

## Biological Insect Control: State of the Industry and Future Success



*Peter Konjoian is president of Konjoian's Horticulture Education Services Inc. His career spans four decades as a commercial grower, researcher and consultant. Greg Bryant is IPM specialist with Beneficial Insectary. Konjoian can be reached at peterkfes@comcast.net.*

**T**oday's guest is Greg Bryant, IPM Specialist for Beneficial Insectary. Greg earned his bachelor's degree from Auburn University in 2012 majoring in zoology with an entomology focus. He worked for various entomology and crop science laboratories before entering the biocontrol industry in 2017. In 2018, he started with Beneficial Insectary.

**Peter:** Hi Greg, thanks for sharing your knowledge with us today. Where does the horticulture industry stand in terms of adopting biological insect control products? How are the different industry production sectors of greenhouse ornamentals and controlled environment agriculture (CEA) edible crops progressing with biological control?

**Greg:** Hi Peter. The biocontrol industry is growing for sure. CEA edible crops have been on board with biocontrol for years. This is especially true for vegetable crops like tomatoes, cucumbers and bell peppers. Ornamentals have been steadily trying to catch up, though. There are several factors for this. One is pesticide resistance, especially with thrips. Growers often become frustrated trying to control them using traditional means, so they often turn to biocontrol companies. Most of the time they'll start off small and try biocontrol in just a few sections of their facility, or in a couple of isolated greenhouses. Once they see that

it works, growers frequently expand the program the following season.

**Peter:** Pesticide resistance is a big deal; growers have heard dire warnings about it for many years. How do you see growers using biologicals with regard to resistance management? Do more choose to move to biologicals and leave traditional products behind in order to avoid resistance or do more choose to incorporate biologicals into their traditional approach as a way to delay resistance and extend pesticide life?

**Greg:** What I see most often is once a grower is comfortable having a full biocontrol program, he or she will mix in the traditional products only as needed. There are some synergies that these products can provide while using biocontrol agents (BCAs), but if a grower is on a robust biocontrol program, that is typically their first line of defense.

They tend to treat the traditional products as the last resort if something goes wrong, and even then, they try to stick with the "softer" chemistries that will do the least harm to their BCAs. In fact, a lot of growers turn to biocontrol because they're told they can't spray some of the products they're used to using and nothing else works for them.

Restrictions on pesticide use, whether it's government regulations or buyers like Home Depot banning the use of neonicotinoids on the plants they sell can be a big problem for growers. Taking away tools in their toolboxes leads to finding alternatives. This ties in to some other reasons the biocontrol industry is growing. Worker safety, REIs, the general public wanting to move towards "pesticide free," and retail growers having to spray after hours are all issues that growers must deal with, and biocontrol is a great solution.

**Peter:** Okay, progress continues, Greg but let's talk about pushing faster. Share some suggestions for greater industry adoption and success.

**Greg:** One of the main factors for success, especially if you are new to

biocontrol, is having good technical support. Find a representative that you trust and that has a good reputation from other growers. If that person has put together other successful biocontrol programs, he or she can likely do the same for you.

You can also talk to other growers that use biocontrol and find out what is working for them. There are always little tips and tricks that growers are taking advantage of. Attend conference education sessions where speakers discuss biocontrol. Ask questions. Also, trust what your biocontrol rep says, and don't be too quick to jump on the spray gun. Keep accurate notes, not only of the pest pressure, but scout for your BCAs and keep track of them too.

Learn what the tipping point is, where the BCAs being used are starting to tip the scale in their favor and overtake the pests. If you are seeing thrips on sticky cards, is Orius also present? How many? Keep in mind that one Orius can kill up to 80 thrips in a day. They don't even eat all of them, they're that aggressive. If you are seeing thrips, but also catching Orius on your sticky cards, or seeing them on your plants, unless the ratio is way out of balance, the thrips likely won't stand a chance.

