FruitNotes

Volume 91, Number 2, Spring 2026

Fruit Notes

Editor: Jaime C. Piñero

Fruit Notes (ISSN 0427-6906) is published four times per year by the Stockbridge School of Agriculture, University of Massachusetts Amherst.

Table of Contents

Cover: MDW20-100 apple trees in bloom at the UMass Orchard, Belchertown, MA on 8-May, 2026. MDW20-100 is an MAIA selection recently released for grower planting and sold as 'Red Zeppelin.' Note that MAIA selects apple trees for late bloom to reduce risk of frost/freeze damager (photo credit: Jon Clements).

A New Chapter for *Fruit Notes*!

Because the transition to the planned blog-style format is still in development, we decided to publish the Spring 2026 issue of Fruit Notes using the traditional website and PDF format.

After many years of working together with *Horticultural News (NJ)*, we will be going in a new direction. Soon, *Fruit Notes* will move forward independently and will once again carry a familiar name from earlier UMass publications:

Fruit Notes of New England

We are excited about this next phase. Our goal is to bring you information in a more timely and engaging way, with:

- Updates about every two weeks (on and off-season)
- Results from field trials and grower surveys
- Highlights from ongoing and completed research relevant to your orchards
- Practical summaries to support pest management and fruit production
- Within selected research articles, more photos and, in some cases, short videos to help illustrate key findings and take-home messages

We hope the new format will make it easier to stay up to date and quickly find useful, research-based information for your operation.

Be on the lookout for *Fruit Notes of New England*!

Sincerely yours,

Jaime Pinero

Comparison of Three Pesticides for Managing San Jose Scale in New York Apple Orchards

Jiyeong Choi[1], Timo Rohula[1], Bradley Palmer[2], Monique J. Rivera[1]

[1]Cornell AgriTech, Cornell University

[2]Reality Research, LLC

San Jose scale (SJS; *Quadraspidiotus perniciosus*) is a widely dispersed pest of tree fruits such as pome fruits, stone fruits, and tree nuts (Alston et al., 2011). Notably, SJS is the most damaging scale pest of apples, especially in high-density orchard system (Jentsch, 2017; Lentz, 2025). This crawler pest colonizes on woody tissues and fruits (reddish-purple ring spots), causing reduced plant growth, smaller fruits, and tree decline especially under heavy infestations (Alston et al., 2011; Lentz, 2025).

In the Northeast, SJS goes through two generations per growing season. SJS overwinters in the immature stage under scale covers on the tree surfaces (twigs and branches), with adults emerging in spring and mating occurring around petal fall (Lentz, 2025). In early to mid-June and early August, SJS crawlers emerge (Jentsch, 2020; Lentz, 2025).

SJS crawlers can be monitored using black electrical tape wrapped around infested limbs, while adults can be monitored using pheromone traps prior or during blooming (Alston et al., 2011; Lentz, 2025). Pruning, where possible, infested branches and suckers are recommended early in the season (Alston et al., 2011; Lentz, 2025). If scales are present, dormant or delayed dormant oil (sometimes in combination with insecticides) spray targeting overwintering SJSs (black cap stage) is recommended to reduce infestation later in the season (Alston et al., 2011; Jentsch, 2020; Lentz, 2025). For post-bloom phase, sprays can be applied at first and peak crawler activities (7-10 days after emergence) (Alston et al., 2011; Jentsch, 2017; Lentz, 2025;).

Heavy infestations of SJSs are difficult and costly to manage, making early prevention of colony establishment critical. We tested three pesticide treatments in this study: (i) Esteem 35 WP, an insect growth regulator; (ii) Sil-MATRIX, a potassium silicate insecticide with barrier-forming activity; and (iii) a combination of Sil-MATRIX and JMS Stylet-Oil, a mineral oil pesticide. The aim of this study was to compare impact of three pesticide formulations applied at half-inch green on SJS mortality in apple orchards in NY.

Materials and Methods

The field trial was conducted in April when trees were in the half-inch green phenological stage. Trees were 27-year-old 'Cortland' apple trees, planted in a 16 × 10 ft spacing in Lyons, NY. Three pesticide treatments were evaluated for their effects on SJS mortality: Sil-MATRIX (29%), Sil-MATRIX (29%) with JMS Stylet-Oil (97.1%) (Sil-MATRIX + JMS Stylet-Oil), and Esteem 35 WP (35%). Untreated control (UTC) was used as a negative control.

Treatments were foliar sprayed with 100 gallons per acre, and a three-point hitch Maschio-Gaspardo tower airblast sprayer was used with a ground speed of 2.1 mph. At 168 days post-treatment, 400 apples per treatment were collected and evaluated for (i) severity of scale damages and (ii) presence of alive and dead SJSs for mortality assessment. Statistical analyses were conducted to find significant differences in means of alive and dead SJSs and SJS mortality across treatments using NB GLMM and binomial GLMM models, respectively, followed by pairwise comparisons.

Results

Assessment of SJS damage severity showed that all three pesticide treatments increased the proportion of apples without scale damage and decreased the proportion of apples with moderate (6-30 scales) to high (>30 scales) severity compared to UTC, but the difference was not statistically significant (Table 1).

Table 1. Assessment of San Jose scale (SJS) damage severity under different pesticide treatments.

Treatment	Apples examined	Percent apples with no damage[a]	Percent apples with low damage	Percent apples with moderate damage	Percent apples with high damage
Untreated control	400	81%	5.75%	10.5%	2.75%
Sil-MATRIX	400	88.75%	5.5%	4.25%	1.5%
Sil-MATRIX + JMS Stylet-Oil	400	84%	6.25%	8%	1.75%
Esteem 35WP	400	86%	7.25%	6.25%	0.5%

[a]Percentage (%) of apples that exhibits no damage (clean/no infestation), low damage (1-5 scales), moderate damage (6-30 scales), and high damage (> 30 scales).

