

Greenhouse Pest Management with Insecticides

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Starting clean: Do not carry-over insects from one crop to another. Keep thrips numbers down to less than 10/card/week in the fall and winter on poinsettias and cordyline (*Dracaena*). Avoid keeping houseplants or allowing weeds to grow in the greenhouse. When each batch of growing media arrives for a new crop, check it for fungus gnats by filling a 1 gal Zip-lock bag 1/2-full with moist substrate. If fungus gnat adults emerge within 3 weeks, consider applying a fungus gnat treatment at planting time. Check incoming plant material carefully. If insects are found treat them with an appropriate product listed below to start as clean as possible.

Scouting: Monitor thrips and whiteflies with yellow sticky cards. Change cards once per week. Use at least one card per house or one per 2,000 ft². Check the first plants to flower for thrips. For spider mites and aphids, check susceptible plants like marigold (mites) and pepper (aphids), weekly. Potato wedges can be stuck in substrate and checked 24 hours later for fungus gnat larvae.

Systemic insecticides:

Applied to the substrate surface as a drench for uptake by plant roots and systemic movement throughout the plant:

<i>Flagship</i> ¹	Kontos ²	<i>Imidacloprid</i>	Mainspring ³	<i>Safari</i>
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Applied as a substrate systemic on cucumbers, tomatoes, eggplant, and peppers:

Gaicho

¹ All neonicotinoid insecticides are substrate systemics, with the exception of Tristar, and are listed in *italics*.

² Kontos is labeled for spider mites, aphids, mealybugs, and whitefly.

³ Mainspring is labeled for thrips, aphids, whiteflies and mealybugs.

Which products are neonicotinoids?

Technically, according to the IRAC classification system based on mode of action, neonicotinoids are all insecticides in category 4A listed below:

Chemical:	<i>Acetamiprid</i> ¹	<i>Dinotefuran</i>	<i>Imidacloprid</i>	<i>Thiomethoxam</i>
Product:	<i>Tristar</i>	<i>Dinotefuran</i> <i>Safari</i> <i>Sagacity</i>	<i>Benefit</i> <i>Bounty</i> <i>Discus</i>	<i>Flagship</i> <i>Imigold</i> <i>Marathon</i>

¹ All neonicotinoid products are listed in *italics*.

Related chemical structure but a different mode of action (category 9C):

Chemical: Flonicamid¹
Product: Aria

¹ Dr. Smitley has seen some news articles that **incorrectly** include flonicamid with neonicotinoids.

Pyrethroid insecticide products:

Pyrethroids are excluded from this list because of documented *resistance* problems with **thrips** and some **whiteflies** and **aphids**. However, they are still *very effective* for susceptible populations of **whiteflies**, **aphids**, **mealybugs**, **caterpillars**, **scale crawlers** and **most other insects**. Some pyrethroid insecticide products available for greenhouse use are:

Astro	Attain	Bifenthrin	Decathlon
Talstar	Tame	Mavrick	Scimitar

Preventing outbreaks: If yellow sticky cards or scouting indicates an increase in **aphids**, **mites**, **thrips**, **fungus gnats** or **whiteflies**, apply one of the following insecticide products **once per week** as a **foliar spray**, unless a **substrate drench application is mentioned**:

Aphids

Acephate 97	Altus	Aria	Azadarachtin + M-Pede ⁴ (Aza-Direct, AzaGuard, Azatin)	BotaniGard
Distance	Endeavor	Enstar II	<i>Flagship</i>	<i>Gaicho</i> ⁵
Kontos ¹	<i>Imidacloprid</i>	Mainspring	Ornazin	<i>Safari</i>
Talstar	<i>Tristar</i>			

(but resistance is possible)

(residue not toxic to bees)

* All neonicotinoid products are listed in *italics*. Apply *Tristar* as a spray.

Broad mites and Cyclamen mites

Avid	Akari	Judo ²	Pylon	SanMite
2 % horticultural oil (oils may be phytotoxic, test first)				

* Reduce humidity to below 80% if possible.

