The bountiful harvest this past fall in Lost Nation was greatly appreciated yet on some trees unmet. That left frozen apples in upper branches which drew in the deer more than ever before. This is how orcharding works. You tweak your approach and improve crop dynamics but then time works against you and you don’t prioritize something you absolutely know you must. And so that ol’ learning curve just keeps on rolling along. Here’s to observations gained and ever more diligence in the new growing season ahead!

Blotch in Overdrive

Global reach continues to shift the challenges faced by growers everywhere. The disease complex seemingly gets more complex as ecosystem dynamics recognize yet more pathogens into the game of fruit production.

Such is the case with Marssonina leaf blotch. Defoliation caused by *M. caronaria* fungi by late summer ends photosynthesis. Leaf spots first appear on the upper surface of mature leaves: these are grayish, brown, and tinged purple at the periphery. Chlorotic discoloration follows between veins. Leaves turn mostly yellow, then a week or two later fall off. This disease manifests on aspen and poplar species in woodlands and has proven its willingness to move into apple orchards in Mid-Atlantic regions. Nor should those in neighboring states be smug... this particular blotch might best be considered indicative of other summer issues that manifest long before growers see problems.
Marssonina leaf blotch is native to Japan, found its way onto China, then South America and Europe, and more recently into North America. Apple growers in the Northeast took note in big way in the wet summer of 2018. Blotch diseases require a year or two of establishment to get the ball rolling. The bottom portion of a tree here and there defoliates one season. This moves up the next season via rain splash and then onto neighboring trees. The battleground is now tree wide and orchard wide. Fruit spotting can occur as well at this point.

Release of blotch ascospores is tied to old leaves on the orchard floor and especially those surrounding miles of woodland floor. Equally critical to note is that the primary infection window for Marssonina continues slightly longer than for apple scab. Both pathogens require prolonged leaf wetness for successful infection, readily provided by high relative air humidity. Blotch symptoms become visible considerably later however, ~45 days later in fact. This research paper suggests that treatments with organic mineral fungicides may well be necessary on a weekly basis through the month of August to curtail secondary infections. There's a wiser course of action for those who read between the lines.
Start with the premise that health works. Maintain a robust beneficial microbe environment in the leaf canopy and keep green immune phytochemistry fully engaged. These are core holistic tenets. Start off with the spring sprays as you normally would for apple scab. This makes sense. Gaining the upper hand by preventing establishment of primary infections limits further launching pads of both scab and blotch conidia within the tree through the summer months.

Now make it a goal to maintain that holistic spray effort. Most growers achieve requisite spring applications in order to prevent primary scab . . . but then slack off to varying degrees in what is perhaps the most critical spray period. One could almost say: *Everything happens in the fruit sizing window!* Fruitlets need protection from insect pests, trace minerals applied to the canopy in tonic amounts enhance tree metabolism, thinning balances excess crop load, and a range of potential disease manifestations can be checked at the door.

<table>
<thead>
<tr>
<th>Primary Infection Window</th>
<th>Spring1 Spring2 CCB(s)</th>
<th>Early scab potential begins at tight cluster and continues into bloom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Sizing Window</td>
<td>Spring3 Spring4</td>
<td>Blotch and scab both are active at petal fall</td>
</tr>
<tr>
<td>(cell division)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Ripening Window</td>
<td>Comp1 Comp2 Comp3</td>
<td>Blotch continues to establish at the same time as cedar apple rust</td>
</tr>
<tr>
<td>(cell expansion)</td>
<td>Summer holistic apps made at 14 day intervals</td>
<td>Secondary scab and blotch threaten only if established earlier on</td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td><em>Fruit bounty and Leaf bounty alike!</em></td>
</tr>
</tbody>
</table>

*See the June 2018 edition of the Community Orchardist newsletter on the network website for explanations.*

Nor is this solely about Marssonina. The first round of aesthetic fungi that ultimately appear as sooty blotch and flyspeck are set back by competitive colonization in the month following petal fall. Those same beneficial microbes surround stomata on leaf undersides where rust and frogeye (black rot) hyphae seek entry at this juncture. Outright fruit rots are best dealt with now as well by supplementing the cuticle defense with calcium and silica while active cell division is underway in developing fruitlets. Opportunities for shoot blight are considerably lessened despite the continued

Marssonina fruit spots look much like bitter pit. On the left is Crimson Crisp, on the right Liberty. Photo by Brian Caldwell
presence of fire blight bacteria. Bottom line: Those holistic comprehensive (comp) sprays made at 7 to 10 day intervals are high priority given the entire gamut of what takes place in the fruit sizing window. Seeing no yellowing leaves later in July and August speaks to front end success as regards Marssonina leaf blotch back in May and June.

