

Insects

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Relatively few kinds of insects and related pests occur on greenhouse and floral crops, but they attack a wide range of plants, can be highly destructive, and are difficult to control.

Many insecticide and miticide formulations are available to growers, but specific uses may be quite limited for any one crop, and plant varieties vary greatly in susceptibility to chemical injury. Your local Extension agent may be able to help you obtain the technical information you need.

Proper Use of Pesticides

Insecticides are poisonous, and their use in the greenhouse can present a serious danger to both the applicator and plant material if handled carelessly or improperly. Some extremely toxic chemicals are labeled and recommended for greenhouse use.

If all precautions are followed meticulously, they are safe, but they should not be used by novices or by unsupervised inexperienced personnel, in home or garden greenhouses, or in greenhouses used for demonstrations, exhibits, teaching, or horticultural therapy. Restricted pesticides must be applied only by certified pesticide applicators, and are marked (+) in the publication.

Pesticides no longer being sold are listed to insure proper usage of existing material in the user's possession. Products withdrawn for marketing reasons can reappear under new brand names.

In order to use a pesticide safely and effectively, the product label should be read thoroughly each time a control treatment is applied. By law, pesticides must be used in accordance with label directions. The following checklist is a guide to utilizing label information and directions. Prior to the actual application of any chemical treatment, determine which pesticide to use from the recommendations in this Pest Management Guide and become familiar with the general directions and precautions found on the label.

Effective application of pesticides depends on: proper timing, favorable treatment conditions of temperature, humidity, moisture, and time of day; plant condition; and thorough coverage, especially the undersides of leaves and in dense or low-growing foliage. Thorough wetting is especially important on waxy foliage and waxy insects such as mealybugs and scales. Most insecticides do not act efficiently at temperatures below 50-55 degrees Fahrenheit, and may cause plant injury if used when the temperature is above 90 degrees Fahrenheit, especially when coupled with high humidity. Overhead irrigation or watering should be avoided for at least 12 hours after applying pesticide treatments. Plants should be well watered, with foliage allowed to dry, before applying chemicals.

Non-chemical control methods should not be overlooked, particularly preventative measures such as making sure not to introduce infested plants into production areas. Weeds and excess plants left around can harbor pests and may be sources of reinfestation. Under controlled conditions, parasites (for example, *Encarsia formosa* for whiteflies) and predators (for example, *Cryptolaemus montrouzieri* for mealybugs) can be introduced for biological control.

Plant Injury

Phytotoxicity is a term referring to plant injury caused by chemicals, particularly pesticides. Greenhouse plants seem to be especially prone to this problem, in part because of the wide variety of plants often grown or held in one common area. Signs of phytotoxicity include: 1) tip or marginal burn of leaves; 2) chlorosis in spots, at tips, or on margins of the leaves; 3) leaf distortion, including curling, twisting, or cupping; 4) stunting or growth reduction in the size of entire plants or certain parts; and 5) abnormal or excessive growth of certain plant parts. Flower parts and bracts are especially sensitive in many cases and are most critical to plant sales. New growth is most commonly affected when systemic chemicals are improperly used. Soil drenches and granular treatments may cause root injury resulting in decline, stunting, and damage to older leaves.

The following suggestions will reduce phytotoxic potential:

- Do not apply pesticides to plants under stress.
- Avoid spraying under extremely hot, sunny, or humid conditions.
- Apply sprays in the mornings between 6:00 a.m. and 10:00 a.m.
- Avoid treating when temperature extremes or severe fluctuations are likely.

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- Apply pesticides when foliage is dry and conditions are conducive to drying.
- Use wettable powders rather than emulsifiable concentrates.
- Do not mix pesticides without prior experience; check compatibility.
- Keep nozzles of aerosols or mist blowers at least 18-24" from plants being treated.
- Never spray insecticides in equipment that has been used for applying herbicides (tanks, pumps, hoses, guns).
- Clean sprayer, tank, pump, hose, and gun after each use.
- Do not let spray mixes stand in the sprayer; do not expose spray concentrates to extreme heat or freezing.
- Read **ALL** of the label directions every time you use each pesticide.

Formulations and Application Methods

Pesticides are available in various formulations: as concentrates for spraying or producing vapors, granular soil treatments, aerosols, smokes, and fogs. In some cases, only one or a few application methods may be registered for use of a specific pesticide.

Dilute sprays are applied with pressurized tank sprayers or high-pressure powered spraying machines. Formulations to be used may be wettable powders (WP), emulsifiable concentrates (E or EC), soluble powders (SP), liquids or liquid concentrates (L, LC), or flowables (F). Wettable powders are less likely to cause phytotoxicity problems.

Concentrate sprays are applied with motor-driven or electric mist sprayers and deliver droplets 5 to 20 times as concentrated as dilute sprayers. Extreme care and skill is necessary for the proper use of mist sprayers to achieve effective, safe, non-phytotoxic treatments.

Aerosols, smokes, and foggers create pesticide concentrations in air that are lethal to pests. Rates of application from aerosol bombs, generators, and foggers are based on air volume in closed greenhouses in terms of amount of pesticide/cubic feet. It is important to close the greenhouse tightly for the recommended length of time followed by adequate prescribed ventilation time periods.

