Fruit Notes

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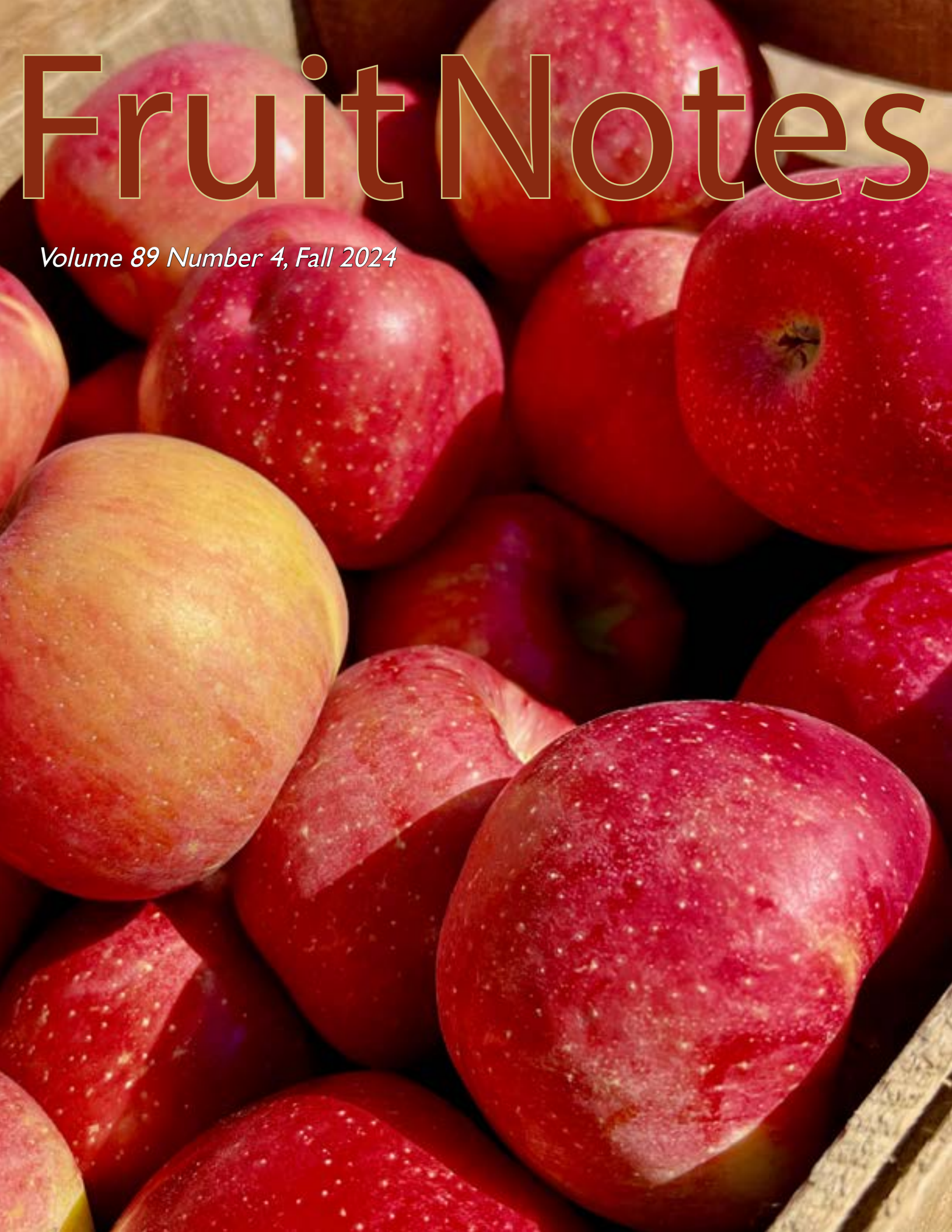

Fruit Notes

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

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Cover: MAIA1 Evercrisp® harvested October 24, 2024 at the UMass Orchard, Belchertown, MA. Photo Credit Jon Clements

Massachusetts Fruit IPM Report for 2024

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Weather

Note: all observations from the UMass Orchard in Belchertown, MA.

Minimum **Winter** temperature was 6 degrees F. on January 21. The winter was mild overall. No bud damage was expected nor observed a result of the winter weather. We had it easy.

Spring: green tip was the first week in April. Bloom was during the second week in May. It's becoming increasingly difficult to peg down green tip and bloom dates with the increasing diversity in apple varieties planted that have varying phenologies, up to a week to ten days apart. Exacerbated by a cool April. During the last week in April, the temperature dropped into the upper 20's and there was some bud damage when apple flowers were in the pink to early bud stage. But it did not put much of a dent into the apple or peach crop.

Summer was not particularly noteworthy, although overall on the warm, humid, and wet side. A high summer temperature of 92 was observed on June 21 but there were plenty of days in the upper 80's. Mid-August started a cool down which lasted into Fall.

Fall: September was a bit above average temperature, and record dry. No one was complaining about warm days and cool nights though. And largely rain-free weekends.

NEWA update: During 2024 there are 42 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

Massachusetts saw a little bit - or a lot- of just about everything in terms of orchard disease this year. Sanitation is the name of the game.

Apple Scab There were several orchards reporting scab at significantly higher than usual levels. Precipitation forecasts were all over the map this spring, confounding scab forecast model output making management difficult enough without compounding that trouble with extreme precipitation events- which we received in many locations in abundance- which had the potential to cause reduced/lost fungicide coverage. Sanitation should be a priority *this fall* as waiting until Spring can mean muddy orchards and trouble getting in to apply urea or implement leaf chopping.

Powdery Mildew was not as widespread as scab seems to have been this year; however, it continues to pop up at the UMass orchard every year and seems to be spreading to new locations. Honeycrisp, among other CVs, is being impacted. Even though there were a number of rain events, they were spread out enough to allow dry, high humidity conditions conducive to PM development. Again, sanitation is key to the reduction of overwintering inoculum.

Peach Leaf Curl was also a surprise development this year. Despite growers reporting implementation of their standard curl management strategies (after a year with

no crop) there was still widespread curl and subsequent defoliation. This year growers were advised to make fungicide applications of chlorothalonil after harvest, rather than waiting until the spring and to focus on tree health this year to compensate for early defoliation.

Bitter Rot continues to increase in incidence in MA orchards and in severity as well in some locations (which tend to vary by year). This year we began sending samples in for genetic analysis to determine which species within the *Colletotrichum* genus are present as not all species are sensitive to the same fungicides.

Fire Blight seems to have been, by and large, relatively brought back to heel this year after last year's outbreak, except in places that still had left over active cankers. After last year's outbreak growers were highly vigilant in controlling this disease.

Marssonina continues to kick around and is causing/has caused early defoliation although no fruit appear to be affected.

Insects

Plum Curculio (PC): Figure 1A shows the average infestation levels recorded at harvest in 10 Massachusetts orchards. Overall, PC injury levels in 2024 were slightly lower compared to those in 2023 (Figure 1B).

Tarnished plant bug (TPB), European sawfly (EAS), San Jose scale (SJS). The injury levels caused by TPB and EAS in 2023 (Figure 1A) were low and nearly identical to those recorded in 2024 (Figure 1B). SJS was only found in one of the 10 orchards.

Japanese beetles. In 2023, we validated a mass trapping system for Japanese beetles at the UMass Cold Spring Orchard. In 2024, three fruit growers evaluated this system. At a farm in NH, three traps were deployed in raspberries and one in blueberries. At a Massachusetts farm, two systems were deployed in raspberries and one in blueberries. A single system was deployed in blueberries at the UMass Cold Spring Orchard. All traps effectively controlled Japanese beetles, capturing thousands while maintaining low beetle counts on the crops. Additionally, a mass trapping system was tested near a basil research plot at the UMass Crop and Animal Research Farm in South Deerfield and at an apple block in response to high beetle populations in a grower's Honeycrisp orchard in Bolton, MA. In the basil plot, results were acceptable but a good number of beetles were already present on the crop when the trapping system was set up. At the apple orhard, the performance of the trapping system was satisfactory but beetles were also present on trees. The trapping system is meant to intercept the pest before they reach the crop.

Mass trapping system consisting of a 3 ft-long mesh sock attached to a yellow vane funnel and baited with a dual lure(for agricultural use) containing the *P. japonica* sex pheromone and floral-based volatiles.

Brown Marmorated Stink Bug. Monitoring BMSB populations over five years revealed significant fluctuations despite consistent trapping methods. The highest numbers were recorded in 2020, with 1,324 adults from pheromone-baited sticky traps across seven orchards. In the summer of 2021, only 166 BMSB were found across five farms, increasing to 667 in 2022 across 11 farms, then dropping to just 17 in 2023 despite consistent monitoring. This population decline may be related to regional weather variability.

