# Horticultural News

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# Horticultural News

Editors: Winfred P. Cowgill, Jr. & Jaime C. Piñero

The New Jersey State Horticultural Society was organized on August 17, 1875 at Geological Hall, Rutgers College, New Brunswick, NJ. It remains the oldest Horticultural organization in New Jersey.

Horticultural News began as the *The New Jersey State Horticultural Society News*, in October of 1920. The Society began "collecting paid membership in order to obtain funds to promote new features of the society and extend the usefulness of the society. The Horticultural Society News was started to be the official society publication." Published M. A. Blake, Professor at Rutgers College was the first president and chair of the publication committee.

Editors served as follows:

| | |
|---|---|
| MA Blake | 1920 - 1947 |
| Norman F Childers | 1948 - 1980 |
| Win Cowgill | 1981 - 1988 |
| Emily Brown Rosen | 1988 - 1990 |
| Linda Butenis Vorsa | 1991 - 1995 |
| Jerry Frecon | 1995 - 2010 |
| Win Cowgill & Wes Autio | 2010 - 2021 |
| Win Cowgill & Jaime Piñero | 2021- |

June 2010: Horticultural News has moved to an online web-based format. The New Jersey State Horticultural Society has partnered with the University of Massachusetts Fruit Notes.

October 2021: Jaime Piñero became the editor from UMass upon the reitrement of Wes Autio. Cowgill and Piñero are the new editors of Horticultural News and Fruit Notes.

Horticultural News is distributed to growers, extension personnel and researchers and libraries across North America. Horticultural News focuses primarily on tree-fruit culture, but addresses small-fruit cultural issues as well. Most reports are from current research at Rutgers University, University of Massachusetts, and other universities.

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Cover: Pink Lady® Barnsby/B.9 - Grown in Baptistown, NJ- Super Slender Spindle, spaced 2' x 10' @2178 Trees/AcrePhoto Credit: Win Cowgill.

# Massachusetts Tree Fruit IPM Report for 2023

**Jaime Piñero[1], Jon Clements[2], Duane Greene[1], Daniel Cooley[1], Elizabeth Garofalo[2], Matthew Bley[2], Mateo Rull-Garza[1], Ajay Giri[1]**

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## Weather

Note: all observations from the UMass Orchard in Belchertown, MA. Minimum **winter** temperature was -13 degrees F. on February 4. This was preceded by the warmest January on record in Massachusetts with the average temperature being 35 degrees F in Belchertown. Within the week following February 4, it was obvious most of the stone fruit flower buds were damaged and there would be no peach crop in Massachusetts this year. Although growers were advised to prune peach trees aggressively to manage tree size given the lack of potential crop; interestingly, growers observed very little shoot damage to peaches from the deep freeze during the growing season. Cain and Anderson (1976), at Michigan State University, determined that minus 15 F was needed to injure peach shoots/wood.

**Spring** was about on time, McIntosh green tip occurring May 5-6. McIntosh bloom was a little early, May 2-3, but the bloom period seemed extended once again, petal fall was a good week later and later blooming varieties (Crimson Crisp) were still in bloom a week after that. Apple bloom was generally quite robust overall. On May 18, when many apple fruitlets were set and sized from 5 to 6 millimeters or larger, a freeze occurred with temperatures in the mid to upper 20s. The remaining flowers were damaged as well as fruitlets. The extent of the damage was widespread with site-specific variability. At the UMass Orchard, apples up on the hill were largely unscathed, while freeze damage on the "flats" and lower was minimal to nearly 100% depending on specific location and variety. McIntosh types seemed to fare better than Honeycrisp (later blooming) which seemed particularly sensitive to freeze damage as evidenced by russeting and cracking. Across Western Massachusetts, damage to apples was significant but depended on location. Eastern Massachusetts generally fared much better with some orchards setting a very heavy, sound crop of apples.

**Summer**, unlike the drought conditions experienced in 2022, 2023 was exceptionally wet. In Belchertown, monthly rainfall measurements were 9.5, 5.2, and 4.4 inches of rain in June, July, and August respectively for a total of over 20 inches on the ground. During the meteorological summer (June-July-August) temperatures were below average, but dew points remained consistently high, and nights did not cool off much.

**Fall** weather, post Labor Day, was initially quite hot, with the highest temperature all season of 92 degrees F on September 7. There was over 10 inches of rain in September, maintaining a wet growing season, often coming on weekends. State-wide the apple crop was down an estimated 25% on account of the May freeze, but because of the wet weather, orchards that operate as primarily pick-your-own still had plenty of apples on the trees post Columbus-day weekend. After the initial week of heat in September, temperatures became cooler, and as apples were taking a long time to color up, the pre-harvest drop was not excessive. Note: ReTain has been a game changer in this business.

**NEWA** update: During 2023 there are 39 active NEWA (https://newa.cornell.edu/) on-farm weather stations in Massachusetts. If you don't have a weather station and would like to be on NEWA – where you can take advantage of many Crop, IPM, and Weather tools – feel free to contact Jon Clements, Massachusetts NEWA state coordinator.

## Diseases

The only real noteworthy item here is the **fire blight** "outbreak" that caught most of us by surprise when, apparently, the May 18 freeze served as a "trauma" event. At the time there was also some lingering secondary blossoms, AKA "rat-tail" bloom. During primary bloom, fire blight risk, as predicted by RIMpro, did not exceed threshold level(s) where an antibiotic was warranted. However, fire blight risk was off our radar screen post-bloom, and after tracing back when we first saw fire blight symptoms to early June, sure enough, the infection "event" occurred approximately at the time of the May 18 freeze (Figure 1). Anecdotally, guru Paul Steiner (University of Maryland) observed that some of the worst fire blight outbreaks in the mid-Atlantic followed a freeze "trauma" event (David Rosenberger, personal communication). Fire blight was widespread, with many Massachusetts orchards having varied amounts of fire blight. At the UMass Orchard, fire blight was particularly onerous on varieties that experienced freeze damage to lingering bloom on one-year-old wood and/or to fruitlets. Interestingly, Honeycrisp had very little (if any) fire blight even though fruits were severely damaged.

In further news…

Late season strikes were observed with no corresponding blossoms. Shoot blight, brought on by infection arising from invasion of developing leaves, was just one more of a litany of unpleasant fire blight occurrences this year. In particular, this was noted in a block of Pink Luster on M9 that had been planted this spring. The planting received strep applications during bloom and blossoms were removed to the best of the growers' ability. Many of these strikes resulted in infection making its way all the way into young trunks.

Another incident, that created much distress in the orchard due to the slight *resemblance* to fire blight, occurred in the late June to early July time frame. One full row of Empire apples, approximately 150 trees, rather suddenly up and died, or, at the very least began the long drawn out process of dying. Tissue samples were sent to multiple labs, none of which were able to isolate *Erwinia amylovora*. Tree fruit pathologists from around the region were consulted. Dr. Dave Rosenberger suggested that, perhaps, lightning had struck the trellis, leading to fire blight-like symptoms. On closer inspection, this hypothesis appears to be the best fit for the damage the trees incurred which includes: splitting that goes through the vascular cambium down to the sapwood (Figure 2), dead to dying shoots and limbs with no evidence of either the typical "shepherds crook", darkened cankers or ooze, and symptoms isolated exclusively to the single row in question. Belchertown residents report several "severe" lightning storms in this time frame.

