

MOVING FORWARD

with preventative strategies

To get the most out of your greenhouse biocontrol program, start with preventative strategies.

BY DR. ROSE BUITENHUIS,
ASHLEY SUMMERFIELD, AND
DR. MICHAEL BROWNBRIDGE

Every IPM strategy emphasizes prevention. This includes starting clean and maintaining a resilient pest management program thereafter. The basic principles to achieve this are minimizing pest entry, maximizing plant resistance and using biocontrol to manage the residual pest populations.

STARTING CLEAN

Cutting dips are becoming common practice. According to the latest floriculture grower survey, 74 per cent of Ontario growers who start from cuttings will dip them first. Research conducted at Vineland Research and Innovation Centre (Vineland) focused on dipping unrooted cuttings in reduced-risk products (e.g. insecticidal soap or oil, biopesticides) and developed methods to control *Bemisia* whiteflies on poinsettias, as well as western flower thrips on chrysanthemum and bedding plants.

For many of the tested products, efficacy had to be balanced against the risk of phytotoxicity. Consequently, the recommended dip rates are lower than spray rates, in particular for soap and oils. The best rates and product combinations were tested on a larger scale in research greenhouse and commercial greenhouse trials. In all cases, the value of adding dips to the IPM program was clearly demonstrated: dipping not only lowered pest numbers on the cuttings, but also improved subsequent biocontrol of both *Bemisia* whiteflies and western flower thrips.

Dip efficacy against two-spotted spider mites was discovered through an accidental infestation in one of the thrips trials. Subsequent laboratory trials confirmed that both Landscape oil and SuffOil-X are good dipping options against this pest, which is often found on chrysanthemum cuttings and together with thrips. Table 1 summarizes the best performing dips against

pests in our research trials. Note that some of these products are still undergoing label expansion to include dipping as an application method, so make sure to check the label. Also, try dips on a small batch of cuttings first, to ensure these products and rates work for you and do not cause any phytotoxicity.

Growers are experimenting to see if dips can help control other pests such as scales, mealybugs, broad mites and aphids. Another possibility is to dip rooted cuttings or liners/plugs. This type of plant material was not included in the Vineland trials, but growers are seeing positive results from this technique. Some people even double dip, once as unrooted

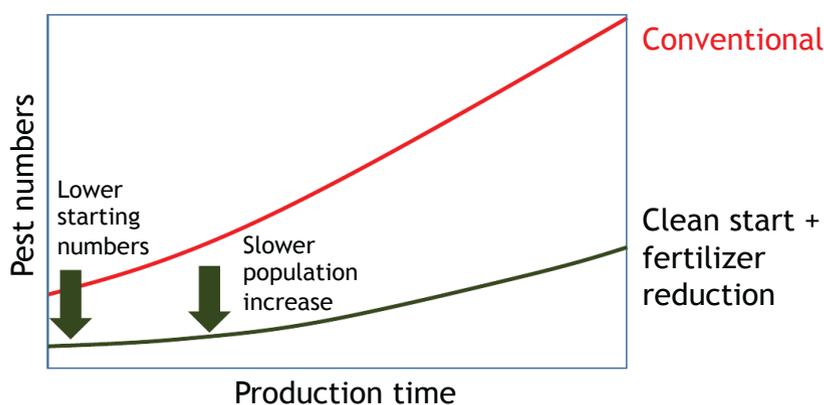


FIGURE 1
Model to illustrate how a clean start and optimized plant nutrition can reduce pest population development, as compared to conventional methods.

cuttings and again when the cuttings have rooted. There are many possibilities and every grower should figure out what works for them.

INCREASING PLANT RESISTANCE

There is a growing realization that pest control must evolve beyond the simple application of control products to include

strategies that reduce plant susceptibility to pests and diseases. The systems approach addresses underlying causes of pest outbreaks and considers how mitigation strategies can be integrated with other crop production practices.