Of the 1,600 apples collected, infested apples with scale damages were assessed for the presence of alive or dead SJSs. Applying Esteem 35 WP significantly reduced mean numbers of alive SJSs compared with UTC (Figure 1). None of the pesticide treatments affected mean numbers of dead SJSs (Figure 2). Application of Sil-MATRIX + JMS Stylet-Oil and Esteem 35 WP significantly increased SJS mortality (Figure 3).

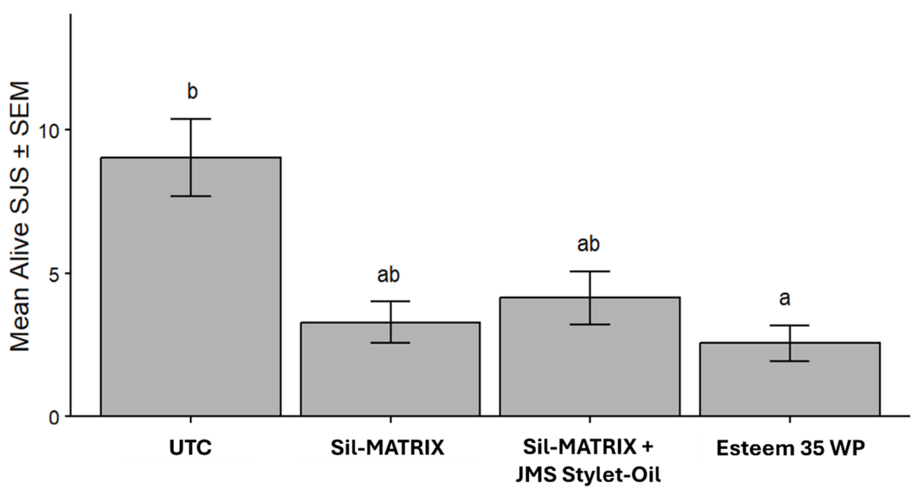

Figure 1. Mean numbers of alive San Jose scale (SJS) per fruit with standard error mean (SEM) shown on y-axis. The x-axis shows untreated control (UTC) and three pesticides tested in this study. Different letters denote significant differences in number of alive SJSs (*P* < 0.05).

Conclusions

This first-year pesticide trial in NY apple orchard showed that application of Esteem 35 WP (35%) at half-inch green significantly reduced number of alive SJSs and led to elevated mortality. It is important to note that effective spray coverage and proper timing remain critical for SJS management, and additional trials over multiple growing seasons are needed to confirm these findings.

Acknowledgements

This study was supported by research funds from Certis Biologicals.

References

Alston, D.G., Murray, M., Reding, M.E. (2011). San Jose Scale (*Quadraspidiotus perniciosus*). Utah State University Extension. Retrieved from https://extension.usu.edu/planthealth/research/san-jose-scale

Jentsch, P.J. (2017). Weighing In On Tree Decline: San Jose Scale Mgt. This Season. Cornell University. .

Jentsch, P.J. (2020). Tipping the scale: First emergence & management of San Jose scale. Cornell University.

Lentz, E. (2025). Developing an IPM Plan for San Jose Scale. UConn Extension. Retrieved from https://extension.uconn.edu/publication/ipm-plan-san-jose-scale/

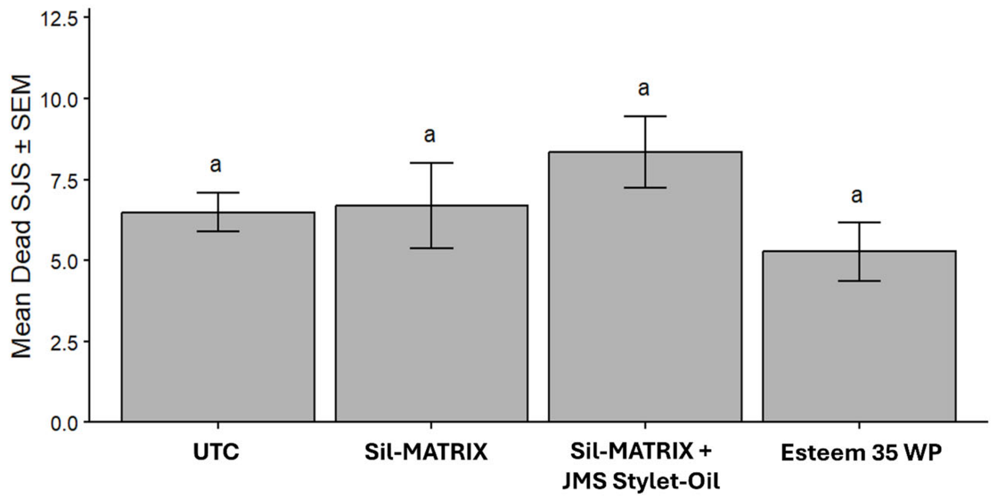

Figure 2. Mean numbers of dead San Jose scale (SJS) per fruit with standard error mean (SEM) shown on y-axis. The x-axis shows untreated control (UTC) and three pesticides tested in this study. Same letter denotes no statistical difference in number of dead SJSs (*P* > 0.05).