Compatibility and Coverage

Care should be taken in mixing different chemicals. Mixing different formulations such as wettable powders and emulsifiable concentrates is not recommended. Never mix herbicides or fungicides, and never use a sprayer that has been used to apply herbicides for insecticide or fungicide application.

For especially waxy foliage, the addition of a wetting agent or spreader-sticker may be desirable when applying sprays. However, it is unnecessary if two or more pesticides are added together, since a greater amount of wetting agent or emulsifier will be present in the tank. The use of two (2) or more emulsifiable concentrates mixed together in the same quantity of water results in twice as much or more solvent applied to the plants and may cause plant injury. **Read the pesticide label carefully for compatibility** statements and mixing **precautions**. Highly alkaline water (pH 8.0 or higher) may cause rapid breakdown of many pesticide chemicals.

Safety and Toxicity

Pesticides are readily absorbed through the skin, as well as being poisonous by ingestion, by inhalation, or by contact in the eyes. Penetration of the skin occurs immediately on contact and is most hazardous when handling undiluted concentrates. It is essential to wear protective clothing, proper gloves, boots, and adequate face shields and respirators or gas masks as directed on the label. Frequent changes to clean clothing and protective devices are essential. With some chemicals, potential eye damage warrants a danger or warning category on the label even though oral and dermal toxicities are in the caution range.

The signal word on the pesticide label ("caution," "warning," or "danger - poison") and the LD₅₀ values are helpful as guides to relative toxicities of pesticides. The LD₅₀ is the lethal dose, orally (ingestion) or dermally (skin absorption) necessary to kill one-half of a test population and is expressed in milligrams of chemical / kilogram of body weight (mg/kg). The LD₅₀'s given below are for technical grade material.

Table 5.2 - Label Categories

Signal Word	Toxicity Category	LD ₅₀ mg/kg	
		Oral	Dermal
DANGER, POISON			
(skull and crossbones)	Highly toxic	0-50	0-200
WARNING	Moderately toxic	51-500	201-2000
CAUTION	Slightly toxic	501-5000	2001-20,000
CAUTION	Relatively non-toxic	over 5000	over 20,000

Table 5.3 - Selected Relative Toxicities

Pesticide	Toxicity LD ₅₀ (mg/kg)	
	oral	dermal
Abamectin	650	>2,000
Acephate	866-945	>10,250
Azadirachtin	>5,000	>2,000
<i>Bacillus thuringiensis</i>	none	none
Chlorpyrifos	96-270	2,000
Cyfluthrin	900	>5,000
Dicofol	820-960	2,100
Endosulfan	100	359
Fenoxycarb	16,800	>2,000
Fluvalinate	261-282	>20,000
Metaldehyde	250-1,000	—
Methiocarb	10-35	>5,000
Permethrin	>430-4,000	>2,000
Resmethrin	>2,500	>3,000

How to Use These Recommendations

Once the pest problem has been identified, consult Table I. Find the pest or pest group (arranged alphabetically) to determine which control measures are available, the formulations that are registered, and remarks. Then consult Table II for specific use and precautionary information on the control measure chosen. Be sure to check the potential phytotoxicity statements. If in doubt about a crop, treat a small sample area. Observe sprayed plants for several days for indications of plant injury.

After using the recommendations here, read and follow the directions on the pesticide label prior to mixing and application.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Aphids						
Abamectin	warning	0.15 EC	—	—	—	See label
Acephate	caution	75SP, 97	3A	—	—	Carnation, chrysanthemum, rose aerosol is labeled for most crops.
Acetamiprid	caution	70WSP, 30 SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WF, ES	—	—	—	All crops
Bifenthrin	warning	.667F	A	—	—	Greenhouse-grown ornamentals
Chlorpyrifos	caution	20ME	8A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Endosulfan	danger	50W	—	—	—	All crops
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Flonicamid	caution	SG	—	—	—	See label for rate range
Fluvalinate	caution	2AF	—	—	—	All crops; see label for phytotoxicity
Imidacloprid	caution	II	—	—	1%G, 60WP	See label
Insecticidal soap	warning	—	—	—	—	See label
Kinoprene	warning	II	—	—	—	All crops
Lambda-cyhalothrin	caution	GC	—	—	—	All crops
Methiocarb	warning	75WP	—	—	—	See label
Naled	warning	—	—	F-8EC	—	All crops
Permethrin	caution	3.2EC	—	—	—	All crops
Pymetrozine	caution	50WG	—	—	—	All crop
Pyrethrin	caution	—	A	—	—	See label
Pyriproxyfen	caution	.86L	—	—	—	See label
Resmethrin	caution	2EC	A	—	—	All crops
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Thiomethoxam	caution	25WG	—	—	25WG	See label
Ultra-fine oil	caution	—	—	—	—	See label
Caterpillars, Cutworms, Loopers, Armyworms						
Acetamiprid	caution	70WSP 30SG	—	—	—	See label for pest species
Azadirachtin	caution	EC	—	—	—	All crops
<i>Bacillus thuringiensis (Bt)</i>	caution	WP	—	—	—	Consult label of this and other brands of <i>Bt</i> available for specific pest uses.
Bifenthrin	warning	.667F	A	—	—	Greenhouse-grown ornamentals
Carbaryl	caution	50W, 80S	—	—	—	All crops
Chlorfenapyr	caution	2S	—	—	—	All crops
Chlorpyrifos	caution	20ME	8A	—	—	See label