Sunflowers are highly attractive to BMSB and can be effective in reducing the number of stink bugs that move into cash crops

In 2024, BMSB numbers increased again, although feeding damage to apples remained relatively low, con-

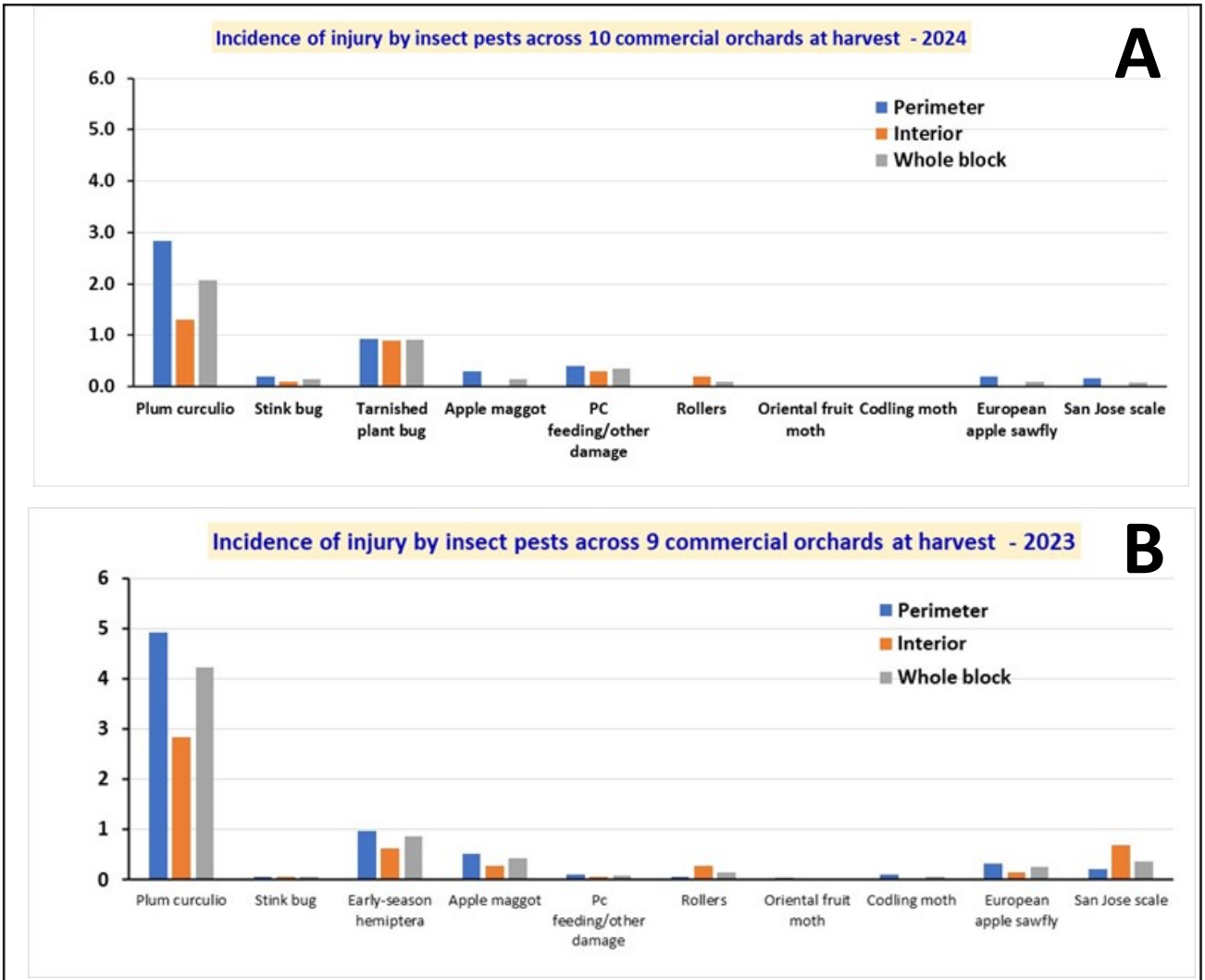

Figure 1. Levels of fruit infestation caused by nine insect species at 10 commercial orchards in Massachusetts in (A) 2024 and (B) 2023.

centrated in two orchards that were hot spots in 2020. For the past four years, we have been studying the use of trap crops (sunflower + buckwheat) combined with lure-baited traps to concentrate BMSB (both nymphs and adults) in specific areas. This research also explores whether trap crops attract natural enemies of BMSB, such as predators and parasitoids. Results from 2024 will be published in *Fruit Notes*.

Mites. Reports of severe mite infestations emerged from one orchard in late June 2024. On-farm research from early July to mid-August at CN Smith Farm East in Bridgewater, MA, involved applying Magister® SC (Gowan, Co.), a quinazoline-based miticide, at 32 oz/acre to two apple blocks. This single mid-July application effectively reduced populations of European red mites and two-spotted spider mites. Although predatory mite numbers initially decreased, they rebounded by mid-August, achieving a favorable pest-to-predator ratio, indicating effective control while preserving biological control agents. Full details are available in the Fruit Notes article.

Oriental fruit moth, codling moth, and oblique-banded leafroller. As shown in Figure 1A, Harvest assessments in 10 Massachusetts orchards revealed zero fruit injury from OFM and CM and very low injury from OBLR. Figure 2 illustrates the seasonal activity patterns of adult CM, OFM, and OBLR in three orchards.

Lures for tortricid moth monitoring. Numerous commercially available lures effectively monitor CM,

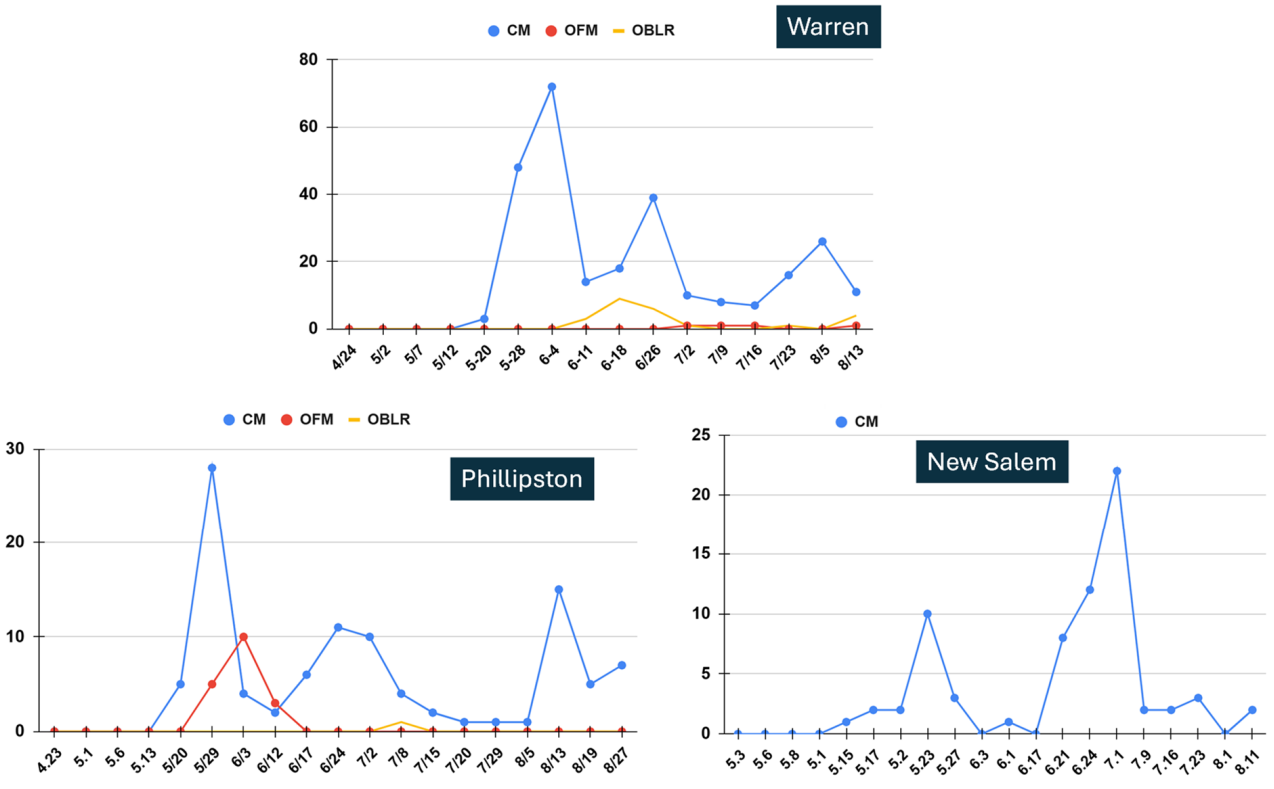

Figure 2. Codling moth seasonal activity as determined by pheromone-baited traps in 2024

OFM, OBLR, and other moth species, primarily using sex pheromones to attract males. Combining plant volatiles or kairomones with sex pheromones can increase captures of female moths. For example, adding pear ester (ethyl (E,Z)-2,4-decadienoate) and acetic acid to CM pheromone traps increases female captures (Knight et al., 2019). Additionally, the "Megalure CM 4K dual" blend of plant volatiles has been developed to attract both CM and OFM females without the use of sex pheromones (Giri et al., 2023). Ajay Giri published a Fruit Notes article describing commercially available lures for CM, OFM, and OBLR, including their deployment methods, which typically involve rubber septa for dispensing pheromones with field longevity of 4 to 6 weeks. Newer options include the PVC matrix system by Trécé, which extends release longevity to up to 12 weeks.

A red 1-quart deli container with a lid and 3/16" holes, baited with diluted Concord grape juice and table salt, serves as an effective and selective trap for SWD.

Spotted-wing drosophila (SWD). UMass has used an effective and inexpensive monitoring system for SWD for nearly five years. The trap consists of a red-painted, 1-quart plastic container filled with 6 ounces of diluted Concord grape juice fermented for seven days with 2% table salt. In 2024, the first SWD (2 females) were captured on May 28. The grape juice bait has proven highly selective, capturing high numbers of SWD while minimizing non-target insect catches. For instance, on July 29, traps averaged 442 SWD males and 332 females, with only 28 non-target insects. By August 5, SWD counts averaged 99 males and 118 females, alongside 102 non-target insects per trap.

Horticulture

Not much to report here, especially compared to 2023. It seems the apple tree decline situation reached a peak last year. Trees that were/are declining still are declining (or dead/dying), but not much new tree decline was observed.

Regarding the chemical thinning period, the late-April frost/freeze made things a little touchy. Initially some good thinning seemed to have occurred, maybe even over-thinning, however, in the end the apple crop set

was above average and even on the heavy side. There was certainly some block-by-block variability though. This was the first year Accede (Valent USA) was used widely on peaches, and results were good to non-existent. But, at the UMass Orchard where Accede was applied during the week of sub-freezing temperatures, significant over-thinning (virtually no crop set) was observed on some varieties. Consider that a lesson learned.