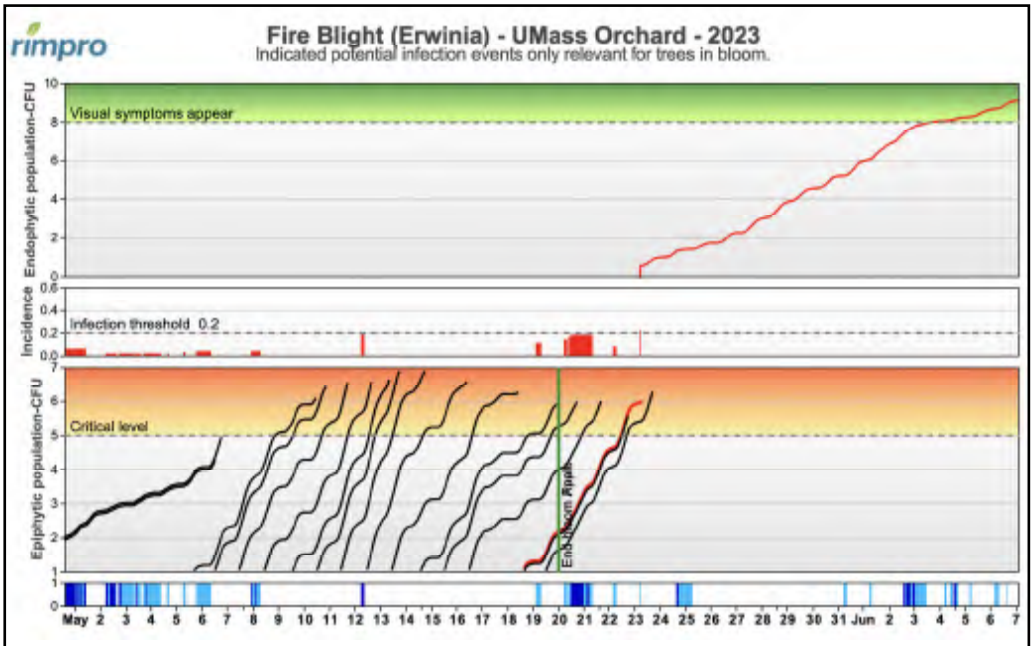


**Figure 1.** RIMpro output for UMass Orchard, spring 2023. Note the predicted infection event circa May 18-19 when the freeze occurred, and then the prediction of when visual symptoms appear June 3-4 when in fact visual symptoms were observed.

## Insects

Japanese beetles. Observations indicated that Japanese beetle (JB) pressure was moderate this year, with some feeding damage observed on Honeycrisp in 3-4 orchards. Research involving mass trapping was conducted in grape and blueberry blocks at the UMass Cold Spring

Orchard (CSO) in Belchertown, MA. The results will be published in the Winter issue of Fruit Notes.

**Figure 2.** Trunk splitting, likely a result of lightning strike.

**Borer activity.** In various MA orchards, we received reports of injury to the base of trees. Upon observation, there were darkened cambial areas under the bark and uncommon instances of insect frass and lepidopteran pupal casings. We conducted assessments in 7 blocks in 3 commercial orchards and recorded the information presented in Table 1. Additionally, at the UMass CSO, where borer injury was reported in Honeycrisp grafted onto varied rootstocks, trapping was conducted, targeting both Peach Tree Borer (PTB) and Black Stem Borer (BSB), in an attempt to identify the active borer species. From August 10th to August 24th 12 male PTBs and 0 BSBs were captured. Insect damage doesn't seem to be the main culprit of tree bark cracking and damaged vascular tissue. Wood-boring insects may be responding to plant volatiles emitted by already damaged and/or stressed trees. Dr. Duane Greene suggested that winter injury is most likely the main cause.

**Spotted-wing drosophila (SWD)**: In 2023, SWD populations reached their peak (Figure 3) about 2 weeks earlier than observed in previous years. For some fruit growers, SWD management wasn't as successful as expected. One grower reported SWD control failure in strawberry and blueberry due to excessive rain, which in addition to washing off the insecticide applications, also kept many customers away from the pick-your-own operation, resulting in a large portion of the crop not being harvested.

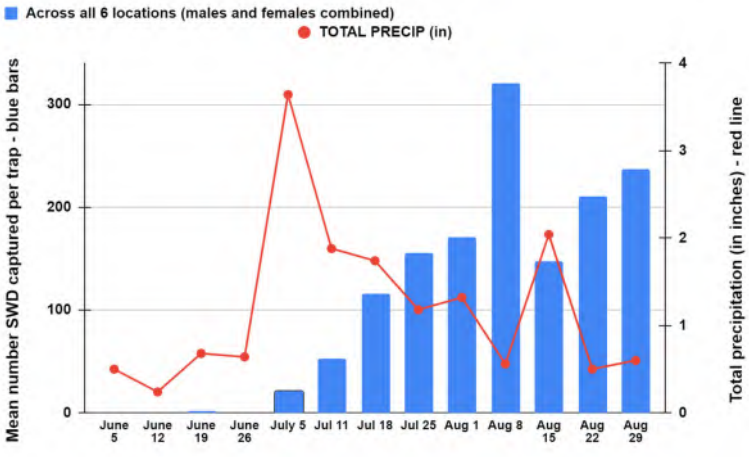


**Figure 3.** Spotted-wing drosophila seasonal abundance measured using traps baited with diluted Concord grape juice fermented in the presence of 2% table salt, a bait that is very attractive to SWD, and total rainfall (in inches) – red line, for each trapping period.

**Levels of insect pest injury at harvest in 9 MA orchards**: Overall, the levels of insect pest injury, in particular plum curculio and tarnished plant bug, were lower than those recorded in previous years. As shown in Table 2 Damage by tortricid moths was very low for codling moth (0 - 0.17%) and obliquebanded leafroller (0 - 0.17%) and non-existent for Oriental fruit moth. *Note that table 2 presents the results of PERIMETER-ROW injury only.* The interior-row injury was lower, as expected. Apple maggot fly (AMF) was well controlled in most orchards. A single orchard block (at CSO) subject to low sprays received 6.41% injury by AMF in the perimeter.

**Table 1.** Incidence of trunk injury observed in 7 blocks in MA, and number of trees with insect frass.

| Block | No. trees inspected | No trees with darkened cambium | No. trees with frass |
|---|---|---|---|
| 1 (G.11) | 20 | 8 | 3 |
| 2 (Bud 9) | 20 | 0 | 0 |
| 3 (Bud 9) | 20 | 2 | 0 |
| 4 (Bud 9) | 20 | 1 | 0 |
| 5 | 20 | 2 | 1 |
| 6 | 20 | 5 | 1 |
| 7 | 20 | 11 | 1 |
| 8 | 20 | 4 | 1 |

**Spotted Lanternfly detected in three new Massachusetts communities (as of 9.21.23).** The invasive

**Table 2.** For each of nine commercial apple orchards in MA, perimeter-row fruit injury by nine insect species. The fruit assessments were conducted at harvest in 2023.

| Orchard # | Plum curculio | Stink bug | Tarnished plant bug | Other (feeding) | Rollers | Oriental FM | Codling moth | European apple sawfly | Apple maggot | San Jose scale |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.71 | 0.00 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 4.28 | 0.23 | 2.48 | 0.00 | 0.00 | 0.00 | 0.00 | 1.13 | 0.45 | 1.35 |
| 3 | 0.72 | 0.00 | 0.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 2.52 | 0.00 | 1.54 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 | 1.54 | 0.00 |
| 5 | 1.39 | 0.00 | 1.56 | 0.09 | 0.17 | 0.00 | 0.17 | 0.35 | 0.52 | 0.00 |
| 6 | 7.07 | 0.00 | 2.02 | 0.00 | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 | 0.00 |
| 7 | 4.27 | 0.00 | 1.71 | 0.43 | 0.00 | 0.00 | 0.00 | 0.43 | 6.41 | 0.00 |
| 8 | 4.22 | 0.15 | 2.26 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 1.66 | 0.00 |
| 9 | 0.51 | 0.00 | 1.69 | 0.34 | 0.00 | 0.00 | 0.17 | 0.00 | 1.69 | 0.17 |
| AVERAGE (%) | 2.86 | 0.04 | 1.59 | 0.16 | 0.03 | 0.00 | 0.04 | 0.32 | 1.36 | 0.17 |

spotted lanternfly (SLF) has recently been confirmed in both Hampden and Worcester Counties in Holyoke, Agawam, and Southborough, MA (Figure 4). These finds represent three newly established populations of the insect, which are in addition to those known previously in Fitchburg, Shrewsbury, Worcester, and Springfield, MA.

