



CROP RECOMMENDATIONS:

Poinsettia

Euphorbia pulcherrima

OVERVIEW:

Successful biological control of Poinsettia crops has been a challenge in recent years, due to the continual abuse of chemical insecticides being used by the propagators of the plant material. Over the years, *Bemisia*, bio-types B and Q have surpassed the greenhouse whitefly as the significant, most prevalent pest. This trend greatly affects the strategy for pest management in the crop. *Bemisia*, especially bio-type Q, is largely resistant to all legal and illegal pesticides, so chemically based strategies for Poinsettia are no longer viable. The high levels of chemical residues coming in on the cuttings, however, make biological control especially during the summer months also non-viable.



This recommendation, therefore, is based on the situation that the *Bemisia* coming in on the cuttings will have at least one month of freedom from any biological controls, effectively giving the pest a significant head start. The primary control for *Bemisia* is the beetle *Delphastus*. *Delphastus* directly targets *Bemisia* colonies, focusing on the eggs first, moving up the development stages until even the adult is consumed. The critical decision is when to take the risk to introduce the *Delphastus*. Too early and the residual chemicals will kill the *Delphastus*; too late, the *Bemisia* will get too much of a head start, especially if September remains hot, delaying the conquest of the *Bemisia* into the later parts of October. In recent years, "hairy" varieties have caused problems with *Delphastus* establishment. For these varieties, correction can only be done using the *Aphidoletes* "A-bomb".

PROPAGATION:

The overview at this stage is to ride out the residual chemical issue. Because most propagation utilizes misting and/or humidity tents to facilitate rooting, we can take advantage of the physical conditions and use fungal and bacterial pathogens. We urge aggressive application of this class of products, as they can help in three ways: first, they can act directly on the adult and nymph stages of whitefly; second, their application helps rinse off some chemical residue; and third, the physical spray damages whitefly adults. The regular misting of the cuttings also disturbs the adult whitefly, causing movement. We believe that trapping eggplants will provide some of the whitefly a slightly more favorable host, and be able to pull some of the pest from the crop. Some *Encarsia* should also be present at all times so that there will be some killing of the whitefly by host feeding or parasitism attempts.

Young seedlings, cuttings or tissue culture plants should be inoculated with *Gaeolaelaps gillespiei* or *Stratiolaelaps scimitus* as soon as they are in the growing media. They both can be applied overhead using

a hand spreader, shaken onto the flats, or premixed right into the soil mix provided it is used up the same day.

One week after introduction of *Gaeolaelaps gillespiei* or *Straiolaelaps scimitus*, nematodes can be watered in at the recommended rate if the crop is being grown wet and significant fungus gnat pressure is evident. The nematodes ensure an effective knock-back of the fungus gnats and also feed and help disperse the soil mites. Rates for both mites are 250 mites per square yard.

Whitefly must be assessed accurately by closely inspecting the cuttings for eggs. It should be assumed that the propagator very vigorously treated the cuttings against adult whitefly. This assumption precludes the normal use of beneficials against whitefly during the first month of propagation due to the residual pesticides. Weekly or twice weekly applications of fungal pathogens such as "No Fly" or "BotaniGard" should be maintained for as long as the humidity remains high. Check with the supplier of these pathogens to ensure that you are manipulating the climate effectively to ensure an adequate kill.

Usually high humidity (for the summer) is required for at least 6 hours to ensure adequate penetration of the whitefly. Because of this, the rooting period is ideal. After 2 weeks, or when the covers for propagation have been removed, begin fresh *Encarsia* at a rate of 1 to 4 per square yard depending on the prevalence of whitefly. It should be noted that the *Encarsia* applied during this period is not expected to survive the chemical residue on the plants. The strategy is to achieve a significant kill of the whitefly caused by host feeding and parasitism wounds. The idea behind this step is that one *Bemisia* killed at this time is 100 that you won't have to deal with in September.

During propagation we recommend that eggplant be present as a possible trapping crop. *Bemisia* slightly prefers eggplant so any movement or jostling of the plants resulting in making the adults taking flight could see some movement over to the eggplant, which is not toxic and will allow *Encarsia* to cycle. If any Greenhouse Whitefly are present, the eggplant will definitely be attractive to them, so it will also help scouting. If a significant whitefly build up occurs on the eggplant, consider yourself lucky, as this will allow you to introduce *Delphastus* earlier than otherwise.

We also believe that during this phase you should install a version of our "flying aphid trap" which was developed in the fall of 2012 for aphid prevention. There is evidence that *Bemisia* are attracted to UV light. This could make a significant improvement in the management of *Bemisia*, but it has not been attempted. The trap is a modified "bug zapper" with the bottom removed. A downward throwing "duct booster" fan is duct taped to the bottom and the power for the fan is taken from the "zapper" circuit. A "paint strainer" bag is then placed on the bottom. Make sure that it is put away before *Delphastus* is released, as it works on them as well.

MAIN CROP:

The overview of this stage is that we are attempting to stop a "runaway freight train." This train has had two months of a head start, so we have to aggressively jump on board and get the brakes working.

