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Biocontrols: Tiny Tools, Big Results

Michael's Greenhouses' head grower is a big believer in the potential of biological controls to help produce a great crop. And he says he has the plants to prove it.

By **Richard Jones**
Group Editor
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Roger McGaughey is like most growers. His goal each season is to produce a quality crop as cost effectively as possible. And part of that process includes taking steps to protect his crops from pests.

Unlike many growers, however, McGaughey says he hasn't applied a chemical root fungicide in his greenhouses in more than three years, and that he's producing a cleaner crop than ever before.

McGaughey, head grower for [Michael's Greenhouses](#) in Cheshire, Conn., was introduced to biological controls less than five years ago. Rather than slowly incorporate them into his production, he jumped in with both feet. Working with a combination of [BioWorks' RootShield](#) (Trichoderma harzianum, strain T-22) and Nemasys nematodes (Steinernema feltiae) from Becker Underwood, he's producing plants free from problems like Pythium, fungus gnats, and thrips. And, he says, he's doing it very cost effectively.

"I want to grow a good quality crop, at a minimum cost, without all the REI and application requirements associated with spraying traditional chemicals," he says. "These biocontrols help me do that."

Start With Good Roots
McGaughey isn't averse to using traditional crop protection products, but his preference is biocontrols when possible.

"I spray chemicals for mildew and disease control and for white rust fungus outside because I have nothing else to really control it. But in the greenhouse, am only using biocontrols now," he says.

Biocontrols like these are a little different from some traditional greenhouse chemical programs, in that they are preventative tools only, says BioWorks sales representative Chris Hayes.

"RootShield, for example, isn't a cure. It forms a shield on the roots. It won't get into the vascular tissue and attack a fusarium wilt. It will block the pathogen and even kill it outside, but it will not go systemic and cure problems inside," he says.

The main benefit McGaughey says he gets with these biocontrols is a growing environment that allows good root development as quickly as possible. The Trichoderma and the nematodes seem to both help clean the soil of some potential pathogen problems, and at the same time, protect the roots from predators. That gives fragile, young roots a chance to develop. And a strong, healthy root system is the key to successful plants, he says.

"Pythium, for example, is around everywhere. The amount a plant will tolerate depends on the quality of the roots," McGaughey says. "If a fungus gnat chews on your plant's roots, you get wounds. The Pythium gets in and you get damage. By using a biofungicide like [RootShield](#), it coats the root and makes an impervious barrier so Pythium and other diseases don't get in."

McGaughey altered his production to make a RootShield application at planting.

"I am applying RootShield to everything now. There's no need for root fungicides after that. I used to do sprays in the greenhouse, but now I have a water tunnel on the planting line and I run a liquid formulation of RootShield wettable powder over the top of the plant," he says. "It coats the plant and the rootball and gives

Want More Biocontrol Options?

Penn State's Steve Bogash has created a helpful chart of biocontrols available for use in the greenhouse. [View it here.](#)



McGaughey says his biologicals program leads quickly to large masses of healthy, white roots.

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me immediate protection. That over-the-top application coats the environment in which the roots are about to grow."

McGaughey claims that under the correct conditions, he sees side and bottom roots in pot mum production in the field in seven days. "In a very short space of time I get a good root system," he says.

How does it work? Steve Bogash, Penn State University regional horticulture educator, sees several things happening.

"For one, Rootshield forms a protective barrier that I call the 'jealous spouse.' Nothing is getting past it," he says.

RootShield produces enzymes that dissolve the cell wall of pathogens and remove them from harming roots. The Trichoderma mycelium also go out and attack other fungal organisms, he says.

Bogash has noticed another benefit, even where there is no disease problem. The Trichoderma seem to act as a mycorrhizal-like organism that take unavailable nutrients and make them more mobile and available to roots, causing plants to take off much faster.

"These days we're keeping greenhouses a little bit cooler and bringing in plants a lot closer to the time we need to and everybody's doing more 'just-in-time' stuff. It's a nice tool to have, Bogash says.

Hayes has noticed the phenomenon too.

"There's a plant growth response, but I don't think it's a hormonal thing. I think it's the Trichoderma allowing the roots to maximize uptake and letting the plant hit its genetic potential," he says.

McGaughey notes that when using the biofungicide, top growth on the plant may start a little slower than normal. But, he says, the first two or three days after planting goes into producing a good root system. Then the top starts to grow out. "Healthy roots are the key. With no legs you can't walk," he says.

Secondary Benefits

In addition to the healthy roots and faster start for the plants, McGaughey says he is able to reduce the amount of fertilizer he would normally apply to a crop.

"Nutrient uptake takes place on the root hairs. When the root system is so white and so good, there are lots of sites for uptake. In effect you can reduce the amount of fertilizer you apply and get the same results. I used to use 200 ppm. Now I use 100 ppm because I have a good root system," he says.

The biocontrols McGaughey employs also offer a zero-hour REI, which means less interruption for his employees working in the greenhouse.

"To spray for botrytis, for example, we would normally do it at the end of the day when no one is there, so we could work around the REI. The RootShield and nematodes I'm using have no REI. I can do what I want when I want, with no interruption in our daily routine.

McGaughey says he is also realizing a savings with his biocontrol program. "RootShield is very cost effective when you break it down. I figure my costs are about one to two pennies per pot, depending on pot size. And because I'm not using any other fungicides through the rest of the crop, I save a significant amount of money," he says.

Adding Nematodes To The Mix

McGaughey was introduced to nematodes a couple of years ago as well. He says they not only help clean up the remaining fungus gnat problems the Trichoderma have missed, but also help with thrips control.

"I spray nematodes at least one time a week on all crops in all of my greenhouses," he says. "As it gets hotter, I spray every five days."

To see success with nematodes, the conditions have to be right and you have to use plenty of water, he says. If the ambient temperature or the leaf temperature is too high, the spray evaporates too fast, and the nematodes will die before they can do their job. McGaughey compensates with a heavy srench on the crops.

"The foliage needs to be wet for about two hours, so I spray in late afternoon or on a rainy day, or I pull the shade curtain if I need to," he says.

As with the RootShield, McGaughey says the Nemesys has been a very cost-effective option for his operation – even spraying 52 weeks a year.

"A \$50-\$60 package contains 250 million nematodes. A srench with one package in 200 gallons of water covers 60,000 square feet of hanging baskets and the crop on the floor. I try to treat all inside areas and as much outside cropping area as possible each week, in season. When I work out my cost figure it costs less than 10 cents per square foot per year for each square foot treated."

A Trend That's Slow To Grow

With reported results like these, why aren't more growers flocking to biocontrols as at least a part of their crop protection programs?

"I think less than 10 percent of growers are using biocontrols. I don't know if they're resistant to it, or if they haven't had a situation where they felt they really needed to do it," Bogash says. "When I work with a grower and there's an opportunity to use biocontrols, they generally try it and stay with it. But there's a lack of understanding of the benefits. I am asking growers to be proactive instead of reactive and it's a hard place for a lot of them to go. This is a completely new way for them to deal with diseases."

McGaughey tries to help other growers understand the process and encourages them to simply try it. When they see those white roots, he says, they know it works.

“A white root system is the first priority. Every time I walk through the greenhouse I pull out a plant and look at the roots. If it looks good up top and the roots do too, 90 percent of my worry is gone. With good roots I can grow a great plant.”

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