

Whitefly Trouble in Poinsettia Production

HOW CAN WE AVOID
A REPEAT OF 2012?

By Ronald Valentin



Encarsia adult

Many poinsettia growers in the United States and around the world experienced trouble controlling whitefly during the 2012 growing season. It was worse in some places compared to others. The source of the plant material and how growers set up their pest management program determined how bad the situation got at some greenhouses. Many traditional pesticides that used to work well were no longer working so well. What can be done to control and manage whitefly levels so that we offer a poinsettia that has whitefly levels so low that they are not detectable for the consumer?

Zero Tolerance and Clean Cuttings:

To formulate an answer to this question, we need to start at the beginning: the production of the cuttings. It was clear that there was a significant difference between the different cutting

producers/breeders of poinsettia cuttings and the level of whitefly. This was noticeable early on at rooting stations/operations in the United States, Canada and Europe. This should not be seen or used as a “blaming game” but rather to look objectively at how poinsettia cuttings are produced and what pest management looks like at the off-shore production sites.

We often hear the term “zero tolerance” being used when talking about young propagation material. In order to try to achieve this zero tolerance, frequent pesticide applications are used on stock plants. However, frequent sprays of pesticides on stock plants (or cuttings) do not guarantee that zero tolerance is actually achieved. Also the diversity of pesticides that are used on stock plants does not guarantee that zero tolerance is achieved. Overuse of pesticides on stock plants can contribute to pesticide resistance, making any pest management program

later in the production process more difficult.

In June and July 2012, it became clear that a problem was in the making with the number of whitefly that were noticed on poinsettia cuttings arriving at the rooting stations. In Canada, cuttings from 10 different growers (and thus also different sources) were sent to a lab in the Netherlands to get an idea of pesticide residues to determine what pesticides had been used on stock plants. No less than 24 active ingredients of insecticides and 20 fungicides were found in these samples. Even with the use of a pest management program that included many different products, cuttings from some of these sources came in with significant levels of whitefly. Almost all whitefly found on these cuttings were *Bemisia*

tabaci, sweet potato whitefly (Q and B type). These whitefly came in with cuttings, not from crops outside or from outside the greenhouse, especially in Canada and Northern and central United States. Why? Bemisia can't survive frost and there is no way they could survive outside in those climate regions during the winter time.

The reasons why Canadian samples were sent out for residue testing are:

1. Many growers in Canada have been working with biological control for many years. These BCAs (biological control agents) can be affected by pesticide residues. Not all residues, but certainly some products that were found, have negative effects for weeks.

2. To determine what products had been used on stock plants. It is very likely that these products have developed some resistance within the whitefly population, so it is not very likely that these products will help to control whitefly going forward during rooting and production of the end product.

3. Are there any pesticide products that are registered that are not found on these cuttings, so that whitefly could be knocked back early on at the rooting stations? Unfortunately, the answer was no on a pesticide level, but there are some products such as Botanigard (*Beauveria bassiana*), NoFly and Preferal (*Paecilomyces fumosoroseus*) that were not on this list but most likely also not looked for.

Most rooting stations decided to try to control whitefly with traditional pesticides to try to reduce whitefly levels prior to shipping rooted material to their customers. In many situations where cuttings came in with higher levels of whitefly, this was not very successful. However, one operation made some significant changes in 2012.

Starting at the Beginning

Not many greenhouse operations that root poinsettias are still doing their own stock plants. However, there are still a few left. One of them is KubePak in Allentown, N.J. The owners and managers of KubePak already saw some signs of trouble in their 2011 poinsettia stock and propagation and made the decision to switch to a BCA approach on the stock plants in 2012. When cuttings

arrived in April 2012 to be set up and rooted as stock, whitefly was found already on the cuttings in the boxes. However, a plan had been developed prior to arrival of the cuttings: dipping of the cuttings prior to sticking.

To reduce the level of whitefly to a minimum,

the first part of the plan was to dip all cuttings in a solution containing Botanigard WP. The active ingredient is an entomopathogen (*Beauveria bassiana*), a fungus that kills insects. The key is that spores of this fungus need to get in touch with the target, whitefly. It affects all larval stages, adults as

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well as pupa, but has limited effects on the eggs. This means that it is not a 100 percent solution, but nothing is. It does significantly reduce the population. The other two products that were used in the same solution are *Steinernema feltiae* and Rootshield Plus. The *Steinernema* is used to control

fungus gnat larva, which can be a problem early on when trying to root poinsettia. The Rootshield Plus is a biological fungicide to prevent problems with fungal disease issues such as *Pythium* spp.

After sticking the cuttings, BCA releases started immediately. In addition to the *Steinernema feltiae*,

Hypoaspis miles and *Atheta coriaria* were released at a rate of 10 mites and 0.2 rove beetles per square foot. This release is only done once at direct sticking, but is typically repeated at half rate after planting in situations where cuttings are stuck in plugs and then potted up in its final pot size.

Releases of *Encarsia formosa* and *Eretmocerus mundus* started immediately at a rate of 0.7 wasps per square foot weekly and this continued until three weeks before the stock plants were discarded. In early August when all cuttings had been harvested the average card count of whitefly was less than three whiteflies per sticky card and no visible whitefly in the crop. A success story: even though cuttings started off with whitefly, the population was controlled very well during the production of the cuttings. The conclusion is that these cuttings were clean of both whitefly and pesticide residues. A perfect starting point for growers who continue with a BCA program.