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Caterpillars, Cutworms, Loopers, Armyworms (cont.)						
Cyfluthrin	warning	20WP	—	—	—	See label
Diflubenzuron	caution	25WSB	—	—	—	Armyworm listed on label
Fenpropathrin	warning	2.4EC	1A	—	—	For beet armyworm; see label
Fluvalinate	caution	2AF	—	—	—	All crops
Novaluron	caution	10SC	—	—	—	Armyworm listed on label
Permethrin	caution	3.2EC	—	—	—	All crops
Pyridalyl	caution	35WP	—	—	—	See label for insect species
Spinosad	caution	11.6SC	—	—	—	All crops
Tebufenozide	caution	2S	—	—	—	All crops
Centipedes (see Millipedes)						
Cyclamen Mite						
Chlorfenapyr	caution	2S	—	—	—	All crops
Dicofol	caution	18.5EC	—	—	—	African violet, cyclamen, snapdragon, gerbera
Endosulfan	warning	50W, 2E	—	—	—	African violet, cyclamen, snapdragon, begonia, gerbera
Spiromesifen	caution	4F	—	—	—	Also labeled for broad mite
Fungus Gnats (Adults)						
Bifenthrin	caution	—	A	—	—	All crops
Fenpropathrin	warning	—	1A	—	—	All crops
Insecticidal soap	warning	25EC	—	—	—	See label, formulations vary
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Resmethrin	caution	2EC	1A	—	—	All crops
Ultra-fine oil	caution	—	—	—	—	See label
Vapona	danger	—	10A	V-41	—	All crops
Fungus Gnats (Larvae)						
Acetamiprid	caution	70WSP 30SG	—	—	—	See label
<i>Bacillus thuringiensis</i>	non-toxic	—	—	—	AS	All crops
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	—	—	—	25WSB	See label
Fenpropathrin	warning	—	1A	—	—	All crops
Fenoxycarb	caution	25WP	—	—	—	All crops
Kinoprene	warning	II	—	—	—	All crops
Pyriproxyfen	caution	.86 EC	—	—	—	See label
Leafminers						
Abamectin	warning	0.15EC	—	—	—	Flower crops, foliage plants
Acetamiprid	caution	70WSP 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Leafminers (cont.)						
Bifenthrin	warning	.667 F	A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	25WSB	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Fenpropathrin	warning	—	1A	—	—	All crops
Fenoxycarb	caution	25WP	—	—	—	Lepidopterous leaf miners only All crops
Naled	warning	—	—	V, 8EC	—	All crops
Novaluron	caution	10SC	—	—	—	Serpentine, citrus leafminers only
Permethrin	caution	3.2EC	—	—	—	Chrysanthemum only
Spinosad	caution	11.6SC	—	—	—	All crops
Vapona	danger	—	10A	—	—	All crops
Leafrollers						
Acephate	caution	75SP, 97	3A	—	—	Rose
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals, trees, shrubs
Chlorpyrifos	caution	20ME	—	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Fenpropathrin	warning	—	1A	—	—	All crops
Naled	warning	—	—	V	—	
Mealybugs (Foliar)						
Acephate	caution	75SP, 97	3A	—	—	Foliage plants, orchids, anthurium, cacti, poinsettia
Acetamiprid	caution	70WSP 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WP, ES	—	—	—	All crops
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals, trees, shrubs
Buprofezin	caution	70WSP	—	—	—	All crops
Chlorpyrifos	caution	20ME	8A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Flonicamid	caution	SG	—	—	—	See label for rate range
Fluvalinate	caution	22.3F	—	—	—	See label
Imidacloprid	caution	II	—	—	1%G	See label
Insecticidal soap	warning	25EC	—	—	—	Concentration varies with formulation; see label
Kinoprene	warning	II	—	—	—	See label

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Mealybugs (Foliar) (cont.)						
Methiocarb	warning	75WP	—	—	—	See label
Naled	warning	—	—	F, V	—	All crops
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Pyrethrin	caution	—	A	—	—	See label
Thiomethoxam	caution	25WG	—	—	25WG	See label
Vapona	danger	—	10A	—	—	All crops
Mealybugs (Root)						
Kinoprene	warning	II	—	—	—	All crops
Millipedes						
Chlorpyrifos	warning	50W	—	—	—	Outside building
Scale Insects						
Acephate	caution	75SP, 97	3A	—	—	See crops listed on label
Acetamiprid	caution	70WSP 30SG	—	—	—	See label
Buprofezin	caution	70WSP	—	—	—	All crops
Chlorpyrifos	caution	20ME	8A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label directions
Dinotefuran	caution	20SC	—	—	20SC	Soil applicaion as drench
Fenoxycarb	caution	25WP	0.6A	—	—	All crops, soft scales only
Fenpropathrin	warning	—	1A	—	—	See label
Insecticidal soap	warning	25EC	—	—	—	Formulations vary; see label
Kinoprene	warning	II	—	—	—	All crops
Pyriproxyfen	caution	.86EC	—	—	—	See label
Thiomethoxam	caution	25WG	—	—	25WG	Labeled for soft scales
Shore Flies						
Cyromazine	caution	75WP	—	—	—	All crops
Diflubenzuron	caution	—	—	—	25WSB	See label
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Pyriproxyfen	caution	.86EC	—	—	—	See label
Slugs, Snails						
Metaldehyde	caution	—	—	—	bait	All crops
Methiocarb	warning	75WP	1A	—	—	See label
Sowbugs						
Cyfluthrin	warning	20WP	—	—	—	See label
Spider Mites						
Abamectin	warning	0.15EC	—	—	—	See label
Acequinocyl	caution	15SC	—	—	—	See label. Two-spotted spider mite.
Azadirachtin	caution	70	—	—	—	All crops