Berries

March was one of the wettest in Massachusetts history with a total precipitation of 8.79" in Belchertown. While this stressed some fields, specifically strawberries as they put out growth, the spring was not one to drown in. April saw an average amount of rainfall and May dried out with less than an inch. Aside from some cold snaps that zapped early flowers, flower set was relatively good. Notably, blueberries had a heavy flower bud set this year due to a mild fall in 2023, the flower set was accompanied with wonderful pollination conditions leading to a (dare I say) abundance of fruit set this season.

The mild and wet winter caused SWD to rear their feared faces at the end of May. In strawberry PYO fields, early varieties arrived earlier than usual, combined with schools not letting out yet and rather hot weather on weekends, operations saw lower attendance and higher amounts of fruit drop. In blueberry PYO fields, heat overnight in July led to fruit quickly ripening and fruit drop as well. Berry pest management programs worked well this season due to a lack of continuous storms, with almost no signs of *Botrytis*, *Anthracnose,* or SWD. This season demonstrated the importance of sanitation as fields with higher fruit drop saw higher SWD trap catch.

Strawberry Nursery Supply Chain Issues

Some Massachusetts growers reported receiving unfulfilled orders or sub-par materials for fall planting. Apparently, there were major concerns about the spread of Neopestalotiopsis fruit rot and leaf spot this year at nurseries using strawberry tips sourced from Prince Edward Island. No cases or reports of the disease were noted in Massachusetts this year.

Insect Pests

Tarnished plant bug. Tarnished plant bug populations reached economic action thresholds in mid-May at only one surveyed strawberry field this season. Very few TPB adults were captured on white sticky cards. Minor instances of 'button' berry injury were observed, primarily in mid-season strawberry varieties. Ultimately, TPB overwintering adult populations were notably low this year in the region; the exact mechanism is not fully understood.

Blueberry aphids. Concerns over Blueberry Scorch have piqued in recent years and more readily available virus testing may be needed by the UMass Diagnostic lab. Blueberry aphids were observed at multiple farms, with relatively high populations in the mid to late summer. While aphid mummies were not abundant, low level of parasitism occurred and growers chose not to control as there were no incidences of Showstring or Scorch virus scouted.

Black vine weevil and white grubs. Strawberry growers reported historic issues with root feeding pests, a problem intensified by this season's wet start which created a favorable environment. Scouting revealed the larvae of Black vine weevil, Japanese beetle, and Asiatic beetle to be the principal culprits at two sites. The entomopathogenic nematode, *Steinernema feltiae*, was utilized on one commercial farm and effectiveness is to be documented next season.

Potato leafhopper. Potato leafhopper appeared early in June and had great environmental conditions. Populations seemed average on farms, requiring multiple insecticide applications to protect newly planted strawberry fields.

Two spotted spider mites. Two spotted spider mite populations built rapidly in June due to prolonged heat waves and little precipitation. However, treatments were not applied prior or post-renovation with populations being controlled effectively by native predatory mites.

Blueberry maggot fly/Cherry Fruit worm/ Cranberry fruit worm. Scouted farms had either no emergence or very low trap catch, signaling very little activity from this trio of pests this season.

Weed Management

In the first year of this new position, the focus was on identifying the most important weed management needs of growers. Grasses and rhizotomous perennial weeds including oriental bittersweet (*Celastrus or-*

biculatus), yellow nutsedge (*Cyperus esculentus*), and hedge bindweed (*Calystegia sepium*) were the most troublesome weeds. Most growers used herbicides or hand weeding as their primary weed control tools and requested more support selecting appropriate herbicides to use. They also expressed difficulty in determining the best application timing. Timing is tricky because growers need to balance tree safety, herbicide efficacy, preharvest intervals, and other crop management activities.

Based on research out of Oregon, we conducted a trial testing the efficacy of quiclorac (Quinstar) on controlling hedge bindweed in highbush blueberries. There was little response of bindweed to quinclorac measured in year 1 of this research, but we plan to continue collecting data in future years.

Two herbicides often used in fruit crops have been or will be removed from production:

- The EPA issued an emergency order to stop the use of DCPA (Dacthal) because exposure by a pregnant individual can cause the fetus to experience changes to their thyroid hormone levels that are linked to low birth weight, impaired brain development, decreased IQ, and impaired motor skills. See the full Emergency Order here or here.
- BASF has decided to stop producing Rely 280, their glufosinate product for use in orchards. Existing inventory of Rely 280 can be used until it is gone. BASF will continue to maintain labels for this legacy brand for several years beyond the last date of production to allow for stocks to be used.

Special Projects/Research/Publications

Extension publications

Cowgill, W. and J. Clements. 2024. Jon Clements Featured Speaker at the New Jersey State Horticultural Society Summer Meeting and Orchard Tour. Fruit Notes 89(3) 7-10.

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Robinson, Z., Rull-Garza, M., Garofalo, E., and Piñero, J.C. 2024. The UMass Research and Extension Experiences for Undergraduates (REEU) Internship Program. Fruit Notes 89(1): 1-5.

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Clements, J. 2024. Current Bud Stages. https://ag.umass.edu/fruit/resources/bud-stages-photos

Clements, J. 2024. 2024 Apple Maturity Report. https://ag.umass.edu/fruit/2024-apple-maturity-report

Research:

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edu/fruit/nifa-planned-integrated-research-outreach-initiative/precision-crop-load-management-for-apples

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Peer-reviewed research articles

Piñero, J.C., Godoy-Hernandez, H., and Leskey, T.C. 2024. Multi-year evaluation of a grower-friendly attract-and-kill strategy for apple maggot fly, *Rhagoletis pomonella* (Diptera: Tephritidae), control in commercial apple orchards. Journal of Economic Entomology https://doi.org/10.1093/jee/toae253.

Tohline, L.I., Stoffolano, Jr. J.G., and Piñero, J.C. 2024. Efficacy and Residual Toxicity of Chitosan for *Rhagoletis pomonella* (Diptera: Tephritidae). Environmental Entomology 53 (3), 442-446. https://doi.org/10.1093/ee/nvae031

Nixon, L., Douglas, M., Piñero, J.C., and Leskey, T.C. 2024. Effects of non-nutritive sugar inclusion in laboratory diets and attracticidal spheres on survivorship and mobility of two Dipteran species, *Rhagoletis pomonella* and *Drosophila suzukii.* Journal of Economic Entomology 117(2): 595–600. DOI: 10.1093/jee/toae003.

Eivazi, F., Piñero, J.C., Dolan-Timple, M., and Doggett, W. 2024. Comparison of cover crop termination methods for small-scale organic vegetable production: effect on soil fertility and health, Journal of Plant Nutrition, DOI: 10.1080/01904167.2024.2308196.

Chen, M., Tang, H., Zhou, Y., Zuo, J., Wang, Y., Piñero, J.C. and Peng, X. 2024. Voltage-gated sodium channel gene mutation and P450 gene expressions are associated with the resistance of *Aphis citricola* (Hemiptera: Aphididae) to lambda-cyhalothrin. Bulletin of Entomological Research 114(1):49-56. doi: 10.1017/S0007485323000603

Grants

2024 $324,262 Piñero J.C. (PD), Delisle, J. (co-PI). Impacting Change: Fostering the adoption of grower-friendly apple Integrated Pest Management strategies in New England. NIFA Crop Protection and Pest Management Program (9/1/24 – 8/31/27).

2024 $299,920 UMass sub-award (total grant: $3,996,373). Leskey T.C. (PD) et al. Cultivating Tomorrow's Orchard: Evolving and Enhancing IPM in Eastern Tree Fruit Systems. NIFA Specialty Crops Research Initiative (9/1/24 – 8/31/27).

2024 $39,014 UMass sub-award (total grant: $324,000. Quintanilla, M. (PD), Piñero, J.C. (co-PI), Shapiro-Ilan, D. (co-PI). Towards the Sustainable Management of Two Economically Important Dipteran Insect Pests, Spotted Wing Drosophila and Apple Maggot, Utilizing Natural Enemies: Entomopathogenic Nematodes and Fungi. NIFA Crop Protection and Pest Management Program (9/1/24 – 8/31/27).

2024 $717,941 Scheufele, S., Piñero, J.C. (co-PI), Ghantous, K. (co-PI). Partnering To Foster Development and Adoption of IPM Strategies for Specialty Crop Producers in Massachusetts (9/1/24 – 8/31/27).

Clements, J. et al. 2024. Precision Crop Load Management for Apples. CORNELL 92884-20621 PRIME USDA. ($20,000).

Clements, J. 2024. Implementing precision apple crop load management at the UMass Orchard. Massachusetts Fruit Growers' Association. ($7,500)

Clements, J. 2024. OrchardWatch. Massachusetts Fruit Growers' Association. ($700)

Gannett, M and M. Bley. 2024. Evaluation of season-long chemical controls and an experimental control of bindweed in established blueberry plantings. Massachusetts Fruit Growers' Association. ($6,250)

2024 North Jersey Tree Fruit IPM Report

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Observation Overview: The IPM observations for 2024 come from the North and South Jersey Tree Fruit IPM Programs. There are 29 farms that participate in the North Jersey program and 13 farms in the South Jersey Program. The program includes approximately 600 acres of apples and 1,650 acres of peaches. Each farm has traps for the pests included in the trap data and are scouted once a week. The data for the charts below comes from the NEWA model <https://newa.cornell.edu/> using the Rutgers Snyder Research and Extension Farm in Pittstown as the weather station source (. The trap data comes from each of the farms in the program and excludes farms using mating disruption. This is because the mating disruption proved to be very effective this year and I had no or very low trap catches in orchards utilizing this method of control.

