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## Biocontrol is Not for the Impatient Grower

Carnation Instant Breakfast was in vogue while I was growing up in the 1960's. The milk based wonder-food was sure to get you going in the morning while simultaneously meeting all of your nutritional needs. Carnation's Instant Breakfast led the way for a generation of consumers who expected "instant" results in life and in the workplace. As a greenhouse grower in the early 1980's I expected to confront every pest in the greenhouse with a lethal chemical arsenal that was sure to inflict instantaneous death to any pest that crept, crawled, or fluttered into my greenhouse.

As we moved into the 21<sup>st</sup> century we knew that there had to be a better way to manage pests as pesticide resistance concerns mounted and our chemical arsenal began to shrink. Biological control became at first a catchword, then a movement, before becoming a mainstream concept within the floriculture industry. While there were early adopters, many growers are still biocontrol dabblers with an uncertain commitment to biological control in the greenhouse.

When a grower calls my office to tell me that their biological control efforts are not working it is often impossible to conduct a forensic investigation of their failure from behind your desk. While on paper it appears that the grower has checked off all of the boxes on their personal "Implementing Biocontrol Checklist" a thorough investigation on-site is frequently required to pinpoint the exact cause for the failure.



My lead question for most growers when I arrive on the scene concerns the health and viability of the biocontrol agents that they have purchased and released. While I have the utmost confidence in the various biocontrol suppliers in our industry, my confidence waivers with growers sometimes when they cannot tell me if the organism was alive or dead when it was released. Though it seems reasonable to expect someone to check the viability of the biocontrol agents before they are released it is frequently not done because biocontrol release is often a delegated task that somehow makes its way to an entry level employee.

As a rule, biocontrols are typically released into greenhouse environments before pest populations explode. Pests tend to have more rapid reproductive rates than beneficial insects or mites so if you give the pest a significant head start you may need to take a more aggressive approach and make a more substantive release of the appropriate biocontrol organisms to reign in the pest. When I visit some operations where biocontrol has been deemed a failure it can be often linked directly to insufficient release rates and improper release timing by the grower. Upon visiting these greenhouses I typically find small populations of biocontrol agents surrounded by what seems to be legions of the targeted pests. A slight augmentation in the population of the biocontrol agent via another targeted release should turn the tide and negate any thoughts by the grower to unleash a round of chemical warfare that will surely wipe out the biocontrol agents while leaving resistant pests behind.



Viability of the biocontrol agent should be verified before releasing it into the greenhouse environment.



Biocontrol agents should be released prior to pest populations exploding.



Poor timing and insufficient release rates of biocontrol agents are key reasons why biological control fails.



Pollinators and biocontrol agents are often inadvertently killed when the incorrect pesticide is selected to manage an insect or mite problem.



Natural mycoinsecticides like *Beauveria bassiana* can kill biocontrols like ladybird beetles when sprayed in a greenhouse.

Commercial biocontrol suppliers work very hard with growers to implement biocontrols. Side effect data published by the biological control agent suppliers provides growers with a roadmap that delineates the anticipated impact of various crop protectant chemistries on the biological control agents that can be employed in their greenhouses. While not necessarily all encompassing these side effect guides if utilized properly can prevent grievous mistakes that can thwart a grower's effort to implement biocontrol.

If these side effect guides are ignored the grower can expect the operational failure of the biocontrol agent. In one area greenhouse the client complained that his biocontrol was not working. He told me that he had not sprayed anything in his greenhouse since the previous year. When I came across the white mycelial encased carcasses of lady bird beetles he revealed that he couldn't wait for the biocontrols to work and sprayed a product containing *Beauveria bassiana* in his greenhouse. Erroneously he assumed that mycoinsecticides would be safe on his ladybugs. While I recognize his belief that he needed to act, his impatience wrecked his initial efforts at biocontrol.

Biological control has been successfully practiced in some greenhouses for 20 years or longer. The successful adoption of biocontrol practices by these growers has been fueled by their realization that they are no longer just managing plants, but are now managing a diverse ecosystem where one misstep or an unintentional consequence can tip the balance in favor of the insect invaders in their greenhouse. For additional information on biocontrol please contact me at [tgf2@psu.edu](mailto:tgf2@psu.edu) .

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