One potential approach that is receiving more and more attention is to increase plant resistance to pests by optimizing (i.e. reducing) fertilizer rates. There is no Canadian Food Guide for pests, but they generally need the same kind of nutrients as we do, including carbohydrates, proteins, lipids and minerals. The fertilizer we use to grow our crops will have a direct effect on the plants' suitability as food for pests. Research has shown that nitrogen is one of the most important nutrients affecting plant-insect interactions and that pests like aphids, thrips and whiteflies flourish on plants grown under high-nitrogen regimes.

In January 2019, Ontario researchers published an article in *Greenhouse Canada*¹ where they demonstrated that the concentration of nitrogen used in chrysanthemum production could be lowered by 75 per cent without affecting plant quality. Other studies at the University of Guelph² indicate that floriculture crops like gerbera and mini-roses are also likely over-fertilized.

So the question becomes, if we lower nitrogen, will we also lower the risk of pest outbreaks? This is the subject of a joint research project by Vineland and Ontario floriculture specialists Dr. Sarah Jandricic and Dr. Chevonne Carlow at the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Funded by the Canadian Ornamental Horticulture Alliance (COHA) research cluster, the goal is to identify nutrient levels that reduce western flower thrips and greenhouse whitefly population growth, on chrysanthemum and gerbera

PEST	DIP PRODUCT(S) AND RATE
<i>Bemisia</i> whitefly	0.5% Kopa + 1.25 g/L BotaniGard 22WP (combination treatment) 0.1% SuffOil-X
Western flower thrips	0.1% to 0.5% Landscape oil* 0.1% to 0.5% SuffOil-X* 2.5 g/L BotaniGard 22WP
Two-spotted spider mite	0.1% to 0.5% Landscape oil* 0.1% to 0.5% SuffOil-X*

TABLE 1

Best performing dips for controlling pests on unrooted cuttings. *Rate depends on the sensitivity of the crop.

respectively, without negatively affecting the production period or the quality of the finished plant. In addition, this project will determine if biostimulants can play a role in this system by helping plants cope with reduced nutrients, improving general plant health or even inducing plant defences against pests.

The next step will be to investigate if reduced fertilizer rates will improve the efficacy of biocontrol agents and how. For example, lower nutrient levels may slow down pest population growth and make it easier for biocontrol agents to 'catch up', or perhaps change pest susceptibility to biocontrol agents. Ultimately, commercial greenhouse trials will demonstrate the benefits of integrated nutrient and pest management strategies.

IMPROVING BIOCONTROL SUCCESS

Early intervention tactics, such as starting clean and growing resistant plants, address some of the major causes of pest outbreaks. Dipping reduces pest populations right at the start and buys time for biocontrol agents to start working. We predict that optimized plant nutrition will slow down pest population growth, which makes it easier for biocontrol agents to manage residual pest populations. This makes biocontrol programs much more stable and resilient, less about chasing after outbreaks and more about maintaining low pest numbers.

REFERENCES

- ¹Shelp, B.J. et al. <https://www.greenhousecanada.com/inputs/fertilizer/moving-towards-low-input-floricultural-operations-32713>
²Zheng, Y. et al. (2004). *HortScience*, 39(6), 1283–1286;
 Zheng, Y. et al. (2010). *HortScience*, 45(9), 1378–1383.

ACKNOWLEDGMENTS

Thanks to Wonhyo Lee for technical assistance. This research is supported by the American Floral Endowment (AFE) and the Canadian Ornamental Horticulture Alliance (COHA) in collaboration with BioWorks, Neudorff, Dümmen Orange, Concentric, Premier Tech, l'Institut québécois du développement de l'horticulture ornementale (IQDHO) and Flowers Canada (Ontario).

Rose Buitenhuis, PhD, is the research scientist in biological control, Ashley Summerfield is the research technician in biological control, and Michael Brownbridge, PhD, is research director of horticultural production systems at Vineland Research and Innovation Centre. Contact rose.buitenhuis@vinelandresearch.com.



519-792-0191 • agrolux.com

