



The Community Orchardist

August 2015

Michael Phillips, Editor

Call it the tree people connection. Be it with long-time friends or new growers come out for a pep talk on healthy orcharding. We share a passion for trees and green plants, for fine fruit and wonder. Our common ground starts with appreciation for this good earth. Coming into harvest is glory time as now we see just what microbes and minerals can do. Not to mention those mason bees and beneficial insects galore. A certain few of our customers will be intrigued enough to want to know about some of these happenings. But mostly ... we have what we share each day with our trees ... and that grower bond thing. I like being part of the Buena Vista Apple Club.

Harvest Ahoy!

An abundant fruit crop awaits many of us this year. Several factors are at play here as far as the New England perspective goes. What would be nice if we growers had a little more say in how such things come to be from year to year!

- Incredibly well-rested trees, as in the bulk of the energy necessary to set fruit in the current growing season (and thus proceed with seed formation) and flower bud formation for the next season went almost entirely towards the latter in 2014. Remember having a very limited bloom and practically no fruit last year? That turn of events had been established in the 2013 season when a cloudy fruit set period limited photosynthesis and thus few flower buds formed for 2014. This whole story line belies why we thin, to balance out seed formation in heavy-setting years and thus get annual flower bud formation.
- May and early June in 2015 offered plenty of sunshine and reasonable warmth for bees to do the pollination thing day in and day out. Viola. Growers have a mighty fruit set to shape into *barn floors full*.
- That delightful stretch of fine weather corresponded with the primary infection window for apple scab. The good rains that came last spring

mostly occurred at night, setting up pathogenic fungal release come first light but rarely allowing enough %wetting hours+for infections to take hold. Rain ended by early morning and then the sun came out to dry off the leaves. Less disease always makes for an impressive crop.

- Fruit growth begins with cell division, which occurs during those weeks immediately after petal fall. Lots of sunshine drives photosynthesis and thus good cell division, and we saw exactly that. Furthermore, if the nights are warm during this period, things are just all the merrier.
- The rainy period of 2015 came in late June and July. Here's where things get interesting. Later in the growing season, the dominant form of fruit growth is cell expansion, basically the period beyond the summer solstice up till harvest. Warmth and plenty of rain during this time made for many large fruit ð even on trees less than adequately thinned.

Next let's consider some of the inevitable bummers which can seem pronounced in an especially good year.

Pre-Harvest Drop

Apples sometimes drop to the ground before they reach the desired harvest maturity, and all the more so with earlier varieties. Apples with short stems may physically %push+each other off the same fruiting spur as fruit size increases towards harvest. Drought stress and strong winds contribute here as well.

Severe insect damage will lead to earlier drops, especially when the seeded core is breached. Ditto for apples cracked by scab or battered by squirrels. Always check early drops for apple maggot fly infestation, and if you see plenty of fine brown tunneling, be sure to pick up such drops twice a week to prevent AMF larvae from reaching the soil to pupate.

Varieties like Duchess and Wealthy, which ripen unevenly over the course or two to three weeks, are simply problematic by nature. Spot picking every few days for color and size is the answer ð and admittedly this requires experience as regards plucking the flavorful fruit but allowing green wannabes more ripening time. A well-managed drop scene involves giving the first round or two to livestock or a hot compost pile. This results in a clean palette beneath the tree, with far less bruising potential where the falling apple hits another below. If the skin is not punctured, and it's only been a day or three since you cleaned up under such trees, %good drops+can certainly be sauced or go into cider destined for the fermentation vat. Sugar levels are now up as these are in truth ripe fruit coming off the tree as opposed to premature drops.

It's worth saying that trees well-mineralized have far fewer drop problems. MacIntosh here in Lost Nation, for instance, holds well on the tree. Investing in minerals for deep nutrition purpose makes far more sense than applying chemical growth regulators to prevent excess drop occurring on unhealthy trees

Bitter Pit in Apple Fruit

Calcium deficiencies contribute to fruit disorders in apple, and chief among these is bitter pit. The visible signs may be only slight indentations in the skin with no change in color. However, the skin over these depressions usually takes on a deeper green color than the surrounding skin, and finally, the disorder shows as small, brown pits.

These sunken spots may be few in number to numerous, and although they may extend over much of the fruit surface, they are most prevalent on the calyx end of the fruit. A knife slice just beneath the skin will reveal dry, tan, spongy tissue within. This disorder may not be evident at harvest but can develop in storage, resulting in unexpected fruit loss.



Identify bitter pit by the fact that spots are sunken, greenish at first then dark and desiccated, and often concentrated around the calyx end of the fruit.