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Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Spider Mites (cont.)						
Bifenazate	caution	50SP	—	—	—	All crops
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals, trees, shrubs
Chlorfenapyr	caution	2S	—	—	—	All crops
Chlorpyrifos	caution	20ME	8A	—	—	See label
Cinnamaldehyde	caution	30EC	—	—	—	All crops
Clofentezine	caution	5SC	—	—	—	All crops
Dicofol	caution	35WP	—	—	—	All crops
Etoxazole	caution	5WDG	—	—	—	See label for resistance management
Fenbutatin oxide	danger	50WP	—	—	—	All crops
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Fenpyroximate	warning	5SC	—	—	—	Labeled for other mite species
Fluvalinate	caution	22.3F	—	—	—	See label
Hexythiazox	caution	50DF	—	—	—	See label
Insecticidal soap	warning	25EC	—	—	—	Formulations vary; see label
Methiocarb	warning	75WP	—	—	—	See label
Naled	warning	—	—	F, V	—	All crops
Pyrethrin	caution	—	A	—	—	See label
Pyridaben	danger	75WP	—	—	—	See label
Spiromesifen	caution	4F	—	—	—	See label for species
Ultra-fine oil	caution	—	—	—	—	See label
Vapona	danger	—	10A	—	—	All crops
Springtails						
Chlorpyrifos	warning	50W	—	—	—	See label
Thrips						
Abamectin	caution	0.15EC	—	—	—	All crops
Acephate	caution	75WP, 97	3A	—	—	All crops
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WP, EC	—	—	—	All crops
Bifenthrin	warning	.667 F	—	—	—	See label
Chlorfenapyr	caution	2S	—	—	—	All crops
Chlorpyrifos	caution	ME	8A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Fenoxycarb	caution	25WP	A	—	—	All crops
Fenpropathrin	warning	—	1A	—	—	
Flonicamid	caution	SG	—	—	—	See label for rate range

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Thrips (cont.)						
Fluvalinate	caution	2AF	—	—	—	All crops
Imidacloprid	caution	II	—	—	1%G, 60WP	See label
Lambda-cyhalothrin	caution	10WSP	—	—	—	All crops
Methiocarb	warning	75WP	—	—	—	All crops
Naled	warning	—	—	V	—	All crops
Novaluron	caution	10SC	—	—	—	See label for listed species
Pyridalyl	caution	35WP	—	—	—	See label for special instructions
Resmethrin	caution	—	2A	—	—	All crops
Spinosad	caution	11.6SC	—	—	—	All crops
Vapona	danger	—	10A	F	—	All crops
Whiteflies						
Abamectin	caution	0.15E	—	—	—	See label
Acephate	caution	75SP	3A	—	—	All crops
Acetamiprid	caution	70WSP, 30SG	—	—	—	See label
Azadirachtin	caution	EC	—	—	—	All crops
<i>Beauveria bassiana</i>	caution	22WP, ES	—	—	—	See label
Bifenthrin	warning	.667 F	A	—	—	Greenhouse-grown ornamentals, trees, shrubs
Buprofezin	caution	70WSP	—	—	—	All crops
Chlorpyrifos	caution	20ME	8A	—	—	See label
Cyfluthrin	warning	20WP	—	—	—	See label
Diflubenzuron	caution	25WSB	—	—	—	See label
Dinotefuran	caution	20SG	—	—	20SG	Soil application as drench
Endosulfan	warning	50WP	—	S	—	All crops
Fenoxycarb	caution	25WP	0.6A	—	—	All crops
Fenpropathrin	warning	2.4EC	1A	—	—	See label
Flonicamid	caution	SG	—	—	—	See label for rate range
Fluvalinate	caution	2F	—	—	—	All crops
Imidacloprid	caution	II	—	—	1%G, 60WP	See label
Insecticidal soap	caution	L	—	—	—	See label
Kinoprene	caution	II	—	—	—	See label
Naled	warning	—	—	S, V	—	All crops
Novaluron	caution	10SC	—	—	—	See label for listed species
Permethrin	caution	3.2EC	—	—	—	See label for sensitive plants
Pymetrozine	caution	50WG	—	—	—	All crops
Pyrethrin	caution	—	A	—	—	See label
Pyridaben	danger	75WP	—	—	—	See label

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.4 - Guide to Pesticide and Formulations Recommended by Pest or Pest Group (cont.)

