31st Annual March Message To Massachusetts Tree Fruit Growers (2023)

By

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Table of Contents

Publications, Videos, and other IPM Resources

Educational resources produced by the UMass fruit team, by other Universities in New England, and by Cornell University are presented below.

- **UMass** IPM Fact Sheets

- **Healthy Fruit** is a timely newsletter that includes information on tree-fruit horticulture, pest management, and related topics. The primary reader is the commercial grower, but anyone growing fruit trees will benefit from this. Healthy Fruit is published weekly or biweekly from April through September and periodically throughout the rest of the year.

  The cost for a subscription to Healthy Fruit is $75 per year for the pdf version (available for purchase at the UMass Extension Bookstore or download the Fruit Publications Order Form and mail it in with your payment).

- **UMass Extension Fruit Team YouTube Channel**.

- **Fruit Notes** is distributed to growers and researchers in 35 states in the U.S. and 14 other countries. Most reports are from current research at the University of Massachusetts and other universities. Electronic versions are available for purchase at the UMass Extension Bookstore or you could download the 2023 Fruit Publications Order Form and mail it in with your payment. There are 4 issues per year. Cost: $35 (electronic copy only).

  - New England Tree Fruit Management Guide.
  - New England Small Fruit Management Guide.
  - University of Vermont Extension - Tree Fruit production.
  - University of Rhode Island IPM program.
  - The Jentsch Poma Lab.

Plant Growth Regulator Updates (Duane Greene and Jon Clements)

Kudos® 27.5 WDG (Fine Americas, Inc.) — label change to include pears. (Kudos only, not Apogee). Note that Kudos application to pears can result in an "off" crop the following year. In addition to growth control, Kudos may result in fire blight suppression. Updated label rate is 6 to 12 oz. per acre between petal fall and pear “turndown” with a second application 6 weeks after the first (if necessary), and we don’t apply when the daytime temperatures are predicted to exceed 90 degrees F.

Arrange™ (Fine Americas, Inc.) — label update/change to allow use on nursery trees to inhibit flowering the year after application. Also allow an increase in label rate in orchards from 100 to 200 ppm.

NAA — sold as **Fruitone L** (Amvac Chemical Corporation), **Refine 3.5 L** (Fine Americas, Inc.), and **Pomaxa** (Valent Biosciences) use on Honeycrisp includes:

- bloom application at 5 to 10 ppm to start thinning and promote annual bearing.
- petal fall application at 5 to 10 ppm to start thinning and promote annual bearing.
- 8-12 mm application at 5 to 10 ppm for thinning and promote annual bearing.
- 5 to 10 ppm at 30, 45, and 60 days after petal fall to promote return boom AND may inhibit bitter pit development (compared to no NAA application) when used at this timing.
- NAA at 10 to 15 ppm pre-harvest for stop drop, with or without ReTain.
- Note that there is no limit to the number of applications per season, however, the maximum amount of Fruitone L and Pomaxa that can be applied is 54 fluid ounces per acre per season. There is no limit for Refine 3.5L.

Apogee (BASF Corporation) or **Kudos** (Fine Americas, inc.) — pink application to Honeycrisp for growth control to reduce bitter pit vs. bloom/post-bloom applications which may in fact increase bitter pit (compared to no Apogee/Kudos or Apogee/Kudos at pink).

Massachusetts Pests Overview

Diseases

Southern blight on apples – a new root disease problem for apples in the Northeast (Dan Cooley, Jon Clements, Angela Madeiras)

Below is an excerpt of an article published in the Winter 2023 issue of Fruit Notes. If you are a subscriber of Fruit Notes, you can access the full article HERE.

People have known that Southern blight can cause problems on apple trees for nearly 100 years. It was a particular problem on nursery trees and young apple trees in the South. The pathogen thrives in warm, moist soil. The optimum temperature for *S. rolfsii* growth is about 85 F, which is a very warm soil, with relative soil water content of 30% or higher. But it appears, as with the summer fruit rots, the warming climate is making Southern blight more common in the Northeast. Southern blight is a problem in apple production areas around the world, particularly in warmer climates. We first discovered a Southern blight problem in apples in Massachusetts in 2017 in a newly planted block. Symptoms developed the year of planting, with many trees rapidly developing brown leaves, and dying back (Figure 1). When trees were dug up, roots were black and rotted with few fine roots. There were distinct white mycelia or hyphae, typical of Southern blight (Figure 2). Since then, Southern rot has been identified in apples in Pennsylvania in 2018 and New Jersey in 2022.

Fig. 1. New apple planting showing tree-dieback caused by southern blight.

Fig. 2. Red arrows pointing to white hyphae in soil from the southern blight fungus. The white at the base of the trunk is paint.

Apple scab pressure during the primary season was modest, and most, if not all growers, achieved 100% acceptable scab control. The number of primary apple scab infections at the UMass Orchard varied, depending on which decision support you used, but are close: NEWA - 7 primary infection events; RIMpro - 6-8 primary infection events depending on your risk tolerance level. As we've seen in previous comparisons, NEWA ended primary season much earlier than RIMpro, with 99% ascospore maturity on 24 May for NEWA, and on 6 Jun for RIMpro. This year, that did not translate into a significant difference in infection periods.

With **fire blight**, some nail biting went on in MA, and 2-3 streptomycin applications were typical. At the UMass Orchard, according to RIMpro, the fire blight infection threshold had reached 6 times! There was a rather extended bloom period across many apple and pear varieties. There were no fire blight strikes observed afterwards, thanks to those strep applications. However, some orchards reported fire blight strikes later in the summer, typically where no streptomycin was applied. Fire blight is here to stay, or as the epidemiologists say, endemic. So, although fireblight resistance to streptomycin application has not been documented in New England, there is strep-resistant fireblight bacteria in New York. Just

because our fireblight has not been documented to be resistant, does not mean that you should not consider resistance management to prevent/avoid fire blight resistance development to streptomycin. Streptomycin is still your one best fire blight preventive when conditions warrant during bloom, but note this resistance management recommendation from Kerik Cox at Cornell, and we quote:

"If you don't have a confirmed detection of streptomycin resistance on your farm, you can protect yourself from future outbreaks."