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Continuing with Whitefly Control after Transplant

The most predominant whitefly species in poinsettia is *Bemisia tabaci*, but *Trialeurodes vaporariorum* (greenhouse whitefly) can often be found on poinsettia in much lower numbers. In order to understand how the BCAs for whitefly work, it is important to understand whitefly and its lifecycle. It is also important to be able to recognize both species. Each species has its preferred parasitic wasp that attacks and controls it. Greenhouse whitefly is best controlled by *Encarsia formosa*, but also *Eretmocerus eremicus*. Sweet potato whitefly is best controlled by *Eretmocerus mundus*, but also can be attacked and parasitized by *Eretmocerus eremicus*. *Encarsia formosa* is a specialist on greenhouse whitefly and does very little to affect sweet potato whitefly (only some host feeding). *Eretmocerus eremicus* affects both whitefly species. *Eretmocerus mundus* is a specialist on sweet potato whitefly.

Experiences in Canada

At our neighbors in the North, biological control of whitefly has taken foothold and the majority of

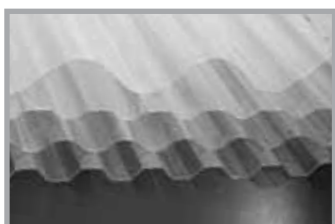
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Poinsettia mix card clipped onto the side of a pot

poinsettia growers adapted their pest management program several years ago. The initial push to change came after a whitefly disaster year in 2002, when many growers in Canada (and around the world) discovered that imidacloprid no longer was effective at controlling whitefly. In an initiative from six poinsettia growers in Ontario, the Ontario Ministry of Agriculture, Food and Rural Affairs, led by Graeme Murphy and other biocontrol companies, a project was started to look at the feasibility of implementing biocontrol in poinsettia. This group grew to a group of 12 growers within two years. Several things were investigated in this group, such as release rates, practical implementation and cost. That last part was looked at by the growers involved who determined that if

cost could be kept below 10 cents per square foot, that would be acceptable (compared with pesticide usage in previous years). The first year that 12 growers were involved the average cost came out at 8.1 cents per square foot for a full BCA program. The focal point continued to be successful with the program and in the first year nine out of the 12 growers did not use any pesticide application at all during the complete crop cycle. Two decided to do a minor cleanup just before shipping and one had to use a few applications at the end. Success rates are very high at Canadian greenhouse operations. Keys to success include immediately starting to release the wasps. Dipping of cuttings also has helped to reduce initial whitefly levels on cuttings at point of entry.



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Poinsettia stock plants at Kube Pak

Special Products for Poinsettia Crops

In the work that was done by the group up in Canada, it was determined that release rates needed to be around 0.7 wasps weekly per square foot. As in most crops, a mix of greenhouse and sweet potato whitefly is expected. A mix of *Encarsia formosa* and *Eretmocerus mundus* are released and typically it is 0.3 Encarsia and 0.4 Eretmocerus. Both wasps are not new to the greenhouse industry and many vegetable growers (primarily greenhouse tomato and cucumber growers) have been releasing these wasps for decades. However, none of the packages sizes and way of introducing was really focused and easy for introducing in poinsettia crops. In the first few years growers had to go to the greenhouse with two different cards holding the pupa of the wasp, one system for Encarsia and another for Eretmocerus. In 2009 poinsettia mix cards became available making things simpler for the growers to introduce these wasps. Poinsettia mix cards contain both wasp in a ratio of 30 *Encarsia formosa* pupas and 40

Eretmocerus mundus pupa per card. One package of cards has 100 of these cards making it good for 10,000 square feet of poinsettia crop. These cards are introduced weekly from the start of the crop until approximately mid- to late-October. The cards are simply clipped over the edge of the pot, and the majority of the wasps will hatch from the pupa on the card within a week and fly to hunt for prey.

Other BCAs for Whitefly

There are other BCAs available that attack and control whitefly. Two important ones are *Amblyseius swirskii*, a predatory mite, and Delphastus, a small beetle. Both are excellent whitefly predators, but less suitable to be used in finishing crops of poinsettia. *Amblyseius swirskii* breeding sachets are sometimes used in poinsettia stock plants, where it does make more sense. Later on in stock plant production the plants themselves make contact. These predatory mites are not able to fly and therefore their mobility is limited to walking from plant to plant. It is not cost-effective to hang one sachet per stock plant, but one sachet per five to six stock plants is acceptable. *Amblyseius swirskii* primarily feeds on the eggs of whitefly.

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Eretmocerus adult

Delphastus is a true whitefly killer. However, the female beetle needs at least 160 whitefly eggs per day to sustain itself. That amount of whitefly eggs is not even produced by an adult female whitefly in her complete adult lifetime. If there is enough whitefly to release and sustain Delphastus, the threshold would be crossed in poinsettia crops. It is an excellent choice for hotspots in cucumber crop and cut gerbera crops where the leaf canopy is not sold and hot spots of whitefly are more technically acceptable.

Conclusion

A successful pest management program starts with clean cuttings. Dipping cuttings in a solution that contains an entomopathogene such as Botanigard WP, NoFly or Preferal can reduce the number significantly. For those growers who choose Botanigard, please make sure it is the WP formulation; the ES formulation is phytotoxic when used on poinsettia cuttings. This can be implemented not only by growers who implement a complete BCA

program, but also by growers still using a traditional pest management program. Communication with the source of propagation material can help planning and creating a strategy. It is critical for growers implementing a BCA program to start immediately releasing parasitic wasp *Encarsia formosa* and *Eretmocerus mundus* to make sure that the first generation of whitefly does not get established.

Many growers who have implemented a BCA program for their poinsettia crop have been so successful that they continued a BCA program on other crops during the spring and summer seasons. Poinsettia crops are excellent stepping stools to get more involved with BCAs. It is typically a monocrop at that time of year and there is a focus on only a few pest problems, of which whitefly is the most important one. [8]

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