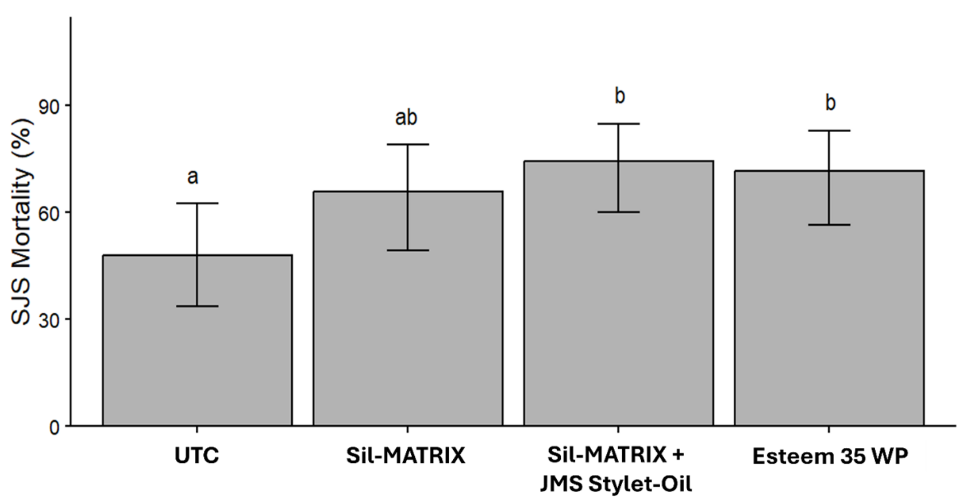

Figure 3. The impact of pesticides on San Jose scale (SJS) mortality. The y-axis shows percent (%) SJS mortality, and the x-axis shows untreated control (UTC) and three pesticides tested in this study. Different letters denote significant differences in SJS mortality (*P* < 0.05).


NOURSE
Delivering Quality
NourseFarms.com | 413-665-2658 | info@noursefarms.com
WE DELIVER
high-quality plants
so you can deliver a
high-quality
HARVEST.

Shifting Away from Herbicides in Grapes and Other Small Fruits

J. Stephen Casscles
Owner of Cedar Cliff Vineyards, Athens, NY; and collaborator in winemaking with Alfie Alcantara at Dear Native Grapes Winery, Walton, NY.

As a Northeast fruit grower, I became increasingly interested in evaluating alternatives to herbicides such as glyphosate, paraquat, and simazine for under-canopy weed management. I grow grapes, along with currants and blueberries in the Mid-Hudson Valley.

I became interested in how repeated herbicide use may influence soil condition, weed communities, and overall vineyard management. The adverse soil attributes that may occur: hard and compacted soils; increasingly less soil tilth, organic matter content, and fewer beneficial earthworm & microorganism populations; lower retention of soil moisture; and more noxious weeds that cannot be easily controlled. This led me to explore alternative practices that could control weeds while enhancing soil health and long-term productivity. This article summarizes observations from a five-year on-farm effort (2021–2025) to reduce reliance on herbicides and evaluate practical alternatives suitable for small- to medium-scale growers in the Northeast.

Weed Management Program Goals

One goal for an under-canopy weed management program is to minimize weed growth to maximize fruit yields and improve vine health. Uncontrolled weed growth creates competition for grape and small fruit crops to receive needed water, sunlight, and nutrients. Further, high weeds can reduce air circulation within the grape canopy or fruit bush to create conditions that foster fungus disease. An effective weed management strategy prevents the spread of weeds *before* they grow too large; not eliminate weeds *after* they have established. This is a more effective strategy; tailoring a weed program to *your* farm to curtail weeds in a timely manner. Such a strategy can rely on many different ways to manage weeds, tailored specifically to the growers' operation.

On-Farm Trial Overview

This article is for Northeast growers, especially small acreage growers, who can evaluate various practices on a small scale, as these techniques are not capital intensive. These techniques (Table 1) may assist small growers who want to farm "sustainably" or have an interest in organic, bio-dynamic, regenerative, or other alternative farming practices.

Over a five-year period, I evaluated approaches to managing weeds under the canopy in grapes and small fruit plantings at Cedar Cliff Vineyards & Nursery (Athens, NY). The primary goal was to identify cost-effective and practical alternatives that:

- reduce or eliminate herbicide use,
- are not excessively capital nor labor-intensive, and
- contribute positively to soil condition and crop performance.

The rolling farm has Valois-Nassau Complex silt loam soils, with fifteen percent glacial till of sandstone, limestone, and shale, with some hard-pan clay soils, which has areas of well drained to not very well drained soils. Under our previous glyphosate application practice, we used a backpack sprayer. It took about eight hours to treat the entire three-acre vineyard and deer fence line with two applications each year. The alternatives below will be compared to this previous practice.

Weed Control Alternatives Evaluated

The following practices were tested under field conditions. Their effectiveness will vary depending on soil type, slope, crop, and management goals of each grower. The practices described below were selected because they could be implemented without major capi-

Table 1. Weed Management Practices Comparison*.

Practice Evaluated	Weed Control Effectiveness	Labor Costs	Equipment & Capital Costs	Yearly Task Obligations
Black Plastic	High	Medium	High	Medium
Stone Mulch	Medium	Medium	Medium	Low
Organic Mulch**	High / Medium	Medium	Medium / High	Medium
Under-Canopy Cultivation	Medium	High	Medium	High
Promoting Low-Growing Ground Cover	Medium	Medium	Low	Low / Medium
Planting Understory Fruit Crops	Medium	High	Low	High***
Mowing and Mechanical Vegetation Control****	High	Medium	Low	Medium / High
Organic Herbicides	Undetermined in this study	—	—	—
Grazing Animals	Medium	High	High	High
Glyphosate Application*****	High	Medium	Low	Medium

* Observations at Cedar Cliff Vineyards, Athens, New York (2021-2025)
** Added benefit of enhanced soil health, fertility, and water retention
*** Added benefit of an additional fruit crop and profits derived from such crop
**** Expected to increase biodiversity, soil tilth and health, & earthworm populations
***** Did not factor in the possible adverse effects to soil health, water retention, & soil productivity

tal investment and adapted to different parts of the farm depending on soil type and crop. In limited situations, the practices below did not preclude the establishment of noxious weeds, roots, and rhizomes that could only be controlled with conventional herbicides.