2024 Weather: Using the NEWA weather data from our Rutgers Snyder Research and Extension Farm in Pittstown, New Jersey (Hunterdon County) as the data source https://www.njweather.org/station/289

Overall, the weather (highs, lows and precipitation), was average for the 2024 growing season. There were very few statewide frost events in the spring however, in our most northern counties we experienced temperatures of 27°F on 4/8/2024 (during tight cluster) and again on 4/22/2024 (during bloom) which affected some of the blossoms and potentially impacted chemical thinning. Overall, most northern NJ growers had excellent apple and peach crops. However, the high temperatures were sustained above 80 °F for much of June through August. **Temperatures 89F or higher totaled 23 days in 2024.** June 20, 21, 22, 23, 26, July 4, 5, 6, 7, 8, 9, 10, 13,14, 15,16,17, August 1, 2, 3, 5, 6, 28.

Temperatures over 89F with full sun enhance the potential for sunburned apples, which greatly increases the potential for the disease bitter rot.

Precipitation was above the 20-year normal until May and then dropped to about half of normal from June-July, then seemingly increased in August but that was largely due to a very large squall that occurred at the Pittstown research station at the beginning of August. Extreme drought has occurred in most of northern NJ with less than 1.3 inches at the Pittstown Station Sept 1- Nov 17, less in other counties.

Additionally, a hailstorm occurred in Sussex and Warren counties on 7/16 which resulted in significant crop loss for some growers.

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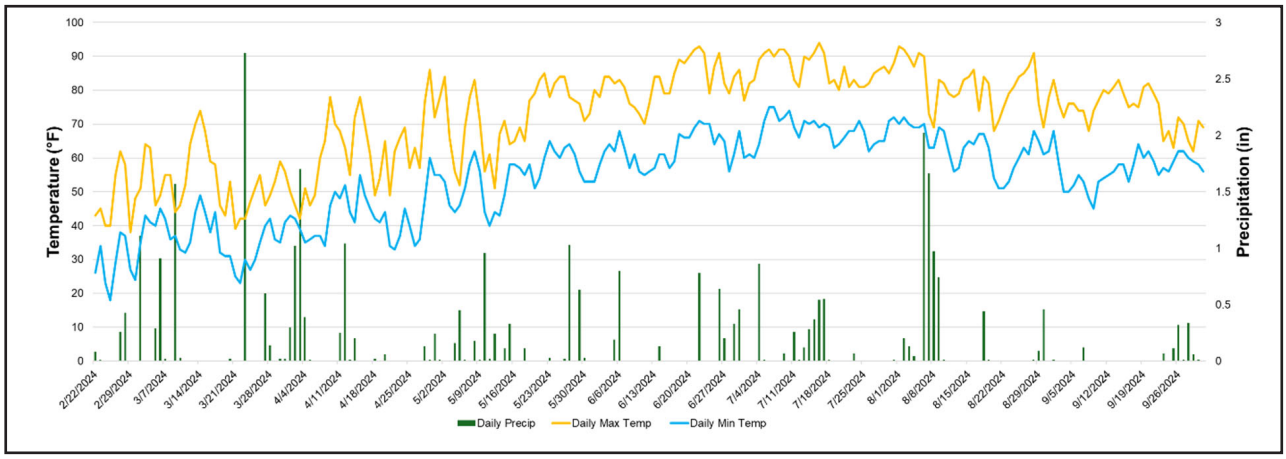
	March	April	May	June	July	August	September	October	Nov 1-Nov 17
Hunterdon, NJ: 30 year normal precipitation	4.05	3.92	4.18	4.55	5.04	4.61	4.53		
Hunterdon NJ: 2024 precipitation	6.89	4.97	4.16	2.21	3.28	6.83	1	0	0.34

enced more scab infection periods during the primary scab phase. Most of these infection periods spanned over a couple days with the longest period lasting 5 days. Most growers were able to avoid primary scab by applying effective fungicides prior to NEWA predicted infection periods. There were a few orchards with heavy scab pressure that experienced major scab outbreaks with over 20% infected fruit found in post-harvest assessments. If growers experienced heavy scab pressure this year, it is recommended to apply urea and mow the leaves

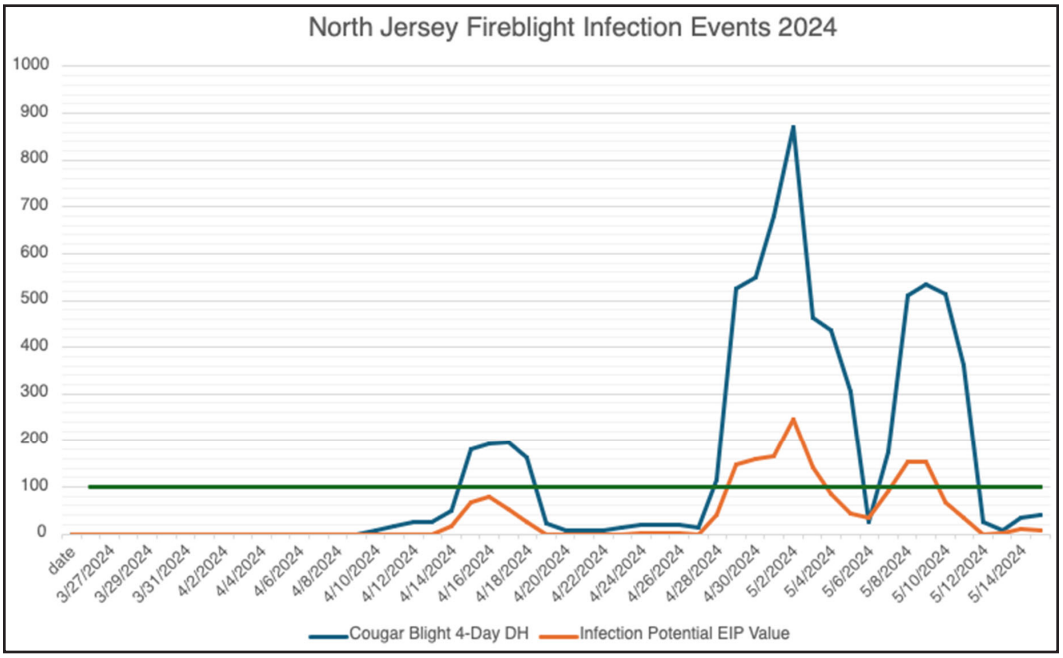


Data sources:

https://climate.rutgers.edu/stateclim_v1/nclimdiv

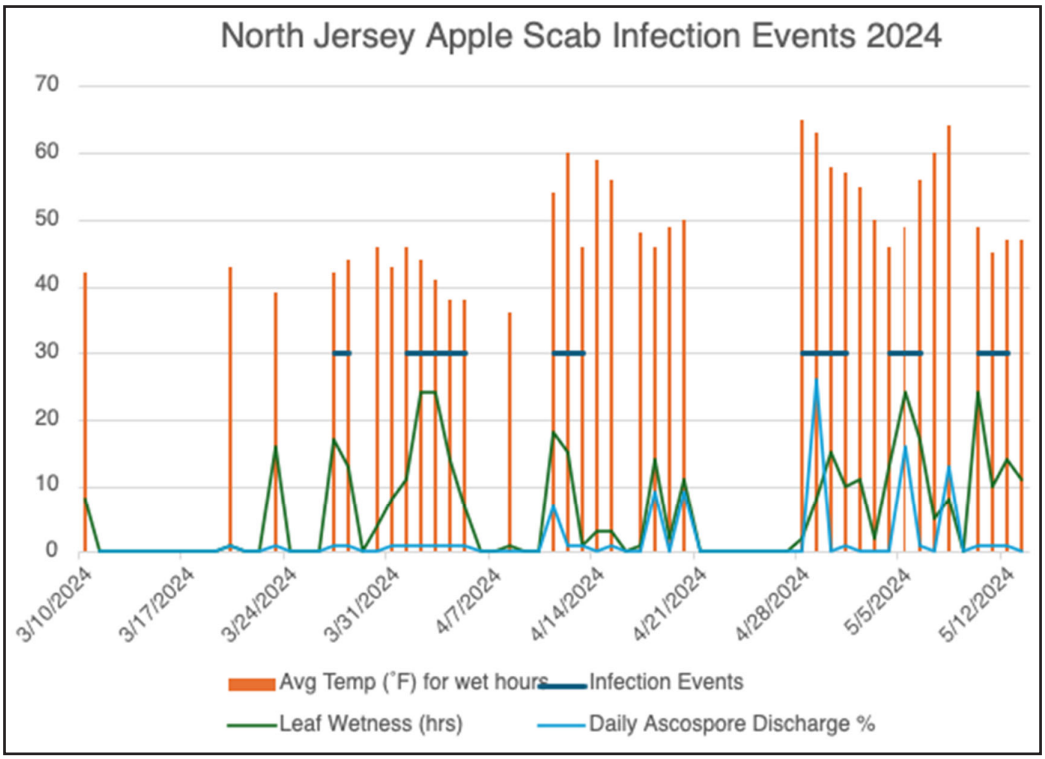
https://www.njweather.org/data/daily

Fireblight: Fireblight presented an issue during the blossom blight phase for growers in both North and South Jersey. As you can see from the chart below, which pulls data from the NEWA fireblight model using the weather station in Pittstown, New Jersey, there were at least two infection periods during bloom where the EIP value was over 100. One of these periods persisted over the course of 5 days which required two applications of an antibiotic, 3 days apart from each other for optimal control.



Apple Scab: Compared to last year, we experi-

once they have fallen from trees to reduce the inoculum moving into the next season.



Rots: Bitter Rot of apple fruit and Glomerella Leaf Blotch have been most challenging to control throughout all New Jersey orchards. Incidence of these diseases occurred in almost all farms in our Tree Fruit IPM Program and appeared most devastating in the Honeycrisp, Empire, Ambrosia and Evercrisp varieties.