- Get trees from established nurseries and be careful with on-farm nurseries.
- During bloom always rotate antibiotics: Options include using a mixture of 1) Streptomycin and Oxytetracycline at the full rate each. 2) Alternate with Kasugamycin, but target on cloud days or evenings. 3) Alternate with Oxytetracycline (not if you used it in a mix), coppers (if safe) and biologicals as needed.
- Epiphytic populations seem to spike at night. Try to make evening applications instead of morning applications. This also helps avoid breakdown of products by solar energy (use a sunscreen adjuvant)."

We might add to above: sanitation (cut out visible fire blight cankers), copper application (s), use the weather-based models (NEWA, RIMpro), and do not apply streptomycin for shoot blight unless justified (young trees at high risk with hail, high wind, thunderstorm, etc. in orchards with history of fire blight). For more detail, see: An Annual Fire Blight Management Program for Apples.

Powdery mildew, given the rather dry spring and summer, was bad at the UMass Orchard in some varieties, particularly Honeycrisp. Bad means the Orchard staff spent time cutting it out, which is a dubious management practice at best. More attention needs to be applied in early spring to selecting fungicides which are effective against powdery mildew rather than focusing on scab alone. Interestingly, not much fruit showed signs of mildew infections, just shoots.

Rots, black and bitter were minimal, particularly when compared to the wet 2021 year, however, at least one MA orchard reported a continuing problem. Another orchard that had a big problem last year went on a more specific and rigorous fungicide program and reported no rot this year. The dry summer probably helped there too. Growers need to be more aware of effective fungicide programs, particularly the timing around bloom and fruit set, to prevent rot in wet years.

Fig. 3. Marssonina leaf blotch at the UMass Cold Spring Orchard, 19 September, 2022.

Marssonina leaf blotch appeared again at the UMass Orchard in September in the usual spots (Figure 3). Evercrisp is particularly problematic, and in wet years, growers need to continue fungicide sprays into September otherwise your Evercrisp will defoliate prematurely. Otherwise, no fruit symptoms were observed. Fuji and Honeycrisp are also susceptible. Some of the MAIA test selections seem susceptible (Sweet MAIA among a couple others), they likely have Fuji, Evercrisp, and/or Honeycrisp as parents. A strong season-long fungicide program, particularly during wet growing seasons, should keep Marssonina at bay. Note that Cevya fungicide now has a 2EE-17 supplemental label specifically for use on one fruit to control Marssonina leaf blotch. The PHI is 0 days.

Insects (J. Piñero and K. Leahy)

2022 levels of fruit injury by insect pests recorded at harvest.

In 2022 the UMass fruit team conducted pre-harvest surveys in 11 orchards (9 in MA, 2 in NH) to assess the level of fruit damage by arthropod pests. Two blocks were sampled per orchard; therefore, 22 blocks were surveyed. In all, 5,533 fruits were visually inspected (= non-destructive sampling) to assess pest injury levels. Figure 4 shows the average level of injury by 9 insect pests separately for each of the two blocks that were sampled. We are presenting results for each of the two blocks that were assessed to show that insect pest injury can vary from block to block even within the same orchard.

