



Competitive Colonization with Beneficial Fungi

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Registered: 4 years ago

Posts: 209

In an adjoining *Marssonina* thread, the question was posed whether or not we could achieve better results against fungal pathogens by competitively colonizing with beneficial (and effective!) fungi, rather than bacteria. This seems like a good conversation to have, especially as we gear up for the annual battle of the primary infection window (Fear the Bloom 2022). We typically lose the bulk of our apple crop to mixed fruit rots; I can't quantify it, but we're talking in the neighborhood of 50-75% of our crop annually, not the measly single digit losses that set conventional hands to wringing. We have often resorted to picking fruit when very underripe, such an unfortunate practice, and a big no-no for cider apples, in order to save fruit that would otherwise have 50% or higher of the fruit surface affected at ideal harvest time. The potential infection windows for fungal pathogens seems to be expanding on either end of the season; we're hearing more and more that budswell is when we need to start looking at prevention . . . up to harvest time. So we're big into addressing our fungal pathogen issues, and the idea of looking at beneficial fungi that might compete with pathogenic fungi more effectively than beneficial bacteria is appealing (although that's a question in and of itself: does fungi inherently compete better against other fungi?).

For our current competitive colonization needs we use EM-1 that we raise in bulk from mother culture and supplement with Quantum to make sure we retain The Purple Guys aka *Rhodopseudomonas palustris*. Raising the EM-1 is such an easy and forgiving process (with apologies to the *R. palustris* which may not survive). Rearing large quantities of beneficial fungi on the farm may not be as user friendly, but I hope we get there someday, not only for convenience and personal satisfaction, but overwhelmingly for cost, as you will see below. In the meantime, I've paid special attention to what beneficial fungi is currently being marketed. *Trichoderma* has been suggested as a genus that may fit the bill, particularly when targeted toward the understory and the beginning of most pathogenic fungal lifecycles. As Mike Biltonen pointed out elsewhere, however, there is potential for post-harvest issues (though *Trichoderma* may be effective against others) when used with apple crops to the extent that there is currently no *Trichoderma* product labeled for use with apples. But you will find it in a lot of general commercial ag products and beneficial blends.

I zeroed in on *Gliocladium catenulatum*, which I had heard was found exclusively in Lalstop G46, product-wise (Prestop, a bee vector product also had/has it, but I seem to remember that that was/is a product still connected to Lallemand). It's made by Lallemand, a company many of you cidemakers will be familiar with if you purchase yeast; they really know their stuff, microbe-wise (knowledgable reps are such joys). *G. catenulatum* is a saprophytic fungi that will attack and break down a broad range of pathogenic (and other beneficial?) fungi. The Lalstop G46 product also claims the additional modes of action of competitive colonization and a pseudo-physical barrier of protection via the production of antagonistic metabolites. Some of us were discussing the appeal of using local microbes for competitive colonization, as they will perhaps be best suited for targeting local pathogenic strains -- this *Gliocladium* doesn't fit that bill; I want to say it hails from Canada if i'm remembering correctly. But -- it is uniquely suited to cooler climates. Ordinarily that would be a drawback for those of us in the Southeast who are struggling to control fungal rots during the hot, steamy growing season; the *Gliocladium* won't be doing anything then. But it loves cooler weather, ie, early season pre-bloom and into bloom, which makes it an ideal early colonizer and control. It also hangs around in the environment well for weeks on end (I have to lay hands on some other notes, but I believe we're talking 6 weeks). We're trying it this spring.

What's not to like? Well, the price, for sure. It's currently \$85 for 3.5 ounces of the stuff through Seven Springs Farm in small size form, and if purchased in bulk boxes containing 5 -- 2 lb bags, it currently runs you \$2,235 per 10 lb box. That 10 lb box will allow us to apply it twice, at budswell and at bloom, hopefully keeping us well-protected during primary infection window. The finesse will come with how to pair this effectively with other biologicals. What does this do to our normal EM-1 applications around that time? We were advised to pre-treat our orchard with a sanitizer like Oxidate to create some space for *G. catenulatum* at inoculation time, and It seems likely that the EM-1 will compete with the *Gliocladium* if applied during the same period. Assuming we opt to favor the latter, how best to make a nice arboreal home for them? When dealing specifically with beneficial fungi, should we assume they will appreciate fatty acids, et al, in the same manner that EM-1 does? Food for thought, quite.

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[Reply Quote](#)[Mike Biltonen](#)[Re: Competitive Colonization with Beneficial Fungi](#)

February 22, 2022 05:48PM

Registered: 10 years ago

Posts: 298

Interestingly I have started to grow mushrooms and contamination is always an issue. Whether fungal or bacterial, it is always an issue. I say this because I was able to grow *Trichoderma* (instead my preferred mushroom) quite easily by using biochar that was left outside au naturel for a year. What I learned is that *Trich* doesn't just occupy space it feeds on mycelium which sounds great if you're trying to destroy a fungal pathogen, not so

good if you're trying to culture beneficial fungi - which is out holistic orchard duff settings is exactly what we are trying to do. Takeaway: I wouldn't apply trich for anything unless I knew what i was trying to control for fear of upsetting the beneficial fungi balance. Plus it seems there is already plenty in the soil naturally - at least in my calcium central NY soils (LOL).

Next, Double Nickel in addition to being a biofungicide is also a bacterial suppressant. So applying something like that can have dual benefits when dealing with pathogens. There are other biofungicides that have the same characteristics, but of course these are not all live organisms and some utilize secondary toxic metabolites to kill or suppress competitors. I've wondred how much of what we get from beneficial organisms is actually competitive colonization or suppressant or both.

As far as fatty acids, fatty acids of carboxylic chains that make up fats and oils. But from my work developing media to grow mushrooms, fungi require sugars and other nutrients as well. I'll add basalt, gypsum, and lime to my LCs when making growth media - I suspect most fungi in nature require a diverse diet as well. I can't speak to bacteria, but since they have infected some wild cultures of mine they are not dissimilar to fungi. So, speaking to EM-1, I am sure the lactobacillus provides some protection from CC and suppressant activity. But the yeast and bg algae really round out its effectiveness. Nonetheless, it is a very narrow spectrum of beneficial organisms. That is why I opt for a more robust mix from nature, Tainio, or both. I will add in EM1 bc I do believe it is very helpful, but there needs to more for robust protection.

Speaking to Gliocladium - I am wary of using any saprophytic fungi to control anything during the season. But late in the season can help reduce the potential for late-season fruit rots. Problems is that many fruit rots start much earlier in the year when the fruit is growing (even during bloom) yet don't manifest symptomatically until later in the season. So we need to think of a multifacted approach and depending on the organism we are trying to control this can and should mean - allopathic+CC+suppressant. Not all at the same time, but at the appropriate times when the disease organism is prevalent for infection (not symptom when it is too late). So if we're trying to build the natural biology of the orchard we need to avoid anything that would kill or suppress beneficials. we need to favor the beneficial over the pathogens, and to that end we need to know what we are dealing with for bio-composition.

Sorry for the rambling (I am listening to midnight gospel at the same time I write this, probably not a good idea). But avoid Trich, avoid other saps, boost+boost+boost, don't kill them off with ill-timed sprays, and think beyond just fatty acids to other nutrients.

[Mike Biltonen, Know Your Roots](#)

Zone 5b in New York

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