GROWERTALKS

Features

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Dip Those Thrips

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Over the past 10 years, studies in Ontario, Canada, have discovered different pest species on unrooted cuttings of several common crops, including whiteflies (*Bemisia tabaci*) on poinsettias, and thrips (*Frankliniella occidentalis*) and spider mites (*Tetranychus urticae*) on chrysanthemums. Most recently, a new invasive pest, Thrips parvispinus, was found on cuttings of tropical plant species, such as mandevilla.

Figure 1. Example of a dipping setup. Cuttings can be kept separate by adding dividers to the dipping tray.

Because of their small size, these pests are difficult to detect when scouting cuttings at receipt, especially in their immature life stages such as eggs, nymphs and larvae. The most challenging are thrips eggs laid inside the plant tissue that can only be detected by holding cuttings for several days until the larvae hatch from the eggs.

Infestation levels vary, with some years being worse than others. For example, in 2018, most sampled batches of chrysanthemum cuttings had thrips (one to two thrips per 20 cuttings) and half of them also had spider mites (up to 118 mites per 20 cuttings). Multiplying this by the number of cuttings a grower receives weekly amounts to a staggering number of pests present at the beginning of the plant production cycle. Also, these pests have short life cycles and reproduce fast, so pest populations can get out of hand very quickly.

Figure 2. Trial at Vineland to screen bedding plant cuttings for phytotoxicity after dipping.

Due to previous pesticide exposure during propagation, the pests on cuttings are probably already resistant against several chemical pesticides, so sprays early in the production cycle will most likely fail. Thus, growers must rely on a biological control program. However, depending on the products used during propagation, pesticide residues on the plant material may interfere with the efficacy of biocontrol agents for several weeks following receipt of cuttings. It's still recommended to start a biocontrol program as early as possible by releasing high numbers of biocontrol agents to try suppressing the rapidly increasing pest populations.

Figure 3. Dipped cuttings vs. non-dipped cuttings at a commercial poinsettia greenhouse.

Spraying reduced-risk products, which are highly compatible with biological control agents (insecticidal soap, mineral oil and biopesticides), may also help control pesticide-resistant pests while leaving minimal residues on the plant surface. However, getting good spray coverage of cuttings under mist or inside plastic tunnels is difficult, especially on the underside of leaves where most of the pests are.

Alternatively, reduced-risk products or biopesticides can be applied as cutting dips by immersing the plant material in a solution resulting in complete coverage of the cuttings. Dips are a quick and convenient way to treat hundreds of unrooted cuttings at once, after which they're stuck in substrate and grown as usual.

What works as dips and what doesn't?

Trials in Ontario and the U.S. have found several reduced-risk pesticides and biopesticides will decrease pests such as thrips, whiteflies and spider mites on unrooted cuttings by 70% to 80%. Buglady Consulting and BioWorks put together a helpful summary table (bugladyconsulting.com/downloadsbuglady; more information can also be found in the *e-GRO Alert* 13-05). Check product labels to know which ones are registered for dipping application in your area.

A few general trends to keep in mind:

■ It's essential to understand for insecticidal soap and mineral oil products dip rates are lower than spray rates due to phytotoxicity. For most of these products, we were able to find effective rates that still killed pests without causing damage to cuttings. Similarly, the oil formulations of products based on entomopathogenic fungi (like *Beauveria bassiana*) may be burning sensitive plant tissues, so it's best to use a wettable powder (WP) formulation if available. It's always a good idea to test a new dip product or rate on a small batch of cuttings to avoid costly surprises due to phytotoxicity.

■ Mineral oil products (SuffOil-X or Landscape oil) are the only products we confirmed can kill thrips eggs. Since thrips lay eggs inside plant tissue, these are normally difficult to target with contact insecticides.

■ Entomopathogenic nematodes were found not to be effective as a foliar dip for unrooted cuttings. Nematodes work best when applied to the substrate to control thrips pupae, so it's likely that they may be more suitable for dipping rooted cuttings.

■ Our trials concentrated on dipping unrooted cuttings. However, there's evidence that dipping rooted cuttings or liners is equally effective while also inoculating the substrate with beneficial nematodes, entomopathogenic fungi and/or other beneficial microbes, such as Trichoderma species.

In addition, there's the option of "double dipping," which is dipping unrooted cuttings again when they're rooted. In general, beware of potential negative effects of products on rooting or plant growth, especially in the case of oil-based products, and adjust accordingly.

■ Products used for dipping don't have long-term residual effects, so other IPM strategies must be applied after dipping to maintain pests at a low level during the production cycle until the plants are sold. Several research trials with thrips and whiteflies have shown dips to be compatible with biocontrol agents and that dipping followed by biocontrol offered better pest suppression than using biocontrol only. Commercial greenhouse growers of poinsettias and potted chrysanthemums have also confirmed the benefits of cutting dips. In a recent survey, 73% of Ontario growers reported dipping their cuttings. As a result of this research, cutting dips as an application method is now part of several product labels. Make sure to check labels and instructions, as there are differences between the U.S. and Canada.

Risk of disease transmission is low

Despite the cutting dips benefits, questions remained about the risks associated with this method. Growers were concerned about the transmission of pathogens from infected cuttings to healthy cuttings when they're dipped together in the same tank. To investigate this, we did a case study with soft rot-causing bacteria (*Pectobacterium carotovorum*) and poinsettia cuttings. This pathogen, common on greenhouse surfaces, is transmitted easily by splashing water and can kill poinsettia cuttings within a few days. Although these bacteria were discovered in dipping solutions at all commercial greenhouses sampled, no differences in disease incidence were found between dipped and non-dipped plants.

Also, when we increased the concentration of bacteria in the dipping solution, we determined only an unrealistically high concentration caused increased disease incidence compared to non-dipped cuttings. Therefore, we concluded that the risk of pathogen transfer among unrooted cuttings through the dip is low. However, it's always good practice to remove cuttings that look infected, change the dipping solution regularly, and clean and disinfect the dipping tank before making a new batch of dipping solution.

If dipping is still not an option, there are other methods in development to disinfect cuttings, including steam treatments and UV-C irradiation. **GT**

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Helpful Resources

To learn more, visit:

Plant wash video (to detect pests on cuttings)

How to dip video