GROWERTALKS

Pest Management

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Perfect Pairings

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The American Floral Endowment (AFE) has long been at the forefront of addressing critical challenges in the floriculture industry. One of the most pressing issues is the control and management of thrips and Botrytis, which have proven to be relentless adversaries for growers. In 2017, recognizing the urgent need for new and effective strategies, AFE launched the Thrips and Botrytis Campaign, a research-driven initiative to mitigate these pests' impact on the industry.

The launch of the Thrips and Botrytis Research Library

Last year, in the July 2023 issue of *GrowerTalks*, I shared some preliminary insights into the release of AFE's Thrips and Botrytis Research Library. This comprehensive resource, housed directly on AFE's website (endowment.org), represents the culmination of 17 special research projects made possible by the generous contributions of 25 industry sponsors totaling $1.5 million. The Thrips and Botrytis Research Library, which is free to access, serves as a central repository for the wealth of knowledge generated from this campaign, offering the industry access to cutting-edge research findings and practical solutions. All of the articles, webinars and more are available in both English and Spanish.

Enhancing biological control agents for Botrytis management

Just because the campaign ended in 2023 doesn't mean that we're done sharing new insights and results with the industry. Our research library continues to be updated with the results of three ongoing funded projects.

One of the projects that's underway is the work conducted by Dr. Jim Faust and Dr. Guido Schnabel from Clemson University called "Enhancing the Performance of Biological Control Agents for Botrytis Management." This is an area of growing importance as the industry seeks to reduce its reliance on chemical fungicides.

Exploring beneficial bacteria

Dr. Faust and Dr. Schnabel's research takes a three-pronged approach to Botrytis management. The first part involves exploring the use of "good" bacteria, specifically *Bacillus subtilis* (the active ingredient in Theia) and *Pseudomonas chlororaphis* (the active ingredient in Howler). These bacteria have shown promise in managing Botrytis, but the researchers are delving deeper to understand how these products work and why they sometimes fail.

For *Bacillus subtilis*, the researchers found that tank-mixing it with certain fungicides (specifically FRAC 3 DMI fungicides) can make it work as well as some of the best treatments out there. However, there's a tricky part—some

fungicides can stop the bacteria from growing, making them less effective. You can see this in Figure 1, which shows B. subtilis growth in Petri dishes with four different concentrations of four different FRAC 3 fungicides: difenoconazole, tebuconazole, myclobutanil and flutriafol. The bacteria didn't grow at all when exposed to difenoconazole, but it grew well with flutriafol. This highlights the importance of choosing the right partners when tank-mixing beneficial bacteria and fungicides.

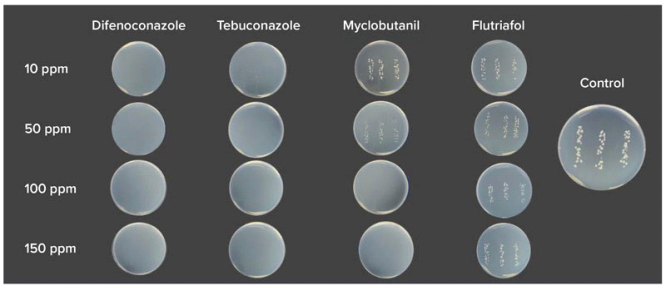


Figure 1. B. subtilis growth in Petri dishes with four different concentrations of four different FRAC 3 fungicides.

When it came to *Pseudomonas chlororaphis*, they discovered something surprising. Even though the product they tested was supposed to contain this bacterium, they didn't find any live bacteria in it. Despite this, the product still worked very well in controlling Botrytis on petunias, suggesting that the real active ingredients might be certain byproducts made by the bacteria, like pyrrolnitrin, which acts similarly to the fungicide fludioxonil. This may mean that it's essentially a biological fungicide, not a living organism, which should translate into a longer product shelf-life and less reactivity to the plant canopy microclimate. Results like this are a reminder that understanding how these biological products work is crucial, especially when considering how diseases can develop resistance to treatments.

Investigating beneficial fungi

The second part of their research focuses on beneficial fungi—specifically yeast-like fungi such as *Aureobasidium pullulans* (the active ingredient in Botector) and *Saccharomyces cerevisiae* (the active ingredient in Julietta). These fungi can also help fight Botrytis, but it's important to know how they interact with fungicides when using them as a tank mix.

Their findings showed that some fungicides, like propiconazole and difenoconazole, can significantly slow down the growth of *Saccharomyces cerevisiae*, while others, like azoxystrobin and fludioxonil, had no negative effects. *Aureobasidium pullulans* also reacted differently depending on the fungicide used—propiconazole and azoxystrobin slowed its growth at higher doses. This suggests that by carefully mixing conventional fungicides with these helpful fungi, we can boost the effectiveness of the fungi while also saving on costs.

Screening biorational products

The third part of their research involves testing non-traditional fungicides, also known as biorational products, to see how well they work against Botrytis. They tried products like glutamic acid, sodium hypochlorite, *Swinglea glutinosa* and chitosan on petunias. Unfortunately, none of these showed strong results in controlling Botrytis.

However, they also looked into using surface sterilants like sodium hypochlorite (bleach) and hydrogen peroxide, which have been used to treat cut flowers like roses after harvest. These sterilants did show some benefits, but the researchers found that they don't offer long-term protection. They're most effective at killing spores just before harvest, but don't continue to protect the plant afterward.

Objectives and future research

Looking ahead, Dr. Faust and Dr. Schnabel have set several important goals for the next year. They plan to test the best combinations of beneficial bacteria and fungi in real greenhouse conditions, confirm how fungicides affect these helpful organisms, and investigate whether there is cross-resistance between *Pseudomonas chlororaphis* and fludioxonil.



Pictured: Botrytis symptoms on a rose.

They're also exploring an interesting possibility: that a product called polyoxin D might help plants resist Botrytis if applied a few days before the disease strikes. If this proves true, it could be a big step forward in managing Botrytis in the future. (Subscribe to AFE communications at endowment.org and check the Thrips and Botrytis Research Library for the latest updates on this project.)

The importance of continued support

As we look to the future, the need for innovative and effective solutions in pest management remains as critical as ever. The important results generated from AFE's Thrips and Botrytis Campaign underscore the importance of continued support from the industry. The findings presented here are not only advancing our understanding of biological control agents, but will also provide practical solutions that can eventually be implemented in the field. This research is vital for building a more sustainable and resilient floriculture industry, and it's only possible through the generous contributions of industry supporters. AFE's ongoing commitment to research and collaboration will continue to drive progress, ensuring the industry is equipped to meet these challenges head-on.

Stay tuned for next month's issue of *GrowerTalks*, where we'll delve into some of the latest developments in our ongoing thrips research from the Thrips and Botrytis Campaign, offering further insights into the strategies and solutions that are shaping the future of pest management and sustainability in floriculture. **GT**

AFE's commitment to advancing the floriculture industry extends beyond research. We actively engage with the industry through publications and presentations, ensuring that research findings are accessible to growers and industry professionals. In addition to our Thrips and Botrytis Research Library, we offer a wealth of other information for growers, including our monthly Grow Pro Webinar Series and quarterly Growing Further Newsletter.

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