Straight sulfur programs have not been particularly effective against Marssonina. Low-dose copper and lime sulfur fared similarly in European trials. Forget about bicarbonates entirely. Some hope a new botanical called EcoSwing along with Regalia and variations on Bacillus spp. fungicides might beef up the core holistic approach further. Sulfuric acid clays may indeed be most helpful as suggested in the limited research to date. Growers can share what's discovered in our forum.

Summertime applications can be stretched to 14 day intervals. This may get tightened up in a particularly wet summer or then again it may not. Time and time again, past spray records reveal the temptation to let things slide. Yet what may have worked out in past seasons now faces additional curveballs as a result of summers getting ever warmer.

Hot and humid conditions favor infection by Collectotrichum fungi. These cause Glomerella leaf spot and subsequent bitter rot of fruit. This shows up regularly in the Carolinas and certainly moves northward in a hot summer. Alternaria leaf blotch severity is affected by severe mite infestation. Necrotic leaf blotch serves up California style. Timing is still everything. The driving organism shifts but not the holistic underpinnings of tree health.

Seeing wild apple trees and/or untreated backyard trees defoliate tells you that Marssonina has likely moved into your area. Organic mineral fungicides will have helped keep maintained trees in better stead compared to bare-ass naked status come late summer. Yet overall oomph begins to falter. Those heirloom varieties that appear to stand up slightly better than mainstream varieties have broader resistance mechanisms at play. That said losing a third or more of the leaves on affected trees takes a toll on bud reserves. This becomes all the more problematic when back-to-back wet years occur. Tree decline sets in, inviting black rot. As climate becomes all the more erratic, orchard hopes get bleaker.

Blotch fungi must be reckoned. Keep a steady hand on that holistic rudder.
**Tree Revamp**

Here’s a checklist of action steps to consider for stressed trees in spring. Talking now about sluggish growth, over-cropping the previous year, and general malaise. Soil investment matters, indeed.

- A couple pounds of Azomite spread throughout tree radius recharges trace mineral availability.
- Gypsum applied 45 days before bloom boosts calcium levels in fruit and supplies sulfate necessary for protein synthesis.
- Microbe diversity gets revitalized through dripline application of compost extract and/or indigenous microorganisms (Korean Natural Farming)
- A mycorrhizal reboot may be in order. Be sure to choose a fungal inoculum featuring multiple endo-type species; one tablespoon per tree; applied in a few spots beneath mulch where roots can be expected.
- Biochar further ups the fungal ante in living soils.
- Haphazardly-placed, ramial chipped wood provides essential organic matter for trees. Study up on **ramial nuance** in that biologic curriculum article posted on the network website.

**Hemp or Bust**

Hemp seed oil has a fatty acid profile much like pure neem oil. What’s missing are the azadirachtins that impact the insect molting cycle, particularly moths. There will come a point as industrial hemp production kicks into high gear that hemp oil will become a cost-effective substitute for neem **when no insect impact is required**. Holistic applications in spring that include neem oil are highly effective for dampening down the moth complex. Neem oil has also proved its mettle many times over with borer. Still, the fats in many orchard sprays are far more about supporting arboreal biology. This is where hemp oil plays its bioregional hand.

Drum prices for this "native seed oil" are currently running $30 a gallon versus $45 a gallon for quality neem oil. Prices for the two oils are similar when talking smaller quantities. And do remember, cold pressed oils are always the righteous choice.

Just imagine the marketing buzz when "CBD fruit" comes to our farm stands!!!
Spray Review

Investigating new product offerings so growers can understand both function and formulation aspects in a holistic context.

"EcoSwing®, a botanical fungicide, has been a leader in fungicidal control of several key pathogens in Latin America for almost 10 years." So states the Gowan literature.

Let's start with the plant involved, for growers absolutely need to grasp this is a botanical extract. As in quite possibly a fermented plant extract, and otherwise an alcohol-based extract.

*Swinglea glutinosa* is a small tropical tree from the Rutaceae family. Originally found in the Philippines and subsequently grown in South America as a garden hedgerow. This vigorous shrub grows up to an altitude of 5000 feet where the temperature rises to 100°F in summer and drops to 20°F in the winter. *S. glutinosa* has an extraordinary pleasant smell and notable medicinal uses.

