trees and groundcovers. <u>DO NOT</u> apply to newly planted ornamentals until the soil has firmly settled and no cracks are present. Not recommended for applications to bedding plants. Groundcovers should be established and well-rooted prior to application. Apply one-half inch of irrigation water, or uniformly incorporate into the soil to a depth of 1 to 2 inches, if rainfall is not received within 3 days of application.
	oryzalin (Surflan 4 AS)	1.5 - 3.0 fl. oz	Controls annual grasses and some broadleaf weeds. Apply over-the-top to established ornamentals. One-half inch of rainfall or irrigation water immediately after application will aid in weed control. Surflan may be tank-mixed with glyphosate for control of emerged weeds. See REMARKS for glyphosate.
	trifluralin (Treflan 5 G) (Preen 1.47 G)	1.8 lb 6.25 lb	Apply prior to planting and to established plants. Optimum weed control is obtained when rainfall or irrigation occurs within a few hours of application. <u>DO NOT</u> apply to newly planted groundcovers. <u>DO</u> apply Treflan 5G to ornamentals with wet foliage. <u>DO NOT</u> apply to seeded beds or to non-rooted plants. Use the trifluralin product that is registered for ornamental use. Preen is also available on dry fertilizer carriers.
	benefin + oryzalin (XL 2 G) (Amaze 2 G)	4.6 - 6.9 lb 4.5 lb	Apply only to established ornamentals. One-half inch of rainfall or irrigation water immediately after application will aid in weed control.
POSTEMERGENCE ¹	glufosinate (Finale) 1 lb./gal.	2.2 - 4.4 fl. oz	Apply glufosinate to kill most emerged weeds. <u>DO NOT</u> allow spray mist to contact ornamental foliage or severe injury will occur. Avoid applications to drought stressed weeds. Ready-to-use, premixed formulations of Finale are also available. Finale is poor on well established perennial weeds with extensive underground storage systems (Florida betony, bermudagrass, nutsedge, etc.)
	glyphosate Various trade names and formulations available	See Label	Apply glyphosate to kill most emerged weeds. <u>DO NOT</u> allow spray mist to contact ornamental foliage or severe injury will occur. Avoid applications to drought stressed weeds. Glyphosate is very water soluble and can be tanked mixed with many preemergent herbicides. Refer to glyphosate label to determine compatibility with preemergent herbicides.
AREAS ADJACENT TO ORNAMENTALS (POSTEMERGENCE)	halosulfuron (Manage 75DF) (SedgeHammer 75DF)	0.9 grams (spray weeds to runoff)	Apply as a post-directed application to control yellow and purple nutsedge in established woody ornamentals. Apply with 1/3 fluid ounce of nonionic surfactant. <u>DO NOT</u> allow the spray to contact foliage of desirable woody ornamentals. Wait three months after transplanting before application. On areas scheduled to be planted in woody ornamentals wait 4 weeks between application and transplanting.

WOODY ORNAMENTALS WEED CONTROL FOR HOMEOWNERS (continued)