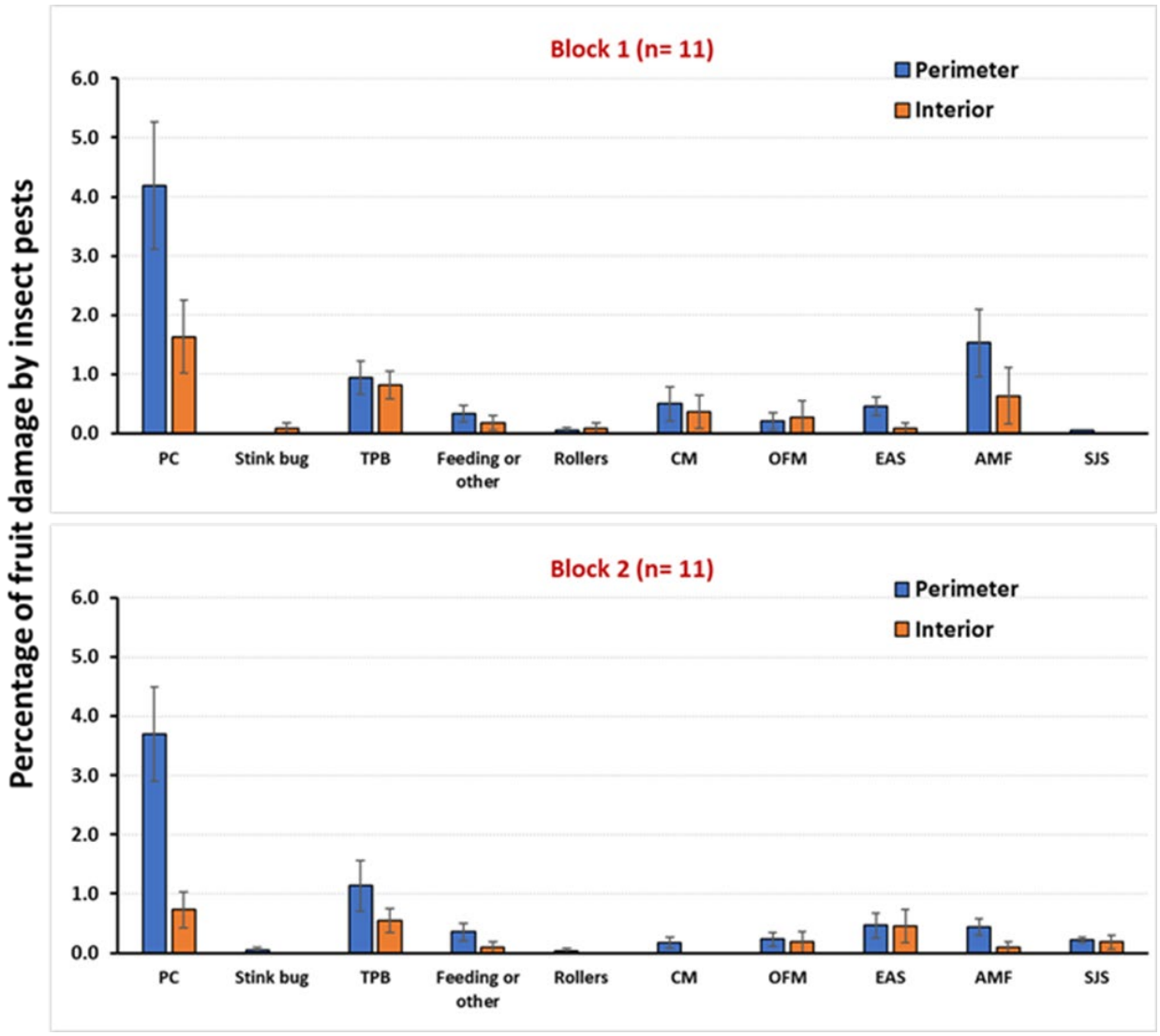


Figure 4. For each of two apple blocks that were visually surveyed, level of fruit injury caused by nine insect pests recorded at harvest in 9 MA orchards and 2 NH orchards. In all, 18 apple blocks were surveyed.

Coleoptera

Plum Curculio (PC). The whole-block level of injury recorded at harvest in 2022 was, on average, lower than that recorded in 2021. Fig. 5 shows the average level of of whole-plot fruit injury recorded at harvest for a 3-year period (2020-2022) according to orchard (9 MA orchards). For most orchards, the highest levels caused by PC were recorded in 2021, when compared to 2020 and 2022. Three orchards (D, E, an F) have kept PC injury levels at or below 2% in all three years.

Whole-block injury: Plum curculio

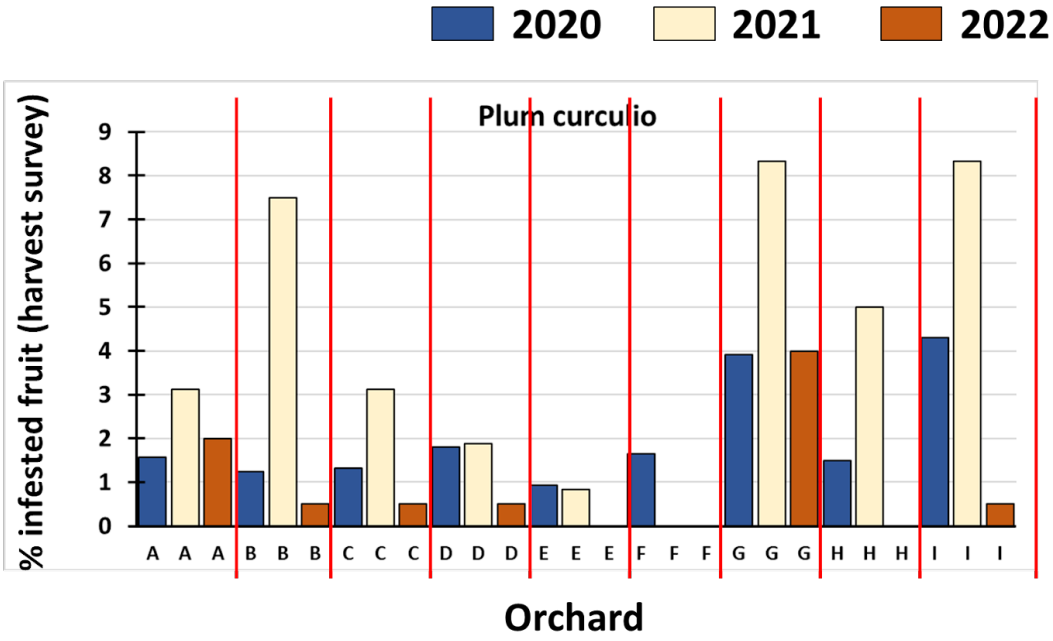


Figure 5. For each of 9 Massachusetts apple orchards (coded A-I), whole-block levels of PC injury to fruit recorded at harvest according to year (2020-2022).

Research update: For nearly 20 years, benzaldehyde (BEN), a plant volatile, has been used in combination with the PC pheromone as a lure for monitoring and control (attract-and-kill) strategy. We have discussed before that, while effective, BEN is relatively expensive and chemically unstable (it degrades with UV light and heat). For the last three years, we have been seeking to identify a replacement for BEN. I am happy to announce that wintergreen oil (= methyl salicylate, MES) has been found to be an excellent replacement for BEN. MES is as (or more) attractive than BEN, is more stable (chemically speaking) and is cheaper (it costs ¼ the price of 4 BEN lures that are needed to bait a trap tree). Therefore, for the next years you will hear a lot about MES in our PC research.

Diptera

Apple Maggot Fly (AMF). At the UMass CSO, the first AMF capture was recorded on June 24. In blocks monitored by K. Leahy, the first captures took place on July 11. The level of control achieved in 9 out of 11 orchards was excellent, resulting in zero fruit infestation even on perimeter-row trees. One orchard in NH experienced substantial AMF injury (5% in the perimeter, 1% in interior-block trees) due to relaxed sprays against this pest.