It will be beneficial to remove infected apples from the trees at the end of this season to reduce inoculum as well as leaves and mummied fruit under the tree.
Specific horticultural programs and spray schedules will be outlined in a separate article for Bitter Rot and Glomerella. Glomerella can also become a fruit rot, Glomerella Leaf Blotch (Bitter Rot), caused by the sexual stage of the fungus. We first observed it in northern NJ in 2019.

Fungicide programs for Bitter Rot: After 1st cover it will be essential to have a contact fungicide combined with specific systemic fungicides in each cover. After 1st cover the choice is usually Captan in every cover spray combined with a short list of systemic fungicides in each spray; Aprovia Frac 7, Omega Frac 29, Merivon Frac 11+7, Luna Sensation Frac 11+7. It is essential these be applied before wetting events and before fruit infection. In South Jersey, White Rot was also prevalent this season, we did not experience white rot in our North Jersey counties.

Cedar Apple Rust and Quince Rust: In Southern New Jersey these diseases, particularly Quince Rust, are becoming more prevalent, especially in Asian Pear. In North Jersey, we also saw a higher incidence of these diseases compared to last season. It is important to begin applying effective materials from pink through first cover.

Nectria Canker: This disease has not presented a major issue in New Jersey in previous years and when it has shown up, it has typically been on varieties that are known to be susceptible. This year one grower experienced this disease on the MAIA variety, Ludacrisp. Almost every tree in the row was infected with multiple cankers per tree. In New Zealand for control of Nectria Canker, apple trees are sprayed with Captan from harvest to leaf drop and then several applications of a Copper Hydroxide like Champ, Kocide 3000 and NuCop (Personal Communication Dr. Srdjan Acimovic, VPI)

Bacterial Spot: In South Jersey control of this disease was very good. In North Jersey there was more incidence of this disease than last year with 4 farms having minor outbreaks. Growers should begin including effective materials for this disease at late petal fall or early shuck-split stage and continue on a 7-to-14-day interval throughout the summer. Shorter application intervals should be used when rainy periods are frequent, and temperatures range from 75F to 85F. A longer 14-day interval is acceptable during extended periods of dry weather. The most effective program is a low dose copper program worked out by Dr. Norm

Lancette in 2014, see: Copper Bactericides for Peach Bacterial Spot Management. Do not apply copper if temperatures are above 85F. http://plant-pest-advisory.rutgers.edu/copper-bactericides-for-peach-bacterial-spot-management/

For resistance management growers should add oxytetracycline (Fireline or Mycoshield) in cover sprays to the copper if they will be applied within 24-48 hours before a rain. Longer than that sunlight breaks down the oxytetracycline.

It is important to remember that combining copper and captan may cause phytotoxicity to the leaves which may be exacerbated in slow drying conditions.

Peach Scab: Control of this disease remains very good in commercial orchards across both North and South Jersey.

Brown Rot: This disease did not present a major issue in North or South Jersey this season. In North Jersey, most growers had less than 2% crop loss caused by brown rot.

Codling Moth: In South Jersey, a biofix was set for this pest on 4/22 which is 3 days later than last year. A biofix was set for this pest on 5/1 for five North Jersey counties (Middlesex, Mercer, Hunterdon, Warren, and Sussex counties) and on 5/6 for one North Jersey county (Morris County) which is 3-4 days earlier than last year. Across the state, trap captures were lower than average, but this pest was more damaging than last year. This season, all 3 generations of this pest caused damage in orchards which are known to have high pest pressure. Mating disruption remained effective in most blocks, but small amounts of damage were found at one farm which had irregularly shaped blocks. In Southern New Jersey, over the last 3 seasons there has been incidence of another internal feeder which is believed to be lesser apple worm. In North Jersey damage of this pest was noted in one orchard on 10/15.

Brown Marmorated Stink Bug: In both North and South Jersey, trap counts for this pest were higher than the past few seasons. There was also a higher incidence of damage found in post-harvest assessments of Pome fruit. In North Jersey, there was also a higher incidence of damage to Stone fruit compared to last season.

Ambrosia Beetle: In North Jersey, we began a monitoring program for this pest this year utilizing clear sticky traps baited with Trece's ethanol lures and wood dowel traps. We had significant trap captures, and this pest attacked the wood dowel traps at all 29 farms in our program. This pest only attacked apples at 4 of the 29 farms, 3 of which were previously known infestation sites. The one farm which had not previously experienced crop loss to this pest experienced 43.3% loss of the trees they had topworked at the beginning of the season. In South Jersey, tree loss continued at normal levels in known infestation sites. The best management practice for control of this pest is reducing tree stress through cultural techniques meaning correcting all drainage issues prior to planting, and managing drought stress with well monitored and timed adequate irrigation.

Scale: White Peach Scale was observed at slightly increased levels in orchards across the state. The late generation of this pest continues to cause damage to later ripening peach varieties in North Jersey. Dormant oil sprays at the beginning of next season will help manage this pest. Ensuring proper coverage of these sprays is essential for control. In North Jersey, this pest did not cause notable damage except in known problem areas. In South Jersey, incidence of San Jose Scale infestation increased over the last season. Early season controls suppressed crawler populations, however, damage in August was notable in many orchards.

Oriental Fruit Moth: A biofix for this pest was set on 4/10 in South Jersey and 4/12 in North Jersey. This pest did not present a major issue to growers across the state this season. Only a few growers had a small incidence of damage to their peaches found in post-harvest assessments.

Plum Curculio: Plum curculio damage was above average in stone fruit. This pest also caused significant damage to pome fruit due to the long bloom period which made control difficult.

Lesser Peach Tree Borer and Greater Peach Tree Borer: It is now recommended the New Jersey growers use mating disruption to control this pest due to the loss of other effective methods.

References:

1) Compendium of Stone Fruit Diseases, 1995 APS, Pages 28-29

2) http://plant-pest-advisory.rutgers.edu/copper-bactericides-for-peach-bacterial-spot-management/

3) Fungicides for European Canker (Personal Communication Dr. Srdjan Acimovic, VPI)

4) Cowgill, Win, 2019. Glomerella Leaf Blotch and Fruit Rot: New Apple Diseases in the Northeast. Horticultural News, Volume 99, NO 3, P.20 Spring, http://horticulturalnews.org/99-2/a4.pdf

Honeycrisp with bitter rot

Fall Chores for Cherry Tree Health

Win Cowgill
Professor Emeritus Rutgers University
Win Enterprises International, LLC

Sweet cherries and Tart Cherries as well need some attention now, late September, to ensure tree health and strengthen fruit buds for next spring.

The fall chores I will focus on in this article will be controlling bacterial canker of cherry and foliar nutrition.

Bacterial Canker

Bacterial canker or bacterial gummosis of sweet cherry is caused by several *Pseudomonas* bacteria. This microbe infects flower buds and spurs. It can completely kill new spurs and leaves and then move into the trunk on cherry. This problem is especially difficult on Gisela dwarf cherry rootstocks as losing a scaffold or getting infection into the trunk will limit production, and the tree rapidly declines.

In our humid climate in the Northeast and Mid-Atlantic, the cankers can continue to develop in lateral branches and the central leader. In some cases, the cankers have grown to girdle and kill two-year-old wood. I have observed central leader dieback as a result. In older wood, the canker looks very much like a fire blight canker in apple. In most cases the canker begins to ooze brown to amber exudate. It appears that under our humid conditions, this disease is very hard to control and can be devastating if control measures and the proper horticultural practices are not followed. This bacterial disease is most troublesome in young plantings where it can cause losses of up to ten percent of the trees. On mature trees, it can reduce yields from 10–50%.

The source of inoculum may come from wild cherry trees in hedgerows. Black cherry, *Prunus serotina*, particularly, may be one source of inoculum for *Pseudomonas* during wind and rainstorms in the spring and summer months. *Removal of these wild cherries may be beneficial. My original source of information on controlling bacterial canker of cherry came from an Ontario Canada fact sheet,* from Ontario Canada written by W.R. Allen "Bacterial Canker of Sweet Cherry" NO. 88-0886 which is no longer in print or posted on the web.

Control Measures

1) ***Pruning Cherries***

Focus on pruning in the summer immediately after harvest. *Avoid large, dormant pruning cuts; and instead utilize summer pruning (immediately after harvest) to minimize the impact of this disease.*

Note that on trees utilizing Gisela Rootstocks, some cuts may have to be made in the dormant stage. However, I suggest waiting until to close to bloom. Look for three days of clear sunny low humidity to begin pruning. Apply a copper pray copper before starting pruning, then paint the cuts with a copper solution and then immediately after pruning and before the next rain event apply another copper spray.

- Pruning sweet and tart cherries right after harvest helps prevent bacterial canker. We learned from the Europeans that the first line of control for this disease is to prune immediately following harvest. •Avoiding dormant pruning lessens the chance of infection in the pruning wounds.
- Use the short stub method- On infected branches, leave stubs of 6 to 8 inches. This practice will prevent the canker from entering the trunk and scaffolds. The canker will not move down the stub.

2) Watch the Pruning Video clips on our website http://giselacherry.com/ and our view more recent videos on our GiselaCherry youtube channel @ https://www.youtube.com/user/giselacherry/videos

3) Spray Copper Now as Bordeaux-
Begin spraying now to control Bacterial Canker. Cankers get started mainly in the fall after most of the leaves have fallen and the trees are beginning to go dormant. The only effective way to control this disease is to reduce the number of bacteria before the trees enter their susceptible period. ***The bacteria that start these cankers are found on the surfaces of mature leaves and other green tissues, and do not come from existing cankers.***

The only successful control we have found is repeated applications of the old Bordeaux mixture in September, October, and November and repeated again in the spring. Bordeaux Mix consists of hydrated lime (Builders Lime) and Copper Sulfate. The rates and methods of mixing are important. Begin your sprays as soon as the second week in September, make 4 applications in the fall

Note however that sprays of Bordeaux applied to green leaves must be safened with vegetable oil (Canola) to avoid burning the foliage. Four additional sprays 14 days apart will be applied. Bordeaux mix will also be applied in the spring with several applications before bud break.