Pesticide	Signal Word	Foliar Spray	Aerosol	Smoke Fog Vapor	Soil	Remarks ¹
Whiteflies (cont.)						
Pyriproxyfen	caution	.86EC	—	—	—	See label
Resmethrin	caution	2A 2EC	— —	— F	—	All crops See label
Spiromesifen	caution	4F	—	—	—	See label for species
Spirotetramat	caution	240SC	—	—	240SC	Soil application as drench
Thiomethoxam	caution	25WG	—	—	25WG	See label
Vapona	danger	—	10A	S, F	—	All crops

¹Be sure to check precautions for phytotoxicity for each pesticide in table.

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names

Other trade or common names that are often found on labels, in advertising, or in trade journals are provided here for reference.

Abamectin - Avid	Cythion - Malathion	Naled - Dibrom
Acephate - Orthene, PT1300	Diflubenzuron - Adept	Novaluron - Pedestal
Acequinocyl - Shuttle	Dinotefuran - Safari	Permethrin - Astro, Pramex, SBP-1315
Acetamiprid - Tristar	Endosulfan - Thionex	Pymetrozine - Endeavor
Azadirachtin - Azatin, Neemazid, Ornazin, Triact, Azatrol	Fenbutatin oxide - Promite	Pyrethum - Pt 1600, X-Clude
<i>Bacillus thuringiensis</i> - Dipel, Gnatrol	Fenoxycarb - Preclude, Precision	Pyridaben - Sanmite
<i>Beauveria bassiana</i> - BotaniGard, Mycotrol, Naturalis-O	Fenpropathrin - Tame	Pyridalyl - Overture
Bifenazate - Floramite	Fenpyroximate - Akari	Pyriproxyfen - Pyrigro, Distance
Bifenthrin - Talstar, Attain	Flonicamid - Aria	Resmethrin - Pt 1200, SBP-1382
Carbaryl - Sevin	Fluvalinate - Mavrik	Spiromesifen - Judo
Chlorfenapyr - Pylon	Hexythiazox - Hexygon	Spirotetramat - Kontos
Chlorpyrifos - Duraguard, Duraplex	Insecticidal soap - M-Pede	Tebufenozide - Confirm
Cinnamaldehyde - Cinnamite	Kinoprene - Enstar	Thuricide - Dipel
Cyfluthrin - See Decathlon	Lambda-cyhalothrin - Scimitar, Topcide	Ultra-fine spray oil - Sunspray
	Methiocarb - Mesurol, Grandslam	Vapona - DDVP, Dichlorvos

Rates of Application (T= Tablespoon; t= teaspoon)

Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Abamectin (Avid) aphids, leafminers, spider mites, thrips, whiteflies	0.15EC	2.0-4.0 fl oz	0.75-1.5 T	0.75-1.5 t	A generic product exists. See label. 12-hr REI SIGNAL WORD - WARNING

Abbreviations: AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)

Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)

Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Acephate (Orthene) aphids, leafroller, mealybugs, scale crawler, thrips, whitefly	75 SP 97	See label for rates	See label for rates	See label for rates	Repeated applications may cause phytoxicity. See label label for rate and species list. SIGNAL WORD - CAUTION
mealybugs	3% aerosol	spray 5 sec- onds/ 100 sq ft	spray 5 sec- onds/ 100 sq ft	spray 5 sec- onds/ 100 sq ft	Apply 5-10 seconds/100 sq ft. Do not use under high temperature and humidity conditions or where gas heat- ing systems are unvented. See label for sensitive plant list. 24-hr REI SIGNAL WORD - CAUTION
Azequinocyl (Shuttle) spider mites	15SC	3.2-6.4 fl oz	1.25-2.5 T	1.25-2.5 t	Do not use on miniature roses or impa- tiens. Use low rate on standard roses. See label for resistance management. 12-hr REI SIGNAL WORD - CAUTION
Acetamiprid (Tristar) aphids, mealy- bug, leafhopper, whiteflies, thrips, scales, fungus gnat larvae, leafminers, caterpillars	70WSP, 30SG	See label for rates.	See label for rates.	See label for rates.	See label for restrictions. 70WSP in water soluble packets. 12-hr REI SIGNAL WORD - CAUTION
Azadirachtin aphids, caterpillars, leafminers, mealy- bugs, thrips, whiteflies	various	See label for rates.	See label for rates.	See label for rates.	Product is available at several concen- trations and sold under multiple trade names. 4-hr REI SIGNAL WORD - CAUTION
Bacillus thuringi- ensis (Gnatrol) fungus gnats	AS	1.0-4.0 pts	3.0-13.0 oz	2.0-8.0 T	Consult label for proper rate. Use 3 weekly applications for heavy infes- tations. 4-hr REI SIGNAL WORD - CAUTION
caterpillars, loopers, budworm, omniv- orous leafroller, armyworm	various	See label for rates.	See label for rates.	See label for rates.	Many formulations exist. Check rate and use labeled rate only. Use full coverage foliar spray when larvae are small. Use lower rate for light infestations. 4-hr REI SIGNAL WORD - CAUTION
Beauvaria bassiana (BotaniGard) aphids, mealybugs, thrips, whiteflies	22WP, ES	See label for rates.	See label for rates.	See label for rates.	A mycoinsecticide. See label for rate for each pest.
Bifenazate (Floramite) spider mites	50SP	1.0-2.0 oz	—	—	See label for species controlled. Do not use in successive applications. Sold in water soluble bags. 12-hr REI SIGNAL WORD - CAUTION