Spotted-wing drosophila (SWD). Monitoring of SWD using diluted Concord grape juice continued in 2022. Figure 6 presents the seasonal activity of SWD in 6 MA orchards (traps were removed from the field in early August).

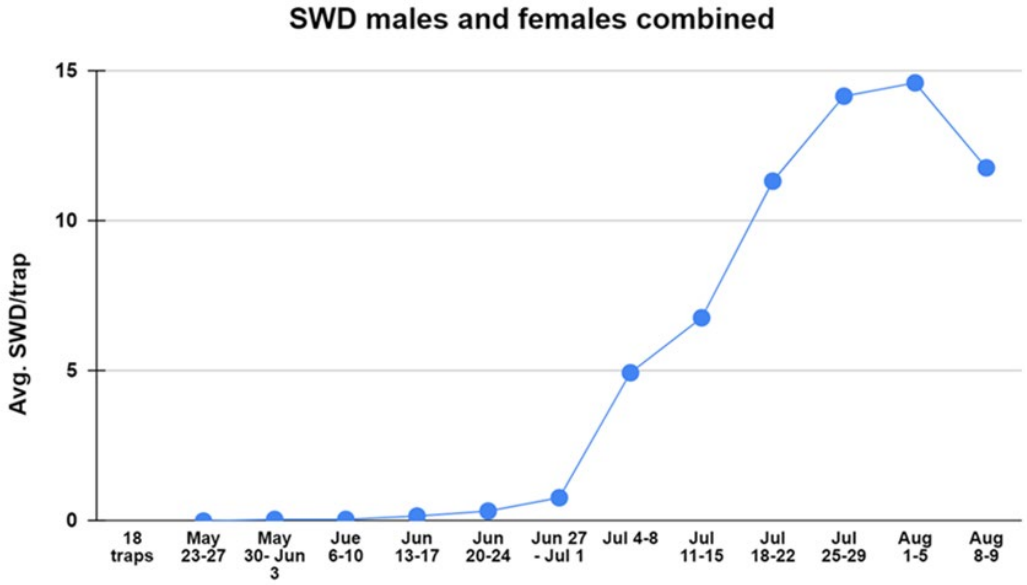
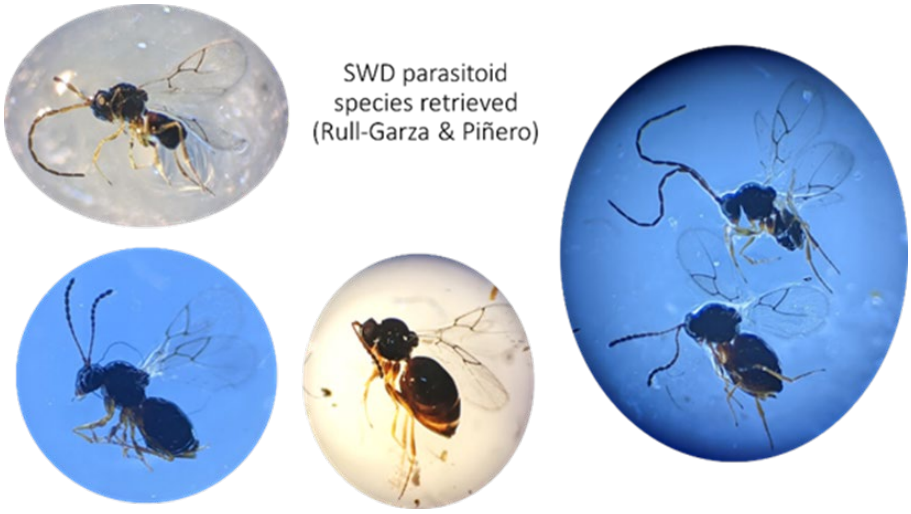


Figure 6. Captures of SWD in traps baited with diluted Concord grape juice deployed at six MA orchards in 2022.

Parasitoids of SWD. In the fall 2022, J. Pinero collected raspberry fruit from a fruit farm located in western MA. With the help of Mateo Rull-Garza it was determined that multiple species of larval parasitoids were found attacking SWD. The level of parasitism was estimated to be around 24%. In British Columbia, researchers reported the presence of *Leptopilina japonica*, and *Ganaspis brasiliensis*. The range of parasitism in those samples was 0-66%.



Hymenoptera

European Apple Sawfly. Our monitoring system reflected very low, or no EAS captures in sticky traps. Low (1%) levels of injury at harvest were recorded in a couple of blocks. Other than that, EAS damage was zero in most of the orchards.

Hemiptera

San Jose Scale (SJS). Only a couple of blocks had very low levels of SJS injury in 2022.

Tarnished Plant Bug (TPB). Having very few TPB captured in white sticky traps while getting around 1% level of fruit injury has been the main news for the past 4 years. Is the white sticky card effective at trapping TPB? Some researchers around the country are exploring other monitoring options.

Pear Psylla. Pear psylla built up very quickly early in the season, despite good-to-excellent control the previous year. Control generally was adequate but we're still using a lot of insecticide over the season! For more information read the article on the use of kaolin clay for pre-bloom psylla control.

Fall applications of kaolin clay can suppress next spring's psylla!

Read this article from WSU.

Pear thrips. Pear thrips were somewhat in evidence in higher/cooler locations in the early spring. Usually the numbers are tolerable, but some spots were over the tentative threshold of 5 per bud cluster.

