



ENTFACT-421

## CONTROLS FOR GREENHOUSE ORNAMENTAL INSECT PESTS

Ric Bessin, Extension Entomologist

The warm humid conditions and abundant food in the greenhouse are ideal for pest build up. Problems can be chronic unless recognized and corrected. While insecticides are important tools, successful control of greenhouse ornamental pests relies primarily on cultural factors. Proper cultural practices can minimize the chance for initiation and build up of infestations. Early detection and diagnosis are key to greenhouse pest management, as well as, the proper choice and application of pesticides when pest outbreaks occur.

### Cultural Controls

Pests may enter the greenhouse in the summer when the ventilators are open. Others may be brought into the greenhouse on new plant material or in soil. Many are able to survive short periods of time between harvest or plant removal and production of the next crop. Cultural controls are the primary defense against infestation.

### Proper cultural practices which will help prevent pest infestations include:

- Maintain a clean, closely mowed area around the greenhouse to reduce pests that develop in rank growth.
- Remove all plants and any plant debris, clean the greenhouse thoroughly after each production cycle.
- Keep doors, screens and ventilators in good repair.
- Use clean or sterile soils or ground media, tools, flats and other equipment.
- At the conclusion of the season remove all plants and any plant debris, clean greenhouse thoroughly and fumigate.
- Inspect new plants thoroughly to prevent introduction insect or disease infested material into the greenhouse.
- Watch for leaks or pooled water that can lead to fungus gnat infestations.
- If possible allow the greenhouse to freeze in winter to eliminate tender insects like whiteflies.
- Avoid wearing yellow clothing which is attractive to many insect pests which can be carried into the greenhouse from outside.
- Eliminate infestations by discarding or removing heavily infested material.

### Pest Monitoring

Early detection and diagnosis of pest infestations will allow you to make pest control decisions before the problem gets out of hand. It is good practice, therefore, to make weekly inspections of plants in all sections of the greenhouse.

Insect monitoring devices are also available. Yellow sticky cards (PT Insect Monitoring & Trapping System, Whitmire) are highly attractive to winged aphids, leafminer adults, whiteflies, leafhoppers, thrips (blue cards can also be used with thrips), various flies and other insects. These can be used to alert you to the presence of a pest and identify hot spots in the greenhouse. One to three cards per 1000 sq. ft. in the greenhouse is recommended and should be changed weekly. If you cannot identify a trapped insect, contact your county extension agent for assistance. Mass trapping products such as sticky tapes are also available for thrips, whitefly, leafminer and fungus gnat detection and management.

### Insecticide Resistance Management

Many of the most serious greenhouse pests tend to be small insects (or mites) with short life cycles and high birth rates. This includes spider mites, aphids, whiteflies and thrips. Development of insecticide resistance is a potential problem with these pests. Susceptible individuals in a pest population are wiped out when chemicals with the same mode of action are applied repeatedly. The proportion of resistant individuals in a population increases and they become more difficult to control. Unfortunately, a grower may increase usage of the pesticide in response to this until it no longer provides control.

As a greenhouse manager, there are several tactics to prevent, delay or reduce insecticide resistance. Countermeasures include reducing the frequency or extent of insecticide treatments, reducing the use of insecticides with long residual action, avoiding treatments which act upon both larva and adults, and including nonchemical methods of biological and cultural control into an integrated pest management

program.

**Phytotoxicity to Pesticides**

Not all varieties of each plant species has been tested with these registered pesticides. Plant response to these pesticides may vary in your greenhouse. Specific environmental factors in your greenhouse greatly affect phytotoxicity. All pesticides should be tested on a small group of plants to be treated at the recommended rate under anticipated growing conditions for phytotoxic symptoms. Signs of phytotoxicity may take 1 to 14 days to develop.

Revised: 11/01

Alphabetical listing of common insecticides (trade names), the pests they control, and a listing of safe and sensitive plants, comments also.