A new Fact Sheet on SLF has been published by UMass Extension (lead: Ms. Tawny Simisky). The MA Department of Agricultural Resources also provides a "Spotted Lanternfly: Management Guide for Homeowners in Infested Areas".

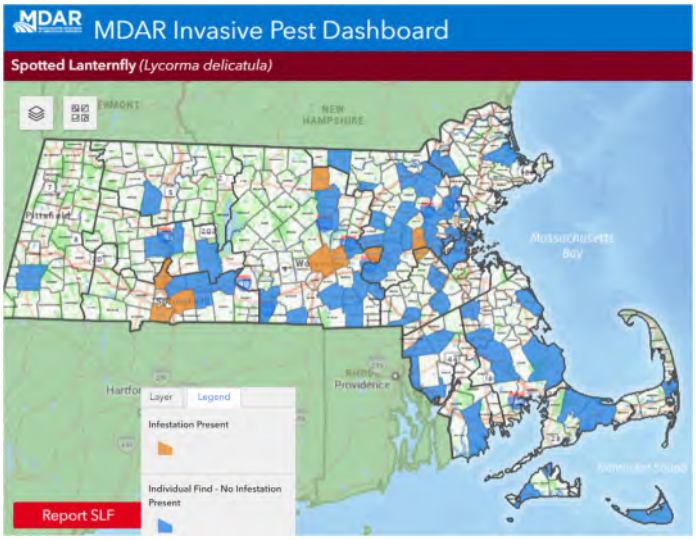


**Figure 4.** Current distribution of SLF in Massachusetts. Map: Massachusetts Department of Agricultural Resources - Invasive Pest Dashboard

**Rosy apple aphid (RAA).** RAA was introduced into North America from Europe in the late 1800s. In 2023, RAA populations were, generally speaking, lower in 2023 compared to the past two years. In 2021, RAA was most prevalent that the green apple aphid but the opposite was found in 2022. Observations conducted at three blocks at the UMass Cold Spring Orchard indicated that symptoms of RAA feeding activity were presented as early as petal fall, and by mid-June the winged adults had already dispersed to alternate herbaceous hosts, such as broadleaf and narrowleaf plantain. The levels of RAA parasitism by wasps recorded in 2023 were as high as 35% (on average) in Red Astrachan and Ginger Gold and as low as 5% (on average) in Dabinett (Figure 5). In 2024, we will increase our efforts to assess RAA presence and abundance in commercial orchards.

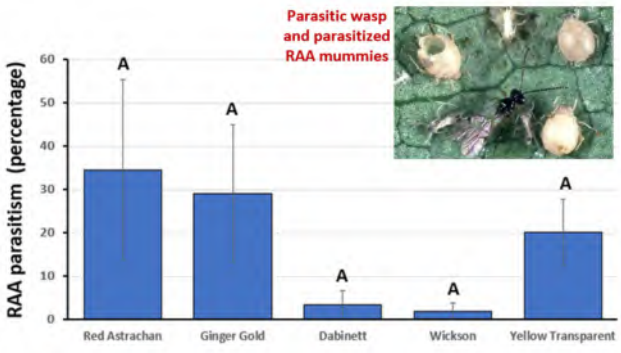


**Figure 5.** RAA parasitism averaged across all three apple blocks in early June 2023.

**Brown marmorated stink bug (BMSB) and egg parasitoids.** In 2023, BMSB populations were the lowest recorded in MA orchards since 2018. Almost no injury by stink bugs was recorded in commercial orchards in the harvest surveys. It is known that wet conditions can reduce BMSB populations by (1) increasing mortality of the small nymphs and (2) by providing adults with alternate food resources in the form of wild hosts feeding sites. In contrast, during dry summers, BMSB can feed more on fruits and vegetables due to the scarcity of other food resources outside farms. For instance, it is known that BMSB utilizes host trees within the forest edge habitats for early-season feeding and perhaps egg-laying. In 2023, we surveyed six fruit tree orchards located in the outskirts of either rural or suburban centers across Massachusetts based on BMSB habitat suitability data. In all, over 10,000 BMSB eggs were

deployed from early July to late August. All sentinel eggs were frozen at -80 °C for 48 hours prior to deployment. Once every two weeks, the team deployed a median of 392 eggs per farm. Egg masses were left in the field for 3 days, time period after which they were retrieved and inspected for signs of feeding by predatory, beneficial insects. The remaining eggs were incubated for 5 weeks to assess the emergence of parasitoids. The adult parasitoids that emerged most likely belong to the native species *Trissolcus euchisti* (species confirmation is pending). Total predation was estimated at 17.7%. We also learned the relative abundance of parasitoid species recovered was greater this year than that recorded in 2022. Collectively, this information will allow us to optimize our sampling efforts in 2024. So far, we have not been able to find the Samurai wasp (*Trissolcus japonicus*) in Massachusetts orchards.

## Horticulture

Because of the freeze and lack of particularly good **chemical thinning** conditions – no carbohydrate deficit to speak of – when chemical thinners were applied, they were generally pretty ineffective. The result was a heavy fruit set post-chemical thinning window except where there was a lot of freeze damage (of course). The heavy fruit set made up somewhat for the overall reduction in the apple crop because of the freeze. In other words, it did not turn out as bad as originally thought. Some orchards had their heaviest apple crop in years. I noted that one orchard that was able to do more apple hand thinning because they had no peaches to hand thin had the nicest looking, well-balanced crop of apples I have ever seen in that particular orchard. After seeing some heavy crops of apples of marginal quality in the fall, I am convinced we don't spend enough time working on precision crop load management, whether it be precision pruning, predicting fruit set, precision chemical thinning, and followed by hand thinning where necessary. We spend a lot of time practicing integrated pest management (IPM), but not enough time practicing precision apple crop load management (PACMAN). Of course, our weather gets in the way, and for some varieties like McIntosh, it makes little difference, but for other varieties like Honeycrisp, over-cropping does us no favors at all.

One more thing, and it is important. By mid-summer, **some apple orchards started seeing patches of obvious apple tree decline as evidenced by off-color foliage and reduced tree vigor** (short shoot growth). Close inspection of the base of the tree revealed the bark was wholesale "sloughing" off the above-ground, exposed portion of the rootstock shank (Figure 6). Essentially this was girdling the trees. Signs of ambrosia beetle (black stem borer) infestation were also evident. Although some rootstock shank bark cracking has been observed previously, this year seems to be the "tipping point" where we are going to lose many trees. The prevailing theory is winter injury which is a result of "false springs" such as we observed in January 2023. (Terence Robinson has promulgated the "false spring" theory.) The bottom line is: **the rootstocks are coming out of dormancy prematurely in mid-winter, and then sudden temperature drops physically freeze free water in the cambium interface resulting in the separation and sloughing off of the bark**. We have seen this mostly on M.9 and several Geneva rootstocks. Otherwise, there is not much rhyme or reason to it. Orchards need to be aware of the potential problem and adopt management strategies to avoid all stressors to the trees; plant best sites, use B.9 or B.10 rootstocks (which seem to be somewhat more cold-hardy), plant the rootstock shank deeper, use berms/raised beds for water management, tile new orchard sites for water management, monitor soil moisture and irrigate as needed, paint trunks white to avoid southwest injury, avoid over-fertilization with nitrogen– to reduce the risk of this kind of tree loss occurring in the future. Climate change is one factor and definitely here to stay.