Rosy apple aphid (RAA). In 2022, RAA populations were well under the levels that occurred in 2021, whether because of aggressive management or a natural cycle, we don't know. As discussed before, in 2021 we experienced a RAA outbreak at the UMass Cold Spring Orchard. In 2022, at the UMass CSO, aphid levels were very low, and green apple aphid, not RRA, was the species that we observed. According to K. Leahy (Polaris Orchard IPM), "t*he outbreak in 2021, spotty though it was, was far and away the biggest I've ever seen in my decades in IPM -- weird!"*

Woolly apple aphid (WAA) continues to rumble around at low levels but enough to be observable on terminal leaf axils and some pruning cuts. One of the best controls at this time is Movento used at the rate of 10-12 oz/A combined with a spreader adjuvant with penetrating properties. Use sufficient volume to thoroughly wet the tree. Slow drying conditions are best. The material is fully systemic, and should reach the colonies feeding on the roots, as well as those that are visible on the aerial portions of the tree.

Brown Marmorated Stink bug (BMSB). In 2021 and 2022, we sought to evaluate the extent to which sunflower and buckwheat could increase BMSB mortality in ghost traps relative to that recorded in ghost traps alone. In 2022, research was conducted at 9 MA orchards and 1 NH orchard. This research is being conducted in collaboration with Jeremy Delisle (UNH Extension). Across the 10 participant orchards and across the entire period of experimentation (early July to late September), 655 BMSB (adults and nymphs combined) were killed by ghost traps in 2022. Three additional species of stink bugs were recorded in 2022: green (16 killed by ghost traps), brown (6), and green burgundy stink bug (4). Detailed results on the performance of trap cropping were published in the winter issue of Fruit Notes. In relative terms, BMSB populations in 2022 were greater than those recorded in 2021, but lower than BMSB numbers recorded in 2020 (year of highest BMSB population levels recorded in MA).

Lepidoptera

Codling moth (CM), Oriental fruit moth (OFM) and obliquebanded leafrollers (OBLR). In 2022, one New Hampshire orchard experienced 3% injury by CM in perimeter-row trees and 0.8% injury by the same pest in interior-row trees. In Massachusetts, one orchard experienced 1.3% and 0.5% fruit injury by CM at harvest. Fruit injury levels by OFM and OBLR were very low for all orchards.

Research update: For the past 3 years, Ajay Giri (graduate student) has been evaluating selected plant volatiles for attractiveness to multiple tortricid (CM, OFM, OBLR, RBLR). Results are very positive. For example, he found that benzaldehyde (the same material that is used for PC monitoring) seems to be as attractive, or even more attractive, to males (mostly OFM) than even the OFM sex pheromone. In 2023, we will be monitoring in various orchards using pheromone-baited traps and plant volatiles such as benzaldehyde.

Mites

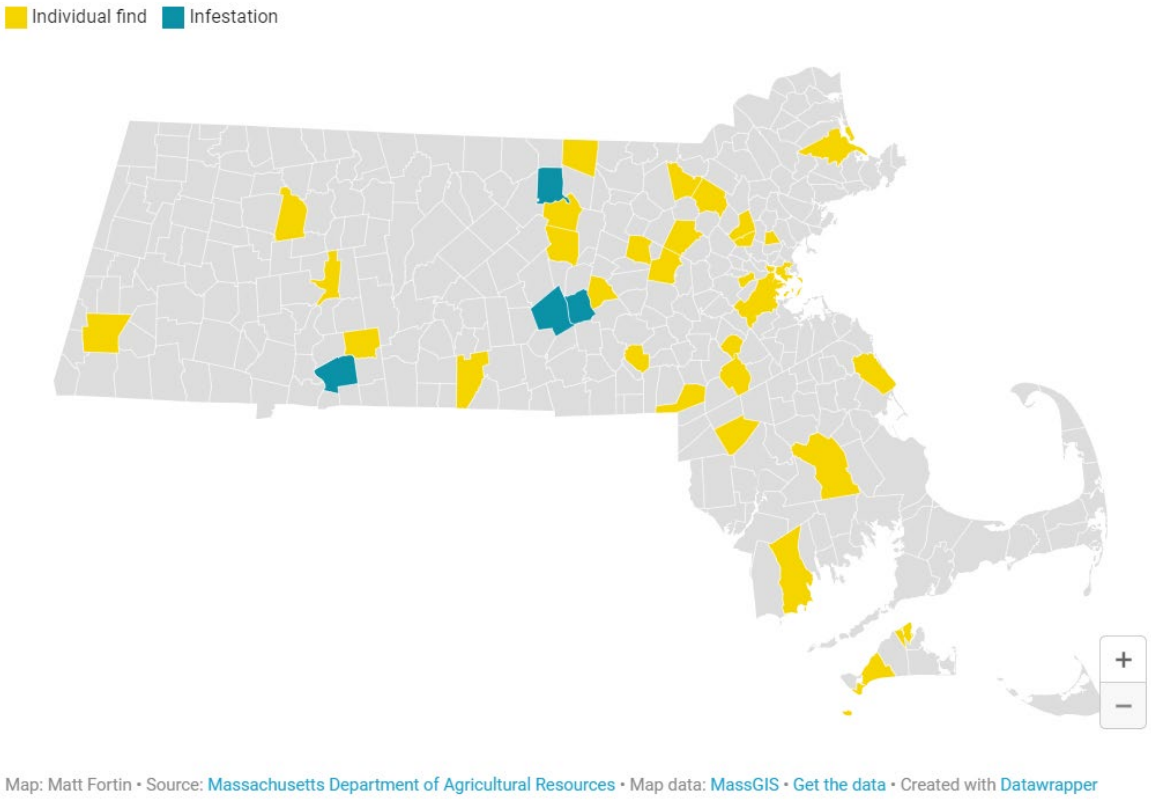
Because of the dry weather, two-spotted spider mites (TSSM) were more prevalent than usual, although predatory thrips were also more abundant than usual. TSSM is more susceptible to biological control than European red mites, and this seemed to be the case in 2022.