When trees are young, fewer and larger fruit are produced which are more prone to bitter pit as a result of calcium being translocated instead to vigorous shoot growth. Similarly, in a heavy cropping year, there's simply less calcium per fruit to go around. Overuse of nitrogen or fluctuating soil moisture increase the likelihood of bitter pit developing as well.

What can be done? Cation balance as regards soil amendments matters! Particularly with lime. Excessive magnesium and/or potassium act to block the uptake of calcium from the soil. Root provision alone doesn't necessarily get enough calcium to each developing fruit. Foliar application of calcium products -- or better yet, homebrewed calcium tea (with effective microbes) -- definitely helps reduce bitter pit incidence provided such sprays are made regularly throughout the fruit sizing window. Effective thinning will help as well in not overtaxing the tree.



It's easy to confuse an obscure fungal disease known as Brooks Spot as bitter pit ... but this is spore-induced rather than a calcium translocation issue.

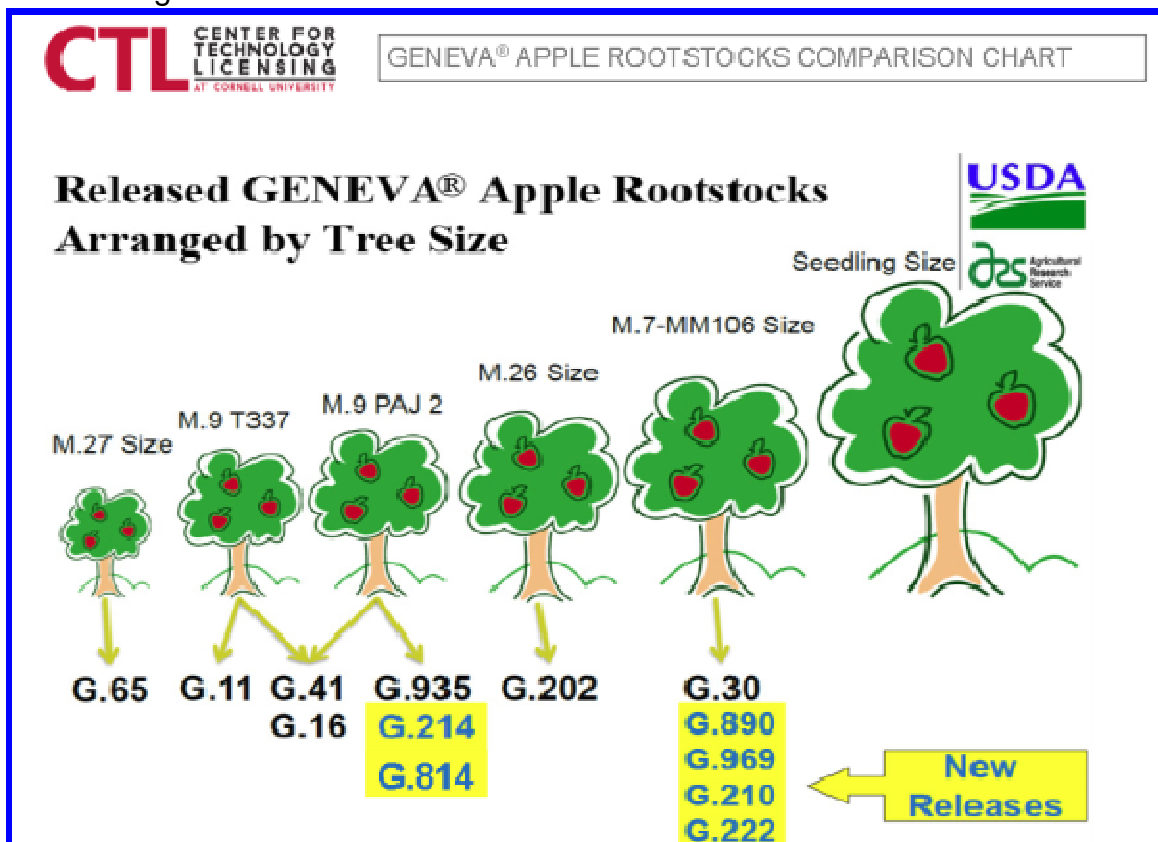
Bitter pit is more likely in some cultivars, such as Baldwin, Northern Spy, Cortland, Rhode Island Greening, Northern Spy, Stayman, and Rambo. Honeycrisp has other calcium issues to boot. These varieties will benefit from a good charge of gypsum (as in 5 to 10# per tree) in early spring following a bitter pit year.

The 40% Size Class

The apple rootstock realm can be grouped roughly into four size classes: Seedling (aka Standard), Semi-Standard, Semi-Dwarf, and Dwarf. Here we make the case which group is the right choice for growers wanting smaller trees and yet not wanting to compromise on mycorrhizal fungal connection and soil health.