**Figure 6.** Rootstock shank "sloughing off" which effectively girdles or partially girdles the apple tree and results in tree decline, loss of productivity, and possibly tree death.

## Special Projects/Research/Publications

### Publications

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# 2023 North Jersey Tree Fruit IPM Report

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***Professor Emeritus Rutgers University***
***Owner Win Enterprises International., LLC.***

Observation Overview: The IPM observations for 2023 come from the North Jersey Tree Fruit IPM Program. There are a total of 28 farms that participate in the program. The on-farm scouting program includes a total of 293 acres of apples and 148 acres in peaches. Each farm has traps for the pests included in the trap data and are scouted once a week. This data is compiled and used to make recommendations for our New Jersey Commercial Tree Fruit Production Guide E002.

The data from Figure 1 below comes from the NEWA model https://newa.cornell.edu/ using the Rutgers Snyder Farm weather station located in Pittstown, Hunterdon County, NJ. The trap data in Table 1 is an average of the data that is generated on each of the farms in the program. Note the data excludes farms using mating disruption. Mating disruption for codling moth/OFM (both Trece and Isomate) continues to be highly effective this year with 36% of growers in the program adopting the practice. Mating disruption for the peach borer complex is the standard now in Northern NJ, even on farms with less than 5 acres with 55% utilizing it. We have over 12 years of experience using mating disruption for peach tree borers. Mating disruption for dogwood borer is being utilized more for controlling this pest, especially with the loss of Lorsban and the almost uniform adoption of the tall spindle production system. Note no trap catches were observed in any of the orchard blocks utilizing mating disruption in any of the three pest complexes.

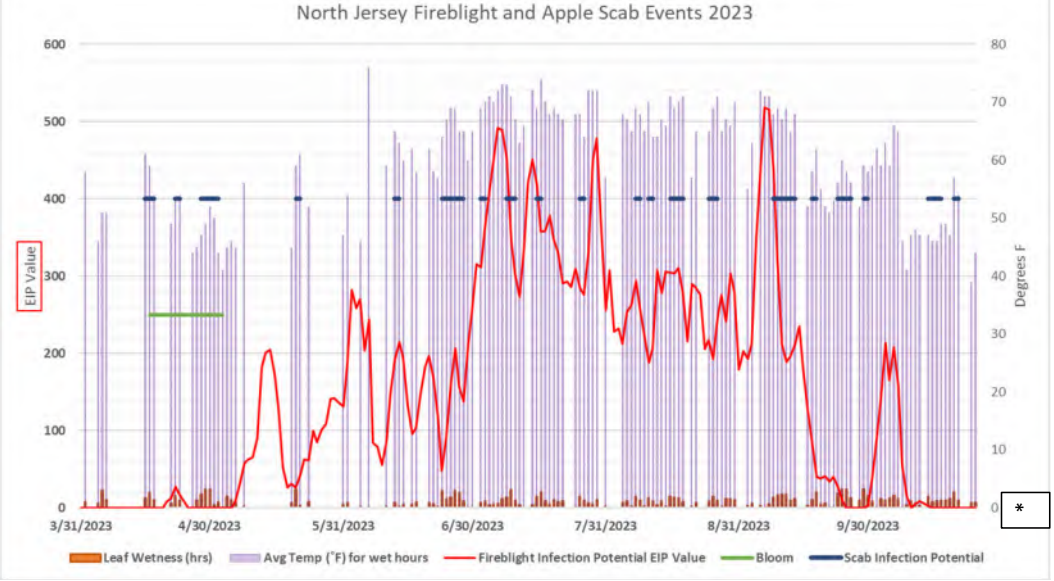


**Figure 1.** Weather Data, Phenology, and Apple Disease Forecasts for 2023 the Rutgers North Jersey Scouting Program. * Depicts average temperature during wet hours because the NEWA model predicts an average temperature of 60 degrees F is required for an infection event.

## Weather and Cold Events

**Winter freeze event** - There were two cold events this past winter, one in December around Christmas and a second in February 2023 where we had 50 degree drops in temperatures. Growers in NJ had some minor injury to peach buds and selected sensitive varieties at some locations, bu all and all northern NJ (and NJ overall) had a full peach crop. However Note that these winter cold temperatures were more severe in NY and most of New England ranging from minus 15 to minus 21F. These severe winter temperatures eliminated most of the peach and stone fruit crops in NY and New England **May Freeze Event** - There was extensive **freeze injury** to apples on May 18, 2023, in NY and New England and in four northern New Jersey counties including Warren, Sussex, Morris, Hunterdon. Over four orchards in these northern NJ counties sustained temperatures of **25F to 33 F with injury ranging from 10-90% overall depending on location and cultivar. This applied to NY and all of New England** as well. There was no injury to blueberries in north Jersey based on my observations and telephone surveys. **Note** this was an unprecedented cold event for this late date with apple fruitlets ranging in NJ from 8-15mm. Apple fruitlets (meaning post bloom) are actually more sensitive to cold temperatures than flowers in bloom- apples will take 28F in bloom- see Critical Spring Temperatures for Tree Fruit Bud Development Stages. In general, apple damage in Northern NJ was spotty and not extensive depending on location, site, variety.

**Hail Storms-** multiple hail storms impacted several growers late in the 2023 growing season.

## Apple Diseases

**Fireblight: This was a low fireblight infection year in Northern New Jersey** Both blossom and shoot blight infections were minimal in grower orchard. See Figure 1, there was no Infection Potential EIP Value above 100 during the bloom period. Fireblight infection requires an average temperature above 60 Degrees F, a wetting event and an infection potential EIP value above 100. These conditions were not met this year during the blossom blight phase, and I did not see any orchards infected with the blossom blight stage of this disease. The few incidences of fireblight this year occurred from trauma blight following multiple hailstorms.

**Apple Scab: This was a low scab year in Northern New Jersey.** Most growers were able to avoid major outbreaks of primary scab this year by applying fungicides before an infection incidence was predicted by the NEWA model. There was one extended infection period from 4/28-5/2 which caused a primary scab outbreak at a few farms. These farms were able to keep secondary scab under control by using anti-sporulant materials.

**Bitter Rot:** This disease continues to prove challenging to control. See Figure 2- Most farms in the program had bitter rot this year, but it only caused major losses at a handful of farms. One farm lost 34% of their crop to bitter rot. HoneyCrisp continues to be the most impacted cultivar with Bitter Rot, especially when grown on full dwarfing rootstocks in our tall spindle production systems. Sunburn on the fruit is one of the main precursors to bitter rot and protectants must be used on sensitive varieties. Strobilurins and Prophyt materials are thought to be effective if sprays are started early enough. See 'Controlling Bitter Rot' of Apple, Horticultural News, Volume 100, Summer 2020.

**Figure 2.** Bitter Rot of Apple Photo credit: Win Cowgill

## Apple Insect Pests

**Codling Moth:** A biofix was set for 5/4 in Mercer and Middlesex counties (central NJ), 5/10 for Hunterdon, Morris, Warren, Sussex and Bergen counties (North Jersey). Growers managed this pest either through timing their sprays to the degree day model or using mating disruption. No trap catches or damage was found in the orchards utilizing mating disruption. The growers using

mating disruption typically used the dual CM/OFM mating disruption, either Trece or Isomate. Most growers timing their sprays to the degree day model had very little or no damage from this pest.

For codling moth in North Jersey our first-generation treatments occurred on June 1st and June 21st second generation treatments occurred on July 20th and August 2nd and **a 3rd generation did occur** in early September, if growers had high trap counts, they treated on September 6th.