It would be my recommendation that in all cherry blocks a program of Bordeaux Mix applications should be made as soon as possible before the next rains.

Spring Copper applications- In addition to the 4 fall applications of copper for bacterial canker, **two additional applications of copper should be applied in the spring prior to bloom.**

Mixing and Making -Bordeaux Mix

Copper sulfate
Use only powdered copper sulfate (bluestone or blue vitriol), often referred to as copper sulfate "snow" because it is finely ground and dissolves relatively quickly in water, to prepare tank-mix Bordeaux. Ordinary lump copper sulfate is not satisfactory. Store copper sulfate snow in a dry place. Moist snow becomes lumpy and is difficult to work through the screen into the tank. Use copper sulfate registered to make Bordeaux mixture.

Hydrated Lime
To prepare tank-mix Bordeaux, use only good quality hydrated lime (calcium hydroxide) also called builders lime. The hydrated lime should be fresh, that is, not carbonated by prolonged exposure to air. Hydrated lime is stable and usually is readily available under several trade names (Builders Lime) or Magnesium lime, a mixture of Ca(OH)2 and Mg(OH)2, may also be used.

Bordeaux formulas are stated as three hyphenated numbers: 8-8-100. The first number refers to the pounds of bluestone (copper sulfate), the second number to the pounds of spray (hydrated) lime, and the last number to the gallons of water to be used. Thus, an 8-8-100 Bordeaux contains 8 lbs. copper sulfate, 8 lbs. spray lime, and 100 gal water.

Have your spray tank ½ full of water and the agitation turned on, then add the copper sulfate or copper sulfate solutions, let mix thoroughly, then add the hydrated lime solution and mix, and then add the Canola Oil at 2.8 quarts/100 gallons to safen the mix for the foliage.

4. Cherry Foliar Nutrition
Foliar applications of Urea nitrogen on cherry have been shown to aid fruit size, increase set and increase cold hardiness

Reference
Ouzounis, Theoharis & Lang, Gregory. (2011). Foliar Applications of Urea Affect Nitrogen Reserves and Cold Acclimation of Sweet Cherries (*Prunus avium* L.) on Dwarfing Rootstocks. HortScience: a publication of the American Society for Horticultural Science. 46. 1015-1021. 10.21273/HORTSCI.46.7.1015.

Here are the details:
Apply with your airblast sprayer-two fall foliar applications of low-biuret urea applied at 20 lbs. per acre per application in 100 GPA spray water. The fall nitrogen applications increase the flowering spur Nitrogen going into winter and can improve spur leaf size the next spring. This translates into larger fruit size.

Timing is early-mid September and repeat with a *second application two weeks* later at 20 lbs. per acre per application in 100 GPA spray water. The September application helps with cold hardiness.

Dr. Greg Lang, MSU, reported that foliar urea was so strikingly consistent in its benefits and that he feels the mid-Sept through mid-Oct is the best window for Michigan growers. (They usually expect leaf senescence from Halloween through the 2nd week of Nov).

Nitrogen (N) and carbohydrates are stored in tree tissues in fall and are vital for fruit tree growth and development in spring. Fruit trees accumulate carbohydrate and N reserves prior to leaf drop, which are stored through the winter until they are remobilized to growing points (flower buds, new shoots and expanding spur leaves) the following spring. Reserves provide trees with the necessary energy for new growth when leaves are not yet present for photosynthesis and roots have not yet begun taking up adequate amounts of N from the soil.

5) I have had several growers over the years combine the copper spray with the urea spray. **Copper**-based fungicides are also effective and economical in controlling **cherry leaf spot**, but they can be phytotoxic to **cherry** leaves, hence the combination of Canola Oil to the tank to safen it.

Figure 1. Bacterial Canker of Sweet Cherry, Rutgers Snyder Farm, New Jersey. Photo: Win Cowgill

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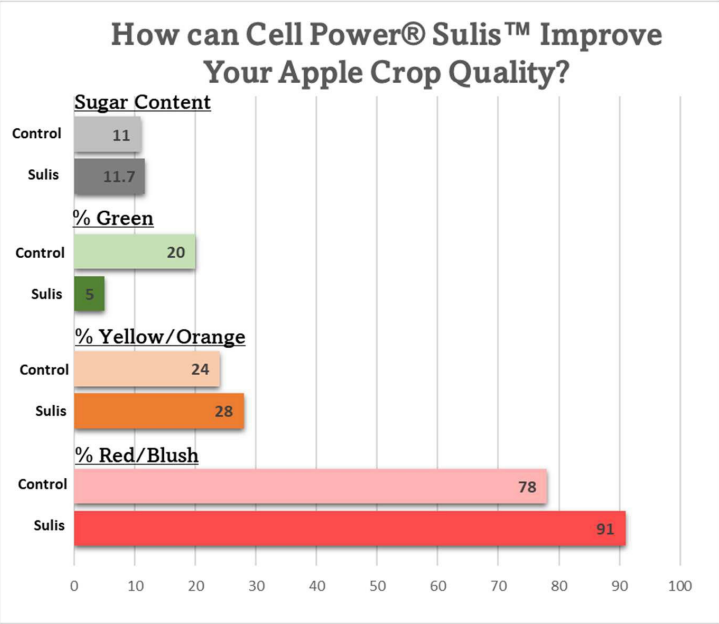

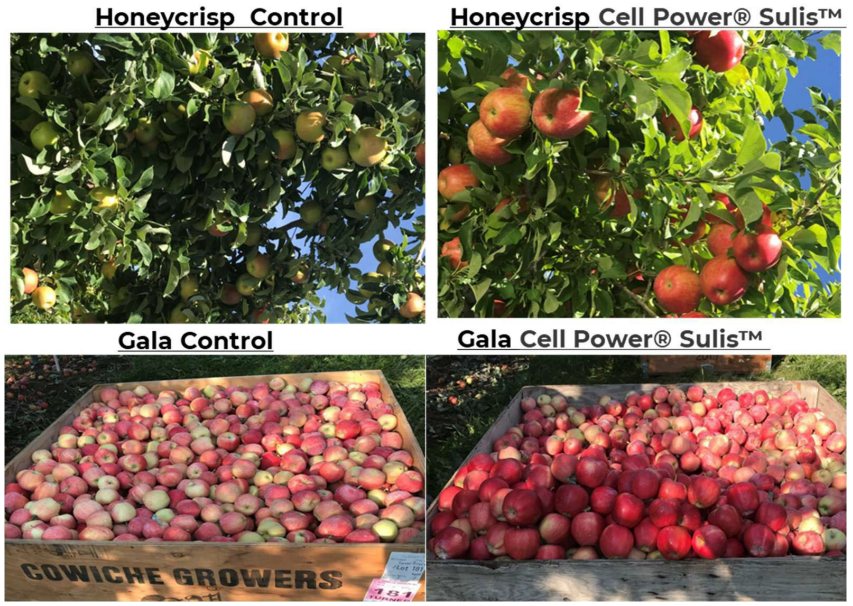

Does applying the diamide insecticide Verdepryn to target plum curculio also affect tick populations?

Jaime C. Piñero[1], Prashant Karki[1], Ajay Giri[1], Nolan Fernandez[2], Stephen Rich[2]

[1]Stockbridge School of Agriculture, University of Massachusetts Amherst

[2]The New England Center of Excellence in Vector-Borne Disease (NEWVEC), Department of Microbiology

The optimum time for controlling nymphal deer ticks (*Ixodes scapularis*) is typically from mid-May through mid-June, before tick populations peak. During this window, ticks are in their nymphal stage, which is the most active and likely to feed on hosts, increasing the risk of transmitting diseases like Lyme disease. In apple orchards, this period coincides with the critical petal-fall application for managing plum curculio, a key pest of apples. The timing of the plum curculio spray can serve as a valuable opportunity for integrated tick management, especially since many insecticide applications targeting curculio may also impact tick populations.

Deer tick, *Ixodes scapularis*

Recently, there has been interest in newer, more selective insecticides that are both effective against pests like plum curculio and rainfast enough to offer extended protection against ticks, even after rainfall. The rainfast nature of Verdepryn, a diamide that has proven to be very effective at controlling plum curculio and other pests at petal fall, may enhance their efficacy in the field, ensuring continued protection against pests even after rainfall events.

Materials and Methods

This experiment was conducted on May 20, 2024, at the UMass Cold Spring Orchard. At petal fall, the insecticide Verdepryn (Cyclaniliprole) was applied to control plum curculio. Five twigs with leaves were collected from trees treated with Verdepryn, 5 hours after the application (REI = 4 hours). Five additional twigs were taken from untreated trees to serve as controls. To prevent desiccation, each twig was covered with a moist paper towel and wrapped in parafilm before being transported to the laboratory in a cooler.

A total of ten 16 oz Pro-Kal deli containers, with perforated lids to allow for aeration, were used for the experiment. These containers were divided into two groups: five received one twig with leaves from Verdepryn-treated trees, while the other five received twigs from untreated trees. Each container was stocked with 20 ticks—comprising a mix of males, females, and nymphs—provided by the UMass Tick Lab, Microbiology Department. Mortality of ticks was recorded at 12 and 24 hours post-application.

Twigs with leaves sprayed with Verdepryn were exposed to ticks in the laboratory.

Results

At the 12-hour mark, 62.4% of ticks in the containers with treated twigs had died, while no mortality was observed in the control group (unsprayed twigs). By 24 hours, tick mortality in the treated group had increased to 95.9% (Fig. 1), with no observable mortality in the control group.