The challenge with high density plantings on dwarf rootstock in organic systems is that less-than-vigorous trees simply can't compete with surrounding vegetation. Eliminate the use of herbicides and those efficiency proclamations by extension specialists become near worthless. Don't take this wrong, for certainly skilled organic growers like Harry Hoch in Minnesota and Jim Koan in Michigan do well by trellis plantings of Bud.9 ð given acceptable biological compromise. Shallow cultivation is key, whether the ground be left open with compost mulch or put into cover crop rotations. All cool stuff. But what about those of us wanting to work with fruit trees in undisturbed soil ecosystems for the duration?

That not-so-tall sweet spot lies with semi-dwarf rootstock in the 40% size class, essentially with the vigor attributes of widely-planted M.26. Only M.26 turned out to be susceptible to fire blight. Enter the Geneva rootstock selections begun by Jim Cummins and Herb Aldwinckle in the early 1970s. Tens of thousands of saplings were deliberately inoculated with fire blight bacterium and Phytophthora fungi (which cause crown and root rots). Those survivors demonstrating proper reduced vigor have in turn been evaluated now for several decades.



Growers today have several new options to try. The 40% size class straddles the M.26 line. The following rootstocks are now being trialled here in Lost Nation:

G.935 . This has been the best semi-dwarf rootstock in New York to date. It has good propagation characteristics in the stoolbed and appears to have good graft union strength. G.935 was the only rootstock to have greater root hardiness than M.26 in Maine trials.

G.202 -- Similar in size to M.26. Resistant to woolly apple aphid as well as fire blight and crown rot. This Geneva rootstock gets the nod in New Zealand plantings. Moderate rooting in stoolbed.

G.890 and **G.222** . Just because *a guy like me* always goes for slightly more vigor! The bulk density of roots on nursery-grown trees of both was quite impressive. Space at 10 feet apart with a scaffold structure.

Stink Bug Madness

Brown-marmorated stink bug has shown affinity for some **300 different plants**. This relatively new kid on the block+in mid-Atlantic regions can be blamed for causing an estimated \$37 million in losses last year for apples alone.



Pear growers will certainly attest to BMSB zeroing in on sizing fruits with a vengeance. Those hard grit spots in a pear at harvest time are the result of stink bug feeding. Stone fruits can be battered as well, from cherries to peaches. So what's a holistic fruit grower to do?

Outrageous diversity creates habitat for a multitude of insects. In the case of BMSB, it's not so much about attracting a beneficial superstar to prey upon this pest but rather using plant preferences to draw stink bugs away from desired crops. Among the top draw plants+are tree of heaven, soybean, English holly, eggplant, summer squash, and corn. Tasty habitat might be enough to foster an effective diversion in its own right. More than likely, these small plantings bordering the orchard (if not right alongside favored fruit varieties) set the stage for Plan B. Here's where more drastic measures can have a targeted impact rather than be applied in broad spectrum fashion throughout the fruit ecosystem. Picture a flame thrower frying stink bugs on a pumpkin trap crop for a great visual ð though in truth we're talking about heavier hitting, organic spray toxins.

Any such strategy starts with making our desired crops less desirable. The **holistic core recipe** addresses this as a matter of course. Pure neem oil acts as an antifeedant to bigger pests; this in addition to the greater good neem offers nutritionally and biologically. This can prove sufficient in the fruit-sizing window (those four plus weeks following petal fall) when holistic coverage for disease protection must be kept up. Another option plays from the fact that *Halyomorpha halys* is repelled by essential oils. Clove, lemongrass, spearmint, and ylang-ylang oils are nearly 100% repellent. Wintergreen, geranium, and rosemary are 60.85% repellent. Use discretion in diluting essential oils (mixed with water and often a lightweight carrier oil) and applying as a mist. Costs add up if you do this orchard-wide and/or to the point of runoff – so think of this as a wee bit extra protection for especially favored fruits. Totally homegrown approaches are worth trying too, using this **garlic/mint concoction** as starting point.

Now back to dealing with substantial numbers of stink bugs on draw plants.

Pyrethrum is made from the finely powdered flowers of the pyrethrum daisy. The word pyrethrum is the name for the crude flower dust itself, and the term pyrethrin refers to the insecticidal compounds that are extracted from pyrethrum. Pyrethrin can be lethal to stink bugs, especially when mixed with diatomaceous earth in the spray tank. The active ingredient rapidly paralyzes pests but may not kill them. The sharp edges of diatomaceous earth particles cuts into the breathing tubes of BMSB, essentially serving as a delivery system for the toxin. Here's why we don't want to apply products like PyGanic orchard-wide: Pyrethrin has high contact toxicity for common beneficial insects as well. And thus we target specific pests like stink bug and Japanese beetle on trap plants. Pyrethrin's insecticidal activity only lasts a few hours and is best applied at twilight directly onto congregated stink bugs.