CROP AND USE STAGE	HERBICIDE FORMULATION	AMOUNT OF FORMULATION/ GAL. PER 1000 SQ. FT.	REMARKS AND PRECAUTIONS
AREAS ADJACENT TO ORNAMENTALS (POSTEMERGENCE) (cont.)	imazaquin (Image) 70 DG	0.2 - 0.26 oz	Can be applied over the top of several ornamentals (see label). Make sure to add a surfactant at 0.25% V/V. Controls several difficult weeds including sedges, wild onion, and wild garlic.
	Potassium salts of fatty acids Scythe 4.2L and various other trade names are available	See label	Apply Scythe to kill most emerged weeds. DO NOT allow spray mist to contact ornamental foliage or severe injury will occur. Avoid applications to drought stressed weeds. Scythe is poor on well established perennial weeds with extensive underground storage systems (Florida betony, bermudagrass, nutsedge, etc.). Also provides postemergent control of mosses, algae, liverworts and lichens inside greenhouses, on growing containers and benches.
POSTEMERGENCE GRASS CONTROL	clethodim (Envoy Plus 0.97 lb/gal)	0.3 - 0.7 fl oz	Apply to actively-growing grasses, which are not drought stressed. Make sure to add a crop oil concentrate at 1% V/V to the spray solution. Refer to label for recommended list of ornamentals. Envoy Plus will not control broadleaf weeds or nutsedge.
	fluazifop-P (Grass-B-Gon and others)	See Label	Apply postemergence to actively-growing grasses, which are not drought stressed. Refer to the label to determine if a surfactant is necessary, and for a recommended list of ornamentals. Fluazifop will not control broadleaf weeds or nutsedge.
	sethoxydim (Segment) 1.0 lb./gal.	0.8 - 1.4 fl. oz	Apply postemergence to actively growing weedy grasses, which are not drought stressed. DO NOT add a surfactant or crop oil concentrate to Vantage. Vantage will not control broadleaf weeds or nutsedge(s).
ORGANIC PRODUCTS	Acetic acid (Weed Pharm and others)	Ready to use (RTU) product, no dilution required	Acetic acid products are burndown products that kill most emerged weeds. DO NOT allow spray mist to contact foliage of desirable plants as severe injury can occur. Avoid applications to drought stressed weeds. Acetic acid products are poor on well-established perennial weeds with extensive underground storage systems (Florida betony, bermudagrass, nutsedge, etc.). Provides no preemergence control weed control.
	Clover oil (Burnout II and others)	Ready to use (RTU) product, no dilution require	Clover oil products are burndown products that kill most emerged weeds. DO NOT allow spray mist to contact foliage of desirable plants as severe injury can occur. Avoid applications to drought stressed weeds. Clove oil products are poor on well-established perennial weeds with extensive underground storage systems (Florida betony, bermudagrass, nutsedge, etc.). Provides no preemergence weed control.
	Corn Gluten Weed prevention Plus, Luscious lawn, and others	Rates vary by product but ~ 1000 to 2000 lbs/A	Corn gluten provides preemergence weed control of weeds coming from seed in lawn and garden situations. It can inhibit the germination of desirable plants coming from seed. It also adds 10% nitrogen by weight.

¹There are many other herbicides available to the homeowner that are not restricted use. Most of these herbicides are available in larger packaging and can be harder to attain. Moreover, most of these commercial products can pose greater potential for plant injury if used improperly.

²All preemergent herbicides require a rain or irrigation event in order for herbicide activation to occur (approximately 0.5 to 1.0 inch of water). If no rain event occurs and no supplemental watering is provided after a preemergent herbicide application, weed control can be extremely poor or totally fail.

³Most preemergent herbicides will only control germinating weed seed. Generally, they will not control weeds after they have become established (1st or 2nd true leaf), and most preemergent herbicides will not control weeds coming from vegetative structures (i.e. yellow and purple nutsedge).

⁴As long as the treated area remains undisturbed, most pre-emergent herbicides will provide weed control for 2 to 4 months in most growing mediums.

⁵Do not apply preemergence herbicides to seeded beds or to non-rooted plants or in greenhouses.

ORNAMENTALS – WEED RESPONSE TO HERBICIDES

Mark A. Czarnota, Extension Horticulturist-Weed Science

	dichlobenil	dimethenamid	flumioxazin	isoxaben	norflurazon	oxadiazon	simazine	oryzalin	oxyfluorfen
Time of Application	PRE								
PERENNIAL WEEDS (control of plants)									
bahiagrass		P	P	P	P	P	P	P	P
bermudagrass		P	P	P	P	P	P	P	P
dallisgrass		P	P	P	P	P	P	P	P
nutsedge, purple	G	P	P	P	P	P	P	P	P
nutsedge, yellow	G	F	P	P	P	P	P	P	P
tall fescue		P	P	P	P	P	P	P	P
wild garlic / wild onion	G	P	P	P	P	P	P	P	P
ANNUAL GRASSES (control of plants from seed with pre herbicides, control of plant with post herbicides)									
annual bluegrass	G	G	E	P-F	E	G	G	E	G
crabgrass	G	G	E	P-F	G	G	G	E	G
goosegrass	G	G	E	P	G	E		E	G
ANNUAL SMALL SEEDED BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)									
bittercresses		E	E	G	G	G	F	G	G
common chick weed	G	E	E	E	G	G	E	G	G
deadnettle	G				G		G	G	
dodder	E								
henbit	G		E	E	F	G	E	G	G
hop clovers	G			G		G	E		
knotweed	G		E		G	G	E	G	G
lespedeza	G			F		G	E		
morningglories	F	F	G	G	F	F	G	F	G
mustards	G	G	G	F		E	E	P	G
niruri / phyllanthus		E	E	E	G	G	G	G	G
spurge	G	E	E	E	G	F	E	G	G
woodsorrel	G	E	E	E	P-F	E	E	G	G
PERENNIAL BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)									
clovers	G	G	E	G		G	E	G	G
dandelion	G		E	G		G	G	G	G
dichondra			E						
docks	G		E						G
Florida betony	E				P				
mallow			E	G	G	G	G	G	G
mouseear chickweed	G		E	G		G	G	G	G
mugwort	E								
pennywort	G								
plantain			G	G		G		G	G

Key to Response Symbols: E = Excellent Control (>90%); G = Good Control (70 to 90%); F = Fair Control (50 to 70%); P = Poor Control (<50%)

If no symbol is given, weed response is unknown.