***Note that growers using CM mating disruption did not have to treat for this third generation.***

**Figure 4.** Obliquebanded Leaf Roller moths captured in a Codling Moth Trap- June 18, 2023, Baptistown, NJ. Photo Credit Win Cowgill.

**Plum Curculio:** This pest was difficult to control this season because we had a long bloom which led to more damage than usual.

**Brown Marmorated Stink Bug:** Trap catches for this pest were very low this season, only a few growers had trap catches significant enough to require insecticides. There was very little damage caused by this pest, when it did appear it was along the wooded edges of the orchard.

**Obliquebanded Leafroller: Figure 3-** Traps were set for this pest only on farms where damage to the leaves was seen during scouting practices. In previous years this pest has not been an issue, but it may be returning to orchards in our area. One codling moth trap **Figure 4**, had Obliques in it. Note that Codling Moth mating disruption does not control Obliques (OBL) (personal communication Peter Jenstch).

**Figure 3**. Obliquebanded Leafroller larvae on apple leaf. Photo Credits: Kaitlin Quinn.

**Ambrosia Beetle:** This pest seems to be becoming a more prevalent issue. Three growers in the program were confirmed to have significant tree loss due to this pest. More work needs to be done to develop monitoring and control strategies for this pest. It is essential that growers utilize cultural controls that reduce tree stress since this pest tends to attack weakened trees. An active scouting/trapping program will be started in 2024. Causes of weakened trees include winter injury, drought, too much water (not using raised beds), and soil drainage issues. See **Figures 5, 6** for examples on apple.

## Peach Insect Pests

**Oriental Fruit Moth:** A biofix was set for this pest on 4/10 for this year. Peach growers in the program managed this pest either through timing their sprays to the degree day model or using mating disruption. No trap catches or damage occurred at any of the farms using mating disruption this year. The farms using the degree day spray model had very little to no damage from this pest this year.

**White Peach Scale:** A few growers had some White Peach Scale damage in their later variety peaches this year. This pest's populations may have been higher this year due to erratic spring temperatures which made it difficult to get oil sprays on. It is important to

**Figure 5.** Extensive industry from Ambrosia Beetle, G.41 rootstock, Belchertown, MA, July 2023. Photo Credit: Trevor Hardy- Brookfield Farm Supply.

apply a dormant oil spray to manage this pest, this can sometimes prove to be challenging since it should not be applied within 48 hours of temperatures in the mid 30's or below. See figures 7, 8, 9, 10, 11

**Lesser Peach Tree Borer and Greater Peach Tree Borer:** Growers should be using mating disruption for these pests now that we have lost Lorsban as a treatment option and that was our best control. These pests were not caught at any of the orchards utilizing mating disruption this year.

## References

Controlling Bitter Rot' of Apple, Horticultural News, Volume 100, NO3 Summer 2020

**Figure 6.** Ambrosia Beetle holes and frass: Sansa apple/Nic.29-Can contribute to Sudden Apple Decline- Note the weak tree on the left. New Paltz, NY Photo Credit: Peter Jentsch, Poma Tech Consulting.

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# A Novel Attract-and-Kill Strategy to Manage Codling Moth

**Ajay P. Giri and Jaime C. Piñero**
***Stockbridge School of Agriculture, University of Massachusetts***

In eastern North America, apple orchards are often attacked by several insect pest species in the Lepidopteran family Tortricidae. Codling Moth (CM) is an economically damaging tortricid pest of apple trees. The main damage is caused by caterpillars, which bore into the fruit rendering the fruit unmarketable. Two common management options to control CM are pesticide-based control and mating disruption. However, applications of synthetic insecticides are detrimental to the environment and to non-target species; there is also growing evidence of these pest's developing resistance to various types of insecticides. While the use of synthetic insecticide is not an option for organic growers, mating disruption and biocontrol represent viable options for organic growers. The mating disruption technique utilizes sex pheromone at high density in the orchard to confuse male moths so that they are unable to find and mate with females. For small scale growers, mating disruption is logistically inapplicable and expensive because this strategy is generally appropriate for orchards with areas over 5-6 acres.

In this study, we evaluated an environment friendly attract-and-kill system against CM. Our goal was to attract CM to particular trees by strategically installing lures. This approach is similar to the trap-tree approach developed by UMass for plum curculio. Then, we applied a bioinsecticide (DiPel®) to kill the pest.

## Materials and Methods

**Lure and trap:** The commercial lure Pherocon® Megalure CM Dual 4K (a blend of four plant volatiles) (= Megalure) for codling moth was the 'attract' component. The lures were purchased from Trécé Inc (Adair, OK). All lures were placed inside orange-colored delta-shaped traps (Pherocon VI, Trécé Inc.) with liners coated with adhesive.

**Biopesticide:** *Bacillus thuringiensis var kurstaki* (DiPel®) was used in the study as the 'kill' component. The commercially available *B.t.* product that was used in this study was DiPel.

**Experimental sites:** This study was conducted in 6 apple blocks across six orchards in Massachusetts from May 2022 to September 2022. Of these orchards, 3 orchards were certified organic apple blocks and received selected OMRI-listed materials. The other 3 orchards received a standard insecticide spray regime against other key pests.

**Attract and Kill system**: In each apple block, trees were assigned one of the following four treatments: **(1)** presence of lures (+) and *B.t.* application to that tree only (+), **(2)** presence of lures (+) but no *B.t.* application (-), **(3)** no lures (-) but *B.t.* application (+), and **(4)** no lures (-) and no *B.t.* application (-) (Figure 1). Tree size ranged from small (M.26) to medium (M.7) in size. Each experimental tree was at least 50 meters apart from each other. The experimental design was a ramdomized block design with 3 replications for organic and 3 for conventional orchards.

Figure 1 shows the study layout. The letter 'T' (e.g., T1, T2) represents the experimental trap trees. The numbers around the letters (e.g., 1.1, 1.2, 2.1) indicate trees sampled to determine if there was any spillover effect.

The field study started in the first week of May 2022, with the installation of traps and lures. Each baited tree received one Megalure 4K trap. These lures were hung on the inner side of the orange-colored delta shaped trap. Delta traps were suspended from the upper third of the tree canopy. Sticky liners were removed after the first capture of each moth species to prevent the further killing of moths in the traps. The moths collected from

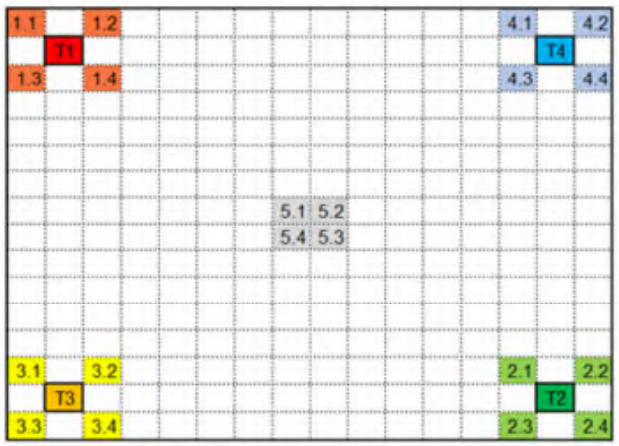


**Figure 1.** Diagram representing the experimental design. The experimental trees were T1, T2, T3, and T4. Study conducted at 3 organic and 3 conventional orchards in Massachusetts.

the first capture were examined under a dissecting microscope to determine their gender. Additionally, standard sex pheromone lure for codling moth were installed in a separate apple block inside all orchards to monitor the presence of moths. All the lures were replaced after every 4 weeks to insure the sustained flow of odor from the traps. Monitoring traps were checked weekly. The information collected from monitoring trap was used to set up a biofix for CM (Table 1). The first continuous capture of CM was considered as biofix and based on that biofix, degree days were calculated to determine the egg hatch for each generation and time the *B.t* sprays ("Northeast tree fruit management guide", 2022; NEWA degree days calculator).