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Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Bifenthrin (Attain) aphids, armyworms, caterpillars, mealy- bugs, leafrollers, plant bugs, scale, mites, whiteflies	0.5%/A	1 lb can/3000 sq ft			A generic product exists. See label for total release directions. 12-hr REI SIGNAL WORD - CAUTION
(Talstar) aphids, whiteflies, mealybugs, spider mites, leafroller, armyworms	0.667F	4.0-20.0 oz	0.8-4.0 oz	2.0-6.0 t	Apply as full-coverage foliar spray. Repeat as necessary. Do not handle plants till dry. Rate depends on pest. 12-hr REI SIGNAL WORD - CAUTION
Buprofezin (Talus) leafhoppers, mealy- bugs, planthoppers, scales, whiteflies	70WSP	3.0-7.0 oz	0.6-1.8 oz	—	Consult label for proper rate. Sold in water-soluble bags. 12-hr REI SIGNAL WORD - CAUTION
Carbaryl (Sevin) blister bee- tle, flea beetle, leaf- hoppers, leafrollers	10D				Apply a light covering of dust barely visible when completed. Treat when plants are dry and humidity is low. Use caution for greenhouse treatments if conditions are not suitable. 12-hr REI SIGNAL WORD - WARNING
mealybugs, plant bugs, thrips (exposed)	50W 80SL	1.0 lb 10.0 oz	6.6 T 4.0 T	6.0 T 3.75 T	
Chlorfenapyr (Pylon) spider mites, cycla- men mites, thrips, caterpillars, foliar nematodes	2S	1.3-2.6 fl oz	1.5-3.0 t	0.5-1.0 t	Labeled for greenhouse vegetable transplants. See label for thrips rate. 12-hr REI SIGNAL WORD - CAUTION
Chlorpyrifos (Duraguard) aphids, leafhopper, leafminer, leafroller, mealybug, mites, scale, springtails, thrips, whiteflies	ME	25.0-50.0 oz	2.5-5.0 oz	1.5-3.0 T	Rates vary depending on pest. See label. 12-hr REI SIGNAL WORD - CAUTION
Chlorpyrifos + cyfluthrin (Duraplex) aphids, caterpillars, mealybugs, mites, scales, thrips, whiteflies	8A	2.0 oz	fogger treats	3000 sq ft	See label for special note re gas-heat- ing systems. 12-hr REI SIGNAL WORD - CAUTION
Cinnamaldehyde (Cinnamite)	30EC	42.5 oz	8.5 oz	2.6 oz	Can cause plant injury. Do not use on begonias, orchids, or poinsettias once bracts are set. 12-hr REI

Abbreviations: AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)

Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Clofentezine (Ovation)	5SC	1.0 oz	—	—	One application per crop cycle. Apply at first sign of mite activity. 12-hr REI SIGNAL WORD - CAUTION
Cyfluthrin (Decathlon) armyworms, lace bug, aphids, leafrollers, mealybugs, thrips, whiteflies, sowbugs	20WP	3.0-4.5 T	2.0-3.0 t	0.75-1.0 t	Addition of a spreader-sticker may improve control. See label. 12-hr REI SIGNAL WORD - WARNING
Cyromazine (Citation) Leafminers, fungus gnats, shore flies	75WP	1.33 oz	—	—	Apply as foliar spray or drench; will not control adults. Sold in water-soluble pouches. SIGNAL WORD - CAUTION
Dicofol (Kelthane) spider mites, cyclamen mite	50WP	0.33 lb	10.0 T	3.0 T	Apply 2 to 3 times at 4-7 day intervals. Works best at cool cool temperatures. Use EC for cyclamen mite. 48-hr REI SIGNAL WORD - DANGER
Diflubenzuron (Adept) armyworms, fungus gnats, leafminers, shore flies, whiteflies	25WP	1.0 oz	—	—	Read label before using as a drench. Under cover uses are registered. Sold in water soluble bags. Rates differ for foliar feeders. Do not use on poinsettia. 12-hr REI SIGNAL WORD - CAUTION
Dinotefuran (Safari) aphids, scale, Japanese beetles, leafminers, mealybugs, thrips, whiteflies	20SG	See label for rates	See label for rates	See label for rates	For foliar insects. Apply as foliar spray or soil applications as drenches. See label for scale species. See label for vegetable transplant use. 12-hr REI SIGNAL WORD - CAUTION
Endosulfan (Thionex) aphids, cyclamen mite, whitefly, thrips	3EC 50WP	0.3 qt 0.5 lb	4.0 T 10.0 T	4.0 t 3.0 T	Use proper mask or respirator. EC may injure some chrysanthemums. Foliage and blooms should be dry. Close vents for at smoke least 2 hrs overnight. 24 HR REI SIGNAL WORD - WARNING
Etoxazole (TetraSan)	5WDG	2-4 packets	—	—	Sold in water soluble packets. 12-hr REI SIGNAL WORD - CAUTION
Fenbutatin oxide (Promite)	50WP	1.0 lb soluble bag in 100.0-200.0 gal			Do not add oil. Apply for foliage only on mums and pre-bract on poiseettias. 24-hr REI SIGNAL WORD - DANGER
Abbreviations: AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Fenoxycarb (Preclude)	0.6A	5-10 Seconds/ 100sq ft	5-10 seconds/ 100sq ft	5-10 seconds/ 100sq ft	See label for dosage for specific pest; WP sold in 1.0 oz pouches. Insect growth regulator. 12-hr REI SIGNAL WORD - CAUTION
(Precision) whiteflies, soft scales, fungus gnats, shore flies, lepidopterous leaf miners, and thrips	25WP	1.0-4.0 fl oz	—	—	
Fenpyroximate (Akari) spider mites	5SC	8.0-12.0 oz	3.0-4.5 T	1.0-1.5 T	See label for resistance management. 12-hr REI SIGNAL WORD - WARNING
Fenpropathrin (Tame) aphids, beet army- worm, leafhoppers, mealybugs, mites, whiteflies, Japanese beetle	2.4EC, 1A	2.67-8.0 oz	1.0-3.0 T	1.0-3.0 t	See label for dosage for specific pest, and for mixing instructions. Aerosol for- mulation contains acephate. 24-hr REI SIGNAL WORD - WARNING
Flonicamid (Aria) aphids, mealybugs, thrips, whiteflies	SG	See label for rates			Each packet contains 20g of product. Registered for greenhouse and interi- or-scapes. 12-hr REI SIGNAL WORD - CAUTION
Fluvalinate (Mavrik) aphids, thrips, mites, white- flies, leaf-feeding caterpillars	2AF	2.0-5.0 fl oz	1.0 T-2.5 T	1.0 t-2.5 t	May repeat at 5- to 10-day intervals if needed. See label for precautions. 12-hr REI SIGNAL WORD - CAUTION
Hexythiazox (Hexygon) spider mites	50DF	See label for rates	See label for rates	See label for rates	Rates differ for high- and low-volume applications. 12-hr REI SIGNAL WORD - CAUTION
Imidacloprid (Marathon)	1%G, 60 WP, II	See label for rates	See label for rates	See label for rates	Generic products exist. Do not over irrigate following application. 12-hr REI SIGNAL WORD - CAUTION
Insecticidal soap aphids, mealybugs, mites	50.5EC 25EC	4.0-10.0 pt 2.0 gal	0.8-2.0 pts 50.0 oz	8.0-20.0 T 15.0 oz	See label. Repeated applications of high rates may cause plant damage. Numerous formulations are available. 12-hr REI
Kinoprene (Enstar) aphids, fungus gnats, mealybugs, scales, whitefly	II Fog	2.5-5.0 oz	2.5-5.0 t	0.75-1.5 t	See label for usage directions. For car- nations, mums, roses. Foliage should be dry. Fogging rate - 1 oz/3,000 cu ft 4-hr REI SIGNAL WORD - WARNING
Abbreviations: AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Lambda-cyhalothrin (Scimitar) adult leaf miners, aphids, armyworms, brown soft scale, leaf-feeding caterpillars, mealybugs, spider mites, thrips, whiteflies	6C	0.75-2.5 oz	—	—	Generic products exist. See label for rates. 24-hr REI SIGNAL WORD - CAUTION
Metaldehyde (Deadline, Metarex) aphids, mites, slugs, snails, western flower thrips	3.25% pellets	1.0 lb/1,000 sq ft			Apply bait only to soil surface around plants, not foliage or other plant parts. 12-hr REI SIGNAL WORD - CAUTION
Methiocarb (Grandslam) (Mesurol) aphids, mites, snails, slugs, western flower thrips	2% G 75WP	1.0 lb/ 1,000 sq ft 0.5-2.0 lbs	 1.6-6.4 oz	 0.5-2.0 T	Only Mesurol labeled for thrips. Apply bait to soil around plants or flats but not on plant foliage. Do not apply to food crops. 24-hr REI SIGNAL WORD - DANGER
Naled (Dibrom) aphids, leafrollers, mealybugs, spider mites, whiteflies (adults)	8E Fog	Vaporize 1.0 fl/ 10,000 cu ft Use 1.0 fl oz/3,000 cu ft in fog generator.	Vaporize 1.0 fl/ 10,000 cu ft Use 1.0 fl oz/3,000 cu ft in fog generator.	Vaporize 1.0 fl/ 10,000 cu ft Use 1.0 fl oz/3,000 cu ft in fog generator.	See label for detailed directions on use and safety precautions. 24-hr REI
Novaluron (Pedestal) thrips, caterpillars, whiteflies, leafminers	10SC	3.0-4.0 fl oz	4.0-5.0 tsp	1.0-1.5 tsp	See label for precautions. 12-hr REI SIGNAL WORD - CAUTION
Permethrin (Perm-up) leafminers, caterpillars, aphids, fungus gnats, mealybugs	3.2EC	10.0 oz	2.0 oz	1.0 T	Apply as full-coverage foliar spray. Rate is for leafminers; lower rate is for other pests. 12-hr REI SIGNAL WORD - CAUTION
Pymetrozine (Endeavor) aphids, whiteflies	50SP	1.25-2.5 oz	—	—	Only sold in water soluble packets. 12-hr REI SIGNAL WORD - CAUTION
Pyrethrin (X-clude) aphids, scale, mealybugs, spider mites, whiteflies	Aerosol	Use 5-10 second application for each 100 sq ft	Use 5-10 second application for each 100 sq ft	Use 5-10 second application for each 100 sq ft	See label. NO - REI SIGNAL WORD - CAUTION
Abbreviations: AF - aquaflo; W, WP - wettable powder; E, EC - emulsifiable concentrate; L - liquid; ME - microencapsulated; SP - sprayable or soluble powder; SC - spray concentrate; D - Dust; G - granular; A - aerosol; F - fog; SG - smoke generator; V - vapor; lb - pound; pt - pint; oz - ounce; fl oz - fluid ounce; cu ft - cubic feet; c - cup; T - tablespoon; t - teaspoon; gal - gallon(s)					
Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)					
Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Pyridaben (Sanmite) mites, whiteflies	75WP	1-3 oz	—	—	Sold in 1 oz pouches. See label for dosage for specific pest. 12-hr REI SIGNAL WORD - DANGER
Pyridalyl (Overture) thrips, caterpillars	35WP	4.0 oz	—	—	Only sold in water-soluble packets. 12-hr REI. SIGNAL WORD - CAUTION
Pyriproxyfen (Distance, Pyrigro) whiteflies, fungus gnats, shoreflies, scale	0.86 EC	3.0-6.0 fl oz	0.5-1.0 fl oz	1.0-2.0 t	See label for restrictions on application per cropping cycle. Rate differs for scale. 12-hr REI SIGNAL WORD - CAUTION
Resmethrin whiteflies	24% liquid	0.5 pt	3.3 T	1.0 T	Spray weekly to point of runoff for 4 weeks. Best results at 70° F. Foliage should be dry. Keep greenhouse closed 2-4 hours following aerosol treatments. SIGNAL WORD - CAUTION
	Fog	1.5 fl oz/10,000 cu ft	1.5 fl oz/10,000 cu ft	1.5 fl oz/10,000 cu ft	
whiteflies, fungus gnats, thrips, cucumber beetles, aphids	1% aerosol (PT 1200)	Apply 5-10 sec/100 sq ft of bench	Apply 5-10 sec/100 sq ft of bench	Apply 5-10 sec/100 sq ft of bench	
Spinosad (Conserve) thrips, spider mites, dipterous leafminers, dipterous gall midges, lepidopterous and sawfly larvae, leaf beetles	SC	3.0-11.0 fl oz	1.0-11.0 T	1.0-11.0 t	Compatible with IPM programs. See label for resistance management and rates for specific pests. 4-hr REI SIGNAL WORD - CAUTION
Spiromesifen (Judo) mites, whiteflies	4F	1.0-2.0 fl oz	1.2-2.4 t	0.38-0.75 t	See label for species and number of applications per season. 12-hr REI SIGNAL WORD - CAUTION
Spirotetramat (Kontos) aphids, whiteflies	240SC	0.8 fl oz (25.0 ml)	0.2 fl oz (5.0 ml)	0.07 fl oz (2.0 ml)	See label for resistance management. Registered for vegetable transplants. 24-hr REI for sprays, no REI for drench. SIGNAL WORD - CAUTION
Tebufenozide (Confirm) lepidopterous larvae	2E	2.0-8.0 oz	1.0-4.0 T	1.0-4.0 t	See label regarding spray adjuvants. 4-hr REI SIGNAL WORD - CAUTION
Thiomethoxam (Flagship) aphids, whiteflies, mealybugs, soft scales	25WG	See label	—	—	See label for rate directly to soil or media. 12-hr REI SIGNAL WORD - CAUTION
	.22G	See label			See label for granular product rate. 12-hr REI SIGNAL WORD - CAUTION
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Useful Equivalents 1 lb WP/100 gal = 1 T/1 gal; 2.0 T = 1 fl oz; 1 pt EC/100 gal = 1 t/1 gal; 16 fl oz = 1 pt; 3 t = 1 T; 2 pt = 1 qt					

