

Pest Alerts...

Chances are you can now find Cabbage maggot fly eggs laid at the bases of unprotected brassicas; Cabbage butterflies are now flying locally— if and when the weather warms, this will increase dramatically— pay attention to young unprotected brassica transplants; Some transplants, either in the greenhouse or now in the field, are showing edema, which may have been caused by prolonged cloudiness and dampness— the plants will grow past it; pay attention to beet leafminer eggs in chard and beets, also spinach — the time to spray spinosad is when you see eggs; if anyone sees allium leafminer damage— consecutive white dots on leaves— please let us know. **Produce Safety Rule (public hearing-virtual-scheduled for Monday, May 18, 2020 at 2PM) and more from RIDEM:** <https://mailchi.mp/ef6fa69ead5e/psrri-gap-grower-training-december-5-6-register-now-7966932?e=adce649c0e>

The Latest COVID-19 Resources: <https://web.uri.edu/coopext/coronavirus-resources/>

--> Need to discuss? Got something you need looked at? URI Extension: 401-874-2967/andy_radin@uri.edu, hfaubert@uri.edu

Products with Biological Active Ingredients: What Works? Part 1

Recently my esteemed New England vegetable crops extension colleagues and I “attended” online webinars with two different purveyors of plant protection products that fall into the category of “biologicals.” These are products which are derived from living organisms. They could actually *be* living organisms, such as microbes that infect pests. Or they could be

natural products derived from the culturing of microbes. Or they could contain products derived from plants. Most of them (with a few important exceptions) have multi-pronged modes of action, meaning that they interfere with certain biological processes or stimulate protective responses. Many, though not all of them, are not biocidal— that is, they don’t all directly kill target pest organisms, though some certainly do (think *B.t.*). Many are designed to alter the biome of the rhizospheres of our crop plants, and also stimulate immune-like responses in plants. Such altera-

tions take more time, and require *preventative* and *repeated* applications.

While this article is not meant as endorsements of specific companies, there are relatively few that actually manufacture such products. However, more and more distributors are carrying them to make



A nice stand of hairy vetch and winter rye

What works...?

them available to you. One of these companies, Marrone, develops and labels products. The other, Certis USA, develops a few products but also distributes many more. I believe it is important to make growers aware of these types of products because generally speaking, they are much more environmentally benign than synthetic products and should be brought into more regular use by all growers. Having said that, there are a number of synthetic products which, when used judiciously, really make it possible to produce abundant yields on limited amounts of land, a precious commodity in RI. Here are highlights of what we learned.

Marrone has a small line of products that can be used pretty broadly. Probably their best known is a fungicide, **Regalia**, derived from a giant knotweed plant (not the dreaded Japanese knotweed, but another closely related species). It has been trialed alone as well as “tank-mixed” in combination with other products, both biologicals and synthetics. Organic growers and those looking to reduce their use of synthetics should really have this in the cabinet. Well, maybe a couple of cases, depending on how much land you farm—common recommendations call for 2 or more quarts per acre. I have not done a trial with it personally, but I’d really like to see what it can do for **Cercospora leaf spot on beets and chard**. This

is a common problem that I see on a lot of farms and I always come up short for an organic control alternative. It has performed well in trials on this and several other diseases, including **powdery mildews** (when combined with systemic, single-mode-of-action synthetics), and **bacterial spot of pepper and tomato** (when combined with copper). Bacterial spot is very common on pepper, particularly older varieties of bell pepper and a lot of open-pollinated chili peppers.

Stargus is very new, now labeled in all 50 states since 2017. It is a culture of the bacteria *Bacillus amyloliquefaciens* and it has three modes of action. Some important targets for its use in RI include *Botrytis* control in grapes, and downy mildews in leafy greens like spinach (especially in high tunnels) and on brassicas in late summer/early fall. It’s not clear if this material is effective on downy mildew of cucurbits, though this disease gets mentioned by the company. An issue with these products is that more of the trials have been done in California where disease pressure is much less than here in the east, where we get 50 inches of rain per year.

Grandevo is an insecticide that has efficacy on spider mites, broad mites, thrips, aphids, and others. It is a culture of the bacteria *Chromobacterium subtsugae*. It used to be a difficult to handle material but now it is in a granular material that easily disperses in water. It is suggested for use in rotation with other materials but also can be mixed with insecticidal soap (such as M-Pede or Des-X) or with products containing azadiractin or neem oil. Allegedly, mixing can have synergistic effects. Modes of action include toxicity with ingestion by insects and some interference with molting. **Venerate**, another bacterially derived product (*Burkholderia* spp.), supposedly controls most caterpillar (Lepidoptera) pests, but more importantly, suppresses feeding of various stink bugs, lygus bugs and plant



Cercospora leaf spot on Beet

Report from Middletown

STILL Cold and Wet, Cabbage Butterflies, and Adventures in Tarping

We have had quite the run of nasty weather over here on Aquidneck Island, although it is about to change drastically. April saw some form of precipitation on 18 of its 30 days, and soil temperatures are about to crack 50 degrees F for the first time this season. The ten-day looks pretty good here – we may finally see steady air temperatures at high 50s day/high 40s night and a lessening in the daily rainfall.