**Table 1.** Biofix date (base 50°F of codling moth and timing of *B.t* sprays based on the NEWA degree days model.

| Biofix date | First generation sprays | Second generation sprays |
|---|---|---|
| May 20 | June 1-3<br>(228-266 DD) | August 8-10<br>(1568-1621 DD) |

Apple trees were sprayed with *B.t.* using a hand-pump backpack sprayer at the rate of 0.65 liter per tree (DiPel standard dose for pome fruits: 2.38 grams of DiPel per liter water) targeting both top and bottom part of leaves. Four adjacent trees were also sprayed to prevent the spillover effect of the traps. Injury data were collected mid-season (June 2022) and at harvest (August 2022). For each block, 100 fruits were visually inspected from each treatment tree (T1, T2, T3, and T4), and 100 fruits from 4 adjacent trees (T1a, T2a, T3a, and T4a), for a total of 800 fruits from each block. All fruits that were suspected of having tortricid injury were brought to the laboratory and dissected for signs of tunneling and presence of larvae.

## Results

In this study, during the mid-season sampling (June 2022) there were significant differences across treatments in traps trees in the organic orchard. Trees baited with lure and not sprayed with *B.t.* [T2(+L -Bt)] had significantly higher levels of fruit injury (18.3%) compared to trees baited with lure and *B.t* sprayed [T1(+L +Bt)] (2.7%) and trees without lure and *B.t.* sprayed [T3(-L +Bt)] (0.3%), but were not significantly different than trees without lure and no *B.t.* sprayed [T4(-L -Bt)] (7.3%) during mid-season sampling (Figure 2).

No significant differences were observed in conventional orchards across trap trees. This may be partly due to the standard insecticide spray regime against plum curculio and apple maggot fly. Those sprays were on top of the *B.t.* sprayed as part of this project. Similarly in adjacent trees, there was no significant differences in percentage of fruit injury in either organic or conventional orchards. In organic orchards, adjacent trees, T2a(+L -Bt), had 11% fruit injury on average compared to 5.7% in T4a(-L -Bt) and 3.3% in T1a(+L +Bt). To identify the injury specific to moth species, we collected all the injured fruit and brought them to the lab for further inspection. Upon lab inspection of larvae and raising them in growth chamber, we concluded that all fruit injuries were caused by codling moth. We did not see any injuries by oriental fruit moths or oblique-banded leafrollers in this study.

In the harvest injury assessment (August 2022), we did not see any significant differences in fruit injury among treatments for trap trees and adjacent trees in both organic and conventional

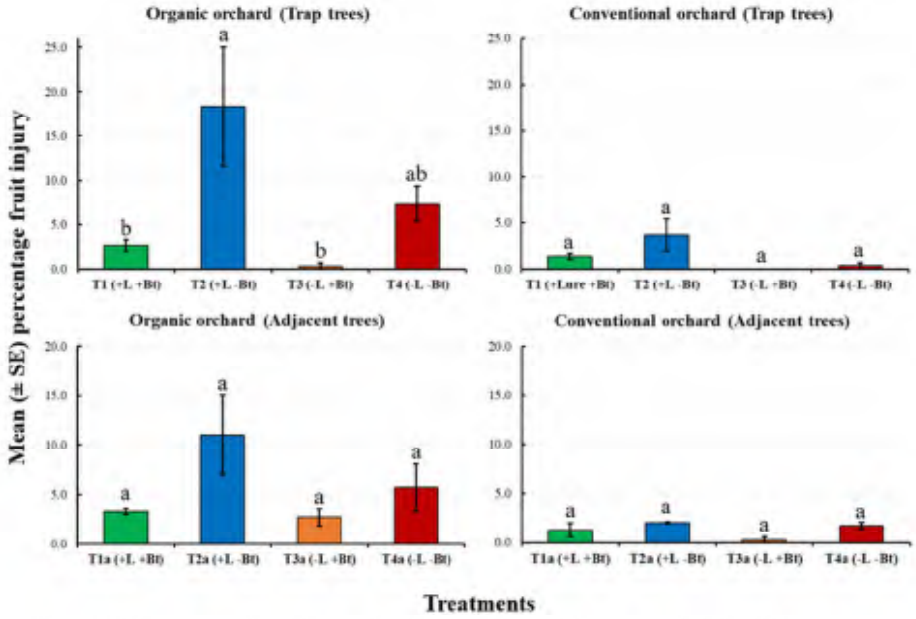


**Figure 2:** Mean percentage injury on fruits by codling moth larvae sampled at mid-season. Means in same bar graph followed by the same letter do not differ significantly at odds 19:1.

**Table 2.** Mean percent injury on fruits by codling moth larvae at harvest survey in 3 organic and 3 conventional apple orchards.

| Tree type | Treatment | Organic orchard [a] | Conventional orchard [a] |
|---|---|---|---|
| Trap trees | T1 (+L +*Bt*) | 1.7 a | 0.0 a |
| | T2 (+L -*Bt*) | 9.0 a | 1.3 a |
| | T3 (-L +*Bt*) | 0.3 a | 0.0 a |
| | T4 (-L -*Bt*) | 0.3 a | 0.7 a |
| Adjacent trees | T1a (+L +*Bt*) | 2.0 a | 0.3 a |
| | T2a (+L -*Bt*) | 2.3 a | 2.0 a |
| | T3a (-L +*Bt*) | 1.3 a | 0.0 a |
| | T4a (-L -*Bt*) | 2.3 a | 1.0 a |

[a] Means in same trees type and type of orchards followed by the same letter do not differ significantly at odds 19:1.

**Figure 3:** Fruit injury by codling moth from the mid-season sampling.

orchards (Table 2). Interestingly, biological differences were noted for the organic orchard. Trap trees, T2(+L -Bt), got 7.3% more fruit injury on average in organic orchard compared to T1 (+L +Bt) just by not spraying *B.t.* on those trees. While comparing lure baited trap trees to its adjacent trees, it seems that injury is mostly aggregated to baited trees and there is less spillover effect of moths as shown by no significant differences in fruit injury in adjacent trees for both mid-season sampling and harvest sampling.

## Conclusion

Odor-baited trap trees baited with Megalure aggregated codling moth injury. By spraying *B.t.* to these baited trees, based on biofix and degree days model, fruit injury was significantly reduced, especially in organic orchards. We did not see any significant differences in conventional orchards partly due to the scheduled insecticide sprays for key pests. These findings can be used to further develop an attract-and-kill system for codling moth. Future studies should evaluate these findings on larger scales and test plant volatiles that are attractive to even more moth species.

## Acknowledgments

We thank all the participating apple growers for allowing us to conduct study in their orchard. Thanks to SARE for providing the financial support for the study. Heriberto Godoy-Hernandez, Prabina Regmi, Matthew Bley, Jaelyn Kassoy, Mateo Rull Garza, and Zoe Robinson provided field support and useful comments on the article. This article is based upon study supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education (SARE) program under subaward number GNE21-256.

Ajay Giri is a graduate student at the Stockbridge

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# New Jersey Comparison of Juice Yields from Apple varieties Intended for Use in Hard Cider Production

**Megan Muehlbauer[1] and Rebecca Magron[2]**
***[1]Rutgers University, NJAES, [2]Rutgers Cooperative Extension of Hunterdon County Flemington, New Jersey***

In 2018 a trial was established at the Rutgers Snyder Research and Extension Farm in Pittstown, Hunterdon County New Jersey to evaluate apple varieties well suited for hard cider production. This trial was established in response to the tree fruit industrys interest in growing apples (many of which are heirlooms), well suited for hard cider production. Apple characteristics of these varieties include higher acids, tannin, and polyphenol content. In this trial extensive data has been collected on yield, fruit size, flowering time, fireblight potential and tendencies toward biennial bearing. This report is limited to a two-year evaluation of the average percentage of juice yield across 29 varieties. Apples have differences in the precent juice content that can be pressed from them. A high percentage of juice is one characteristic that improves the desirability of an apple for hard cider production. In this component of the study, we evaluated the apple cultivars to determine the average percentage of juice per pound of apple weight.