Delphastus is the key against *Bemisia*, preferring it over other whitefly species and preferring the eggs. Going for the eggs is by far the most effective strategy, but it does not provide quick or obvious results during the month of September. The grower must let September develop patiently. *Delphastus* is applied in a staggered way, to ensure that any lingering chemical sub-lethal effects are minimized. The good news is that during this stage the grade of the track shifts as the temperatures begin to drop. *Bemisia* may be aggressive in the summer, but in the fall they rapidly become passive, hunkering down into hot spots in preferred varieties. A hot September pushes us back for as many weeks as it is hot. Based on the initial *Bemisia* loading and the September weather, the ultimate end release rate of *Delphastus* will range from

one to three beetles per square yard. *Encarsia* should be continuously released from the day the misting tents come off to the end of any detectable whitefly at a rate of one to four wasps per square yard, weekly.

Re-apply *Stratiolaelaps* or *Gaeolaelaps* at the transplanting stage at the same rate (250 per square yard). Fungus gnats should be monitored using yellow sticky traps. The larvae should be regularly monitored by applying a slice of raw potato to the surface of the soil. Leave it there for a set period of time, e.g. overnight (12 hours), then remove and inspect. The larvae are attracted to the potato. Increasing numbers suggest a developing problem, while decreasing numbers show control. Fungus gnats should not be tolerated as they reduce the root development of the young plants and the flying adults are capable of transporting pest mites, such as broad mite or possibly Lewis mite.

Whitefly prevention is a multipronged attack. *Bemisia* is not easily scouted or monitored. My favorite way of detecting and monitoring *Bemisia* is to walk through the crop, gently kicking the pots, or if on benches, banging the benches together or with my fists. Unlike the Greenhouse Whitefly, *Bemisia* tend to be mobile only at temperatures above 77 F and prefer higher density clusters. These clusters are a defensive strategy against the parasitoids, as the sticky honeydew is repellent to the wasps. So far, we have not been able to find a "trapping" plant that is capable of attracting the *Bemisia* away from the crop. The Greenhouse Whitefly can be attracted away from the Poinsettia by the eggplant. We still recommend having at least one eggplant in each production house as Greenhouse whitefly is still a significant Poinsettia pest, and there is a slight affinity for *Bemisia* with the eggplant. The eggplant should be in the house before the Poinsettias are spaced so that when the *Bemisia* is disturbed it might find the eggplant. Unless you are prepared to pick up every plant, it is best to assume that *Bemisia* eggs survived the propagator's treatment, and being introductions of *Delphastus catalinae*, after a suitable waiting period to ensure that the residuals of the propagator's treatment are gone (at least 4 weeks after sticking the cuttings). Three staggered introductions, each two weeks apart, of 0.1 to 0.3 beetles per square yard should be done. If significant levels of *Bemisia* are present, the rate of *Delphastus* release should be doubled or even tripled. Some beetles should be placed near known infestations, but most should be neutrally released, ensuring aggressive searching. *Delphastus* find *Bemisia* and all other whitefly by smell, greatly preferring *Bemisia*. Once *Delphastus* has eliminated the *Bemisia* they will turn to other whitefly species. Lower levels of *Bemisia* are typically discovered in Poinsettia crops about mid October. This is because *Bemisia* do not act the same way Greenhouse Whitefly does. *Bemisia* tend to clump in hot spots, and if undisturbed, tend not to be attracted to yellow sticky traps.

Do not attempt to chemically knock down a *Bemisia* infestation. *Bemisia* is resistant to all of the approved and unapproved chemicals, and a treatment will only kill the adults and render the site unacceptable for beneficials. Severe hot spots should have the *Aphidoletes* "A-bomb" applied, one tray for every hot spot, but only during September. Earlier applications may suffer from chemical residues, and later applications are pushing the *Aphidoletes* into the lower light levels and lower temperatures of fall. *Aphidoletes* will readily go after *Bemisia* if no aphids are present. Also release *Delphastus* at and near the hot spot at a rate of 10 per square yard (hot spot dimensions). Repeat two weeks later.

I am not mentioning the Greenhouse Whitefly only because any or all of the applications, including the eggplants, will easily manage this pest.

Thrips in Poinsettia are slowly becoming a bigger issue over the years so careful management is necessary. Having *Stratiolaelaps* or *Gaeolaelaps* in the soil will prevent WFT from cycling, as the soil mites are very effective in predateding the pupating thrips larvae. Trap plants such as Yellow Hero Marigold are very effective in Poinsettia. If thrips damage is being seen, apply *Amblyseius cucumeris* at a rate of 50 to 500 per square yard, every three to four weeks.

Lewis mite is very hard to detect until it is too late. If you have a history of Lewis mite, or you have reason to suspect that Lewis mite has come in on the cuttings, apply *Amblyseius fallacis* at a rate of 20 mites per square meter, just once, after the plants are transplanted, but before they are finally spaced.

FINISHING OFF:

As bad as *Bemisia* can get, they really don't like the coloring up conditions, and are unsuited to the cooler temperatures in the final month of a Poinsettia crop. As long as there are *Delphastus* present during the last month, control will be achieved. If you can reduce the temperature, by all means do so. The *Delphastus* will slow down, but they will still be much faster than the remaining *Bemisia*.

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