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Eastern NY Commercial Horticulture Program

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Tree Fruit News

Recommendations for Harvest Management Plant Growth Regulators in the Hudson Valley for 2017

Dan Donahue– ENYCHP

Every season is different from the last, and this year is no exception to the rule. Let's review the 2016 season: A severe spring freeze, along with above average heat for July and August, and dry conditions until the middle of harvest made for an uncertain apple harvest. The tables have turned for 2017, with no significant freeze (the apricots and plums may disagree) or frost losses, some hail and general concern about fruit finish, plenty of natural rainfall, degree-day accumulations running around 5% less that last year, poor performance of chemical thinners, and a limb-buster of a crop on the trees.

After reviewing last season's Harvest Management Program data, and our local research project results, as well this season's parameters of weather, crop load, and the Blanpied & Silsby model, below are my recommendations on PGR use for harvest management in 2017.

Current Observations and Factors to Consider when Predicting Harvest Maturity

- The results of a **McIntosh maturity model** used to predict the CA cut-off date for mac's in the Hudson Valley Laboratory research orchard, (Reference: Information Bulletin 221, Cornell Cooperative Extension, *Predicting Harvest Date Windows for Apples*, by David Blanpied & Ken Silsby, http://rvpadmin.cce.cornell.edu/pdf/submission/pdf198_pdf.pdf), The predicted range of harvest dates for standard strain McIntosh grown on larger trees is September 6-13, 2017. According to this result, McIntosh apples picked from the HVRL orchard after 9/13 are not likely to be suitable for controlled atmosphere storage. I was skeptical of, and so did not report on the model's results for 2014, 2015, and 2016. For 2017, the prediction seems reasonable to me.
- We know that the heavier the crop, the more delayed in color development, starch pattern index movement, and Brix.
- The 2017 season has been slightly cooler than last year, with August temperatures predicted to be average.
- At this time last year, all indicators pointed towards an earlier than average harvest. However, the hot (90+) days of last August appeared to have actually slowed

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In this issue of Tree Fruit News:

Temperature and Rain 6/28/17 - 7/23/17

Locations	Avg Temp (F)	Max Temp (F)	Min Temp (F)	Total Rain (in)
Chazy	69.4	86.7	53.1	2.2
Peru	68.8	84.3	54.5	3.7
Crown Point	70.1	88.0	53.0	0.8
Clifton Park	71.5	90.6	51.9	2.5
Hudson	73.4	92.3	49.8	4.4
Highland HVRL	73.3	90.7	52.3	3.7
Marlboro	N/A	N/A	N/A	3.8
River-head	76.6	92.1	57.0	2.2

maturity development as harvest approached. To illustrate, in late July I was convinced that my 30 day pre-harvest Honeycrisp fruit samples for peel analysis should be picked August 1st, and they were, based on an estimate of a September 1st first pick harvest. Turns out that September 8th was about the right harvest date last season. Goes to show that the predicted harvest date can be a moving target.

- Based on the prediction that August temperatures will be "average" and generally below 90f during the day-time, I think that we can expect the first harvest of "non-PGR treated" treated apples **on early sites** to be as follows:

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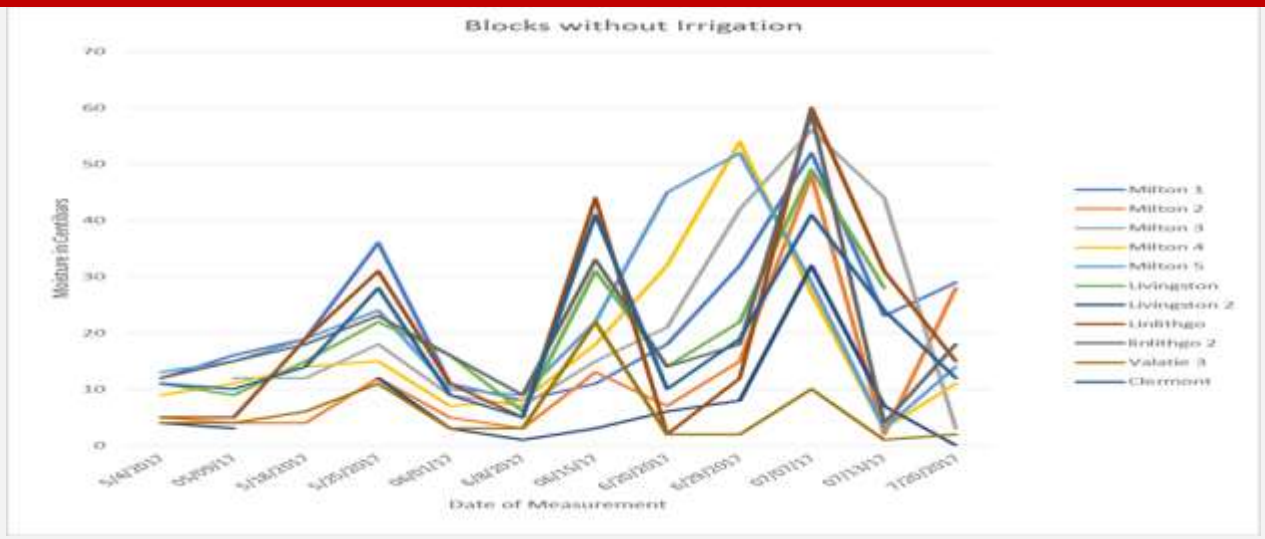
Gala: September 2nd

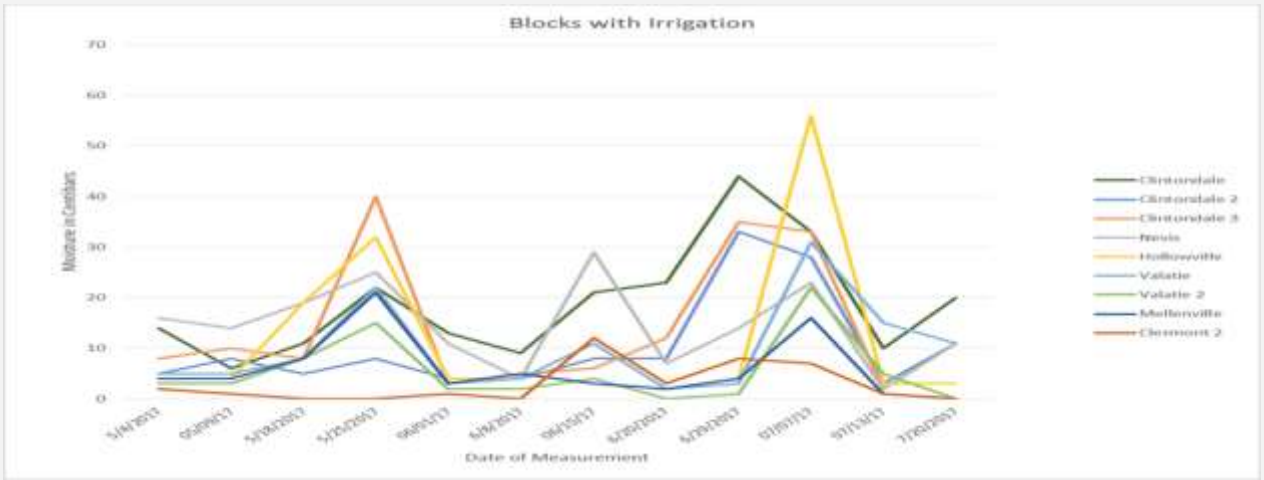
McIntosh (non-Marshall): September 6th

Honeycrisp: September 9th

2017 Hudson Valley Soil Moisture Sensor Data

Dan Donahue– ENYCHP





The graphs above represent the soil water tension measured weekly with Irrometer Watermark electronic sensors set at 8" soil depth in our 20 Honeycrisp research plots throughout the Hudson Valley in 2017. Centibar readings that exceed 50 are a cause for concern, and indicate that irrigation water should be applied in the near future if natural rainfall does not occur. Generally speaking, the availability of irrigation has not be a critical factor to date in bearing blocks. The distribution of rainfall has been variable, so there are areas in eastern Dutchess County which are reported to have missed a few of the rains. Newly set and non-bearing orchards with limited root systems must be adequately watered to boost terminal growth and avoid excessive stress on the young trees. If you're interested in installing your own sensors, they cost approximately $50 each, and require a $300 hand-held electronic meter to take readings. Set them at 8"-12" and in line with the trees to avoid damage from weed spray booms. Contact Dan Donahue at djd13@cornell.edu if you would like more information.