<b>Common Name (Trade Name)</b>	<b>Pest controlled</b>	<b>Safe plants</b>	<b>Sensitive plants</b>	<b>Comments</b>
<b>Abermectin</b> (Avid 0.15EC)	Spider mites (all motile forms), leafminers	Various ornamentals	Do not use on ferns or conifers.	Insecticide/miticide: May require 3 to 4 days to achieve maximum effectiveness
<b>Acephate</b> (Orthene Turf, Tree and Ornamental Spray, PT 1300 TR, Orthene, PT 1300 DS Orthene)	Aphids, cabbage loopers, lacebugs, leafminers, leafrollers, mealybugs, plant bugs, scale crawlers, sweet potato whitefly, thrips, whiteflies	Roses, orchids, anthuriums, cacti, poinsettia, carnations, chrysanthemums, impatiens, marigolds, petunias, geraniums, snapdragons, fuchsia, lantana, New Guinea impatiens, ivy, geraniums, boston fern, dracaena, ficus, schefflera, philodendron, lillies, african violets, hibiscus, begonia, azalea, viburnum, yew	Do not apply to American elm, flowering crabapple, sugar maple, and cottonwood.	An organophosphate insecticide. Do not apply to roses or chrysanthemums with open flowers.
<b>Bacillus thuringiensis var azawai</b> (XenTari)	Armyworm, loopers, Heliothis	Flowers, bedding plants, herbs, and ornamentals.		A biological insecticide that attacks the gut and must be injected. Does not kill adults. Toxic to the predatory mite <i>Metaseiulus occidentalis</i> and green lacewing
<b>Bacillus thuringiensis var kurstaki</b> (Dipel 2X, Javelin WG, Steward)	Armyworm, loopers, Heliothis	Flowers, bedding plants, herbs, and ornamentals		A biological insecticide that attacks the gut and must be injected. Does not kill adults
<b>Bacillus thuringiensis Serotype H-14</b> (Gnatrol)	Fungus gnat larvae	Ornamentals		A biological insecticide that attacks the gut and must be injected. Apply as a soil drench. Does not kill adults
<b>Bendiocarb</b> (Dicarb, Turcam)	Aphids, thrips, mealybugs, greenhouse whitefly, black vine weevil, scales, collembola	African violet, ageratum, aglaonema, aralia, asarina, asparagus sprengeri, begonia, calathea, calendula, camellia, carnation, celosia, chrysanthemum, coleus, cottoneaster, Croton, daffodil, dahlia, dianthus, dieffenbachia, dracaena, epipremnum, episcia, fatsia, ferns, ficus, fountain grass, fuchsia, gazania, geranium, gladiolus, gloxinia, hydrangea, hypoestes, impatiens, iris, ivy, ixora, leucothoe, lily of the valley, maranta, marigold, mondo grass, nandina, nasturtium, nicotiana, pansy, peperomia, petunia, philodendron, photinia, pieris, poinsettia, portulaca, pothos, primrose, rose, sago palm, salvia, sansevieria, schemera, shasta daisy, sinningia, snapdragon, spathiphyllum, spirea, sycamore, verbena, viburnum, vinca, wandering jew, and zinnia.		A carbamate insecticide.