Mummified aphids can also be an indicator of the tipping point. As an example, do to some unusual environmental conditions, one of my growers had a terrible aphid outbreak on ornamental peppers. I visited and saw thousands of aphids, but also hundreds of mummies. A week later, nearly every aphid was either eaten by an aphid predator (some naturally occurring since they didn't spray) or mummified by an *Aphidius* parasitoid wasp (Figure 1). The grower trusted that the tipping point had been reached and the aphids were going to lose the war very soon.

**Peter:** Earlier you mentioned a common approach where a grower will start out on a small scale testing biologicals in a few sections of a range or several greenhouses before transitioning

the entire operation. That's excellent advice not only for pest management practices but for any new product or practice a grower is considering. I like to bring the word "control" into a conversation like this where control has two meanings.

First, if a grower is testing biologicals in one section or one greenhouse, what are they being compared to? Most often it's the other sections or greenhouses receiving traditional pesticide applications. In other words, the traditional method is the control treatment. But a well designed trial goes beyond that. It's also important to design the trial around the same crop, same planting, same environmental conditions, and so on in order to practice good control over the entire effort.

Making sure we have a good control treatment and ensuring we practice good experimental control allows us to compare apples to apples rather than geraniums to poinsettias or tomatoes to kale. A sloppy trial that lacks either or both levels of control will likely result in an outcome that is less reliable than desired.

**Greg:** Good points, Peter, but I honestly haven't seen that very often. I completely agree that a good experimental design is key to seeing good results, but that's not always practical for most of the growers I've worked with. What often happens is growers are so busy and their plants are moved around so much that they only have one small section that has a particular crop that doesn't move out of that area and, consequently, there are no other areas with that crop. Or they'll only try biocontrol in propagation where all of their plants spend time.

**Peter:** You just described why certain product categories are difficult to trial under controlled conditions. Insects and diseases, temperature, lighting ... it's challenging for growers to set up good, controlled trials for these categories. I can see where biocontrol trials often follow the storyline "I spent that much money spraying, this much using BCAs, and my results were such and such." It helps a great deal, as you stated, that more and more growers are realizing that biological control is the future, one way or another. Moving on to compatibility of BCAs with traditional pesticides, what pointers can you pass along?

**Greg:** Another factor for success (or in this case failure) is when growers try to incorporate a biocontrol program into their regular spray rotation. If the first question you ask is, "What can I still spray?" you are not ready to use biocontrol. Too often I've talked to growers who told me that they tried biocontrol for thrips, but it failed. When I asked what they did for aphids,



**Figure 1.** Mummified aphids on greenhouse grown ornamental pepper.

whiteflies and other pests, they said they stuck with the pesticides they've always used. This is never going to work, since the chemicals used for the other pests are harming the BCAs for thrips control.

If you're starting biocontrol for the first time, there has to be a change in mindset from your traditional spray program. You have to be proactive and have a solid plan put together in advance. Biocontrol is mostly about prevention, so staying ahead of the pests is critical. In most situations, biocontrol will be the first line of defense, chemical controls should be looked at like the fire extinguisher. Consider your biocontrol program as a whole ecosystem within your facility and take an IPM approach wherever possible.

**Peter:** Your comment about a grower asking "What can I still spray?" says a ton about our challenge as educators. That simple question may be this article's primary message regarding grower adoption.

The whole arena of biological products continues to grow. A portion of my research focus is on biostimulants, products that leverage the natural, healthy ecosystem you

cited above. Any of us involved in biological products feel strongly that much research is needed which will subsequently require extensive grower education.

**Greg:** Ongoing education is critical. Even for growers who've been in the industry for years, there is still more to learn, new techniques to discover, new pests to deal with, or new BCAs to help combat them. If a grower's just starting with biocontrol for the first time, there's nothing wrong testing it on a small scale first, and that's usually the best approach. Learn what worked and what didn't and talk to your biocontrol rep about how to improve and expand the program the next season. If you have a comprehensive approach that takes all pests into consideration, have a plan made out with the right BCAs to use, apply them with the appropriate timing, and have a dedicated staff that will help you execute the plan, you will see good results.

**Peter:** Greg, thanks for sharing your experience with us. Growers can feel confident that resources are available to help them step up to the next rung on the biocontrol ladder. [gpn](#)