Now let's turn to the label and explore what might excite orchardists. Fungal diseases listed include powdery mildew, botrytis gray mold, and *Monilinia* blossom blast. Brown rot on stone fruits and Alternaria leaf blotch make the sanctioned list as well. In addition, apple scab and cedar apple rust have been specified for suppression as authorized under FIFRA Section 2(ee).

EcoSwing has a multi-site mode of action... which kind of means the company hasn't told us much. Given its zero-day preharvest interval, we can assume this is relatively benign as Gowan products go. Recommended rates are 1.5 to 2 pints per acre for both berries and tree fruits. One supplier retails this botanical fungicide at $170 a gallon, thus costing $43 per acre at the higher rate.

Some closing thoughts from Mike Biltonen, a holistic orchard consultant in New York State: "Apart from the fact that EcoSwing is not labeled for Marssonina, I plan on using it for both cedar apple rust and scab in apples to a limited degree this year. I suspect, with no proof, that it will be mildly successful against Marssonina given that both scab and this particular leaf blotch are ascomycete fungal pathogens, albeit with different life cycle timings. Again, there is not any data I am aware of, but using it starting at tight cluster to mid-July for CAR and PM (on label) could yield some favorable data/observations."
"The Quantum Growth Series of products consist of different combinations of naturally occurring microorganisms that share key traits for plant enhancement. The organisms inhabit the root zone and vascular system of a plant, helping to breakdown, hold and transport nutrients and water. Photosynthetic strains in the products are capable of converting radiant energy, including the sun's, into energy for plant growth. Other organisms have the extraordinary ability to unlock chemical bonds, facilitating nutrient uptake that would not be available to the plant in the organism's absence."

What's key here is distinguishing between living and spore-forming consortium of microorganisms. You will find a paper posted in the HON Library entitled Quantum Thinking that details my initial foray into enhancing microbial diversity in the holistic core recipe. Rest assured, the lower rates shared in that analysis work quite well in a holistic system for the reasons stated. More to the point, crop results appear to be phenomenal one year in to trialing Quantum Total at Lost Nation Orchard.

The purple guys have my attention! As do the Bacillus and Pseudomonas species which play huge roles in disease suppression. These microbes further supplement the lactobacilli and yeasts in effective microbes. Orchard trials with Quantum are definitely going to be continued.

"Rhodopseudomonas palustris can modulate photosynthesis according to the amount of light available. Acknowledged by microbiologists to be one of the most metabolically versatile bacteria ever described, it has the ability to increase the level of light harvesting complexes to increase absorption in low light situations. R. palustris can fix carbon and nitrogen, providing a method to accelerate delivery of these key elements to the plant."

Made by Ecological Laboratories in Florida  https://growquantum.com/
Green Earth Ag and Turf in Connecticut  https://greenearthagandturf.com/
Rocky Mountain Bio-Ag in Colorado  https://www.rockymountainbioag.com/
The only people with whom you should try to get even are those who have helped you.

— May Maloo

Network Support
Hearty thanks to the growers and sponsors listed here. These are the folks who have contributed financial support for these efforts since the last newsletter.

Generally speaking, it takes twenty or so names on this list to finance a next newsletter. That goal was met for the Winter 2019 and Spring 2019 issues but we indeed came up short last summer and fall. The growing season demands attention; I get that. Equally apropos, it helps to have contact from headquarters to serve as a reminder that this work has value. I'm glad to report we're back in the groove!

If this content matters to you, please consider doing your bit right now. Sharing holistic insights "freely" actually requires real time support.

Stay in touch, think deeply, and treasure those venerable trees!

Michael Phillips

Usha Rao - SPONSOR RENEWAL
Szilárd Zicska
Shawn Greenbaum
Stephanie Vietor - RENEWAL
Roy Steinbrecher
Juniper Sundance
Thomas Moore - RENEWAL
Peter Fisher - RENEWAL
Sue Benik/ Anthony Kline - RENEWAL
Hal Palmer - RENEWAL
Jacob Riley
Sam Lindenmuth - NEW MEMBER
Carter Holliday - NEW MEMBER
Seven Springs Farm - SPONSOR
Stuart Buchanan
Cedrus Hannan - NEW MEMBER
Perry White
Tim & Betsy Price - RENEWAL
Heather Leach - NEW MEMBER
Glenn Aldridge - RENEWAL
Barb Lathrop
Gerald Bartle - RENEWAL