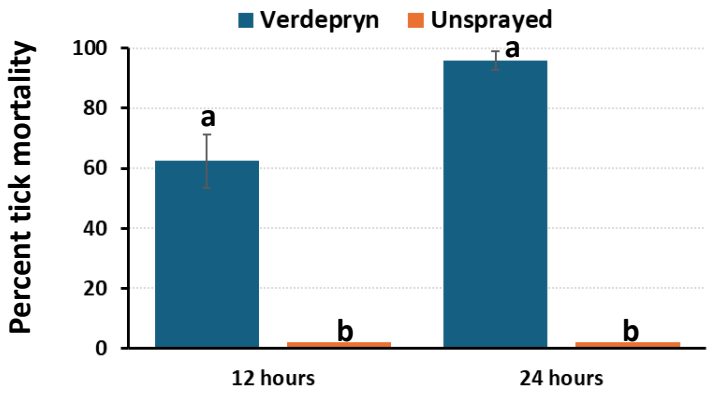

Figure 1. Tick mortality (adults and nymphs) at 12 and 24 hours post-exposure to Verdepryn-treated vs. untreated foliage. No mortality occurred in untreated groups. Treatment significantly increased mortality (odds 19:1).

Conclusion

The results suggest that Verdepryn insecticide can effectively help reduce tick populations on apple foliage, even though ticks are not the target pest of the treatment. The high mortality observed within 24 hours post-application indicates that Verdepryn, when applied for managing apple insect pests such as plum curculio, can also incidentally contribute to tick management in apple orchards.

Acknowledgements

We extend our gratitude to Heriberto Godoy Hernandez for his technical support and to Andy Martin (Honeypot Hill Orchards) for his insightful discussions that inspired this idea.

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What Are the Best Dwarfing Rootstocks for HoneyCrisp Apple, with Bitter Pit in Mind

Win Cowgill
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Megan Muehlbauer
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Honeycrisp apple has many challenges in growing it under commercial conditions, but one of the most difficult is the physiological disorder, bitter pit. Honeycrisp and some other varieties are very susceptible to this calcium deficiency disorder.

Bitter pit is a physiological disorder found in apple fruit. This is due to a lack of calcium in fruit cell walls which causes pitting of the fruit observed as discrete necrotic spots. This disorder can be particularly devastating in the high value cultivar Honeycrisp and can lead to 20-80% crop loss at harvest and/or after cold storage, see figures 1, 2.

Figure 1. Photo Credit: Fruitgrowernews.com

Figure 2. Left: Healthy apples no bitter pit. Right: Honeycrisp apples with bitter pit. Photo credit: researchgate.net.

The causes of bitter pit remain complex. It differs in severity based upon variety, calcium availability, summer temperatures, amount of shoot growth, and crop load. Managing these many factors takes very close observation, and sometimes costly mitigation strategies. One of which is monthly sprays of calcium, which have been shown to have inconsistent control of the disorder.

Rootstock Selection

The discussions in this article will focus on dwarfing rootstocks for Tall Spindle Planting Systems.

B.9 has been the rootstock of choice in the western New York apple growing region for reduced bitter pit in Honeycrisp for the past 15 plus years. It produces one of the smallest trees. We know this from past research, personal observation, and industry planting trends. However, note when B.9 is grown south of Lake Ontario it is more difficult to manage. This is true for even the Hudson Valley of NY. Also for NJ, VA and PA. In these states, B.9 tends to runt out in the warmer climates. B.9 is highly precocious as is HoneyCrisp, the combination causes

trees to stop growing after they begin to crop, hence the term runt out. We need a rootstock about the size of M.9-337 that will impart bitter pit tolerance to the Honeycrisp variety grown in Tall Spindle.

NC-140 Rootstock Multistate Trials

To this end our NC140- our multistate rootstock project has been investigating different rootstocks for size control and their effect on bitter pit, especially on vulnerable varieties such as Honeycrisp. Evidence has shown that rootstocks have differing vigor and differing abilities to update nutrients specifically cations (K and Ca), resulting in less bitter pit incidence found in certain cultivars. However, rootstock vigor, growth can differ based on environment. Thus, over the course of 3 years we collected data on bitter pit incidence in two rootstock studies (2010 & 2014 NC140 plantings) at the Rutgers Snyder Research and Extension Farm in Pittstown NJ to determine the effect of rootstock on bitter pit incidence in different Honeycrisp scion combinations.

We also looked at NC140 data from two other states, Virginia Polytech (VPI) and Cornell University.
At the Rutgers Snyder Farm:

- In NJ 2010 NC140 Rootstock trial B9 and B10 were equally good for controlling bitter pit at harvest, data not shown

- In NJ 2014 NC140 Rootstock trial B9 was not included.

- In NJ 2014 NC140 Rootstock trial, yield in pounds per tree was not significantly different between G.214, B10 and G.969 and were in line with all other rootstocks in this trial, Table 1.

Materials and Methods for NJ NC140 2014 HoneyCrisp Rootstock Planting

These trials were planted at these 3 locations above. Here were the parameters of the NJ, 2014 NC140 Honeycrisp trail. It was planted at a spacing of 4' by 12' (907 trees per acre) and consisted of 14 different rootstocks (B.10, G.11, G.202, G.214, G.30, G.41, G.935, G.969, M.26 EMLA, M.9 NAKBT337, V.1, V.5, V.6, V.7). From 2014 to present the trees were managed in accordance with the commercial standards as written in the 2021/2022 New Jersey Tree Fruit Production Guide.

The trial was sampled during each of the following harvest seasons 2018, 2019, 2020. A total of 5 trees were sampled from each rootstock in the trial. At harvest a total of 50 random fruits were harvested from each tree. Each apple was rated for incidence of bitter pit and a total percentage of bitter pit (# of apples with bitter pit / 50 x 100) was recorded per tree. The samples were then loaded into bins and put into cold storage (37.4 °F) for 3 months. After three months the percent bitter pit incidence for each sample was recorded again.

Yield was recorded by tree and as well as the Trunk Cross Sectional Area to determine relative tree size in all 3 states. See Figure 3 and Table 1.

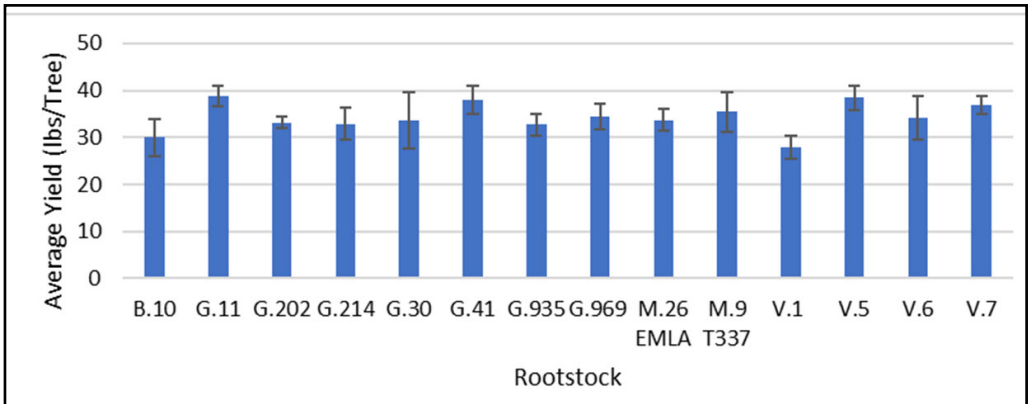


Figure 3. Average percentage yield of Honeycrisp apples 2018-2020 by tree across 14 rootstocks in the 2014 NC-140 Honeycrisp block, Rutgers Snyder Research and Extension Farm, Pittstown, Hunterdon County, NJ. Note: Data displayed with standard error bars.

Discussion

Budagovsky rootstocks, referred to as Bud or B. (e.g., B.9 and B.10), were developed in the Soviet Union by crossing M.8 x Red Standard (Krasnij Standart). B.10 was developed at the Michurinsk University of Agriculture, Russia, from crossing B.9 X B.13-14.

Dr. Sheriff noted "it is worth mentioning that B.9 and B.10 share the same breeding origins, and the resistance of B.9 to bitter pit cannot be called into question."

Table 1. The size of 'HoneyCrisp' trees on different rootstocks relative to M.9 T337 and M.26 EMLA.

Rootstocks	Tree vigor relative to M.9 T337	Tree vigor relative to M.26 EMLA
G.41	0.93	0.80
G.11	0.94	0.81
G.935	1.08	0.92
B.10	0.88	0.76
M.9 T337	1.00	0.86
G.214	1.49	1.28
G.969	1.65	1.42
G.30	1.87	1.60
V.1	1.93	1.66
V.5	2.10	1.80
V.7	1.96	1.69
V.6	2.30	1.98

All three states -NJ, NJ, VA indicated B.10 is about the same size as M.9 T337. With G.214 and G.969 larger. See Figure 3 and Table 1 and refer to the Geneva Apple Rootstock Comparison Chart in the appendix.

In NJ, Figure 4 shows that rootstocks B.10, G.214 and G.969 had the lowest amount of bitter pit at harvest.