<b>Bifenthrin</b> (PT 1800 Attain, Talstar T&O 10 WP, Talstar T&O Flowable)	Aphids, armyworms, brown soft scale, caterpillars, fungus gnats, cutworms, loopers, mealybugs, plant bugs, scale, whiteflies, spider mites, thrips, leafminers	Ornamental and flowering plants		A synthetic pyrethroid insecticide. Apply during early evening when foliage is dry and temperature is between 60 - 80 F. Use an alternate class of chemistry in a treatment program to delay or prevent resistance.
<b>Chlorpyrifos</b> (Dursban 50 WP, PT 1325 ME Duraguard, Pageant DF)	Ants, aphids, beetles, caterpillars, centipedes, crickets, leafhoppers, mealybugs, plant bugs, scale, sowbugs, thrips (exposed), whiteflies	Ornamental and flowering plants	Do not use on croton, schefflera, zebra plant, copperleaf, black olive, papayas, cissus, ficus, weeping fig, Cuban laurel, yellow hibiscus, red/Chinese hibiscus, impatiens, Boston fern, petunia, and some roses.	An organophosphate insecticide. Direct spray to some open blooms may cause petal drop. Do not use additional wetting agents, spreaders or stickers.
<b>Cyfluthrin</b> (Tempo 2, Tempo 20 WP, Decathalon)	Armyworms, cutworms, flies, crickets, fungus gnats, sowbugs, ants, aphids, flea beetles, leafhoppers, plants bugs, mealybugs, thrips, scales, whiteflies	Ornamentals		A synthetic pyrethroid insecticide
<b>Cyromazine</b> (Citation 75 WP)	Leafminers	Container grown chrysanthemums		An insect growth regulator. It has some systemic effects, but should be applied as a high volume spray.
<b>Diazinon</b> (Knox-Out 2FM PT 265, Knox-Out PT 1500R)	Ants, aphids, caterpillars, crickets, fungus gnat larvae, leafminers, loopers, mealybugs, millipedes, mites, scales, thrips	Various ornamentals	Do not use on bella palm, dracaena, hoyo, maidenhair fern, neath, poinsettia, and prayer plant.	An organophosphate insecticide.
<b>Dibrom</b> (Naled 8 E)	Spider mites, adult whiteflies, aphids, leafrollers, mealybugs	Roses and other ornamental plants	Often used as a vapor treatment when applied on heat pipes.	An organophosphate insecticide.
<b>Dicofol</b> (Kelthane 35, Kelthane 50)	Mites	Ornamental and flowering plants		A miticide.
<b>Dienochlor</b> (Pentac Aquaflo, Pentac WP)	Two-spotted spider mite, European red mite, broad mites	Most ornamental plants including: roses, chrysanthemum, carnation, gardenia, poinsettia, snapdragon, zinnia, delphinium, palms, maranta, zebra plant, schefflera, dieffenbachia, aphelandra		A miticide.
<b>Endosulfan</b> (Thiodan T&O 3EC, Thiodan T&O 50WP)	Aphids, whiteflies, cyclamen mite	Ornamentals	Do not use on 'Bnafon Deluxe', 'Fred Shoemith' or 'White Knight' chrysanthemums.	A chlorinated hydrocarbon insecticide. On chrysanthemums, apply before plants flower for best results.
<b>Fenoxycarb</b> (PT 2100 TR Preclude)	Whiteflies, thrips, scale, aphids	Bedding plants, cut flowers, potted plants, foliage and flowering plants, and ornamentals		An insect growth regulator. Apply during early evening when foliage is dry and temperature is between 60 - 80 F.

<b>Fenpropathrin</b> (Tame 2.4 EC)	Aphids, beet armyworm, mealybugs, greenhouse whitefly, lace bugs, leafhoppers, two-spotted spider mite, sweet potato whitefly	Ornamental plants including: Anthurium, bedding plants, chamomile, chrysanthemum, crossandra, columbine, foliage plants, geranium, gladiolus, impatiens, liriopie, lilly, mrigold, poisetia, snapdragon, azalea, croton, camellia, cotoneaster, gardenia, hibiscus, rose, viburnum		A synthetic pyrethroid insecticide.
<b>Fluvalinate</b> (Mavrik Aquaflow)	Aphids, thrips, mites, whiteflies, flea beetles, leafhoppers, plant bugs, leaf-feeding caterpillars	Ornamentals		A synthetic pyrethroid insecticide. May work slowly on some species. Allow 3 to 4 days to evaluate performance. Piperonyl butoxide will aid in the control of some pest species such as whiteflies, aphids, thrips, and mealybugs.
<b>Horticultural oil</b> (SunSpray Ultra Fine Spray oil)	Aphids, fungus gnat, leafminers, mealybugs, scales, spider mites, whiteflies Safe plants:	Azaleas, begonias, camelias, chrysanthemums, Easter lilles, ferns, gardenias, hibiscus, jade plant, New Guinea impatiens, palms, philodendron, portulaca, reigor begonias, zinnias, poinsettia, dieffenbachia	Do not use on coconut palms or maidenhair ferns. Blooms of chrysanthemums and geranium may show injury at higher rates. Do not use on poinsettia bracts. Some bleaching and spotting has been observed on open blooms.	Most effective on whitefly during immature stages. Kills insect by suffocation. Complete coverage is necessary. Is incompatible with pesticides containing sulfur.
<b>Imadacloprid</b> (Marathon 1G)	Aphids, mealybugs, thrips, whiteflies	Ornamental flowering, foliage, and bedding plants		A systemic insecticide. Do not apply to soils which are water-logged, or saturated which will not allow penetration of water into the root zone of the plants. Do not over-irrigate or allow excessive runoff to occur following application.
<b>Insecticidal soap</b> (M-pede, Safer, Ringer Attack)	Aphids, lace bugs, leafhoppers, plant bugs, mealybugs, mites, scales, thrips, whiteflies	Flowers and bedding plants	Do not use on azaleas, begonias, bleeding heart, camellias, crown of thorns, fuchias, gardenia, impatiens, jade plants, lantana, lilies, palms, or sweet peas. Do not use on transplants or root cuttings. Test on euphorbias, chrysanthemums, dracaena, dieffenbachia, ivies, palms and succulents before using. Do not apply to open blooms.	Avoid application when temperatures exceed 90 F.