Growers' Issues in the First Part of 2017– An Overview

Dr. Srdjan Acimovic

1. Probable Bacterial Blossom Blast of Apple. At several locations in the lower Hudson Valley (Milton, Marlboro, Rexford NY), we examined randomly affected young apple trees with dried buds at half-inch green to pink stage. Among other cultivars such as 'Gala', 'Snapdragon' was affected significantly in Marlboro. Blossom blast was visible on 'Snapdragon' trees at the head- or chest-high areas of the trunk, or rarely at some scaffold branches (Figure 1).

Figure 1. (A) 'Snapdragon' pink buds probably killed by bacterial blossom blast, (B) brown wood of 'Gala' below the blossom blast affected buds, (C) *Pseudomonas* colonies isolated from Marlboro 'Snapdragon' trees expressing blossom blast symptoms (Photos by Acimovic S. G. and Pavlovic Z. 2017).

Symptom-based diagnosis led us to believe that this might be blossom blast that rarely occurs on apples and is most common on *Prunus* spp., with cherries and apricot severely. On pome fruit, blossom blast has been rarely reported on pears in Michigan and California. The cause of bacterial canker (blossom blast) on *Prunus* spp. are bacteria *Pseudomonas syringae* pv. *syringae* and *Pseudomonas syringae* pv. *morsprunorum*. Bacterial blossom blast of pear is caused by a bacterium *Pseudomonas syringae* pv. *syringae*. *Pseudomonas syringae* is a commonly present bacterium on the surface and inside of the plants, causing infection on many plant species. It colonizes bark and flower buds occasionally causing bacterial blossom blast on apples. *P. syringae* pv. *syringae* on apple was reported in South Africa and Australia (cv. 'Jazz'. Some strains of *P. syringae* have ice nucleation activity, i.e. bacterial cells act as ice-nucleating particles, exacerbating the effect of frost or near-frost events in spring. This frost promoting trait of ice nucleation activity implies the significance of frost injury as a predisposing factor for infection (Kennelly et al. 2007). It is probable that this trait lead to blossom blast symptoms in the lower Hudson Valley when mild frost event(s) tool place. We know of one event predicted for early morning of 4 May 2017. After isolations of bacteria from samples collected in Milton, Marlboro and Rexford, we found colonies of plant pathogenic *Pseudomonas* only on 'Snapdragon' trees in Marlboro (Figure 2). Blossom blast on the other two locations, was probably caused by very low populations of *Pseudomonas* bacteria that died quickly due to warm weather and we could not isolate them, or by infestation of Black Stem Borer. Further *Pseudomonas* identification to the species/pv. level will require more work. Read more about this topic at: Growers' Issues in the First Part of 2017 – An Overview (I)

2. Apple Tree Decline (aka RAD/SAD). It is important to note that above described symptoms of possible bacterial blossom blast must not be mixed with apple decline syndrome aka Rapid Apple Decline/Sudden Apple Decline that many orchards in NY are showing. Symptoms of rapid and different chronic apple tree decline types are available here: Having RAD is Also SAD by Dr. Kari Peter at Penn State, Apple tree collapse: What we know (and don't know) by Horticulture IPM Specialist Kristy Grigg-McGuffin and Dr. Michael Celetti at OMAFRA and Trunk-Related Problems in Apples: SAD by Dr. David Rosenberger. At this point, we must remain patient and remember that a first step towards finding control options for this problem is correct diagnosis of the cause. To help in determining causes please take the Survey of Apple Tree Decline compiled by CCE Dan Donahue and funded by ARDP: https://goo.gl/forms/IloX8FBGhYU3GP452