Invasive Pests Update (J. Piñero)

Spotted Lanternfly (SLF)

Since 2018, SLF has been seen in 33 communities in Massachusetts so far, with infestations in four. This winter, state crews removed and destroyed a combined total of 5,500 egg masses in Worcester, Shrewsbury, Fitchburg, and Springfield. Most of the 5,500 were found in Springfield, while the largest number of adult SLF were in Worcester. Worcester's infestation is roughly eight-tenths-of-a-square-mile, running between Routes 9 and 20. The Massachusetts

Department of Agricultural Resources considers a community to have an infestation when spotted lanternflies are found there actively on trees, feeding, mating, and laying eggs.



At UMass, we have been collaborating with the Extension Landscape, Nursery and Urban Forestry Program in two ways: (1) to produce and disseminate educational materials and (2) to monitor for SLF in commercial fruit farms. During January and February 2023, the UMass Extension Landscape, Nursery and Urban Forestry and the Extension Fruit Program offered the annual Invasive Insect Webinars, which focusing on the impact, monitoring, and management of invasive insects in Massachusetts and the nation. Find the recordings of these webinars as well as past topics at https://ag.umass.edu/landscape/education-events/invasive-insect-webinars.

Working in partnership, an SLF Management Guide was published: https://ag.umass.edu/landscape/fact-sheets/spotted-lanternfly-management

Since 2021, we have been monitoring for SLF using Circle traps from May-October. The trap uses a methyl salicylate (= wintergreen oil) lure. It is serviced once every two weeks and the lure in changed once a month. No SLF have been found in our surveys involving traps.

For more information about spotted lanternfly, visit:

UMass Extension's Fact Sheet: https://ag.umass.edu/landscape/fact-sheets/spotted-lanternfly
MDAR's Massachusetts Introduced Pests Outreach Blog: https://massnrc.org/pests/blog/
MDAR's Spotted Lanternfly Mini Poster: https://massnrc.org/pests/linkeddocuments/SLFminiposter.pdf
Order Spotted Lanternfly Materials from MDAR: http://bit.ly/FPOMOrder

Egg parasitoids found attacking BMSB in Massachusetts (Mateo Rull-Garza, Zoe Robinson, and Jaime Pinero)

In a variety of cropping systems throughout the US, there are native species of parasitoids that attack stink bug eggs. Over the decades, several uninvited biocontrol candidates have popped up on new continents. One example is the exotic samurai wasp (SW), a parasitoid that, though smaller than a tenth of an inch, can kill up to 80% of BMSB populations in Northern China. In the summer of 2022, we deployed over 10,000 frozen eggs of BMSB in 10 commercial orchards throughout MA. Sentinel eggs were deployed from May to September. July was the first and only month when we recovered parasitized eggs (84), con- stituting a 2.5% parasitism rate out of the 3,405 eggs deployed in that same month. The adult parasitoids that emerged were *Trissolcus euchisti* (n= 53), *Telenomus podisi* (n= 10), and *Ooencyrtus* sp. (n= 7), as well as two underdeveloped parasitoids from the subfamily *Telenominae.*

For more information, click HERE to access the Fruit Notes article.

Pesticides Update (J. Piñero)

In 2023 there were a few pesticide updates for fruit crops:

- **FROM BASF:**

  SERCADIS (a.i. fluxapyroxad):

  - Apple: BASF renamed Sercadis. It is now Tesaris.
  - Apple: Use rate of Tesaris remains the same.
  - Apple: All mentions of Sercadis in the NETFMG are being replaced with Tesaris.
  - Pear and peach: Tesaris will be added to wherever in the guide there is a FRAC 7.

  CEVYA:

  - Apple, pear, and peach: Use rate was updated to 5 ounces.
  - Use rate of Tesaris is 3.5-5.6 ounces.

- **FROM CERTIS:** All labels listed in the NETFMG remain the same for 2023.
- **FROM GOWAN:**

  Apple: Dormant and green tip rates for Badge SC should be updated to 3.5 - 7 pts/A.

Apple: Torino SC (a.i. Cyflufenamid; FRAC U6) registered for powdery mildew control. Unique mode of action. Rate: 6.8 Oz/A with only one application per season.

Cherry: Torino SC registered for powdery mildew control.

Apple: Updated timing of application of Onager Optek (a.i. Hexythiazox; IRAC 10A) is pink to petal fall. Strong activity against all immature stages of spider mites.

Updates in Mating Disruption

CIDETRAK CM OFM COMBO MESO (Trécé, Inc.): Newly registered solid dispenser technology for mating disruption of Codling Moth and Oriental Fruit Moth.

- Similar to pre-existing product (CIDETRAK CMDA + OFM MESO), but Trécé removed the DA (i.e., pear ester) and added **97% more** Codling Moth Pheromone and **25% more** Oriental Fruit Moth Pheromone.
- Recommended deployment rate of 32 dispensers/A for low to moderate populations and up to 38 dispensers/A for high populations.
- Currently, CIDETRAK CM OFM COMBO MESO is registered in CT, DE, MA, NY, RI, and VT in the Northeast US.
- CIDETRAK CMDA + OFM MESO – is still available for purchase.

Dan Donahue's Honeycrisp Playbook (to mitigate bitter pit risk) (J. Clements)

I attended the Eastern New York Fruit & Vegetable Conference February 22-23, 2023, in Albany NY, hosted by the Cornell Cooperative Extension (CCE) Eastern New York Commercial Horticulture Program (ENYCHP). A day and a half of tree fruit talks, mostly featuring speakers from Cornell University and on many pest management (insect & disease) and production (horticulture) management issues. Check out my @jmcextman Twitter hashtag #ENYFVC for a bunch of pictures and comment on their presentations.