<b><i>Kinoprene</i></b> (Enstar 5E, Enstar II)	Immature whiteflies, aphids, soft and armored scales, mealybugs, fungus gnats	Ornamental plants including: aluminum plant, azalea, Boston fern, bromeliad, chrysanthemum, devil's ivy, dianthus, dracaena compacta, emerald gem nephthylis, English ivy, epipremnum aureum, exotica perfection dumbcane, false aralia, fluffy ruffles fern, fuchsia, geranium, gerbera, gloxinia, heartleaf philodendron, hydrangea, kalanchoe, lantana, lily, marigold, pelargonium, petunia, purple passion plant, red-veined prayer plant, Sanders dracaena, snapdragon, table fern, variegated oval leaf peperomia, wax plant, weeping fig, areca palm, aucubifolium [cotton], coleus varieties, coral ardisia, grape ivy, neanthebelle palm, and sprengeri fern, zebra plant	Do not use on some poinsettia and rose varieties.	An insect growth regulator. May cause some damage to blooms under certain conditions, apply in the prebloom stage.
<b><i>Neem</i></b> (Azatin, Margosan-O)	Whiteflies, thrips, mealybugs, leafminers, loopers, caterpillars, beet armyworm	Bedding plants, potted plants, foliage plants, ornamentals, trees and shrubs		An insect growth regulator. Do not add surfactants. Do not apply when temperatures will exceed 90 F.
<b><i>Nicotine</i></b> (Nicotine Smoke Generator)	Aphids, thrips, chysanthemum and rose midge, whiteflies	Safe plants: Greenhouse ornamentals	Do not use on African violets. Do not fumigate tender plants.	A botanical insecticide.
<b><i>Permethrin</i></b> (Pounce T&O 25 WP, Pounce T&O 3.2 EC)	Cabbage looper, beet armyworm, omnivorous leafroller	Greenhouse roses	Some rose varieties are sensitive to permethrin. Treat a small number of plants to determine plant safety prior to commercial use.	A synthetic pyrethroid insecticide.
<b><i>Pyrethrin + PBO</i></b> (PT 1100 Pyrethrum, X-clude PT 1600 A, Pyrenone)	Ants, aphids, beetles, caterpillars, fungus gnats, leafhoppers, mealybugs, moths, plant bugs, scale, spider mites, whiteflies	Ornamental and flowering plants	Do not use on cyclamen or nasturtium	A botanical insecticide and a synergist.
<b><i>Resmethrin</i></b> (PT 1200 TR, PT 1200 DS)	Ants, aphids, armyworms, beetles, caterpillars, centipedes, fungus gnats, lacebugs, leafhoppers, mealybugs, milipedes, plant bugs, scale, sowbugs, thrips, whiteflies	Bedding plants, cut flowers, foliage and flowering plants and ornamentals		A synthetic pyrethroid insecticide
<b><i>Steinernema carpocapsa</i></b> (Exhibit)	Root weevils and grubs, fungus gnat larvae, shore fly larvae	Ornamentals		Biological larvicide containing parasitic nematodes. Incompatible with some other pesticides. See label for guidelines.
<b><i>Sulfotep</i></b> (Plantfume 103)	Spider mites, thrips, soft brown scale, mealybugs, whitefly	Various ornamentals		An organophosphate insecticide.