Table 5.5 - Guide to Pesticide Usage Cross Reference to Other Common Trade Names (cont.)

Rates of Application (T= Tablespoon; t= teaspoon)

Pesticide	Formulation	50 Gal	10 Gal	3 Gal	Precautions And Remarks
Ultra-fine spray oil aphids, leafminers, whiteflies, mites, scales, mealybugs	6E	0.5-1.0 gal	13.0-26.0 oz	4.0-7.5 oz	Applicator should conduct phytotoxicity tests. 4-hr REI SIGNAL WORD - CAUTION
Vapona aphids, leafminers, leafrollers, mealybugs, thrips, whiteflies	10% aerosol	Use 2-4 second application for each 1,000 cu ft	Use 2-4 second application for each 1,000 cu ft	Use 2-4 second application for each 1,000 cu ft	Treat when foliage is dry. Best and safest at house temperature of 60-65° F. Keep vents closed at least 2 hrs, or overnight. See label for precautions.
	4E	vaporize 1.0 oz/10,000 cu ft	vaporize 1.0 oz/10,000 cu ft	vaporize 1.0 oz/10,000 cu ft	SIGNAL WORD - DANGER
aphids, mealybugs, spider mites, thrips, whitefly	Fog	1.0 oz EC/3,000 cu ft	1.0 oz EC/3,000 cu ft	1.0 oz EC/3,000 cu ft	
	smoke	6.0 oz can/10,000 cu ft	6.0 oz can/10,000 cu ft	6.0 oz can/10,000 cu ft	

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