

## Dead Bed Era: Biological Control as a Methyl Bromide Alternative<sup>1</sup>

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### Introduction

In case you haven't noticed, we are about to leave the "dead bed era". Methyl bromide served us well, killing most soil-borne pathogens, insects, nematodes, and weeds. But by all accounts (i.e., IFAS research) the alternatives leave something to be desired. Hence, a lively bed will be the result. Sure, we'll develop chemical cocktails tailored to certain situations, but we are losing more ground than we are gaining when it comes to the use of agricultural chemicals. If we continue on the present course, most of what we are using today will either be ineffective or have lost its registration when we lose methyl bromide (2005). So what's an alternative? Dare I say it? Biologicals!

### Biologicals

Believe it or not, in the past two years many transplant houses in Florida have silently put away their copper/EBDC sprays in favor of a phage, a virus that attacks bacterial spot. Learning how to use the phage was frustrating at first, but this year several transplant facilities have mentioned how disease free their transplants have been using phage technology.

Transplant producers are just like vegetable growers, except they plant hundreds of crops each year. So if biologicals are working for them, perhaps you should take a closer look at this technology.

Biological control has been around for decades, yet success stories are few. That is because we have expected too much. Our chemistry has been so effective in defeating diseases and insects that we have used chemistry as the standard on which to judge the biological. But Mother Nature operates according to the familiar phrase "you win some, you lose some." Let's face it: you never really beat bacterial spot!

With the public clamoring for safe food and a turn toward reduced pesticide usage, several enterprising companies have stepped up to market biologicals. The jury is still out on most products as they simply haven't undergone enough testing. The USDA currently lists more than 36 commercially available products as antagonists of plant pathogens and more are emerging all the time. Most plant pathologists will tell you that in sidetests, chemicals will outperform biologicals every time. In fact, in tests that pit the biological against the disease it is

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supposed to control, the biological often delivers only minimal control at best (10% or less). Most research stops when poor performance is indicated. And that's the point, while these products can't stop Mother Nature's disease arsenal, they do provide other benefits along the way that help you help yourself.

## **So How Can Biologicals Help You?**

### **Easy Application**

These products are generally applied either as a seed treatment or as an amendment to the peat/vermiculite when growing transplants. The products themselves are either dusts, granules, or flakes, and liquid formulations are on the drawing board. Just a one-shot deal and forget about it! No repeat applications, no tricky timing issues, and best of all, no re-entry or pre-harvest interval considerations.

### **Growth Promotion**

Of the several products tested at the SWFREC, all have shown an ability to increase plant growth. This growth response is most noticeable in the transplants, but measurable growth differences have been seen in the field as well. Enhanced growth in plants, can translate to an ability to outrun grow seedling diseases, promote more rapid establishment, better foraging performance (accessing water and nutrients), and in the long run, foster earlier maturity. These benefits simply increase the plants' ability to take full advantage of the resources in the surrounding environment.

### **Disease Reduction**

Tests at SWFREC have clearly shown reductions in both the incidence and severity of disease. Products varied in level of performance and differences may not have been detectable to the naked eye. For example, in a trial involving a natural infestation of bacterial spot on pepper, 20% of the untreated plants were diseased compared to 13% of the treated plants. Furthermore there were 6 spots per leaf on the untreated plants compared to 4 spots per leaf on the treated plants. This may not seem like a great deal of protection, but it might make the difference between an epidemic and a controlled

outbreak. Additionally, the slower advance of the disease provides the grower a management tool in that chemical controls and application timing can be more effective. Similar results were noted for *Phytophthora capsici* on cantaloupe (lower incidence/slower development). However, the virulence of *P. capsici* simply proved too devastating for the biologicals in the end ("... you lose some.") This by no means constitutes an exhaustive list of disease trials, but a trend seems to be emerging.

### **Insect Repellence**

We have not seen this aspect at the SWFREC; however, insect repellence has been documented. Researchers at Auburn University have shown that certain biologicals altered the level of cucurbitacins in cucumbers and thereby made them less pleasant-tasting to cucumber beetles. This biochemical phenomenon also reduced the amount of cucurbit wilt pathogen transmitted by the cucumber beetle apparently due to its reduced feeding. This may be just an isolated case; however, the ramifications seem very beneficial.

### **Nematode Reduction**

USDA researchers have documented reduced root galling and improved root condition in nematode infested soils for tomato and pepper, in Florida. Some organisms were better than others in eliciting these responses and some were more effective in one crop or the other.

### **Yield Effects**

If the biologicals bring about any of the above-mentioned effects, you will probably see a positive impact on yield. We have seen everything from more extra-large fruit at first harvest and more total fruit after three harvests in pepper to no yield differences, early or late, in cantaloupe. We even had one incident of a reduction in extra-large tomato fruit size at first harvest, but no effect on total harvest (size, weight, or grade). Again, these effects vary with the organism and the crop on which it is used, and will probably not perform identically every year ... you know, like Mother Nature.

So what are we to make of all this? At this level of development you cannot expect great things from biologicals. However, you can expect these organisms to show up every day of the season and give you the best they can give. It's the little things that add up during the course of the season that produce the successful year. As we enter the lively bed era without the grand slam of methyl bromide, we are going to need all the help we can get, and this broad spectrum of benefits provided by biologicals will certainly help. What better way to help yourself than to put something living in that transplant plug or on that seed.