1) Black Plastic. Rolls of black plastic reduced weed pressure, but was relatively expensive to install, maintain, remove, and dispose of the plastic. It did not contribute organic matter to soils and diverted rainfall away from the root zone. With specialized equipment, this approach may be more feasible for some growers.

2) Stone Mulch. Applying gravel or small stones under the canopy moderately suppressed weed growth and helped to retain soil moisture. Once stones are placed, this practice works well and is relatively permanent, however, it is helpful to occasionally place more stones to freshen-up your stone mulch. This method was relatively low in cost when materials were locally available and required minimal maintenance once established. Stones may also help reduce surface compaction under some conditions and beneficially re-direct heat back to vines.

3) Organic Mulch. Organic materials such as wood chips, leaves, straw (not hay because of weed seeds) or compost provided effective weed suppression and incorporated organic matter to soils. To remain effective, reapplication is required at least every two years due to decomposition. When using wood chips, additional nitrogen inputs may be needed to offset nitrogen immobilization during decomposition. If the mulch is laid on too thick, it can create nesting places for rodents such as mice. Use only fully composted mulch that has attained high temperatures to kill weed seeds and seedlings. The time to apply mulch is significantly longer than applying herbicides to suppress weeds, but the added benefit is healthier soils. Further, once mulch is added, the application of subsequent mulch layers is much quicker than the first application.

4) Under-Canopy Cultivation. Mechanical cultivation can effectively control weeds but may damage shallow root systems in certain grape and currant varieties. It also requires specialized equipment and careful timing to avoid soil compaction, especially under wet conditions. This method is much more labor intensive with substantial tractor usage when compared to applying herbicides as the furrow needs to be made and peeled off each year. In the past, this was a very common way to control weeds, but is becoming less popular today.

5) Promoting Low-Growing Ground Cover. Encouraging naturally occurring or planted low-growing species (e.g., strawberries, marigolds and zinnias) helps suppress weeds and increases plant diversity under the canopy. Over time, strawberries establish themselves, expand their coverage, and curtail weeds from growing. To maintain such strawberry beds, they need to be occasionally weeded and set out new runners to expand these beds. Some plant species may also provide additional benefits such as habitat for beneficial insects.

6) Planting Understory Fruit Crops. Integrating crops such as currants beneath grape rows can provide an additional crop while reducing exposed soil. Currants ripen by July, so they do not conflict with vineyard work. They are fungus disease resistant and late spring frost tolerant. Further, birds, deer, and other wildlife are not fond of currants, so there is little wildlife damage and no netting is required. In pruning grapes to increase currant production, heighten the grape vine's under canopy so that they have sufficient sunlight and air drainage. This approach requires attention to potential competition for water, sunlight, and nutrients and may be more suitable for certain deep rooted grape varieties and site conditions.

7) Mowing and Mechanical Vegetation Control. Using a push mower proved to be practical for small vineyards. While somewhat more time-consuming than herbicide application, it helped to maintain low ground cover and reduced the presence of larger weeds over time. Both mowing and herbicide applications were done twice a year. Using a lawn mower is not recommended for vineyards with high-profile medium-sized stones. Using a string trimmer took about twenty-five percent more time than either mowing or applying herbicides. If a string trimmer is used, care must be taken to avoid trunk damage. Our observation was that creating a low under-canopy groundcover reduced the percentage of herbicide treated ground that had barren, hardpacked soils, and increased soil health and tilth.

8) Organic Herbicides. Products such as horticultural vinegar, plant-based oils, and fatty acid formulations are used by some growers as alternatives to conventional herbicides. These were not evaluated in this trial, but should be considered in future studies.

9) Grazing Animals. Some growers use sheep or goats to control vegetation. This approach contributes to nutrient cycling and reduces mowing needs, but requires fencing, animal water access, and careful timing to avoid crop damage. Further, these grazing animals need to be taken care of for the rest of the year when not in the vineyard.

Comparative Observations. Each under-canopy weed control practice presented trade-offs in terms of cost, labor, and effectiveness. No single approach was opti-

Photo 1. Red currants grown as an understory fruit crop, with naturally occurring low-growing clover serving as ground cover.

Photo 2. Naturally occurring alpine strawberries, clover, and other low-growing ground covers helping suppress taller weeds under grapes and other small fruit crops.

mal under all conditions. It is important to tailor such weed control program to each farm's soils, fruit crops, and labor/capital needs or restrictions. After five years of evaluating different weed control practices, the best practices for weed control studied were in order of cost-effectiveness: mowing, organic mulch, stone mulch, low-growing ground covers, and under-canopy fruit cultivation. The least cost-effective practices were

Photo 3. Push mower used to manage tall weeds under Pallmer grape vines.

Photo 4. Naturally occurring wild alpine strawberries to suppress tall weeds under grape canopy.

Photo 5. Seeded low growing marigolds to suppress tall weeds. Due to their strong scent, may deter some harmful insect pests.

Photo 6. String trimmer used to manage tall weeds.

black plastic and under-canopy cultivation, with the jury out on organic herbicides and animal grazing. It is understandable why applying herbicides is popular with growers. It is effective, with low to medium labor and capital inputs to apply. However, the long-term use of herbicides may lead to less healthy soils that have less tilth, organic matter content, and ability to retain useable moisture for vine or fruit bushes.

References

Bley, Matthew, Gannett, M., *Experimental Control of Bindweed in Established Blueberry Plantings,* Fruit Notes, Vol. 90, 11-15, Spring, 2025.

Casscles, J. Stephen, *Grapes of the Hudson Valley and Other Cool Climate Regions of the United States and Canada,* Flintmine Press, Coxsackie, NY, 30-33, 37-41 (2023).

