Problems Controlling Whiteflies

There are some really tough whiteflies out there this summer. We had two major growers who received poinsettias in the spring from the West Coast. One shipment came in late March for stock plant production. The other greenhouse operation received plants in April to produce tree poinsettias. In both cases the plants came in with small populations of whitefly. In hindsight, they should have refused the infested plants, but it was a busy spring.

In both cases they treated with imidacloprid and then ignored the plants through the spring bedding plant season. The grower that introduced the plants in late March ended up applying Avid, Azatin, Azatin, BotaniGard, Sanmite, Safari, Distance, TriStar and finally, Kontos. He just obtained a reasonable control in early August since he applied the Kontos, but it took several weeks for the Kontos to really show an impact.

The second grower’s greenhouse operation treated plants May through August with wet sprays of Aria, Talus, Judo, 1% oil, Sanmite, NoFly, Endeavor, Marathon II, and Azatin. They were applying the foliar applications once a week. The whitefly population kept increasing. Two weeks ago they applied a Kontos drench. Since they applied the Kontos drench (about 2 weeks prior to my visit) the newer foliage was pretty clean, but I still found several viable 2nd and 3rd instars and a couple of adults with their mouthparts still inserted into the foliage and still alive. The older foliage (4 - 6 weeks old) had incredible populations of eggs, and all sessile stages present. I have not seen populations of whitefly like this one in a very long time. There was actually sooty mold growing on the foliage with all of the honeydew produced by the whiteflies.

I brought samples back to our lab and they were *Bemisia tabaci*. Several years ago several growers had major problems with *Bemisia tabaci* Biotype Q which was resistant to several classes of chemistry.

If you are having a tough time controlling whitefly this fall, call me at 410-868-9400 or send an email to sgill@umd.edu so we can discuss control options.
Whitefly Control Information Below From: Chemical Class Rotations for Control of Bemisia tabaci (Hemiptera: Aleyrodidae) on Poinsettia and Their Effect on Cryptic Species Population Composition
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*Bemisia tabaci*, is a polyphagous bug with over 900 host plants. Being highly fecund, *B. tabaci* has the potential to develop insecticide resistance rapidly as demonstrated by reports of use failures with MEAM1 and MED cryptic species (commonly known as biotypes B and Q, respectively). Insecticide resistance management is a key component of pest management practices. In trials conducted in Florida by USDA and IFAS research entomologists, out of 18 active ingredients tested, dinotefuran (applied as a soil drench) was the most efficacious against both MEAM1 (B-biotype) and MED (Q-biotype) cryptic species compared to the other chemical or bio-rational insecticides evaluated. Reduced susceptibility of MED was reported against a variety of treatment regimes.

The efficacy of different insecticides against MED whitefly had been determined and compounds were categorized as tier one including the most efficacious compounds (spirotetramat, dinotefuran, acetamiprid, and spiromesifen) and tier two the compounds which reduce whitefly populations, but not quite as successfully (imidacloprid, thiamethoxam, pyridaben, pyriproxyfen, flonicamid, oil, and azadirachtin or hydrophobic extract of neem oil).

Rotations should be made at 7 day intervals if whitefly populations are still unacceptable. Rotations can be used to manage MEAM1 and MED cryptic species and maintain a very low population level or completely eliminate Bemisia on poinsettia. It is imperative to continue to emphasize the importance of rotating among different modes of action in our pest management programs in order to retain effective chemistries for as long as possible in the market place.

**Pyridaben** (Sanmite): Pyridaben, in trials in Florida, did not prove to be a reliable compound for the rotation, but it did suppress the population and could be included in a rotation once the population was knocked down and a grower wanted to maintain control.

**Pyriproxyfen** (Distance): Pyriproxyfen is powerful insect growth regulator (IGR) that mimics a juvenile growth hormone which suppresses embryogenesis and adult emergence. This IGR was used as a measure of MED resistance. Pyriproxyfen is still very effective against MEAM1 in the United States and is a compound often used in rotations by commercial greenhouses. However, with the introduction of the MED whitefly it is no longer as promising, since this cryptic species is supposedly resistant to pyriproxyfen.

**Flonicamid** (Aria): Flonicamid is another insecticide where mixed results in efficacy against Bemisia have been observed. This compound belongs to the pyridine carboxamide group and is systemic with selective activity against hemipterans including whiteflies and aphids by rapidly inhibiting feeding. In these experiments a significant reduction in adult, but not in immature whiteflies was observed. Results of trials in Florida indicate there was only efficacy for adults. This compound could still be used in a rotation with the understanding that it was primarily an adulticide.

**Acetamiprid** (TriStar): Acetamiprid is a tier one neonicotinoid that has been efficacious against both Meam1 and Med cryptic species.

**Spiromesifen** (Judo): Spiromesifen and spirotetramat (Kontos) belong to the new IRAC 23 Ketoenol group which includes both derivatives of tetric acid (spiromesifen) and tetramic acids (spirotetramet). Both were used as tier one compounds in these experiments. Spiromesifen is reported to act effectively on the egg and early nymphal stages of B. tabaci (both MEAM1 and MED) but adults and late nymphal instars are reported to be only moderately controlled.
**Spirotetramat** (Kontos): Spirotetramat is the newest insecticide on the market and can be applied as a soil drench. This compound is principally effective on immature stages but also significantly reduces fecundity and fertility of B. tabaci. Spirotetramat is a true systemic, possessing full ambimobility or two-way systemicity (phloem and xylem transport), that can penetrate through leaf cuticle and translocate up to growing shoots and down to roots thereby protecting all areas of the plant. The treatment was followed with acetamiprid and the result was excellent control.

