



## Bug-Wise

No. 7

May 5, 2009

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**Insecticides for Commercial Greenhouse Ornamentals:** Insecticides, fungicides, miticides, growth regulators, disinfectants, and more! It's difficult for commercial growers to keep track of the many different pest control products and chemicals that they use, or might use, in their work. Because greenhouse pests like whiteflies and spider mites are so quick to develop resistance, it is especially important for growers to be aware of which insecticides and miticides they are using and which class of chemistry they belong to. It is important to rotate insecticide/miticide use, but rotating to another product in the same chemical class (for example switching from Marathon to Safari or Flagship) will not help.

One way to help organize your thinking about insecticides is to divide them into groups based on how they are used, which class of chemistry they belong to, or which pests they control. The following lists are intended to provide examples of these kinds of groups, but they are not intended to be complete or definitive. See product labels and other insect control recommendations for information on use rates, labeled crops, PHIs, and other critical information. Always read product labels at least twice—once just before you buy the product and again just before you apply the product.

**Neonicotinoid Media Drenches:** Several systemic products are labeled for application as media drenches or through irrigation. These treatments are slower-acting than foliar sprays, but usually provide long-term control, lasting as long as several months. Although these are currently very effective treatments for the pests they are intended to control, they all belong to the same class of chemistry, the neonicotinoids, and must be used sparingly to delay development of resistance. Follow resistance management recommendations on product labels. Avoid successive applications of neonicotinoid products. Application rate depends on pot size, plant type, number of plants per pot, and many other factors. Read application directions carefully.

Marathon II (imidacloprid), by OHP, was the first neonicotinoid to be used as a media drench. It is effective against aphids, soft scale, whiteflies, fungus gnats, leaf miners, and other sucking pests, but will not control mites or most caterpillar pests. Marathon is also labeled for use on seedlings of certain vegetable crops being grown in the greenhouse for resale as transplants.

Flagship 25 WG (thiamethoxam), by Syngenta, is also a neonicotinoid, but it is relatively new to the commercial greenhouse industry. When applied as a media drench, Flagship controls aphids, whiteflies, mealybugs, and fungus gnats. It is also labeled for application as a foliar spray. Flagship will not control mites or caterpillar pests.

Safari 20 SG (dinotefuran), by Valent, is another new neonicotinoid product that can be applied either as a media drench, or as a foliar spray. Safari is very effective against whiteflies, including silverleaf whiteflies, and mealybugs. It is also labeled for control of aphids, soft scale, fungus gnats, lace bugs, and leaf miners. In addition, Safari also provides good control of armored scales. Like other neonicotinoids, it does not control mites or most caterpillar pests.

**One Neonicotinoid as Foliar Spray Only:** TriStar 30 SG (acetamiprid), by Cleary, is a neonicotinoid that is only labeled for application as a foliar spray (it may not be applied as a media drench). Tristar is very effective against whiteflies, including silverleaf whiteflies. It also controls aphids, mealybugs, leafhoppers, leaf miners, scale, and thrips. Avoid applying to crops that have already been treated with a media-applied neonicotinoid.

## **A New Systemic Insecticide for Greenhouse Use:**

Kontos (2 lbs ai/gal.) (spirotetramat), by OHP, is a new systemic insecticide for use in greenhouses, belonging to a unique chemical class (it is not a neonicotinoid). This product exhibits translaminar movement and also moves both up and down within plants systemically. It can be applied as either a drench or as a foliar spray to control aphids, whiteflies, mealybugs and other sucking pests, but it is not labeled for thrips or caterpillar pests. When applied as a drench, Kontos provides systemic control of spider mites, but it is slow-acting and will not control heavy populations of spider mites. Kontos is also labeled for use on transplants of certain vegetable crops being grown in the greenhouse.

**Insect Growth Regulator Products:** Growth regulators usually mimic natural insect hormones and work by triggering abnormal growth in the target insect species: premature molting, interfering with egg development, etc. This means they are usually slow-acting and only control immature insects. Despite their slow activity, growth regulators are extremely useful insect management tools and are especially effective in resistance management.

Distance 0.86 lb ai/gal (pyriproxyfen), by Valent, is especially useful as a foliar spray for control of immature whiteflies, including silverleaf whiteflies. It is also effective against crawlers of certain scale and can be applied as a media drench for control of fungus gnats.

Talus 40 SC (buprofezin), by SePro, is another growth regulator that is especially useful against silverleaf whiteflies and other whitefly species. It is also effective against mealybugs, leafhoppers, and scale crawlers.

Pedestal 0.83 SC (novaluron), by Chemtura, is a growth regulator product that is effective as a foliar spray against whiteflies, thrips, and armyworms.

Ornazin 3% EC (azadirachtin), by SePro, is a botanical product that acts as a growth regulator against whiteflies and provides control of many other pests. It is generally less effective and less long-lasting than other growth regulator products, but can provide effective control when multiple applications are applied at close intervals, according to label directions. Although azadirachtin is extracted from neem tree seed, it is not the same as neem oil (see discussion under 'Oils').

**Caterpillar Pests:** Conserve 1 SC (spinosad) by Dow, is effective against all caterpillar pests when applied as a foliar spray. Conserve is also one of the more effective treatment options for thrips, including western flower thrips. However, it may not provide good control of thrips hiding in flowers or buds, due to lack of contact.