## *Materials and Methods*

Samples of six apples per tree (two trees per variety) were taken from twenty nine cider varieties. The samples were weighed and then put into a tabletop juicing machine. The volume of juice was then measured in vials. The percentage of juice was calculated as the volume divided by the weight of the apple sample.

## *Results/Discussion*

The average percentage of juice varied widely (~40%) across the 29 cultivars (Figure 1). The lowest juice yields were approximately 25% juice per lb. of apple mass and were found in Calville Blanc and Roxbury Russett. While the varieties that retained the largest percentages of juice per weight were nearly 70% juice. These varieties were Pink Pearl, Sangre del Toro and Major. Further analysis will be done to determine if the varieties with the highest juice yields also had the greatest and most consistent fruit yields from 2018-2023.

Our next report will also present our data on fruit size, flowering time, fireblight potential and tendencies toward biennial bearing.

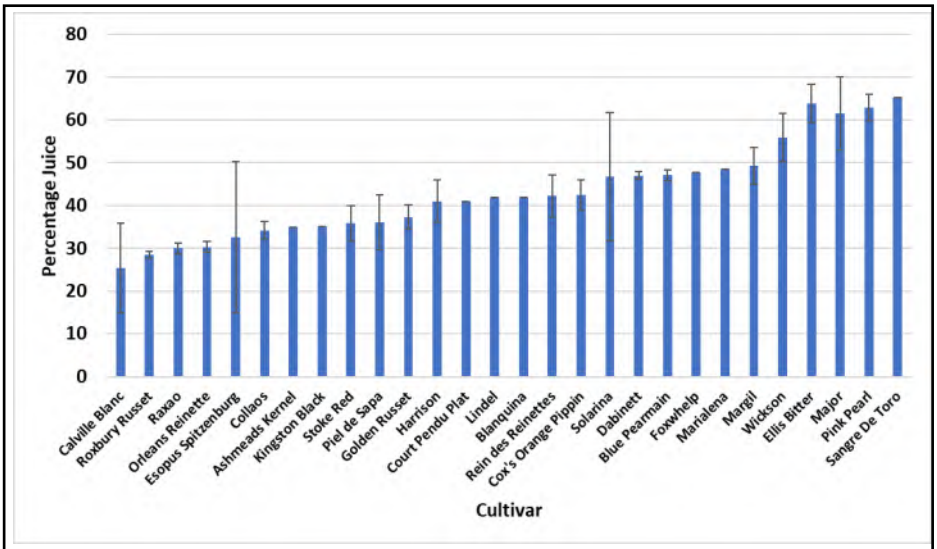


**Figure 1**. Average percentage of juice per apple sample collected from the 2022 and 2023 growing seasons.

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# Accede 40 SG Peach Thinning Evaluation in New Jersey-2023

**Win Cowgill**
***Professor Emeritus Rutgers University***
***Owner Win Enterprises International., LLC.***

**Greg Clark**
***Valent USA LLC.***

## Peaches/Nectarines

Accede® PGR is the first of its kind chemical thinner registered for use on peaches/nectarines. Trials have demonstrated that an application of Accede to peaches/nectarines during the period from bloom to petal fall will reduce fruit set and reduce, but not eliminate, the need for hand thinning.

Valent conducted grower demonstration trials in NJ in 2022 and 2023 with numerous peach growers.
See our article on Accede Peach Grower Trials in 2021 and 2023 in New Jersey
http://www.horticulturalnews.org/103-2/HN4.pdf

## 2023 Accede Peach Thinning Evaluation in North Jersey,

Two orchards were selected in Norther New Jersey, Sunhigh Orchard in Randolph, NJ (Morris County) and Melick's Town Farm, Califon, NJ (Hunterdon County. The goal was to evaluate Accede on a number of peach varieties for efficacy, 8 were done, 4 at each location. We know there are varietal differences on how Accede performs as a peach blossom thinner.

The experiment was set up with single tree replications in a completely randomized design. All treatments were applied with a Rears Nursery Cart Sprayer (Photo 2) with a handgun (Photo 3), at 100 PSI at 100 GPA. Treatments were applied full bloom, (Photo 1).

The effects of the treatment can start to be seen one week after application (photo 4) but it really takes until pit hardening to determine the percent of fruit that was removed. Trees were evaluated at shuck split and at pit hardening. Data was collected at first harvest, ½ bushel of peaches per tree per tree/replication were harvested, 15 of these were selected for uniformity and data collected, weight and diameter (Photos 5,6).

**Photo 1.** Applications conducted at full bloom.

**Photo 2.** Rears Nursery Cart Sprayer.

## Results and Discussion

Accede Thinner worked well across the board on all cultivars tested. Both farms averaged 50% blossom thinning, 4 % increase in diameter and 16 % increase in weight/ mass. Hand thinning still needed to be done for touch up. Thinning ranged from 32% to 73% with Gloria. In my mind Gloria over thinned with Accede in this experiment. Our target is 40-60% thinning (Figures 1-4).

**Photo 3.** Hand Gun Application of Accede @ 100 PSI.

We used the low rate of Accede, 300PPM and a higher rate of surfactant 0.1% v/v or 16 ounces/100. The surfactant was Regulaid which is a NIS penetrating

**Photo 4.** Peach flowers starting to desiccate, one week after application.

**Photo 5.** Data collection at harvest, 15 peaches sampled per tree, measured for diameter.

**Photo 6.** Data Collection at harvest, 15 peaches sampled per tree, weighed on scale.

- Location: Sunhigh Orchards, Randolph, NJ
- Replications- completely randomized -4 single tree reps per treatment-
- Applied with Handgun, 100 GPA, 100 PSI
- Treatments:
  - UTC
  - ACCEDE 300 ppm + Regulaid 1 pt/100
- Timing: mid to late bloom, 4/14 (5-8PM)

**Figure 1.** 2023 Sunhigh Data.

| Sunhigh Orch. | | | |
|---|---|---|---|
| Variety | % thinning | % Incr dia | % Incr mass |
| Redhaven | 48.5 | -1.6 | 8.2 |
| Ernies Choice | 60.2 | -0.6 | 19.6 |
| Loring | 47.1 | 5.4 | 8.6 |
| Jerseyglow | 38.9 | 4.3 | 23.0 |

**Figure 2**. Sunhigh Date, Minimum Temperature, Average Temperature, Maximum Temperature, Relative Humidity (RH), and precipitation.

| Date | Tmin | Tave | Tmax | Relative Humidity Avg [%] | Precip (in) |
|---|---|---|---|---|---|
| 2023-04-07 | 39 | 49 | 54 | 35 | 0 |
| 2023-04-08 | 32 | 41 | 51 | 42 | 0 |
| 2023-04-09 | 33 | 44 | 57 | 50 | 0 |
| 2023-04-10 | 35 | 50 | 64 | 49 | 0 |
| 2023-04-11 | 44 | 59 | 72 | 34 | 0 |
| 2023-04-12 | 59 | 69 | 81 | 34 | 0 |
| 2023-04-13 | 57 | 72 | 87 | 41 | 0 |
| 2023-04-14 | 62 | 75 | 90 | 33 | 0 |
| 2023-04-15 | 58 | 64 | 71 | 82 | 1.09 |
| 2023-04-16 | 55 | 62 | 70 | 84 | 0 |
| 2023-04-17 | 51 | 57 | 63 | 70 | 0.15 |
| 2023-04-18 | 41 | 47 | 51 | 50 | 0 |
| 2023-04-19 | 39 | 49 | 62 | 49 | 0 |
| 2023-04-20 | 42 | 54 | 71 | 52 | 0 |
| 2023-04-21 | 47 | 57 | 70 | 65 | 0 |

