Chemical Class: Chloronicotinyl Insecticides

The chemical class, chloronicotinyl is a relatively new chemical class that contains a number of systemic insecticides that are registered for use in greenhouses. These include imidacloprid (Marathon), acetamiprid (Tristar), and thiamethoxam (Flagship). These materials are transported throughout the plant in the transpiration stream and provide a certain degree of residual activity after application. The products currently available vary in their water solubility, which affects how rapidly the active ingredient is taken up by the plant.

Chloronicotinyls have a different mode of action compared to organophosphates (Orthene and Duraguard), carbamates (Mesurol), pyrethroids (Talstar, Decathlon, and Mavrik), and macrocyclic lactone (Avid). Chloronicotinyl insecticides kill target pests in a similar manner as the natural product nicotine by acting on the central nervous system, causing irreversible blockage of the postsynaptic nicotinergic acetylcholine receptors. These insecticides disrupt nerve transmission in insects causing uncontrolled firing of nerves. This results in rapid pulses from the steady influx of sodium, leading to hyperexcitation, convulsions, paralysis and death. A general characteristic of chloronicotinyl insecticides is that they are highly effective in controlling phloem-feeding or sucking insects including aphids, whiteflies, and mealybugs; however, they are not active on spider mites (i.e. twospotted spider mite).

Because all three commercially available chloronicotinyls have similar modes of activity it is important to not rotate from one chloronicotinyl to the next as this will increase the selection pressure on the target pest population and may potentially enhance the development of resistance. In order to avoid the issue of resistance, use an insecticide with a different mode of activity either before or after using a chloronicotinyl insecticide.

What Can You Do To Control Whiteflies When Poinsettias Are In Bract?

Whiteflies continue to be a problem on poinsettias although less so with the use of imidacloprid (Marathon); however, I continue to receive inquires on
how to deal with whiteflies when poinsettias are in bract. Managing whiteflies on poinsettias that are in bract is more difficult with the loss of Plantfume 103/Sulfotepp and because fewer insecticides are labeled for use on poinsettias when in bract. The major concerns are the potential harmful effects (phytotoxicity) when insecticides are applied to bracts and any potential residues that may remain following an application. It is important to remember that poinsettia cultivars may vary in susceptibility to insecticide treatments that are applied to bracts. If possible, treat a sample of plants prior to making an application to the entire crop. Below is a listing of insecticides that cannot (based on label information) be used on poinsettias when they are in bract:

- Distance (pyriproxyfen)
- Insecticidal Soap (potassium salts of fatty acids)
- Endeavor (pymetrozine)
- Orthene (acephate)
- Pedestal (novaluron)
- Enstar II (kinoprene)
- Cinnamite (cinnamaldehyde)
- 1101 Pyrethrum TR (pyrethrin)

**How Does Fertility Affect Insect And Mite Pests?**

Nutritional management is important in producing a marketable crop. However, plant nutrient content may impact plant-feeding pests. Certain insect pests prefer plant tissue with high levels of nitrogen and protein and low carbohydrate and phenol content. High or low fertility levels can increase crop susceptibility to insects and mites. Many plants grown under optimal light and nutrient conditions produce natural chemical defenses that can protect them from insect and mite pests. However, changes in light and nutrition can compromise these defenses, thus increasing the potential for insect and mite problems.

High fertility levels can increase soluble salts in growing medium, which stresses plants and increases their susceptibility to insect and mite pests. The soft, succulent tissue resulting from excess fertilizer is often easier for insects and mites to penetrate with their mouthparts.

Plants respond to high fertility levels, especially from excess levels of nitrogen, by moving more nutrients to new growth. This provides pests easier access to nutrients they need to grow and reproduce. Consequently, insects and mites can grow faster and cause greater injury to crops. In general, supplementary nitrogen in plants may result in enhanced growth, survival, and reproduction of many plant-feeding insects and mites. Increased fertilizer applications, particularly nitrogen concentrations, has led to increased reproduction in a number of insect and mite pests including aphids, spider mites (twospotted spider mite), leafminers, and whiteflies. Additionally, the source of nitrogen may influence reproduction. For example, higher numbers
of whitefly eggs are found on poinsettias fertilized with ammonium nitrate than when fertilized with calcium nitrate.