One presentation worth bringing to you here was by Dan Donahue, tree fruit specialist with CCE's ENYCHP. Dan has always been quite inventive, so his talk was excerpts from his 'Honeycrisp Playbook,' a series of specific recommendations to mitigate bitter pit risk when growing Honeycrisp apples. So without further adieu, here is Dan's most recent and comprehensive **'Playbook'** with some comments by yours truly…

Avoid replant sites - *yea, Honeycrisp are tough enough to grow as it is, give them a break and grow on virgin ground and/or follow BMPs for replant sites (fumigation, cover-cropping, etc.).*

Soil pH should be adjusted to about 7.0 - *start a little high on pH with addition of lime to bring pH close to 7, that lime has calcium in it (don't use dolomitic-high mag limestone), and that slightly higher pH than the normal recommendation of 5.9 to 6.5 will enhance nutrient availability.*

Use 30% less ground potassium (K) than other varieties - *K is antagonistic to calcium uptake and movement in the plant, don't ignore the need to have some K (as dictated by soil/foliar nutrient tests), just don't use as much as you might, say with Gala?*

Moderate nitrogen (N), shoot for 2.2% in the leaf analysis, no foliar N - *high nitrogen = high bitter pit, enough said? Feed the roots N using calcium nitrate as dictated by leaf analysis, just err on the short side vs. lots of N.*

Use B.9 or B.10 rootstocks, avoid Geneva rootstocks - *pretty straight forward, M.9 rootstocks fall somewhere between B.'s and G.'s in bitter pit prevalence. B.10 is a bit more vigorous than B.9. Friends don't let friends plant Honeycrisp on G.41. Good tree spacing for Honeycrisp on B.9 are app. 2.5 feet between trees by 10-11 feet between rows. A bit more in Dan's study Bitter Pit Response to Rootstock and Region in Eastern New York State.*

No apple crop in 2nd leaf - *yup, grow your trees (with moderate nitrogen!) for years 1-3 in the orchard. Apples off young trees will be bitter pit prone anyways. Do de-fruit them when young, only start cropping when they are as tall and wide as you want, as they will stop growing (much) when they start fruiting.*

Light to moderate tree vigor, pruning - *a "calm" tree is what you want to mitigate bitter pit risk. Use thinning (vs. heading) cuts as much as possible while pruning.*

Avoid precision pruning to a bud load < 2.5 buds per target crop load - *yea, leave more buds than you might otherwise with say, Gala? You don't want to fall too far short of your target crop load in the end. Good insurance here. But I might go down to 2 buds per target crop load* 🤓*.*

Avoid aggressive, early crop reduction, aggravates bitter pit - *normally we recommend thinning early and often. Not so much here, but there is a fine line. More below…*

Prohexadione-calcium (Apogee/Kudos) at pink, do not apply post-bloom - *Dan's work that has been field tested indicates Prohex-Cal applied post boom results in more bitter pit than when it is applied at pink. And, that pink application gives pretty effective growth control too. More here from Dan. And his own words "I recommend avoiding conventionally timed Prohex if at all possible."*

10 ppm NAA at bloom, avoid bloom thinning with ATS or lime sulfur - *that NAA at bloom nudges the thinning start (but not aggressively) and also promotes return bloom (well, at least it*

is a start). Bloom thinning with caustic thinners typically and aggressively thins early (what did he say above?) and leaves the king bloom typically, especially when using the Pollen Tube Growth Model. King bloom = larger apples = more bitter pit? Maybe, maybe not, this may not always be true. But you might get away with using caustic bloom thinners with B.9/10 rootstocks? If bloom thinning with caustics, you should be using the pollen tube growth model.

Calcium (Ca) at petal fall, continue through 5 weekly applications - *I'd be using the formulated liquid calciun products (Sysstem-Cal, etc.) at this timing and then switch to calcium chloride mid-summer until harvest? More here from Dan.*

Target chemical thinning at 8-12 mm stage - *is this all starting to come together? Besides, particularly when following the carbohydrate model to determine rate and timing of chemical thinner applications, this is when THE most effective chemical thinning often happens, at 8-12 mm. Still, NAA 10 ppm at bloom! And don't forget to use the apple carbohydrate thinning model when chemical thinning at this time.*

Hand thin to target fruit load at 35 days post-bloom - *Honeycrisp initiates flower bud development early, as soon as 30 days after bloom. Too many apples on the trees thereafter will inhibit flower bud formation = biennial bearing. Get it? So, hand thin Honeycrisp first!*

3 sprays NAA at 5 ppm - *that's 2 oz. per 100 gallons dilute tree row volume per acre, beginning no later 30 days post-bloom, then 45, then 60 -- for return bloom enhancement AND research has shown that the auxin factor of NAA reduces bitter pit. I recommend 2 oz. per acre, period. Some return bloom recommendations use ethephon, might be OK in addition to those NAA sprays.*

Limit irrigation (deficit?) late June through harvest - *yup, you don't need to be blowing those Honeycrisp apples up and diluting calcium (and promoting calcium sink shoot growth) = more bitter pit risk. More on deficit irrigation of Honeycrisp (where practicable LOL) here from Washington State University.*

Use EMR model and/or passive bitter pit prediction protocol on M.9 rootstocks destined for long term storage - *No need to test B.9 or Geneva rootstocks as they will have less or more bitter pit respectively Dan says. If you want to know more, here is the reference for EMR (Environment, Minerals, Rootstock): Daniel J. Donahue, Gemma Reig, Michael Rutzke, Anna Wallis, Michael Basedow, Sarah E. Elone. 2021. A Predictive Model for Malus × pumila Borkh c.v. 'Honeycrisp' to Reduce Storage Risk in Eastern New York State, U.S.A. Acta Horticulturae 1314. Proceedings of the International Symposium on Precision Management of Orchards and Vineyards, October 2019. https://doi.org/10.17660/ActaHortic.2021.1314.51 And, a bit more about the passive bitter pit prediction model here: https://www.goodfruit.com/to-predict-bitter-pit-let-it-sit/*

Weigh pros/cons of using ReTain/Harvista sprays, may increase bitter pit - *bitter pit risk increases with earlier harvested apples, might increase with later harvested apples, but not sure here? Apples will get bigger = more bitter pit? Is there a sweet spot for less bitter pit with*

intermediate harvest dates? Just something to keep in mind when using these harvest management tools.