- Location: Melick's Town Farm, Califon, NJ
- Replications- completely randomized -8 single tree reps per treatment-
- Applied with Handgun, 100 GPA, 100 PSI
- Treatments:
  - UTC
  - ACCEDE 300 ppm + Regulaid 1 pt/100
- Timing: mid to late bloom, 4/14 (2-4:30PM)

**Figure 3.** 2023 Melick's data by cultivar.

| Melick | | | |
|---|---|---|---|
| Variety | % thinning | % Incr dia | % Incr mass |
| Gloria | 73.2 | 8.6 | 23.1 |
| Messina | 42.2 | 5.3 | 13.8 |
| Big George | 62.9 | 2.3 | 11.5 |
| Victoria | 32.3 | 7.2 | 18.5 |

**Figure 4.** Melick's Date, Minimum Temperature, Average Temperature, Maximum Temperature, Relative Humidity (RH), and precipitation.

| Date | Tmin | Tave | Tmax | RHavg | Precip |
|---|---|---|---|---|---|
| 2023-04-07 | 39 | 49 | 54 | 34 | 0 |
| 2023-04-08 | 33 | 41 | 50 | 42 | 0 |
| 2023-04-09 | 34 | 44 | 56 | 50 | 0 |
| 2023-04-10 | 35 | 49 | 62 | 51 | 0 |
| 2023-04-11 | 43 | 58 | 70 | 36 | 0 |
| 2023-04-12 | 60 | 69 | 80 | 35 | 0 |
| 2023-04-13 | 59 | 72 | 84 | 40 | 0 |
| 2023-04-14 | 61 | 74 | 87 | 35 | 0 |
| 2023-04-15 | 58 | 63 | 70 | 88 | 0.98 |
| 2023-04-16 | 54 | 61 | 69 | 89 | 0 |
| 2023-04-17 | 50 | 56 | 62 | 69 | 0.18 |
| 2023-04-18 | 41 | 46 | 51 | 51 | 0 |
| 2023-04-19 | 37 | 49 | 62 | 49 | 0 |
| 2023-04-20 | 43 | 55 | 70 | 53 | 0 |
| 2023-04-21 | 47 | 57 | 71 | 70 | 0 |

surfactant and therefore a bit more active. It has been my standard for use with PGR's for over 20 years.

Applications of any PGR should be done in early morning or evening to allow for slow drying. Even though our temperatures were warm on day of application no phototoxicity was observed.

In conclusion, Accede is a unique product filling a nitsch for a chemical PRG thinner for peaches. It assists with effective Crop Load Management. The use of Accede allows for significantly less hand thinning labor, the biggest cost of production in peaches. We also saw increased fruit size and therefore potential increased dollar return per acre.

I would urge all Peach Growers to try Accede for Peaches in 2024.

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- **Cell Power® Sulis**
  Helping to improve color and brix

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Alongside Mo, this product also includes specific cell wall protectants. These counter ethylene, enhancing the ABA effect and preventing softening of the fruit. The further inclusion of boron doubles down on sugar production

OMEX® Agrifluids USA has been working with Cell Power® Sulis™ since 2016 in the US market. "We started running trials with Sulis™ in 2016 to show earlier ripening, improved color and higher brix held up. We had already been impressed by the trial results from Britain, where this technology was developed" says OMEX® agronomist, Dean Konieczka. OMEX® has replicated those trials here in the United States by trialing this product from the east coast to the west coast in many fruit crops with some of most successful grower results being in Honey-crisp, a notably difficult to color variety.

To stimulate color and brix ahead of harvest, apply Cell Power® Sulis™ as soon as fruit starts maturation, repeating the application at 7-10 day intervals.

Learn more at www.OMEXusa.com or contact your regional agronomist to learn more.
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# New Jersey News

**Midge Keelin Hauser was awarded the NJ Farm Bureau's Woman of the Year Award** at the 105th Annual Convention November 13, 2023 at the Westin Princeton Forrestal Center, Princeton, NJ.

**Midge Hauser, with John Hauser, Owners of Hauser Hill Farms.** John has been a long term Board of Director with the NJ State Horticultural Society

Carolyn "Midge" Hauser of Hauser Hill Farm in Middlesex County is our 2023 New Jersey Farm Bureau Woman of the Year. Midge graduated from Susquehanna University in 1990 with a BA in Spanish and lived and studied in Segovia, Spain. After graduation, she worked for the Manhattan DA's office in the Witness Aid Services Unit and the Special Projects Bureau, where she used her knowledge of Spanish to translate for victims of crimes. When she left the DA's office, she decided to teach. She finished her degree in education and later earned a Master's degree from Marygrove College. She has been teaching for 26 years and presently teaches Spanish at Old Bridge High School to 9th grade students. "Teaching has afforded me the opportunity to have summers off to focus on the farm and all the work that needs to be done," Midge says.

Midge and her husband, John, met on a blind date in 2000 and married later that same year. She says, "everything moved very quickly because it didn't take long for me to figure out that John was one of the absolute best human beings I'd ever met." This union was her introduction to farm life, which she has taken with incredible stride. Midge has served as President and Secretary of the Middlesex County Board of Agriculture and was named the 2019 Middlesex County Farmer of the Year. Midge has been described as a woman who will do a lot of the behind the scenes work to get things done. Her ability to balance both her career off the farm and the inner workings of their busy farm prove her dedication and passion for agriculture.

Midge's advice to the future generations of women in agriculture is to get involved. We play a crucial role in agriculture. Not only supporting our partners, but important roles in the businesses we help run, the families we raise and support, and many agriculture related boards we volunteer with. It is important that we lend our voices to keep agriculture viable in New Jersey. Legislators need to know that this industry is one of the most vital in the world, not just our country and our state. When asked: What brings you the most joy about being a woman in agriculture?
Midge responded:

"One of the things that brings me much joy about being a woman involved in agriculture is being a part of something bigger than myself. Farming is a legacy, something that is passed down through generations. I'm proud of my husband and the work he does. I'm equally proud to be by his side and help keep the legacy going by supporting him and being a voice for agriculture. It isn't always easy, but it's always rewarding."

What an excellent example you have set for New Jersey women in agriculture. We congratulate you on this achievement, and appreciate your passion for agriculture, and what you represent as a member of New Jersey Farm Bureau.

**Dave Bond** was presented with the Arthur West Distinguished Service Award to NJ Farm Bureau.

Gary is long term treasurer for the NJ State Horticultural Society, John is also a long-term board member and heads up the NJSHS research grant program.

Patricia Hastings, Rutgers Pest Management Office Program Associate, presenting on pesticide safety at the Northern New Jersey Tree Fruit Twilight meeting in May at Melicks Town Farm Oldwick, NJ. There were over 30 growers in attendance.

An orchard tour at the Northern New Jersey Tree Fruit Twilight meeting in May held at Melicks Town Farm, Oldwick, NJ. There were over 30 growers in attendance.

Dr. Joeseph Heckman, Rutgers Soil Fertility Specialist presenting at a wine grape twilight meeting held this past July at Working Dog Winery, Hightstown, NJ. There were over 25 growers in attendance at this meeting.

Dr. Peter Oudemans, Rutgers Small Fruit Pathologist, presenting at a wine grape twilight meeting held this past July at Working Dog Winery, Hightstown, NJ Over 25 growers in attendance at this meeting.

# Horticultural News

New Jersey State Horticultural Society
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Hackettstown, NJ 07840