3. Fire blight: continuing apple tree death in 2017 due to 2016 outbreak. Epidemic outbreak of fire blight in NY Champlain Valley apple region during 2016 continued to take its tool in 2017. Primarily late infections of shoots and/or rootstock suckers led to latent rootstock infections that overwintered and expressed as collapsing trees in spring 2017. We found dying rootstocks on apple trees that did not

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push green flush or pushed only limited growth in 2017 and detected fire blight cankers below and above the graft union (Figure 3). On the same trees, we found fire blight cankers on the trunk at the chest-height, probably formed from internal infections spreading through bearing limbs where infections first started on flowers or shoots (Figures 4-7). Pruning cuts can be seen because removal of strikes was performed in late in spring or early summer 2016. However, the bacterium has spread into the trunk before the cuts were made and formed the canker later in the season. Infection reached the rootstock by either (a) spreading from the limb into the trunk and then internally spreading into the rootstock via xylem, or (b) infection of the rootstock suckers by inoculum dissemination from the canopy, down to the suckers (rain, insects, wind). These trees continued to be removed in 2017.

Figure 3. Rootstocks infected by fire blight on 'McIntosh' trees. (A) Dark-grey fire blight canker is labelled with the blue circle, (B) The same canker shown with stripped bark, (C) Advanced fire blight canker on infected rootstock and 'McIntosh' scion, (D) Canker on the trunk with marginal cracking on 'McIntosh' (Photo by Acimovic S. G. 2017)

4. Excessive rain = wet feet = most likely *Phytophthora* Crown and Root Rot (PCRR) on apple trees. Several growers contacted us due to young trees declining during July. Similar was reported to us for Massachusetts. With a lot of rain in 2017, symptoms indicate that young apple trees are declining due to *Phytophthora* crown and root rot, which is a disease that can be caused by different species of pseudofungi from *Phytophthora* genus. Saturated soil is required for movement of *Phytophthora* zoospores that infect toots.

One to several days of waterlogging lead to severe PCRR. Swimming zoospores are attracted by the root compounds released in the soil. Dr. Dan Cooley says that a diagnostic lab determined that two reports on Evercrisp/B.9 and Honeycrisp/B.9 in MA are caused by *Phytophthora*, indicating PCRR. Dying trees had poor root growth and brick red rootstock wood (Figure 10). Surprise was that Bud 9 is supposed to be resistant/tolerant to PCRR. Dr. David Rosenberger remembers a specific 1980's *Phytophthora* outbreak in a newly planted orchard on MM.111 in NY Hudson Valley. We received a report in July 2017 from Valatie NY about collapsing Honeycrisp trees on M.7 rootstock, reported as both susceptible and/or moderately resistant (Figure 4).

According to Dr. Wayne Wilcox, pictures indicate classic symptoms of *Phytophthora* root and crown rot (PCRR caused by *P. cactorum*). He pointed that MM.111 and Bud. 9 are relatively resistant to *Phytophthora* in general, but there are differential reactions to different *Phytophthora* species and the resistance can "break down" under "pressure". There are data and observations to support the breakdown of resistance due to the stress imposed by prolonged waterlogging/anoxia as a "pressure". It also seems possible to him that prolonged waterlogged/anoxic conditions (and perhaps other stresses) allowed one or more *Phytophthora* sp. to invade Bud. 9 to a degree that normally would not happen. The same thing can happen on M.7 rootstock. Dr. Wilcox isolated *Phytophthora* from this rootstock showing similar symptoms.

Dr. Rosenberger and Dr. Wilcox warn that if you are replanting onto heavy soils, you would benefit from planting he trees into slight berms along the tree lines before trees are planted. This can be done even with high-density plantings if one attempts to raise the tree line elevation by only 6 or 8 inches compared to the row middles. This improves tree performance and reduces/eliminates risks of PCRR because *Phytophthora* release with virtually no zoospores 10 inches above the water table and very very low number of them at

Figure 4. (A) PCRR associated declining apple trees reported in MA on B.9 rootstock (B & C) Brick red rootstock color on PCRR associated apple tree decline reported in MA on B.9 rootstock (Photos made by Jon Clements and Dan Cooley, 2017)

an elevation of 4 inches above a standing water table/ puddle. If you think/know that berming will make the drive rows too wet to get through with a sprayer, then you know that the site should not be planted before drainage tile is installed. Dr. Cooley reports that in one of the unbermed orchards in MA (from the MA figures 8-10 above) there is around 20% tree loss, probably with more to come.