**Oil** (plant or petroleum): Oils represent a completely different mode of action than the other insecticides used in these experiments. Oils physically kill by suffocating pests regardless of whether they are plant or petroleum derived. Therefore, it is very important that complete coverage is achieved because the oil must actually get on the insect for it to be effective. Because of this physical activity, selectivity toward one cryptic species over another was not expected and no clear favoritism could be detected. Oil is much more effective early in a rotation when the population is low. Oil significantly reduced immature populations by the second week after application and provided significant reduction for adult populations by the first week.

**Insecticidal soap** (M-Pede): Insecticidal soaps are contact poisons derived from potassium salts which are totally degradable, environmentally friendly and considered a staple in organic pest control. Insecticidal soap was used in the fourth experiment following the application of an entomopathogen (*Metarhizium anisopliae*; Met-52) and was applied for three consecutive weeks. Average mean percent mortality over five weeks for immatures was 82% and for adults was 91%.

**Azadirachtin or neem oil** (Azatin or Triact): Azadirachtin is a steroid-like tetranortriterpenoid derived from neem trees whereas Triact is a clarified hydrophobic extract of neem oil and both are considered effective against *B. tabaci* by preventing molting and reducing growth, development and oviposition in adults. Azadirachtin was used in the first trial and neem oil was used in the remaining three greenhouse trials. When either compound was used first in the rotation and sprayed twice, performance was moderate with average mean percent mortality ranging from 48 to 75 for immature whitefly and 31 to 80 for adult whitefly. Performance was better when neem oil was used in the rotation after an entomopathogen and sprayed three times with average mean percent mortality for immature of 82 and adults of 91.

**Best Performing Materials:** Dinotefuran, spiromesifen, and acetamiprid were the only three treatments that completely eliminated the adult or immature whiteflies during at least one evaluation in their rotation, but all treatments significantly reduced the whitefly populations.

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**Brown Marmorated Stink Bug Update**

We are finding all stages of brown marmorated stink bugs in the area this week. Nymphs are the stage in the highest numbers. Here at the research center in Ellicott City, the stink bugs are still heavily infesting *Hibiscus moscheutos*, but we are also finding them on crabapple and bronze fennel this week.
It's Baaaack! Impatiens Downy Mildew (IDM)

Impatiens Downy Mildew (IDM) is cropping up on Impatiens walleriana in Maryland landscapes within the past week. Those intrepid gardeners and landscapers who decided to ignore the warnings and plant garden impatiens this year have been safe from this disease for most of the season, at least in part because any plants on the market were treated with fungicides to control the disease during production. But now, most landscape plantings have “outgrown” the protection of fungicides applied in the greenhouse, and this year our unusually cool, moist summer weather is perfect for disease development. Look for slight yellow mottling or leaf curl as initial symptoms of the disease (Figure 1). Turn those leaves over, and you’ll see a white “lawn” of sporulation of the downy mildew pathogen (Figure 2). Infected leaves will drop, eventually leaving leafless green stems. Fungicides will not cure infected plants, so management involves removal and destruction of diseased plants.

Management involves removal and destruction of diseased plants. One way to dispose of infected plants is to send them to Dr. Jo Anne Crouch at USDA ARS in Beltsville, who is collecting isolates of IDM for research. Her website with information on sample submission can be found at http://www.ornamentalpathology.com/. Because there is the potential for the pathogen to overwinter in our area in infected plant debris, it is a good idea to avoid planting garden impatiens in the same beds next year.

Control: Monitor closely for the first signs of damage and that is when control measures should be applied or initiated. Physical controls are best if you are in a situation where this is practical. Search for the caterpillars and squish them or put them in a container of soapy water. If you have large numbers of plants that are being attacked you will likely need to apply chemical controls. A major issue of importance is to apply product types and at times that will prevent negative impacts on pollinators! Read the product labels! Apply products in the evening when pollinator activity is reduced. We recommend products with Bacillus thuringiensis (Bt for caterpillars) or spinosad for control of caterpillars. Note that young caterpillars will be better controlled than late instar caterpillars. Applications may have to be repeated for optimal control.

Saltmarsh Caterpillars on Sunflowers

Saltmarsh caterpillars were found feeding on sunflowers this week. Early instar saltmarsh caterpillars do not feed through the leaf so look for thin, brown areas on foliage. Later stages of this caterpillar will eat holes in the leaves. Also, look for saltmarsh caterpillar moths laying eggs on chrysanthemum stems at this time of year. The larvae feed on the inner growth first, so you have to examine the interior of the plants to detect these caterpillars early.

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Late instar saltmarsh caterpillar. Earlier instars tend to paler in color. There are also black forms of this species.

Figure 1. Upper surface of impatiens leaf (arrow) with downy mildew, showing slight mottling.

Figure 2. Lower surface of same leaf showing extensive sporulation.
Mark your calendar for November 7th. The University of Maryland Extension and the Maryland Greenhouse Growers’ Association are developing a one-day seminar on greenhouse topics. We have asked Maryland greenhouse growers and industry experts that are experienced in growing tougher to grow greenhouse crops to share some of their secrets how to produce quality plants.

Several growers are moving fertility management to lower rates of nitrogen and potassium and higher rates of micronutrients. This produces better quality plants with lower fertilizer inputs. Dr. Cari Peters of Peter’s Lab will talk about this method at the conference. There will also speakers talking about new markets to investigate.

Get a copy of the schedule and registration information at https://extension.umd.edu/ipm