Gannett, Maria, *Experimental control of bindweed in established blueberry plantings: Year 2 (2025),* Fruit Notes, Vol. 90, 15-17, Fall 2025.

Milkovich, Matt, *Where do we grow from here ?: Our changing climate demands resilience,* Good Fruit Grower, 5, April 1, 2024.

Penn State University Extension, *Controlling Weeds in Nursery and Landscape Plantings.* https://extension.psu.edu/controlling-weeds-in-nursery-and-landscape-plantings.

Rothamsted Research, *The World's Food Supply Is at Risk: Modern Agriculture Is Destroying the Soil Beneath Our Feet,* SciTechDaily, October 10, 2025, https://scitechdaily.com/the-worlds-food-supply-is-at-risk-modern-agriculture-is-destroying-the-soil-beneath-our-feet/.

Schloemann, Sonia, Editor, UMass Amherst, *New England Small Fruit Pest Management Guide, 2024-2025.* An annual guide prepared by the New England Universities that operate Cooperative Extension Services.https://www.umass.edu/agriculture-food-environment/fruit/ne-small-fruit-management-guide.

Wise, Alice., Senesac, A., Dunst, R., *Sustainable Viticulture in the Northeast: Alternate Weed Management in New York Vineyards.* Finger Lakes, Lake Erie, and Long Island Regional Grape Programs, Cornell Cooperative Extension, https://newyorkwines.org/wp-content/uploads/2021/10/sustainableviticulture3.pdf.

Stephen Casscles is the author of the books Grapes of the Hudson Valley and Other Cool Climate Regions of the U.S. and Canada and The Wine Grapes of Chungcheongbuk-do, Korea.

EDITOR'S NOTE: The observations presented here are based on a small, diversified planting (approximately three acres) and reflect practical, on-farm experience. These practices are likely most applicable to small- to medium-scale operations and may require adaptation for larger or more mechanized systems.

Circle Traps for Plum Curculio: Revisiting Their Potential for Population Suppression

Jaime Piñero[1] and Brittany Kordick[2]

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

[2]***Kordick Family Farm, Westfield, NC***

Plum curculio (PC) remains one of the most important early-season pests of apples in eastern North America, and management continues to rely largely on insecticide applications around petal fall. At the same time, there is increasing interest in approaches that take advantage of insect behavior. Circle traps exploit the natural climbing behavior of PCs adults by intercepting them as they move up tree trunks, and we need to determine whether odor lures could be added to enhance captures.

A commercial apple grower in North Carolina has been evaluating Circle traps over multiple years with two practical objectives: to determine whether sustained trapping can reduce local PC populations and injury, and to develop deployment strategies that are feasible under commercial conditions. Early results were encouraging. In 2023, six traps captured 593 adult PCs over the season. In 2024, increasing trap density to eighteen traps resulted in 723 PCs captured, along with noticeable improvements in fruit quality in previously high-pressure areas . These results prompted a more structured evaluation in 2025, including comparisons among lure types and unbaited traps.

Materials and Methods

The 2025 study was conducted in a commercial apple orchard of approximately 1,000 trees on M.111 rootstock, located adjacent to wooded areas with historically high plum curculio pressure. Two trapping settings were used: a perimeter block targeting immigration from surrounding habitat, and a smaller (~40-tree) test orchard used to compare lure treatments.

In the test orchard, Circle traps (Figure 1) were deployed on individual trees using three treatments: plum essence, methyl salicylate (= wintergreen oil), and unbaited controls. Each tree represented a different cul-

Figure 1. Circle (trunk) traps deployed at Kordick Family Farm, North Carolina. The mesh band intercepts plum curculio (PC) adults moving along the trunk. A methyl salicylate (wintergreen oil) lure (left) or a plum essence lure (right) is placed nearby and is being evaluated for attractiveness to PCs. These traps exploit PC crawling behavior: adults climb to feed but often drop at night; as they move along the trunk, they are funneled into the collection device.

tivar or genotype, and there was substantial variation in bloom and fruit set across the orchard. Some larger trees required multiple traps due to trunk diameter, although trap fit was not always ideal under those conditions.

Traps were installed early in the season and checked frequently during the main period of PC activity. Daily captures were recorded, along with general observations on bloom stage and tree condition. For analysis, captures were grouped into biologically meaningful periods defined by the data. The period of peak activity was identified as the interval with the greatest accumulation of captured PCs. Earlier captures were classified as pre-peak, and later captures through late May as post-peak. Data after June were excluded from lure comparisons, as they likely represented a new generation and lures were not replaced.

Results

Seasonal pattern of plum curculio captures in a North Carolina orchard. Capture patterns showed a pronounced and early peak in plum curculio activity, with the highest captures occurring in late March to early April. Following this peak, captures declined steeply but did not drop to zero. Instead, a prolonged low-level activity persisted through May and into the summer, with occasional minor increases. By late May, captures were consistently low, indicating the end of the main immigration period of overwintered adults (Figure 2).

Lure Performance over time. This analysis included captures of overwintered PCs only – until May 31. First captures occurred on March 29, when activity was minimal. During this before-peak period, wintergreen oil and plum essence traps performed similarly, while unbaited traps captured no PCs (Figure 3).

The main immigration period occurred from March 30 to April 7. During this peak window, lure-baited traps numerically captured more PCs than unbaited traps. Wintergreen oil traps averaged 20.2 PCs per trap, plum essence 16.6, and unbaited traps 6.4, suggesting a potential lure effect during movement of overwintered adults.

