

# Greenhouse Insect Management

David Smitley  
Michigan State University  
December 9, 2016

**Starting clean:** Do not carry-over insects from one crop to another. In empty greenhouses treat the soil surface with Duraguard before starting a new crop. 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 media arrives for a new crop, check it for fungus gnats by filling a 1 gal Zip-lock bag 1/2-full with moist soil. 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 ft<sup>2</sup>. 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 soil and checked 24 hours later for fungus gnat larvae.

**Systemic insecticides:** Kontos, Mainspring, *Imidacloprid*, *Flagship*, and *Safari* can all be applied to the soil surface as a drench for uptake by plant roots and systemic movement throughout the plant. *Gaucho* can be used as a soil systemic on cucumbers, tomatoes, eggplant, and peppers. Neonicotinoid insecticides are listed in *italics*. The only soil systemic insecticides available at this time that are NOT neonicotinoids are Kontos and Mainspring. Kontos<sup>1</sup> is labeled for spider mites, aphids, mealybugs, and whitefly. 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. This includes *acetamiprid* (*Tristar*), *dinotefuran* (*Safari*, *Dinotefuran*, *Sagacity*), *thiomethoxam* (*Flagship*) and imidacloprid (*Marathon*, *Benefit*, *Discus*, *Imigold*, *Bounty*). Flonicamid (Aria) has a related chemical structure but a different mode of action (category 9C). However, I have seen some news articles that incorrectly include flonicamid with the neonicotinoids. Neonicotinoid products are listed in *italics* at the end of each pest section.

**Pyrethroid insecticide products:** Pyrethroids have been 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, Talstar, Decathlon, Decathlon, Tame, Scimitar, and Mavrick.

**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 soil drench application is mentioned:

**Thrips:** Aria, BotaniGard ES, Mainspring, Mesuro, Orthene 97, Overture, Pedestal, and Pylon. Avid and Safari have worked well in research tests in other states, but we have had some tests where they did not work well in Michigan. Also, if Distance is applied as a soil drench it will reduce the number of thrips adults emerging from pupae in the soil.

**Aphids:** Aria, azadarachtin + M-Pede<sup>4</sup> (Aza-Direct, AzaGuard, Azatin), BotaniGard, Distance, Endeavor, Enstar II, *Gaicho*<sup>5</sup>, Kontos<sup>1</sup>, Ornazin, Orthene 97, Talstar (but resistance is possible), *Tristar* (residue not toxic to bees).

Neonicotinoids: *Imidacloprid*, *Safari*, or *Flagship* applied as a soil drench or as a spray. *Tristar* as a spray.

**Whiteflies:** Azadarachtin (Aza-Direct, AzaGuard, Azatin O), BotaniGard ES, Distance (not for Q biotype), Endeavor, Enstar (not for Q biotype), *Gaicho*<sup>5</sup>, Judo<sup>2</sup> (see phytotox footnote), Kontos<sup>1</sup> (see phytotox footnote), Ornazin, Orthene 97, Pedestal (do not use on poinsettias), pyriproxyfen (Distance, Pyranica or Engulf), Sanmite, and Talus (not for Q biotype). Low rates of insecticidal soap<sup>3</sup> (M-pede) and horticultural oils<sup>3</sup> (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: *Imidacloprid*, *Safari*, or *Flagship* applied as a soil drench or as a spray. *Tristar* as a spray.

**Spider mites:** Akari, Avid, Floramite, Hexygon, Judo<sup>2</sup> (see phytotox footnote), Kontos, Magus, Ovation, ProMite, Pylon, Shuttle-O, Tetrasan, Ultiflora

**Broad mites and cyclamen mites:** Avid, Akari, Judo<sup>2</sup>, Pylon, SanMite, 2 % horticultural oil. Reduce humidity to below 80% if possible.

**Fungus gnats:** Azadarachtin (Aza-Direct, AzaGuard, Azatin O), Adept (not on poinsettias), Citation, or pyriproxyfen (Distance Pyranica or Engulf) as a soil drench. Allow growing media to dry between waterings, as soon as is possible.

Neonicotinoids: *Imidacloprid*, *Safari* or *Flagship* applied as a soil drench.

**Mealybugs:** Aria, Duraguard ME, Kontos, Orthene 97, Talus and Xxpire.

Neonicotinoids: *Imidacloprid*, *Safari*, or *Flagship* applied as a soil drench or as a spray. *Tristar* applied as a spray.

**Florida fern caterpillar:** Because these caterpillars are usually resistant to pyrethroid insecticides try using Adept, Bt, Pedestal, Orthene, Mesurol or Duraguard ME.

---

<sup>1</sup> On the Kontos label: Not recommended for use on geraniums, orchids, hoyas, *Dracaena*, *Cordyline*, *Schefflera*, neanthebella palm, and ferns. Do not make more than one application per season to *Hydrangea*, *Impatiens spp.*, crotons, *Fuschia* hybrids, *Petunia*, *Peperomia*, stock, or cyclamens.

<sup>2</sup> On the Judo label: Do not use on geraniums, *Peperomia*, *Dracaena*, and ‘Classy’, ‘Attache’ or ‘Vogue’ roses. It is not recommended to use Judo on *Alstromoeria*, *Agyranthemum*, *Bacopa*, *Matthiola*, *Lobelia*, New Guinea impatiens, ferns, phoz, English ivy, cyclamen, hydrangea, schefflera, fuschia, crotin, neanthebella palm and *Primula*.

<sup>3</sup>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). In general concentrations of oil greater than 1% or of soap greater than 2% can be phytotoxic.

<sup>4</sup>AzaDirect at 24 oz and M-Pede at 128 oz per 100 gallons.

<sup>5</sup>Gaucho is labeled for use as soil systemic only on greenhouse-grown vegetables. Bemisia (silverleaf whitefly) resistance to imidacloprid is common.

NOTE: More phytotoxicity and additional information is available on the Wall Chart, 'Insect Controls for the Greenhouse Industry', MSU Extension Bulletin E-2696, also available at the website: <http://flor.hrt.msu.edu/IWC/index.html> , and as a phone app.

---

Practices that contribute to growing Bee-Friendly plants:

- **Do not spray flowers in the last 2 – 3 weeks before shipping**
- **Do not apply soil drenches of imidacloprid or other neonicotinoids any later than 1 year before shipping. Do not exceed the labeled rate.**
- **Read bee warning information on pesticide labels and avoid practices that are harmful to bees.**