

Delving into new disease foes

Not just for pests, biocontrol agents are being researched for their effect on diseases by Vineland Research and Innovation Centre, which has surveyed and spoken with growers who use them.

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By Patrick Williams



Vineland's Dr. Michael Brownbridge, research director, Horticultural Production Systems (left); and Taro Saito, senior research technician in biological control. Photos courtesy of Vineland Research and Innovation Centre

Biological controls can have a propensity to confuse and challenge growers, says Dr. Michael Brownbridge, research director, Horticultural Production Systems at Vineland Research and Innovation Centre in Ontario. Consider, for example, *Bacillus subtilis*, a common active ingredient. Different strains may have different properties. For example, some promote plant growth and others control disease.

"If I'm [a grower] looking for product, and I've just gone to a talk or read somewhere that I should be using *Bacillus subtilis*, and I just picked the first product off the shelf that says '*Bacillus subtilis*' on it, and then wonder why it doesn't control a pest or disease — well, efficacy can depend on the strain," Brownbridge says.

But grower uncertainties are not thwarting many of them from adopting biocontrols. Numerous growers, Brownbridge says, use biocontrols to avoid resistance, like they have seen against traditional synthetic chemistries, and adapt to growing public concerns about high pesticide use in greenhouses and on produce, Brownbridge says.

As *Greenhouse Management* reported in its January issue, Vineland has found that biocontrol use for pests among Ontario floriculture growers had risen from 69 percent in 2014 to 92 percent in 2018. This same demographic of growers also increased their use of biocontrols for disease control in the same timeframe, rising from 30 percent to 70 percent, according to a Vineland survey.

Combining biological and chemical controls

Brownbridge says he considers Ontario growers' 70-percent use of biocontrols — agents such as *Bacillus* and *Trichoderma* — to be close to a full adoption rate; in other cases, the plants are in and out of the greenhouse so quickly that disease infection isn't a concern. Meanwhile, many U.S. growers Brownbridge has met are beginning to adopt full biological programs and incorporate compatible synthetic chemistries based on their biological program, rather than the previously more common reverse scenario.

"As long as the chemical and the biological [controls] are compatible, oftentimes you get even better results by using the two components together, perhaps in a spray rotation or something like that," Brownbridge says. "They can be very, very compatible and give you very, very good levels of disease suppression when you use the chemical and biological [controls] in combination. But there is no one-size-fits-all scenario. It's all crop- and location-dependent."

A clean environment

Multiple factors can help growers determine biocontrols' effectiveness in their greenhouses. When adopting biocontrols, growers need to maintain good growing conditions and sanitation practices, Brownbridge says. "Biocontrols will not work if all of the other steps aren't in place, as well," he says. "They don't give 100 percent control, they don't work curatively, and they don't work when there are high pest or disease pressures, or perhaps when conditions are very, very favorable for diseases to develop."

One favorable condition for disease, for example, is an unsanitary environment, so it works in growers' favor to sanitize their greenhouses. Between crop cycles, Brownbridge says, growers should spray a disinfectant on benches and clean floors of algae, moss and, if they have dirt floors, weeds. They must ensure that flats and pots are sterile, and potting mixes remain free from diseases. Plant propagators' reputation rests on providing clean cuttings, but growers need to be aware that sometimes cuttings are infected.



Dr. Michael Brownbridge, research director, Horticultural Production Systems

Brownbridge compares the necessity of a clean greenhouse environment to society's need for clean hospitals. "Ideally, a hospital is free of all sorts of diseases, because you've got a bunch of compromised people in there that can easily be infected if there's a lot of dirt, filth and pathogenic organisms around," he says. "[It's the] same when you have a greenhouse — you want it to be as clean as possible."

Au revoir, resistance

Biological controls have multiple modes of action: producing antibiotics to interfere with disease development; parasitizing pathogens; crowding out disease-causing organisms for space in roots; taking up resources that pathogens would otherwise use; and inducing plants' own defense pathways that protect them from infection, Brownbridge says.

"Against a chemical, it's frequently [that] the mode of action is very specific on a specific biochemical pathway, so it's easier for the organism to develop alternative pathways to get around it," he says. "But with biocontrol agents having these multiple modes of action, it's harder for the disease organisms to develop resistance to that."

A new approach

To achieve successful results with biocontrols, growers need to understand their crop and the conditions in which it needs to be grown, and keep it healthy throughout its growth, Brownbridge says.

"For people shifting off conventional pest control into biological, it's a little bit of a change of mindset, change of approach and a change of thinking around the whole crop cycle and the whole system in which you're going to use this material — and ensuring all parts of that system are working together," he says.

<http://magazine.greenhousemag.com/article/february-2019/2019-focus-on-disease-control-biocontrols-vineland.aspx>