From April 8 to May 31, captures declined and the pattern shifted. Unbaited traps averaged 10.5 PCs per trap, compared with 8.5 for wintergreen oil and 8.3 for plum essence (Figure 3), suggesting that after peak immigration, trap performance depended more on placement and tree-level factors than on lures. These results reflect conditions in a single commercial orchard in North Carolina, so additional research across multiple orchards and regions is needed to determine how broadly these findings apply.

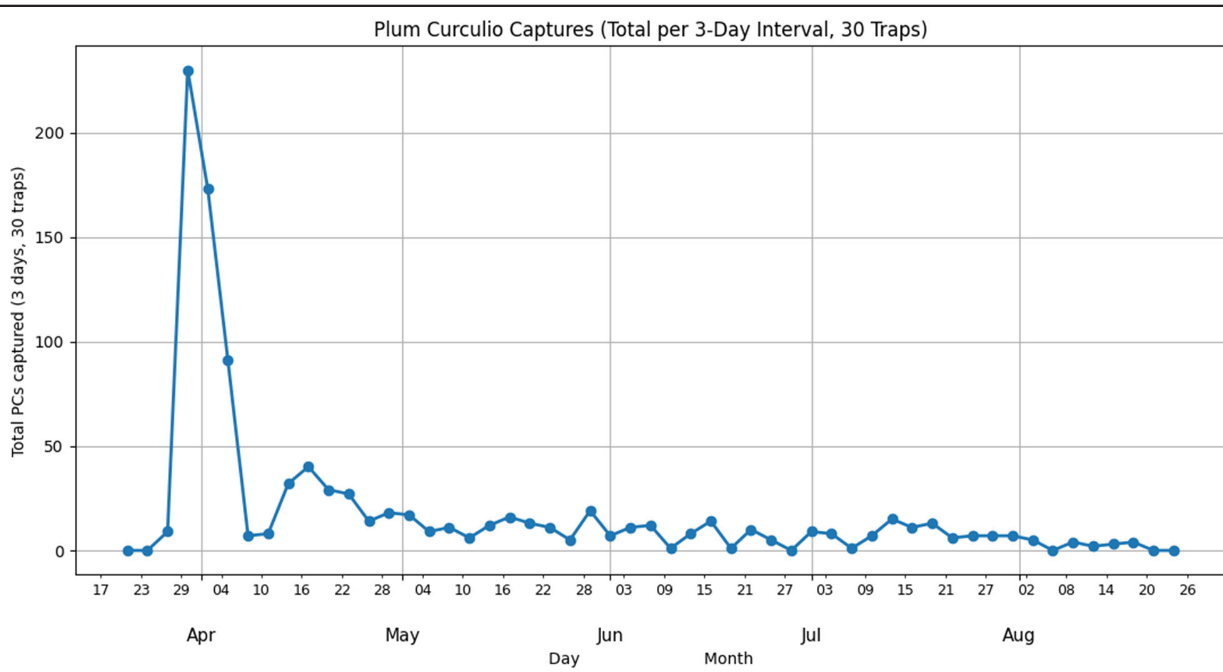

Figure 2. Total plum curculio captured in 30 Circle traps summed over 3-day intervals. Captures were near zero early, then surged sharply at the end of March/early April (peak activity), followed by a rapid decline and low, steady captures for the rest of the season.

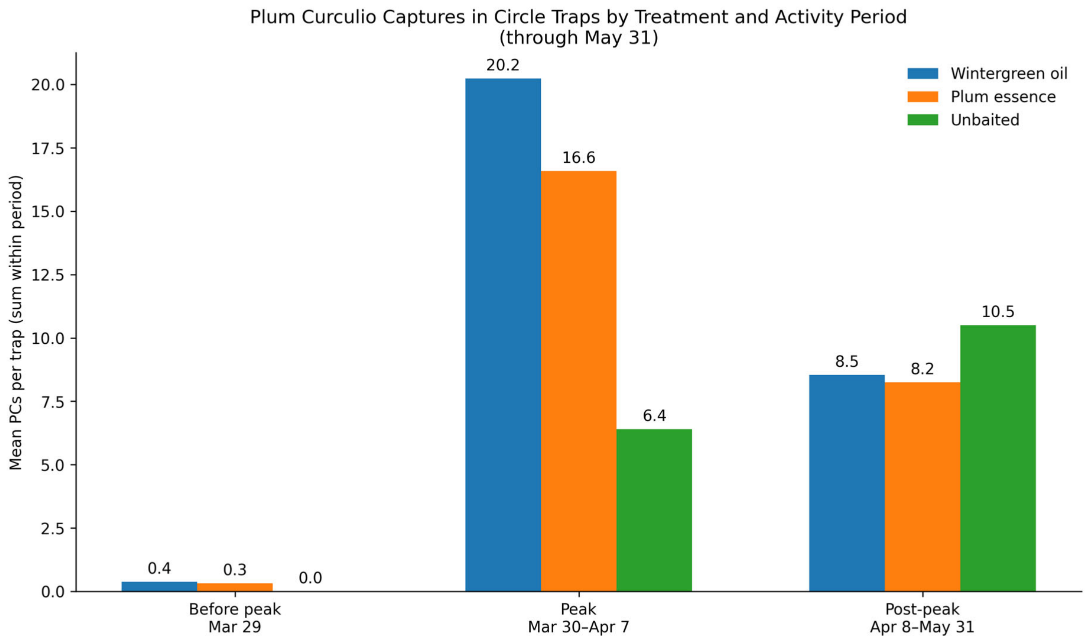

Figure 3. Mean plum curculio captures per trap (summed within each period) for overwintered adults in a North Carolina orchard. Peak activity (Mar 30–Apr 7) showed higher captures in wintergreen oil and plum essence traps, while post-peak (Apr 8–May 31) captures were higher in unbaited traps, indicating a shift from lure-driven to movement-driven trap performance. Data after May 31 were excluded.