ORNAMENTALS – WEED RESPONSE TO HERBICIDES (continued)

	prodiamine	trifluralin	clethodim	clopyralid	diquat	fluazifop	glufosinate
Time of Application	PRE		POSTEMERGENCE				
PERENNIAL WEEDS (control of plants)							
bahiagrass	P	P	G	P	P	G	P
bermudagrass	P	P	G-E	P	P	G-E	P
dallisgrass	P	P	G	P	P	G	P
nutsedge, purple	P	P	P	P	P	P	P
nutsedge, yellow	P	P	P	P	P	P	P
tall fescue	P	P	G	P	P	F	P
wild garlic	P	P	P	P	P	P	P
ANNUAL GRASSES (control of plants from seed with pre herbicides, control of plant with post herbicides)							
annual bluegrass	E	G	E	P	G	E	G
crabgrass	E	E	E	P	G	E	G
goosegrass	G	G	E	P	G	E	G
ANNUAL SMALL-SEEDED BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)							
bittercresses	G	G	P		G	P	G
common chick weed	G	G	P		G	P	E
deadnettle	G	G	P		G	P	G
dodder	P		P			P	
henbit	G	G	P		G	P	E
knotweed			P			P	E
lespedeza	G	G	P	E	F	P	F
morningglories	G	F	P		G	P	P
mustards	F	F	P		G	P	G
niruri / phyllanthus	G	P	P		G	P	G
spurge	G	G	P		G	P	G
woodsorrel	G	F	P		G	P	G
PERENNIAL BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)							
clovers	E	G	P	E	F	P	F
dandelion	G	G	P	G	G	P	P
dichondra			P	P		P	
docks	G	G	P	G	P	P	G
Florida betony			P	P	P	P	P
mallow	G	G	P		G	P	G
mouseear chickweed	G	G	P		G	P	G
mugwort			P	E	G	P	P
pennywort			P	G	G	P	P
plantain	G	G	P	P	G	P	F

Key to Response Symbols: E = Excellent Control (>90%); G = Good Control (70 to 90%); F = Fair Control (50 to 70%); P = Poor Control (<50%)
 If no symbol is given, weed response is unknown.

ORNAMENTALS – WEED RESPONSE TO HERBICIDES (continued)

	glyphosate	halosulfuron	paraquat	pelargonic acid	sethoxydim	triclopyr
Time of Application	POSTEMERGENCE					
PERENNIAL WEEDS (control of plants)						
bahiagrass	G	P	P	P	G	P
bermudagrass	G	P	P	P	G	P
dallisgrass	E	P	P	P	P	P
nutsedge, purple	G	E	P-F	P	P	P
nutsedge, yellow	G	E	P-F	P	P	P
tall fescue	E	P	P	P	G	P
wild garlic	G	G	P		P	
ANNUAL GRASSES (control of plants from seed with pre herbicides, control of plant with post herbicides)						
annual bluegrass	E	P	E	G	P-F	P
crabgrass	G	P	G	G	E	P
goosegrass	E	P	F-G	F	E	P
ANNUAL SMALL-SEEDED BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)						
bittercrosses	G		E	F	P	G
common chickweed	E		E	G	P	G
deadnettle	G		E	G	P	G
dodder	E				P	
henbit	E		E	G	P	G
knotweed	E		E	G	P	G
lespedeza	E			F	P	G
morningglories	G		F-G	F	P	G
mustards	E		E	G	P	G
niruri / phyllanthus	E		E		P	G
spurge	E		E	G	P	G
woodsorrel	E		E	G	P	G
PERENNIAL BROADLEAF WEEDS (control of plants from seed with pre herbicides, control of plant with post herbicides)						
clovers	F			P-F	P	G
dandelion	E	G		P	P	G
dichondra	E				P	G
docks	E				P	G
Florida betony	G				P	G
mallow	E			F	P	G
mouseear chickweed	E			G	P	G
mugwort	E			F	P	F
pennywort	E				P	G
plantain	E				P	G

Key to Response Symbols: E = Excellent Control (>90%); G = Good Control (70 to 90%); F = Fair Control (50 to 70%); P = Poor Control (<50%)
 If no symbol is given, weed response is unknown.

