

FOCUS: GREENHOUSE INNOVATION

When biocontrol doesn't work, how to deal with infiltrators, intruders or invaders

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While virtually all greenhouse vegetable growers use biocontrol in their greenhouses, sometimes the finely tuned eco-environment is upset by infiltrators, intruders or invaders. That's the topic that Michael Brownbridge will tackle at the Canadian Greenhouse Conference on October 7.

"Some infestations can be dealt with using techniques compatible with your biocontrol program," says Brownbridge, research director, horticultural production systems, Vineland Research and Innovation Centre. "Others are more challenging."

While he participated in a conference in the United Kingdom, exploring the role of biopesticides in modern agriculture, his Vineland colleague Rose Buitenhuis offered a preview of his presentation. "For any number of reasons, a biocontrol program may fall on its back," explains Buitenhuis. "One of the most important steps is to make sure the pest is identified properly so that you're applying the right bio-control product."

Infiltrators, for example, arrive on propagative material. Whiteflies, thrips or leafminers may be hiding in cuttings. Most tomato propagators in Canada are conscientious in using slow-release sachets which contain predatory mites to eat the infiltrators. However, if any propagative material has been treated repeatedly with a pesticide, then the

resident pests may be pesticide-resistant when they arrive at your greenhouse. In addition, residues can adversely affect the beneficial species released to manage the pests.

"It's a big hurdle to make bios work on propagative material," says Buitenhuis, "but a clean-start approach can set you up for success through the rest of the growing season." Ideally, growers work with the propagator in advance on a bio program that is seamless from the originating greenhouse to the commercial growing greenhouse.

Intruders are less predictable in their invasions. Onion thrips, for example, can be managed with bios, but when their numbers increase, it may be more difficult. There are no good bios for Lygus bugs, so a spray is always necessary.

"Look for compatible sprays," says Buitenhuis, "and then re-establish the bio program." Know as much as possible about the specific insect and research whether any new biologicals are registered in North America. If a hot spot of infestation is identified within the greenhouse, ask workers to enter that location at the end of their shift so the insects won't be carried on clothes to reinfest another area. Where possible, choose plant genetics that are tolerant of pests. Use bios preventatively rather than curatively.

Banker plants can work very well in some settings. For example, pots containing cereals carry-



Rose Buitenhuis, Vineland's research scientist for biological control

ing cereal aphid may be interspersed in greenhouse rows; the cereal aphid serves as a host/food for parasitic wasps. Parasitoids are continuously produced on the banker plants and move in to the crop to parasitize pest aphids.

When all else fails, pesticides are employed. Choosing the right pesticide is made easier by consulting a Side Effects Manual. These manuals outline how toxic a pesticide is to biocontrol agents and the duration (persistence) of effect. With this knowledge, the grower can choose the most compatible approach. Even if there are incompatibility concerns, ways can be found to integrate pesticide with bios. For example, a grower may decide to spot spray areas where the highest infestations exist, re-introducing bios when pest populations have

been reduced and residues are no longer high enough to affect the biocontrol agent.

In the presentation that Rose Buitenhuis gives at the Canadian Greenhouse Conference, she'll be talking about the quality assurance of biocontrol agents. Quality checks on biocontrol products are vital but rarely performed. New standardized procedures make this task easier and less time-consuming.

"Travel and storage are very hard on living organisms," says Buitenhuis. "Once they arrive, you should check that they are in good condition."

A quality assurance guide is available from the Vineland website to help communicate with the company. It's not enough to say, "I think they're dead."

Proper pest identification is key to choosing a beneficial predator. There are many aphid species, so the choice of biocontrol must match the aphid. How you introduce beneficials into the greenhouse is also important. Predatory mites, for example, can't walk very far so don't place them where they have to bridge gaps in the rows.

Invaders are a threat that may be sporadic or not here yet. When first detected in Ontario greenhouses, *Duponchelia fovealis* was considered a quarantine pest by the Canadian Food Inspection Agency. While fond of ornamentals, this moth also has a taste for peppers. Fortunately, it has not been widely found in Canada and is now considered an 'economic' rather than a quarantine pest.

But other exotic invaders are out there, including the Mexican pepper weevil, *Anthonomus eugenii* which has been found in some vegetable greenhouses and fortunately can be controlled. *Tuta absoluta* is a devastating pest of tomatoes that has shown up in greenhouses throughout the world. In Canada, researchers are preparing for its potential arrival.

"We're thinking about how to 'future-proof' the industry for pests such as this," says Buitenhuis. "Knowing how the insect has been managed elsewhere allows us to identify a range of solutions to any incursions and to develop a strategic series of responses should the pest make it into North America."

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