Grandevo® can be even more effective than the synthetic pyrethroid esfenvalerate and other conventional pesticides, according to Tracy Leskey of the Appalachian Fruit Research Station. Lab tests showed several isolates of *Beauveria bassiana*, including an organic formulation **Mycotrol-1™** gave 100% mortality to *H. halys*. Nothing like a parasitic fungus to clean the slate! If you're going to spray fruit trees directly for BMSB, go these routes instead of pyrethrin.

Trapping also has a place in bringing BMSB numbers into balance. Male adult stink bugs produce an aggregation pheromone that attracts females and males alike. The **Rescue Lure** in conjunction with the **Dead-Inn Pyramid Trap** will bring full-blown adults and nymphs to a guaranteed end. This can require as many as a dozen such traps per acre, however, so don't lose sight of an integrated strategy featuring draw plants to keep costs down. One inspired twist on the commercial trap is to utilize the lure within a box packed with straw and/or crumpled newspaper to bring an overwintering hoard of BMSB on board in the fall months. Place such boxes on a winter solstice bonfire – and then say goodbye stink bug.

Question of the Month

I am trying to understand the dynamics of fungal and bacterial colonization and the effect of spraying neem or other foliar sprays. Why does it benefit only the good bacteria and fungi? Why wouldn't all bacteria and fungi benefit from these applications? Good and bad alike? Is it really as simple as, item A is good for all the good things and harmful to all the bad? Or am I missing the point, is it really beneficial to all good and bad, and simply a matter of supplying enough resources so that a diverse colony develops, good and bad, yet somehow balanced?

This scene on the surface of the leaf and fruit isn't so much about "good" and "bad" but about diversity and nutrient resources. There are basically three pathogen groupings when dealing with fruit tree disease. These in turn have food preferences and specific launching points, all of which influence our choice of action as growers:

Fungi that tap directly into the plant for sustenance include scab, rust, leaf curl, and rots in the establishment phase ... all of which have a "primary infection window" that speaks to specific timing. These pathogens utilize certain enzymes to allow hyphal penetration into plant tissue in order to live. This grouping demands our attention from the first showing of green tissue to as much as a few weeks after petal fall, varying with the fungal invader in question. Here we need to be thinking about competitive colonization, plant immune function, and enzyme inhibition to keep disease at bay.

Fungi that feed on cuticle exudates include sooty blotch and flyspeck, and the fruit phase of rots which then quickly go on to consume it all. Footholds are gained in the immediate weeks after petal fall, coming round again from alternate plant hosts and/or launching sites at the base of blossoms and shoots (brown rot in particular). Here we need to be thinking about competitive colonization along with silica and calcium boosting of the cuticle to keep disease at bay.

Bacterial pathogens require an "opportunity" to get into the vascular system of the tree. Such discussion can be found elsewhere in our grower forum but just know that competitive colonization is really important here.

Elaine Ingham has reported that maintaining a diverse colonization on the order of 70% on plant surfaces will thwart disease organisms. *Biological reinforcement* with compost tea and/or effective microbes is the means to do this. *Deep nutrition* from the fatty acids in fish and unadulterated neem along with a wide array of trace mineral availability from seaweed and ocean minerals has import here. What takes place after spraying a holistic brew is mostly beyond our ken. We don't know which benign/beneficial fungi and bacteria are going to dominate. We don't know the degree of nutrient uptake by trees . through leaf stomata and bark surfaces . which depends in part upon microbe consuming microbe in the arboreal sphere. We don't know the degree that systemic resistance gets triggered by terpenoids and flavonoids in pure neem oil and other indigenous herbal remedies. What we do know are the results to be seen at harvest time in terms of great fruit.

An Herbal Storage Tip

Putting a handful of freshly picked thyme sprigs in the bottom of a bushel box will help apples stay nice longer. That bowl of peaches on the counter will benefit as well – peaches stay fresh longer despite being unrefrigerated – and anyway, who likes cold peaches!? Oregano, rosemary, and mint can be used too.

“It is ironic to think that man might determine his own future by something so seemingly trivial as the choice of an insect spray.”

– Rachel Carson, Silent Spring

Network Support

There are some new names here, growers who have renewed support, and our ever-committed business sponsors. Huzzah to these folks who have stepped to the plate with financial backing for network efforts since the last newsletter! Once we have twenty or more responses, a next newsletter will get written. So speaks a straightforward budget.

Our funding mechanisms are much like public radio: **You decide a pledge amount that works for you.** Click those blue words and do your part to keep the ball rolling. Part of every donation from here on in will automatically be designated to go towards Holistic Orchard Research.

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

Michael Phillips

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