Grower observations: Localized reduction in injury. Grower observations suggest a meaningful reduction in injury in high-pressure areas. In a row of Wickson crabapple trees that historically produced heavily damaged, unmarketable fruit, the introduction of Circle traps over two seasons coincided with a marked improvement in fruit quality, with substantially fewer oviposition scars per fruit. While not quantified experimentally, this observation is consistent with the hypothesis that sustained trapping may reduce local pest pressure. This remains to be verified through further experimentation.

Orchard-scale observations. At the orchard scale, effects were less clear, although there was some indication of reduced early-season fruit drop. It is plausible that trapping may intercept immigrating adults at orchard borders, potentially easing pressure on interior trees, but this requires further study.

A practical note on trap maintenance: Circle traps may capture non-target insects in addition to PC, especially early in the season. In Brittany's orchard, earwigs were among the most common bycatch. Because earwigs are beneficial predators that contribute to biological control in many orchard systems, growers using circle traps should consider checking traps frequently to release non-target organisms when feasible. This improves stewardship of beneficial insects, although it does add labor.

Conclusions

This on-farm study shows that Circle traps can capture meaningful numbers of PCs, and this has been a consistent finding in that North Carolina orchard. In 2025, peak activity occurred earlier than expected and was more closely linked to temperature than to petal fall. Circle traps are not a stand-alone solution due to continued immigration, but they are a useful complementary tool and provide insight into PCs movement. Lures may improve trap efficiency early in the season; however, they were not replaced during this study. Future work will evaluate the effect of regular lure replacement. Because this was an on-farm observational comparison with tree-level variability, these results should be interpreted cautiously.

How to Install Circle Traps

Circle traps can work very well, but only if they are installed carefully. The goal is to force any insect walking up the trunk to enter the trap, so small gaps or poor fit can greatly reduce effectiveness.

Place the trap around the main trunk about 1–2 feet above the ground, on a relatively even section. If the bark is rough or flaky, remove loose pieces so the screen can sit flush against the surface. Wrap the screen tightly around the trunk and secure it with staples so it remains snug. Attach the wooden support piece with a single screw to keep the trap stable under field conditions. Adjust the screen so it directs insects upward into the capture device, taking advantage of the natural climbing behavior of plum curculio.

The most important step is to eliminate gaps. Pay close attention to bark irregularities and add extra staples where needed to maintain a tight seal all the way around the trunk. In our work, traps have been most effective when installed early and tightly sealed, allowing them to intercept adults moving from the ground into the canopy.

Acknowledgements
This work was supported by the USDA National Institute of Food and Agriculture (NIFA), the Center for Agriculture, Food and the Environment, and the Stockbridge School of Agriculture at the University of Massachusetts Amherst (project MAS 00522). The content is solely the responsibility of the authors and does not necessarily represent the official views of USDA or NIFA.

What Eastern Tree Fruit Growers Told Us About Their Biggest Pest Challenges

Oluwafunmilayo E. Ajiferuke[1], Alexa J. Lamm[1], Tracy C. Leskey[2], and Jaime C. Piñero[3], *on behalf of the multistate eastern tree fruit IPM team*

[1]Department of Agricultural Leadership, Education and Communication (ALEC), University of Georgia

[2]USDA ARS Appalachian Fruit Research Laboratory

[3]Stockbridge School of Agriculture, University of Massachusetts

In a multistate focus-group assessment involving 82 eastern U.S. tree fruit growers, participants consistently identified codling moth, San Jose scale, and plum curculio among their most important insect pest concerns. Growers also highlighted challenges related to insecticide resistance, invasive species, and the need for more reliable decision-support tools. Importantly, participants expressed strong interest in improved alternatives to conventional insecticide-based management, including mating disruption, biological control, and enhanced monitoring systems.

The study also found that growers prefer receiving IPM information through a mix of formats, including email newsletters, videos, online resources, and in-person meetings—reinforcing the importance of multiple Extension communication channels.

This study is part of a broader multistate 4-year USDA-funded initiative bringing together researchers, Extension specialists, and growers across the eastern United States to improve IPM for key tree fruit pests. The overarching goal is to develop practical, science-based management tools that reduce pest pressure while supporting economically and environmentally sustainable fruit production.

Read the full article here: Ajiferuke, O.E., Lamm, A.J., Lee, C.-L., Byrd, A.R., Piñero, J.C., DiGiacomo, G., Blaauw, B.R., Rivera, M.J., Wilson, J.K., Guedot, C., Schoof, S.C., Biddinger, D.J., Krawczyk, G., Walgenbach, J.F., Nielsen, A.L., Shapiro-Ilan, D.I., and Leskey, T.C. 2026. *Assessing eastern US tree fruit growers' pest issues, practices, and preferences to inform effective IPM communication.* Journal of Integrated Pest Management 17: pmag010.

What Growers Told Us: Using Listening Sessions to Guide IPM in New England Tree Fruit Systems

Oluwafunmilayo Ajiferuke[1], Alexa Lamm[1], Jaime C. Piñero[2], Elizabeth Garofalo[3], Jon Clements[3], and Tracy C. Leskey[4]

[1]*University of Georgia, Athens, GA*

[2]*Stockbridge School of Agriculture, University of Massachusetts*

[3]*UMass Extension*

[4]*USDA-ARS, Appalachian Fruit Research. Station, Kearneysville, WV*

Eastern U.S. tree fruits growers face unique pest management challenges, and this could be linked to greater disease and insect pressure which are associated with high humidity, a diverse insect pest community and influx of invasive species. Integrated Pest Management (IPM) strategies are continually developed and modified with the aim of reducing pesticide use, reducing pest infestations, and preventing crop loss, with the main aim of maintaining fruits quality and yield. Previous research attested to growers using IPM strategies; however, resistance to management strategies have led to myriads of crop loss.