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE

Paul Smith, Extension Entomologist and Elizabeth Little, Homeowner IPM/Sustainable Agriculture Extension Specialist

What is Organic Gardening? Generally accepted organic practices comprise soil management, fertilization, and pest management.

The USDA National Organic Program established rules for commercial organic production. These rules do not apply to home gardeners, but they are a useful guide to choosing organic pest management alternatives. The chemicals listed in this section are recognized as organic insecticide, fungicide and bactericide alternatives by the National Organic Program.

Organic pest management is not simply replacing a conventional pesticide with another chemical that is labeled 'organic'. Knowledge and planning are the keys to successful organic gardening. Consider a Master Gardener Class offered through your local Extension Service. Additionally, your local library offers books on organic gardening.

Principles for Organic Gardening

Healthy plants are less susceptible to pests and disease. Stressed plants attract some pests.

Choose plants that are adapted for your local climate.

When you buy plants, inspect them carefully for signs of pest infestation.

Test the soil to make sure the plants are receiving the nutrients they need to stay healthy.

Plant at the right date and under the proper light/water conditions.

Consult your local Cooperative Extension agent for advice about choosing plants and creating healthy growing conditions.

Anticipate problems.

Find out what pests and pathogens are common in your area.

Look for plant varieties resistant to regular pests and pathogens.

Learn the life cycles of the pests and pathogens you expect.

When/how do they arrive?

Are any stages of the life cycle vulnerable (or protected)?

Cooperative Extension is your best source.

Scout for pest and disease problems regularly.

It is much easier to manage young insects, early infections, and small populations.

Scout at least three times per week in warm weather.

Look at the whole plant, under leaves, and along stems.

Practice good sanitation.

Dispose of diseased or spent plant materials promptly.

Many pests and pathogens will persist over the winter in crop debris.

Use crop rotation.

Do not plant the same type of plants in the same place each year.

Encourage natural controls.

An assortment of flowers and herbs will attract beneficial insects.

Use mechanical controls.

Row covers and hand-picking are practical on a small scale.

Water spray is effective against many insects if the plants are hardy enough to withstand a vigorous spray.

Utilize cultural controls.

An appropriate planting date may avoid peak pest populations.

Mulch helps keep plants healthy and controls some pests and pathogens.

Avoid plants or particular varieties that have a lot of pest problems.

Use chemical controls sparingly. An “organic” listing does not eliminate all risks.
 Spot treat instead of spraying a large area.
 Use pesticides only when other options are not practical.

ORGANIC INSECTICIDE/MITICIDE OPTIONS

Except for spinosad products, nearly all organic insecticides have little or no residual activity. Repeated applications may be necessary before you see results.

Nearly all organic pesticides have a very broad range of use sites, which means you can use them nearly anywhere in the garden or landscape. Check the label to be sure it is labeled for the site you need to treat.

USE ALL PESTICIDES ACCORDING TO THE LABEL INSTRUCTIONS! If used improperly, even natural products may injure your family or pets.

To use this guide, locate your pest problem and identify the chemical options. Review the chemical options for additional information and potential risks. If you need help choosing among several options, consult your local Extension agent.

Caterpillars	– pyrethrins, <i>Bacillus thuringiensis</i> kerstaki, spinosad, neem
Fire ants	spinosad (fire ant bait formulation)
Thrips	spinosad
Aphids, whiteflies, other soft bodied pests	pyrethrins, oils, insecticidal soap, neem
Stink bugs	neem, pyrethrins, spinosad
Beetles	spinosad, pyrethrins, neem
Scale insects	oils
Mites	oils, sulfur, insecticidal soap
Mosquito larvae	<i>Bacillus thuringiensis</i> israelensis
Yellow jackets	traps, pyrethrins
Slugs/snails	iron phosphate

Pyrethrins (pyrethrum) are produced by some varieties of chrysanthemum. Pyrethrins are often combined with piperonyl butoxide (PBO), which significantly increases the effectiveness of pyrethrins. The PBO is a synthetic chemical; some people do not consider PBO combinations an organic alternative.