Florida fern caterpillar				
Adept Pedestal	Bt	Duraguard ME	Mesurool	Orthene
Note: These caterpillars are usually resistant to pyrethroid insecticides				
Fungus gnats				
Apply as a substrate drench:				
Adept (not on poinsettias)	Azadarachtin (Aza-Direct, AzaGuard, Azatin O)	Citation	<i>Flagship</i> ¹	<i>Imidacloprid</i>
Pyriproxyfen (Distance Pyranica or Engulf)	<i>Safari</i>			
* All neonicotinoid products are listed in <i>italics</i> .				
Mealybugs				
Apply as a substrate drench:				
Altus <i>Safari</i>	Aria Orthene 97	<i>Flagship</i> Talus	<i>Imidacloprid</i>	Kontos
* All neonicotinoid products are listed in <i>italics</i> . Apply <i>Tristar</i> as a spray.				
Spider mites				
Akari Judo ² (see phytotoxic footnote)	Applause Kontos Sanmite	Avid Magnus Shuttle-O	Floramite Ovation Sultan	Hexygon ProMite Tetrasan
Ultiflora				
Thrips				
Aria Overture	BontaniGard ES Pedestal	Mainspring Pylon	Mesurool <i>Safari</i>	Orthene 97 <i>Tristar</i>
Note: If Distance is applied as a substrate drench, it will reduce the number of thrips adults emerging from pupae in the substrate.				
Whiteflies				
Acephate 97	Altus	azadarachtin (Aza-Direct, AzaGuard, Azatin-O, Azatin XL, Molt-X)	<i>Beauveria bassiana</i> spores (BotaniGard ES or 22WP, Mycotrol ES)	Distance (not for Q biotype)
Endeavor	Enstar (not for Q biotype)	<i>Gaicho</i> ⁵	Judo ² (see phytotoxic footnote)	Kontos ¹ (see phytotoxic footnote)
Mainspring	Ornazin	Pedestal (do not use on poinsettias)	Pyriproxyfen (Distance, Pyranica or Engulf)	Sanmite
Savate	Talus (not for Q biotype)	Xpire		
* Insecticidal soap ³ (M-pede) and horticultural oils ³ (SuffOil-X, Ultra-Pure Oil, SunSpray Ultra-Fine Oil, Triact70, Saf-T-Side) can be used if care is taken not to exceed label rates and not to spray open flowers, to avoid phytotoxicity.				
* Neonicotinoids: <i>Imidacloprid</i> , <i>Safari</i> , or <i>Flagship</i> applied as a substrate drench or as a spray. <i>Tristar</i> as a spray.				
Important Foot Notes				
¹ On the Kontos label: Not recommended for use on geraniums, orchids, <i>Hoya</i> , <i>Dracaena</i> , <i>Cordyline</i> , <i>Schefflera</i> , neanthe bella palm, and ferns. Do not make more than one application per season to <i>Hydrangea</i> , <i>Impatiens spp.</i> , crotons, <i>Fuchsia</i> hybrids, <i>Petunia</i> , <i>Peperomia</i> , stock, or cyclamens.				
² On the Judo label: Do not use on geraniums, <i>Peperomia</i> , <i>Dracaena</i> , and 'Classy', 'Attache' or 'Vogue' roses. It is not recommended to use Judo on <i>Alstroemeria</i> , <i>Argyranthemum</i> , <i>Bacopa</i> , <i>Matthiola</i> , <i>Lobelia</i> , New Guinea impatiens, ferns, phoz, English ivy, cyclamen, hydrangea, <i>Schefflera</i> , fuchsia, croton, neanthe bella palm and <i>Primula</i> .				
³ In phytotoxicity testing, insecticidal soap and horticultural oil products have been at the top of the list for being the most phytotoxic to greenhouse plants (assuming that plants listed on the label as being sensitive are not included in the test). Do not exceed labeled rates which are usually a 1% concentration of oil or a 2% concentration soap.				
⁴ AzaDirect at 24 oz and M-Pede at 128 oz per 100 gallons.				
⁵ Gaicho is labeled for use as substrate systemic only on greenhouse-grown vegetables. <i>Bemesia</i> (silverleaf whitefly) resistance to imidclopriid is common.				