Dr. Wilcox's experiments with raspberries are consistent with his recommendation: When *Phytophthora* species cause only ROOT rot, treatment with Ridomil and other *Phytophthora* labelled fungicides provides at least a theoretical opportunity to stop the disease progress and for the plant to regenerate new (protected) roots and largely recover. In contrast, he warns that once a tree is girdled beyond a certain point of no return, it's going to stay that way (i.e., it won't regenerate a new crown) and at best will just limp along. Unfortunately, this is the typical scenario that is likely on pome fruit trees.

Continues from page 2...Plant Growth Regulator Review for 2017

In 2017 there are 3 materials, which are registered for control of pre-harvest drop in apples: NAA, ReTain and Harvista.

- **NAA** provides modest drop control because it inhibits abscission, however fruit softening and reduced storage life are likely if warm weather follows application or if harvest is delayed until ripening has been substantially advanced.

- **ReTain** is a plant growth regulator which inhibits ethylene production in the fruit and reduces pre-harvest drop. It also reduces fruit cracking and fruit greasiness but it delays the development of fruit red color about 1 week. Application rates and timings vary by variety. Applied at varying timings (2-4 weeks pre-harvest) and rates (1/3 to 1 pouch/A) ReTain provides different levels of control of pre-harvest drop and fruit maturity. Its performance is improved when combined with NAA since the two products work synergistically to reduce fruit drop while the ReTain suppresses the increased production of ethylene triggered by the NAA.

- **Harvista** is a newer class of drop control chemical for foliar application, which inhibits the action of ethylene in the fruit and reduces fruit drop. The AgroFresh Company provides very specific, on-site recommendations for the timing of Harvista recommendations to its customers.

McIntosh Harvest Management PGR Recommendations for the Hudson Valley of New York State

- **NAA:** NAA requires 1-2 days to come into effect, and will provide a degree of drop control for a period of 7-10 days, although drop control is not always reliable. In the case where you may need 3-4 days of drop control and long term storage is not planned, NAA can be useful. However, since NAA stimulates ripening and can provide unreliable drop control when applied alone, in general the use of NAA alone is not recommended.

- **ReTain Timing:** ReTain can be applied 2-4 weeks before anticipated normal harvest. In general, apply ReTain at 3 weeks before harvest in cool years and at 4 weeks before harvest in hot years. Growers in the Hudson Valley commonly apply ReTain 4 weeks be-

fore the estimated first harvest date, with good success. Apply ReTain 4 weeks prior to your estimated first harvest date. For 2017 on early sites in the Hudson Valley, my **recommended application timing** for (non-Marshall) McIntosh is **August 9th.** For all of your blocks, including earlier strains like Marshall, **adjust the dates according to your experience**.

- **ReTain Application Rates:** One pouch of ReTain per acre will give the best drop control but will delay color development by 7-10 days. A ½ pouch of ReTain will also work and has a less negative effect on fruit color but the control of fruit drop will wear off sooner, perhaps too soon.
- **ReTain + NAA:** Dr. Terence Robinson's research in the last several years has shown the best combination of drop control with the least negative effect on fruit color is achieved by splitting a full rate of ReTain into 2 sprays of ½ rate of ReTain each time and including 10ppm NAA in both sprays. In 2017, **on early sites**, apply of the first 1/2 pouch of ReTain per acre + 10 ppm NAA (4oz/100 gal) 3 weeks before normal harvest, on **August 16th.** The second application of 1/2 pouch of ReTain per acre + 10 ppm NAA timed for one week before normal (untreated) harvest, apply on **August 30** in the Hudson Valley. Always take into account that **ReTain has a 7 day PHI.**
- **Surfactants:** It is critical to include an organosilicone surfactant with ReTain especially when combined with NAA. The organosilicone surfactant, such as Silwet (12 oz. /100 gallons), improves the uptake of ReTain better than other surfactants thus ensuring that sufficient ReTain is absorbed by the leaf to suppress the stimulatory effect of NAA on ethylene production.