Pyrethrins are also available in product combinations with oil or sulfur to give the products greater activity against mites and diseases.

Risks: May kill bees and other beneficials. Extremely toxic to aquatic species. Pyrethrins can be toxic to cats.

NOTE: Very short (hours) residual activity. Insects may recover from pyrethrin exposure unless PBO is added to the product.

Pyrethrin products – Garden Safe, Ortho Ecosense, Bonide, others.

Horticultural oils and dormant oils are highly refined petroleum products. Oils must be applied to the insects/mites to kill them. No residual activity.

Risks: May kill nontarget arthropods if they are covered with oil. May cause plant injury, particularly if the weather is hot or the plant is water stressed.

NOTE: Be sure you are using the right oil and the right concentrations to minimize the risk of plant injury.
 Petroleum oil products – Bonide All Seasons and many others

Other oils include sesame oil, soybean oil, and canola oil. We have limited information about their efficacy, but their activity will be similar to the petroleum oils. They can also cause phytotoxicity.

Neem (azadirachtin) is derived from the Neem tree. Leaf extracts and oils pressed from nuts are available. Neem is an insecticide, an insect growth regulator, and a repellent. An insect growth regulator prevents juvenile insects from maturing properly.

Risks: High concentrations can harm fish. Low risk to bees and other beneficial insects.

Neem products: Green Light, others

Spinosad comes in two forms. The organic form is derived from a soil bacterium, *Saccharopolyspora spinosa*. The other form is a synthesized version of the same chemical; it is not considered to be organic.

Risks: May harm bees. Low risks for other nontarget species.

Spinosad products: Fertilome, Bulls Eye

Iron phosphate is the only organic slug bait in U.S. Used for many years in Europe.

Risks: Low risks to nontarget species.

Iron Phosphate products: Ortho Ecosense, Worryfree

Insecticidal soap may also be called Potassium Salts of Fatty Acids. They must be applied directly to the insects. They have no residual activity.

Risks: May cause plant injury, particularly when weather is hot or plant is water stressed.

Insecticidal Soap products: Ortho Ecosense, Safer, others.

Sulfur is commonly found in combination with other organic products to provide control of fungal diseases.

Risks: Low risks to nontargets. May cause irritation of skin, eyes, and throat tissue.

Sulfur products: many.

Bacillus thuringiensis kerstaki is a strain of *Bacillus* bacteria that only infects caterpillars. The caterpillars must consume the bacteria. Birds, fish, pets, people, etc. catch this strain of bacteria.

Risks: Very low risks to nontarget species (except other caterpillars).

Bacillus thuringiensis kerstaki products: Dipel, Thuricide, others.

Bacillus thuringiensis israelensis is a similar strain of bacteria that controls mosquito larvae. Use it water containers or ponds where mosquitoes are a problem.

Bacillus popilliae is a bacterial strain that infects Japanese beetle larvae. It will not affect adult insects. There is no clear evidence that using *Bacillus popilliae* will reduce Japanese beetle damage in your yard.

Japanese beetle traps catch large numbers of Japanese beetle adults attracted from a large area. There is no clear evidence that using Japanese beetle traps will reduce Japanese beetle damage in your yard. On a large property, it may be possible to attract Japanese beetles away from desirable plants; however this strategy is unproven.

Yellow jacket traps can help to reduce the number of yellow jackets in a local area. May seem ineffective if other foods are

nearby that are also attractive to yellow jackets.

Diatomaceous earth is not recommended. It loses most of its effectiveness in damp/humid conditions, and it is difficult to avoid inhaling the dust.

Home brews are commonly used and widely touted on the internet. Common brews include garlic, hot pepper, ground insects, etc. Because there is no consistency among brews, there are no reliable data to gauge their effectiveness. Garlic and hot pepper are known to repel some insects.

<http://www.omri.org/> Organic Materials Review Institute and the National Organic Standard. Includes a list of all of the pest management chemicals accepted as organic.

<http://attra.ncat.org/organic.html> National Sustainable Ag Information Service. This site has a great deal of information about organic production, including pest management.

<http://www.ams.usda.gov/AMSv1.0/NOP> - USDA National Organic Program.

ORGANIC FUNGICIDE/BACTERIACIDE OPTIONS

The products listed in this section are registered by the EPA and are “approved” for use in organic production. However, most of these products are non-specific and are toxic to humans, plants, and many non-target invertebrates and aquatic life. In addition, the effectiveness of most of these products is generally limited when compared to “conventional” pesticides. With this in mind, organic pesticides should not be considered as substitutes for or used as conventional fungicides in a pest control program, and should only be used judiciously and as a last resort in an integrated pest management program. Most plant diseases in the home garden do not cause sufficient harm to the plant to justify the use of pesticides.