Within the complex backdrop of issues growers are facing, the adoption/continuation of IPM practices are premised on the perception of their overall value. Additionally, evaluation of these IPM strategies reveal economic benefits; however, pest management decisions made by growers are not solely dependent on economics. Effectiveness of the IPM strategies, time to implement, management philosophy (e.g., environmental sustainability), suitability and compatibility of methods with the existing farm system are some of the factors growers consider when deciding to use IPM.

Noteworthily, failures of pest management strategies have made Massachusetts tree fruit growers grapple for solutions, with many using both chemical and biological approaches. The complexities surrounding IPM, as well as its dynamic and multidimensional decision-making process, would facilitate agricultural extension educators not to overlook critical factors influencing its adoption, and undermining the effective communication of IPM advancements. Overall, our goal was to gather insights on pest management practices, challenges, and opportunities for improvement. Specifically, we identified evolving pest problems among Massachusetts tree fruit growers, documented their IPM strategies the growers are currently using, examined the economic, social and climate concerns of growers, and examined communication channels suitable for introducing new or improved IPM strategies to encourage adoption.

Methods

Qualitative research design was adopted for this study. Focus group session were physically held in Massachusetts, U.S with 12 apple and peach growers. Guiding the focus group session, we utilized a moderator guide developed by a team of three (3) science communicators and agricultural education faculty members. The moderator guide was then reviewed by a team consisting of entomologists, economists, and extension specialists to assure accuracy of the content area and transferability. Growers from the focus group were then asked a set of questions that gave insights on pest management practices, challenges, and opportunities for improvement. They were first asked to identify their primary pest problems and the overall impact on their production practices. Growers were then asked about their pest management strategies (current strategies and adoption challenges). They were further asked concerns related to social and community concerns, economic pressures and climate change impacts. In addition, growers identified research and development needs. Lastly, growers were asked about their preferred mode of communication. Data were analyzed using MAXQDA to identify themes related to our interest.

Results

The major pest challenge identified by Massachusetts growers was Plum Curculio, a weevil causing significant damage to both apple and peach, especially difficult to control during bloom periods. Other pest issues identified include Scab, a common fungal issue with significant economic impact, reducing marketable produce to cider apples, fire blight, and emerging bacterial disease posing threats to orchards.

Growers reported that they currently use IPM strategies, notwithstanding, they encountered adoption challenges. Strategies used include IPM principles, such as predictive pest models based on degree days and weather monitoring, frequent spraying using tailored "cocktails" of fungicides, insecticides, and plant growth regulators, and implementation of weather-based tools to optimize spray timing and efficacy. Also, practices such as trap trees, border sprays, and lure-based attractants are used for specific pests like plum curculio. The adoption challenges include risk aversion, which limits the use of unproven methods, as failures can lead to season- long impacts. Also, growers reported that resistance of management strategies that is due to over-reliance on specific chemical groups is another big issue with adoption.

Apple and peach growers in Massachusetts also mentioned that there are social and community concerns. These concerns range from public perception to community perceptions. The growers strive to balance transparency with educating the public about their practices. Growers also reported misconceptions on "organic production". Organic and non-organic growers face distinct expectations, with organic methods often misunderstood as spray-free. In addition, the visual effects of spraying and misconceptions about pesticide use are quite misleading. There is also a huge resistance from the community/neighbors. Noise from spraying operations and proximity to residential areas create tensions, requiring careful scheduling and communication.

Growers recognized some major economic concerns that could impede adoption of the new IPM strategies. These includes rising costs of chemicals, labor costs, and equipment which have eroded profit margins, especially for wholesale operations. Similarly, retail operations benefit from higher pricing due to the "farm-to-table" experience but face risks from weather-dependent customer turnout. Growers also mentioned that market dynamics makes local growers compete against cheaper, mass-produced supermarket options, emphasizing the importance of freshness and the "buy local" movement.

Furthermore, growers discussed impact of climate change, and its potential risks on apple and peach orchards. Warm winters and erratic weather patterns (e.g., sudden frosts, heavy rains) increase susceptibility to pests and diseases. Also, extended growing seasons and unpredictable conditions complicate the timing and effectiveness of pest control.

Ultimately, growers identified their top three research priority areas within the project focus, and these were decision-support tools for pests like plum curculio (including monitoring traps and degree-day models), alternative management tactics for codling moth and oriental fruit moth (such as mating disruption and nematodes), and innovative approaches like behavioral deterrents and eco-stacking (valuing ecological services).

Communicating the research development is crucial for adoption of these IPM strategies by the growers. When asked about their current communication channels, growers are heavily on reliant on weather models, extension updates, and guides like the New England Tree Fruit Management Guide. Also, majority of the growers also use private weather stations and advanced pest modeling systems to inform their decisions.

Conclusion

Apple and Peach growers in Massachusetts continually face peculiar pest problem that affects the overall fruit quality and production. This have led the growers to use IPM strategies to combat these pest pressures. Resistance to management remains one of the obstacles that hinders adoption of the refined IPM strategies. Also, economics and market dynamics will impact adoption if not factored into IPM strategies development. Massachusetts tree fruit growers unanimously identified decision-support tools for pests like plum curculio, including monitoring traps and degree-day models as one of the pressing priority research areas. IPM research should prioritize refining and validating pest management models, so they are more accurate and adaptable across orchard systems in the region and weather patterns. Our result recommends the use of centralized platforms offering real-time updates and localized data could enhance decision-making. Lastly, enhanced communication between researchers, extension services, and growers was emphasized as critical for future success.

Acknowledgements

This work was supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture focused on Specialty Crop Research Initiative with grant number USDA-NIFA SCRI #2024-51181-43213.