Gala Recommendations for the Hudson Valley of New York State

Effects of ReTain on Gala:

- Fruit will remain on the tree an additional 7-14 days.
- Improved fruit size as fruit will increase in size approximately 1% per day
- Reduced stem end cracking and greasiness in 2nd & 3rd picks.
- Maturity is delayed, and becomes more even on the tree. As a result, is sometimes possible to reduce the number of picks necessary down to one or two.

- **ReTain Rates:** Apply a ½ pouch of Retain per acre. The 1– 2 pouch rates of Retain are almost never* recommended since Retain at higher rates has a very strong negative effect on Gala color development.
- **ReTain Timing:** Apply 2-3 weeks before expected first harvest. The recommendation this year is based on 21 days, so the **application date for Gala** in 2016 on the **earliest sites** is **August 12.**
- **Surfactants**: It is critical to include an organosilicone surfactant with ReTain. The organosilicone surfactant, such as Silwet (12 oz. /100 gallons), improves the uptake of ReTain better than other surfactants.

Honeycrisp Recommendations for the Hudson Valley of New York State

- **Honeycrisp** is a low ethylene producing variety that has very uneven ripening but can have significant preharvest drop in some years. The use of retain is recommend in blocks that have had a pre-harvest drop problem in the past.
- **ReTain Timing:** Apply three weeks before expected harvest. The recommended application date for 2016 on the **earliest sites** is **August 19**.
- **ReTain Rates:** Apply 1/3 of a pouch/acre rate of Retain on Honeycrisp.
- **Surfactants:** It is critical to include an organosilicone surfactant with ReTain. The organosilicone surfactant, such as Silwet (12 oz. /100 gallons), improves the uptake of ReTain better than other surfactants.

Harvista Observations and Recommendations

- Pre-Harvest Fruit Drop Control.
- Safe delay of harvest for additional color and fruit size development.
- Maintenance of fruit firmness before and/or after harvest (storage benefits are short term).
- Slowed starch conversion.
- Delayed and reduced incidence of water core.
- Greater consistency in maturity for improved storage performance.
- Fewer pick dates required for multiple-pick varieties Recent research has demonstrated a reduction in Soft Scald in Honeycrisp.

Harvista Timing & Rates: The general timing range is 3-14 days pre-harvest. Please contact AgroFresh technical support for specific guidance.

NYS Apple Producers are Being Asked to Complete a CCE Statewide Apple Decline Survey

Dan Donahue, ENYCHP and Tess Grasswitz, CCE-LOF

Cornell Extension Specialists are being asked with increasing frequency to investigate the chronic decline and/or rapid collapse of apple trees in young, high-density plantings in all regions of New York State. Symptoms of chronic decline can include poor growth, off-color foliage, and a generally "unthrifty" appearance that worsens over several years. The death of a previously healthy tree over the course of just a few weeks has been termed Sudden Apple Decline (SAD) or Rapid Apple Decline (RAD). In some of these cases, tree death can be ascribed to Fire Blight (*Erwinia amylovora*) or Crown/Root Rot (*Phytophthora sp.*), but in many cases the cause (or causes) are much less clear. Over the last year, the decline and demise of apple trees in orchards up to the 8th leaf has become a hotly debated topic among producers, researchers, extension specialists and industry consultants in several states across the mid-Atlantic and New England regions, as well as parts of Canada.

A long list of potential causes of decline has now been compiled by fruit workers throughout the eastern U.S., including winter injury, herbicide injury, Ambrosia beetles and Dogwood Borer. In addition, we have learned since December 2015 that many of our high-density apple orchards are infected with one or more latent viruses. Hence we cannot discount the possibility that the observed declines are due to interactions between multiple stressors, or that we are facing the possibility of a previously unrecognized problem.