**Miticides:** Because of their short life cycles, mites can quickly develop resistance if repeatedly exposed to the same miticide. Consequently, it is especially important to follow good resistance management practices when using miticides. Fortunately, there are several effective miticides, representing different chemical classes, labeled for use on greenhouse ornamentals. Keep at least three different miticides on hand and rotate their use; avoid successive treatments with the same product. Some of the most useful miticides are discussed below.

Judo 4 SC (spiromesifen), by OHP, controls spider mites, as well as broad mites and eriophyid mites. It also provides excellent control of whiteflies, including silverleaf whiteflies. Judo exhibits translaminar activity, which means it moves through leaves, from top to bottom, a trait that is especially useful against mites and whiteflies.

Avid 0.15 EC (abamectin), by Syngenta, is effective against spider mites, as well as broad mites and eriophyid mites. It also controls leaf miners. Avid exhibits translaminar activity, meaning that it will move through leaves, from top to bottom.

Floramite 2 SC (bifentate), by Chemtura, is specifically for control of spider mites.

Shuttle O (1.25 lbs/gal) (acequinocyl), by OHP, is specifically labeled for control of spider mites.

Pylon (2 lbs/gal) (chlorfenapyr), by OHP, controls spider mites, as well as broad mites and certain eriophyid mites. Pylon also controls armyworms, loopers, and thrips, although thrips in blooms and buds may escape due to inadequate coverage. Note that Pylon is only labeled for indoor/greenhouse use.

**Oils:** Oils control pests by suffocating them. Consequently, thorough coverage is key to obtaining effective control with oils. Oils are especially effective against small, soft-bodied pests such as spider mites, scales, whiteflies, mealy bugs, etc. Because of their mode of action, oils will control pests that are resistant to other products, which makes them useful tools for resistance management.

**Horticultural Oils:** Horticultural oils consist of highly refined paraffinic oils formulated with an emulsifier to allow them to mix in water. There are many different brand name products. They are usually applied at 1 to 2% concentration, but read label carefully for mixing and application directions. Be aware that horticultural oils can cause plant injury, especially when temperatures are too low or too high. Check the label. Horticultural oils are especially useful against difficult to control pests such as scales and mealybugs.

**Neem Oil:** Neem oil is extracted from the seeds of the neem tree—but this is a different product than azadirachtin. There are several different brand name products; Triact 70, by OHP, is one example. Neem oil products are used to control certain fungal diseases, but they also have activity against whiteflies, mealybugs, aphids, mites and scale crawlers and provide an organic control option for these pests.

**Pyrethroids:** Several pyrethroids are labeled for use on greenhouse ornamentals. Although pyrethroids are broad spectrum insecticides, their use in greenhouses is limited because they generally are not effective against common greenhouse pests such as whiteflies, mealybugs, and spider mites. In fact, pyrethroid treatments will often flare these pests (stimulate population increase). Still, pyrethroids are useful treatments for thrips, beetles, and many other insect pests, and they can also be useful in tank mixes with other greenhouse insecticides. Three of the most common pyrethroids labeled for greenhouse use are: Decathlon 20 WP (cyfluthrin) by OHP; Talstar P (bifenthrin) by FMC; and Tame 2.4 EC (fenpropathrin) by Valent. Note that the chemical name of most pyrethroids ends in ‘thrin’.

**Whitefly Efficacy Trial Results:** The following table shows results from a whitefly (*Bemisia tabaci* biotype B) trial we conducted on greenhouse grown poinsettias at Mississippi State University in 2008. It shows the level of whitefly control provided by some of the products discussed in the preceding sections. Note that most treatments were applied twice, but the Azatin XL treatment was applied 5 times, at weekly intervals. ‘DAT’ = Days After Treatment and T1 = First Treatment. Numbers for the untreated check pots are shown in the bottom row for comparison purposes. The low numbers of immature in the untreated pots at 28DAT1 were due to “being between generations”. These data show that all six tested products provide effective control of silverleaf whiteflies. Note that Safari, applied either as a drench or as a foliar spray, and the growth regulator Distance were still giving excellent control out to four weeks after the last spray.

See Data Table on Page 4.

Treatment/formulation	Rate/100 gal	Treatment Times	Average No. immature whiteflies/2 leaves		
			14 DAT1	28 DAT1	42 DAT1
Safari 20 SG, drench	24 oz.	T1	1.8 bc	0.0 b	0.0 e
Safari 20 SG, spray	8 oz.	T1, 14DAT1	0.5 c	0.0 b	4.3 de
Judo 4 , spray	4 fl oz.	T1, 14DAT1	18.5 b	0.3 b	18.0 cd
Azatin XL, spray	16 fl. Oz.	T1, 7DAT1, 14DAT1, 21 DAT1, 28 DAT1	16.8 b	0.0 b	19.7 bc
Flagship 25 WG, spray	4 oz.	T1, 14DAT1	4.0 bc	1.0 b	90.3 abc
Distance 0.86 EC, spray	8 fl. Oz.	T1, 14DAT1	13.8 bc	1.3 b	0.0 e
Talus 40 SC, spray	9 fl. Oz.	T1, 14DAT1	5.5 bc	0.3 b	145.3 ab
<b>Untreated Check</b>	--	--	<b>407.0 a</b>	<b>14.2 a</b>	<b>242.5 a</b>

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This information is for educational and preliminary planning purposes only. Brand names mentioned in this publication are used as examples only. No endorsement of these products is intended. Other appropriately labeled products containing similar active ingredients should provide similar levels of control. Always read and follow the insecticide label.

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