All of this cold and wet has meant slow germination. On May 1st, a planting of English peas, snow peas, and Sugarsnap peas finally emerged eighteen days after sowing. For a while, we had thought they were goners, but they're decent stands – just slow moving. Fava beans and Spring Brassicas have also been late to emerge, necessitating flame weeding over beds while we wait and wait.

Cabbage white butterfly (*Pieris rapae*) is out in full force right now, scouring fields for emerging yellow rocket as well as your kales and cabbages. Row covers weighted down with sandbags remain our first defense against them, along with keeping fallow areas mowed down hard to limit their food supply. Eventually we will have no resource

but to break out the B.t., but for now, the butterflies are manageable.

We are late to the game with tarping and the mysterious game of occultation, but can report good results from a 50' x 100' tarp laid down in the last week of February. Our field is windy, and moving the tarp is an adventure, but the tarp did exactly what it was supposed to do. We moved it last Sunday after putting it down on February 28th, and are pretty impressed with its weed-smothering abilities even in winter and early spring. Dandelions and asters seemed to cling to life a bit, but everything else was obliterated, and we will likely invest in a couple more to keep them rotation.

We hope you are all well and hanging in there. Fingers crossed for a drier season and a few uninterrupted days to work soil.



What works...? continued

bugs. I can think of two important pests for which there are no softer insecticides available: squash bugs and tarnished plant bugs. IF Venerate does a good job on these, then this is something you may want to have on hand. A formulation designed for soil application is sold as **Majestene**. They claim that it can solve plant parasitic nematode problems, as well as wireworms and white grubs.

Do any of these products work here in New England? They really haven't been put to the tests. However, I've been assured that if we want to test out any of these products, we can get some to try. Just a phone call away... and then however long it takes for them to ship some out.

Certis USA distributes a number of products in several categories: Microbials (including viruses, baculoviruses, several *Bacillus* species including insecticides and fungicides, and fungi); Botanical Extracts, Microbial Extracts, and several mineral products, most of which have organic labels. I will just highlight some of their more important products here.

Their best-known fungicide is **Double Nickel**, which is a culture of *Bacillus amyloliquefaciens*, the same bacterial species as the Marrone product, Stargus. It has a longer track record than the newer product. In various side by side trials, they performed equally or differently, but both significantly reduced disease severity. The label is pretty broad, and it no doubt will work better in some situations than others. Like all of these products that induce resistance in the crop plants, they should be applied preventatively and several times during the season.

Trichoderma is genus of soil-dwelling fungi and can be usually found in all soils where plants are growing. They colonize the surfaces of plant roots and some grow into the root cortex. There is a long list of mechanisms by which they prevent plant disease in crop plants. There are also several species among the many products marketed, and even specific strains within some of these species. They are commonly

used as seed treatments, transplant soaks, and in-furrow applications. Commonly used products include RootShield, Tenet, and the Certis product called **SoilGard**. Efficacy (to varying degrees) has been shown on damping off diseases caused by *Pythium*, *Rhizoctonia*, and *Fusarium*. Use of these preventatively in the greenhouse is a good practice, especially if you don't have a lot of space and you know that, deep down inside, your plants are too crowded. Actinovate, a strain of soil-dwelling *Streptomyces lydicus*, also has efficacy on damping-off organisms as well as *Phytophthora* crown and root rots. It can also be used as a foliar spray for powdery mildew and botrytis. For efficacy data on specific crops, see Meg McGrath's (Cornell in Long Island) list: https://rvpadmin.cce.cornell.edu/uploads/doc_582.pdf

A quick note on viral pathogens of plant pathogens – not human pathogens. Phages are viral units that attack specific species of bacteria. There are now products that are used against *Xanthomonas*, *Pseudomonas*, and *Clavibacter* species. Where certain of these are serious, incurable problems, bringing in the viral artillery is very much worth a shot. It could mean the difference between being able to grow tomatoes at all, or not, if your farm has a chronic problem.

Certis also distributes a form of copper, known as copper octanoate, which is actually a combination of a fatty acid soap (like insecticidal soaps) and copper. Their product is known as **Cueva**. This combination of ingredients not only makes it stick to foliage better, it also requires a much smaller percentage of copper in the formula, which means you are not introducing so much additional copper into the environment if you are trying to control plant diseases only with organically approved products. It is labeled very broadly, both for fungal and bacterial (foliar) pathogens. Remember that copper is a protectant fungicide. It needs to be covering leaf surfaces when conditions are right for spore germination. Don't wait until after the rain to apply it with the rationale of "oh, it'll just wash off."

To be continued...