After numerous orchard visits by specialists in different states, a working group of regional apple professionals coordinated by Dr. Kari Peter of Penn State University has developed a comprehensive list of symptoms to identify declining orchards. From this list, extension professionals in Pennsylvania and New York developed an on-line survey of apple tree decline in order to facilitate consistency in the collection of orchard data, and the identification of commonalities. **If you have apple blocks showing decline symptoms, your comprehensive and accurate completion of this on-line survey will be an essential first step in helping us identify possible causes and to search for solutions to the problem.** Please include data for **all** of your declining blocks: the more data points we have, the more we will learn. **Please be assured that your specific farm information will be kept strictly confidential.** This statewide apple decline survey project has been funded by NYS apple producers under the auspices of the NYSDAM New York Apple Research & Development Program.

To complete the survey, please click here. *The survey may take a few moments to load.* **Thank you.**

If you would prefer to complete the survey through an in-person *interview* during a farm visit, please contact Dan Donahue at djd13@cornell.edu and arrange an appointment before the end of August.

RAD/SAD Tree Collapse
Photo Credit: Dr. Kari Peter, PSU

Chronic Tree Decline
Photo Credit: Dan Donahue, Cornell ENYCHP

Opportunity to Participate in Hudson Valley Honeycrip/Bitter Pit Prediction Study

Dan Donahue, ENYCHP

Whole fruit mineral analysis is expensive, both the lab charges and the shipping cost. I've not been recommending that growers spend money on the analysis of fruitlets early, or fruit cortex tissue later on as research as yet to substantially correlate these mineral analysis results with future bitter pit risk. There is much research interest these days in using the mineral content analysis of apple peels as a tool to predict the development of bitter pit in Honeycrisp at harvest and in storage. Has the volume of our Honeycrisp crop increases, it will become necessary to store the crop over longer periods of time. Bitter pit symptoms can appear at harvest, but the symptoms are known to worsen significantly after only 30 days in refrigerated storage. In 2016, the incidence of bitter pit in 19 Honeycrisp survey plots throughout the Hudson Valley ranged from 3-70+%. A single lesion can be enough to remove the apple from the fresh pack, with resulting loss of value of 80%. Having the ability to identify blocks that are at serious risk of bitter pit development would help growers make marketing and storage decisions that minimize the dollar losses.

Severe Bitter Pit in Honeycrisp
Photo by Dan Donahue

I'm currently in the 2nd year of just such a study in the Hudson and Champlain Valley's. The technique being evaluated is to analyze Honeycrisp peels from the calyx half of the apple approximately 35 days before expected harvest. The results from year one were interesting, and potentially useful if the correlations observed prove to be reliable predictors over several seasons worth of data. **Are you interested in participating in a validation study for 2017?** I'm looking for a limited number of growers to submit samples for analysis, prediction, and subsequent evaluation of bitter pit in storage. The cost would be $40/sample. Email me at djd13@cornell.edu for the details. Samples would be taken during the week of July 31st.

Upcoming Events

- **Tuesday August 8th– Thursday August 10: Champlain Valley & Vermont Northern New York & Vermont Young& Beginning Growers Fruit Study Tour**

- **Tuesday August 29, 5:30: Angry Orchard , Walden NY**

  Glynwood Foundation is sponsoring a gathering to get a better understanding of the potentials and challenges for growers of producing apples for the hard cider industry.

Last month, a group of growers, researchers and hard cider makers took part in a trip to southwest England's orchards and cider houses in order to understand how the well-established hard cider economy there functions. They came back with insights into that industry and excitement about the opportunity that the growing hard cider market represents for NY's apple growers.

To share what was learned, and discuss how growers can work with hard cider makers to shape this developing market, three of the trip participants who are also members of the NYCA are inviting growers, extension educators, and anyone involved in the apple or cider industry to their orchards for a brief presentation, dinner, and hard cider tasting. These are free to attend and will take place across the state.

This series of meetings is presented by Glynwood in partnership with Angry Orchard with participation from the New York Cider Association.