Type of diseases controlled	Compound	Notes
	Coppers:	
Many fungal and bacterial diseases, including powdery and downy mildew, fungal leaf spots, anthracnose, bacterial leaf spot and/or blight, fire blight and rust on a wide variety of fruits, vegetables and ornamentals. Effectiveness against most pathogens is often limited. Labeled for many plants.	Copper sulfate and fixed coppers (copper hydroxide, copper oxide, copper oxychloride)	Copper is toxic to fish, aquatic invertebrates, and humans. Label directions and harvest intervals should be followed carefully. Copper is a heavy metal and must be used in a manner that minimizes accumulation in the soil Coppers have the potential to burn the foliage and flowers of many plants. To avoid this problem, do not spray prior to or during the flowering period, or during prolonged cold, wet weather. Refer to individual product label for plants which may be treated.
Various diseases of fruits, vegetables and ornamentals including leaf curl on peaches and bitter rot, black rot and scab on apples. Labeled for many plants.	Bordeaux Mixture (hydrated lime/copper sulfate)	Lime added to copper sulfate increases the effectiveness of the copper. Phytotoxicity (burning of foliage and flowers) can occur on many plants including the young, tender leaves of peach, plum, rose and apple. Some sensitive plants require diluting the product to one half strength (depending on the product used – see label) to avoid phytotoxicity. Should not be used during cool, wet weather since this can increase damage to plant foliage.
	Sulfurs:	
Used in the dormant season to kill overwintering fungal spores of black spot, powdery mildew and rust of rose, leaf curl and shot-hole of peach, cane blight and leaf spot of brambles. Some brands labeled for delayed dormant and/or growing season applications for scab and powdery mildew of apple, anthracnose, rust and powdery mildew of blackberry and powdery mildew and scab on pear.	Liquid lime-sulfur (calcium polysulfides)	Labeled for roses, peaches, pears, brambles, fruit trees, deciduous hedge plants, delphinium, lilacs, euonymous, columbine, crepe myrtle, sweet peas, zinnias, fruits, ornamentals, and tuberous begonias. Do not spray when temperature is expected to exceed 80°F within 24 hours. Spray early in the morning or late in the evening to avoid burning of foliage. Also controls mites and scale.

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE (continued)

Type of diseases controlled	Compound	Notes
Sulfurs: (cont.)		
Controls fungal diseases including powdery mildew, scab, and cedar apple rust of apples, brown rot and scab of peach, plum and nectarine, powdery mildew on brambles and strawberry. Also labeled for powdery mildew, leaf spots, rust and botrytis on many vegetables and ornamentals (includes black spot of rose).	Elemental sulfur (Dry wettable sulfurs of flowable sulfurs)	<p>Should not be used when the temperature is above 90 degrees or within four weeks of an oil spray as injury to the foliage may occur. Refer to individual product label for plants which may be treated. Do not use on apricots, cucumbers, d'Anjou pears, melons, spinach, squash or viburnum as sulfur causes injury and defoliation to these plants.</p> <p>Sulfur is lethal to beneficial insects, spiders and mites leading to increased problems with certain pests including mites. Residue may be a problem.</p>
Other compounds:		
Some control of insect vectors of viruses and a few fungal diseases such as powdery mildews and black spot.	Oils, horticultural, narrow range oils as dormant, suffocating, and summer oils	Do not apply when sulfur compounds have or will be used. This combination is toxic to the plant. Repeated use can cause build-up in the soil.
Controls various foliar fungal diseases, in particular powdery mildew on various hosts.	Potassium bicarbonate	Diluted in water and often mixed with insecticidal soap (surfactant) and horticultural oil to increase effectiveness.
Fire blight control in apples and pears only	Streptomycin	<p>Bactericide/antibiotic compound. Has no fungicidal activity. Fire blight bacteria can develop resistance with prolonged use.</p> <p>When used for fire blight control of apples and pears it must be applied during bloom prior to the appearance of symptoms to be effective. Sprays should begin at 20-30% bloom and continue every 3-4 days until petal fall.</p> <p>Do not apply when fruit is visible.</p> <p>Do not apply within 30 days of harvest for pears.</p> <p>Do not apply within 50 days of harvest for apples.</p>