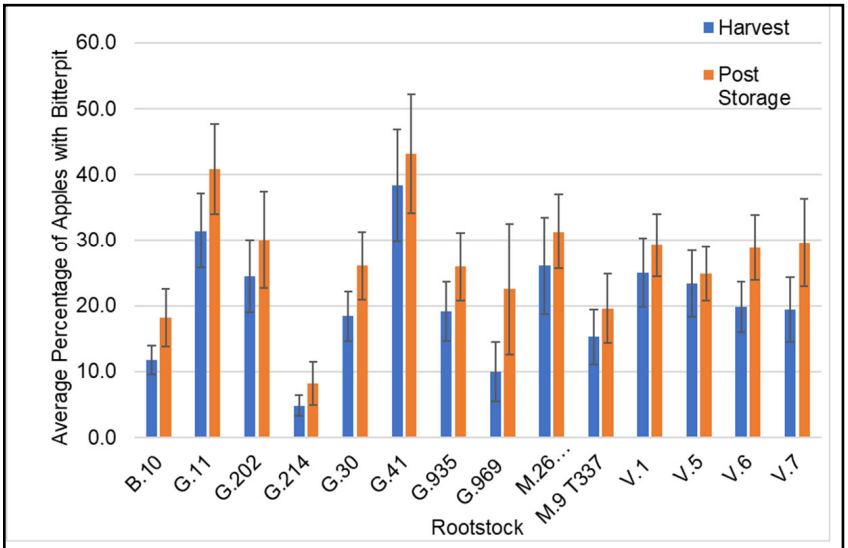


Figure 4. Rutgers NC140 Honeycrisp percentage of apples with bitter pit, data from 2018-2020 growing seasons.

In Virginia, VPI- Figure 5 shows B.10 had the lowest incidence of bitter pit.

In NY, Dr. Terence Robinsons data (not shown) indicates the 2014 NC140 average bitter pit incidence (%) of 15 rootstocks between 2018 and 2022 matched NJ results. That is in NY, B.10, G.969, and G.214 stocks had the lowest bitter pit incidence of the 15 over 5 years. All three of these stocks had low to moderate vigor measured by 5-year average TCSA increment measurement. Of the three in the period of 2018-2022, G.969 had the highest 5-year cumulative yield and the bitter pit free yield was nearly identical to the cumulative yield. Both B.10 and G.969 had high average fruit peel calcium (Ca) and low fruit peel K/Ca between the years of 2018-2020.

In *conclusion*, B.10 grown in NJ, NY and VA had the lowest incidence of Bitter Pit of the 14 and 15 rootstocks evaluated.

Dr. Sherif also commented that "B.10 stock is the most outstanding rootstock in VA. Particularly with regards to its ability to reduce bitter pit incidence at harvest and after three months in cold storage for five consecutive years (2017–2021). In addition, our nutrient analysis of Ca, K, and Mg in the skin and flesh of B.10, G.41 (moderately sensitive), and V.6 (very sensitive) revealed that B.10 had significantly higher levels of Ca and lower levels of K and Mg than the other two rootstocks. Furthermore, additional biochemical analyses of cell wall components from the three rootstocks demonstrated that fruits from B.10 contained more free Ca, which is a far more significant factor than bound Ca, but is often disregarded by researchers."

Recommendations for Honeycrisp Rootstocks

- B.9 – Excellent for Bitter pit, one of the smallest tree sizes, **preferred in Western New York** along Lake Ontario -Fireblight tolerant, **takes extensive high-quality management to grow and perform**

- B.10- excellent for bitter pit, M.9 size, Fireblight tolerant, cold hardy, productive, tolerant to replant disease, moderate resistant to woolly apple aphid.

- G.969- Excellent for Bitter pit, larger more vigorous than M.9, M.7 size- very resistant to fireblight, cold hardy, not susceptible to latent virus, tolerant of replant disease, tolerant of phytophthora, high resistance to Wooly apple aphid.

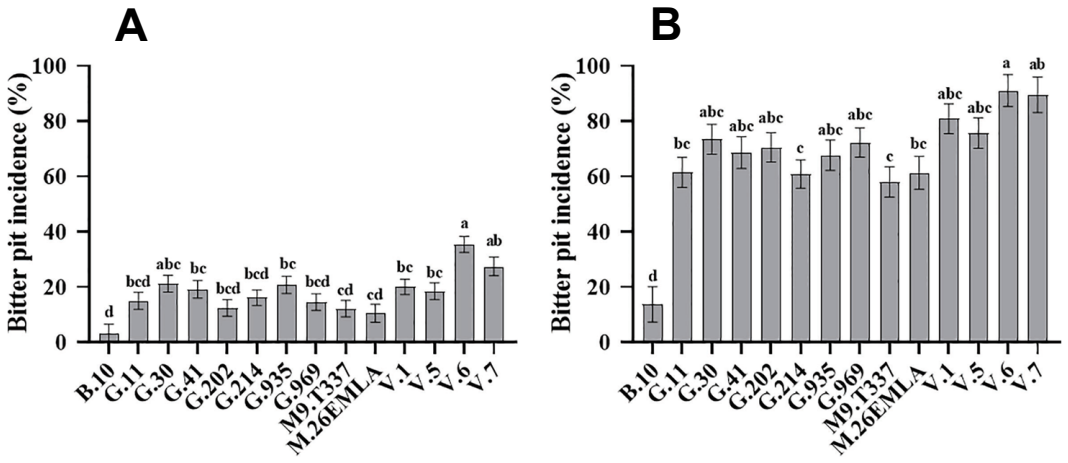


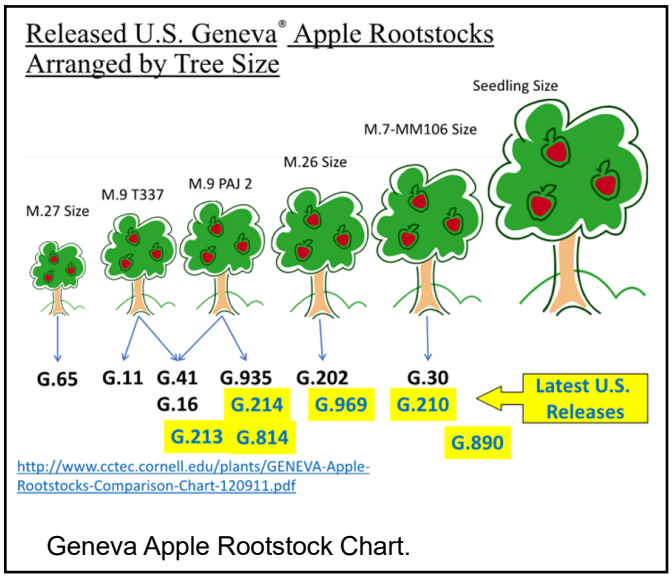
Figure 5. Rootstock effects on bitter pit (BP) incidence in 'Honeycrisp' apples. (A) Cumulative BP incidence at harvest (each bar represents the average of four growing seasons); (B) cumulative BP incidence after three months of cold storage (each bar represents the average of three growing seasons). Means not sharing any letter are significantly different at a = 0.05., according to Tukey's HSD test in JMP Pro16.

- G.214- Excellent for bitter pit, fireblight tolerant, slightly larger than M.9- smaller than M.26, very resistant to fireblight, cold hardy, not susceptible to latent virus, tolerant of replant disease, tolerant of phytophthora, high resistance to woolly apple aphid, consider for use, harder to find.

- Do not use G.41- Extensive bitter pit, remains juvenile and thus delays productivity in years 2-5 (shy bearer

Do not use M.9 clones, fireblight issues.

Appendix



Geneva Apple Rootstock Chart.

References

- **Rootstock effects on bitter pit incidence in 'Honeycrisp' apples are associated with changes in fruit's cell wall chemical properties**
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- *https://bud10rootstock.com/*
- **Big Breakthrough When It Comes To Bitter Pit and 'Honeycrisp' Apples**
- *https://www.growingproduce.com/fruits/apples-pears/big-breakthrough-when-it-comes-to-bitter-pit-and-honeycrisp-apples/*
- **Geneva Apple Rootstock Comparison Chart** *https://ctl.cornell.edu/wp-content/uploads/plants/GENEVA-Apple-Rootstocks-Comparison-Chart.pdf*
- **Rootstock effects on bitter pit incidence in 'Honeycrisp' apples are associated with changes in fruit's cell wall chemical properties**
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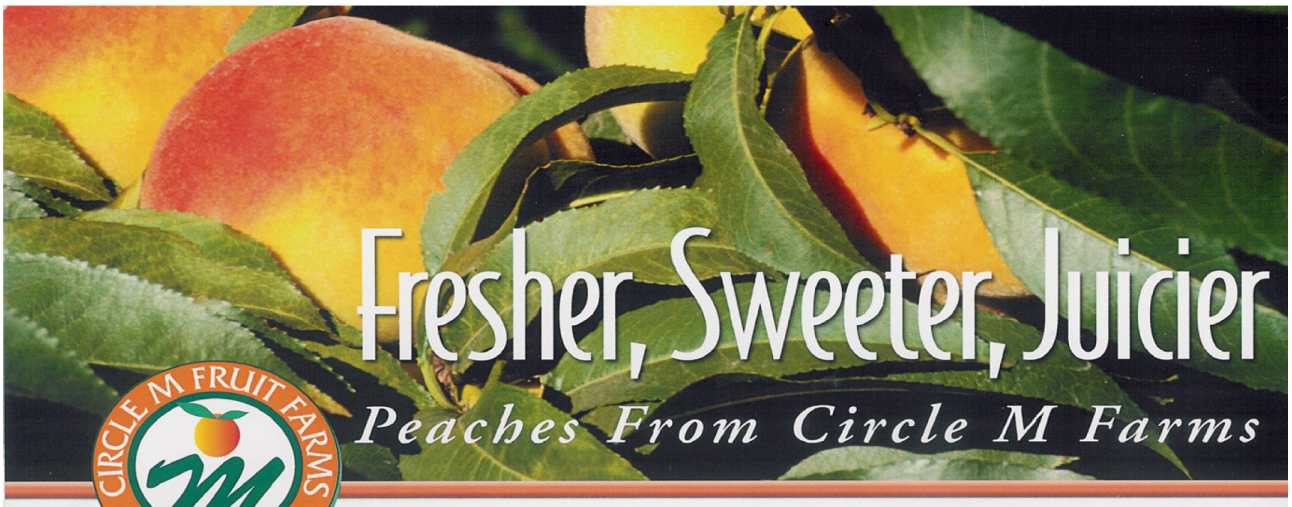

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