M.9 rootstock, third pick for long term storage = less storage bitter pit - *has shown to be the case for that third pick, might represent optimum maturity?*

That is the most current Honeycrisp Playbook (for mitigating bitter pit risk) according to Dan Donahue. But hey, check out It's the Calcium Stupid, some recommendations from the recently deceased Jeff Alicandro/agri.assistance, RIP Jeff.

NEWA Weather Station Purchase Options (J. Clements)

To date the Massachusetts Network for Environment Applications (NEWA) includes 37 on-farm (mostly) weather stations. NEWA provides "up to date IPM forecasts and weather data." If you are interested in purchasing a weather station and joining the MA NEWA network, below are the two hardware options. If you purchase a weather station, there is no cost to get you on NEWA. (Thanks to: USDA/NIFA AWARD Number: 2021-70006-35388 TITLE: Integrating development, implementation and awareness of effective strategies and technologies to promote Specialty Crop IPM in Massachusetts). If you have any questions, don't hesitate to contact me.

Weather station purchase options for NEWA include:

KestrelMet 6000 Weather Station

https://kestrelmet.com/kestrelmet-6000-weather-station

$999.00

Choice of wi-fi or cellular (add $300 for cellular, first year free, $50 a year thereafter)

Includes: temp/RH, solar radiation, wind speed & direction, rain gauge

Add leaf wetness sensor ($149)

Add solar radiation sensor ($199)

Total NEWA configuration: $1347 (wi-fi) or $1,647 (cellular)

Add a tripod mount: $99

Optional/recommended soil sensors (three, soil temperature and moisture) $599

Onset NEWA Recommended NEWA Starter Kit

https://www.onsetcomp.com/corporate/partners/newa

$2,874

Includes: RX2106 MicroRX Station (cellular), leaf wetness, temp/RH, solar radiation, wind speed & direction, rain gauge.

Add 2-meter tripod kit: $250

RX2106 is Hobonet capable, allowing Hobonet sensor network expansion:
https://www.onsetcomp.com/hobonet-field-monitoring-system

NEWA Alternative, RIMpro? (J. Clements)

Yes, RIMpro is an alternative/complement to NEWA, especially if you don't have a NEWA site nearby. From the RIMpro website "RIMpro is a decision support system (DSS) for the sustainable management of pests and diseases in fruit and grape production. Every day, the cloud service together with the weather data system help thousands of growers and consultants worldwide to make the best decisions to protect their crops."

RIMpro needs a weather data source, which can be a NEWA weather station or using "virtual" Meteoblue weather data. The cost of RIMpro is approximately $300 per year depending on the current exchange rate and what weather data source you choose. (The RIMpro Invoice can be paid using PayPal.) If you choose to use a NEWA site, the NEWA data feed is $60 and can be purchased here: https://blogs.cornell.edu/newa/rimpro-data-feeds/ RIMpro is not for everyone, but it is arguably the most fine tuned in terms of it's pest management models, which include for example, apple scab, fire blight, codling moth, etc. If you use the Meteoblue data feed it also has an apple fruit thinning model. If you have any questions about RIMpro, feel free to contact me.

IPM and other News Around the Country (J. Piñero)

Life history traits of spotted lanternfly when feeding on grapevines and tree of heaven

Erica Laveaga, Kelli Hoover and Flor E. Acevedo (Department of Entomology, The Pennsylvania State University)

The invasive planthopper, spotted lanternfly (SLF), *Lycorma delicatula* (White) (Hemiptera: Fulgoridae), feeds on a broad range of plants including species of economic importance such as grape. Although SLF feeds on wild and cultivated grape, the effect of grapevines on the insect's life history traits is unknown. This study examined the effect of cultivated Concord grapevines (*Vitis labrusca*) and the insect's preferred host tree of heaven (TOH), *Ailanthus altissima*, on SLF development, survival, reproduction, and body mass. Newly emerged nymphs were allowed to feed on either TOH, Concord grapevines or a mixed diet of Concord grapevines plus TOH through adulthood until death. Development, mortality, and oviposition of paired adults were tracked daily to calculate the SLF rate of development, survival, and reproduction among treatments**. When feeding exclusively on Concord grapevines, SLF was able to develop and reproduce but had higher mortality, slower development, and produced fewer eggs**. SLF fed on the mixed diet of grapevines plus TOH exhibited faster nymphal development, laid more eggs, and had higher body mass compared with those fed only on grape or TOH. SLF had greater survival when fed on either the mixed diet or on TOH alone. We conclude that Concord grapevines are a poor-quality host for SLF, but when combined with TOH, SLF fitness increases above that of feeding on TOH alone. This study supports the elimination of TOH as a part of SLF vineyard management practices.

Efficacy of insecticides for control of two-spotted spider mites in strawberries, 2022

Marwa Aly, Steven Van Timmeren, and Rufus Isaacs (Michigan State University)

In this study conducted in Michigan, researchers evaluated the efficacy of five pesticide treatments against one untreated check. Three treatments were applied via foliar application at labeled rates: Aza-direct at 32 fl oz/acre (0.09 ml in 0.5 ml of water per pot), Admire Pro at 1.3 oz/acre (0.004 ml in 0.02 ml of water per pot), and Magister* at 36 fl oz/acre (0.106 ml in 0.6 ml of water per pot). The other 2 treatments were applied to the soil using a pipette to apply the following rates to each pot: AZA at 32 fl oz/acre (0.09 ml in 4.7 ml of water per pot) and Admire Pro at 14 oz/acre (0.04 ml in 2.1 ml of water per pot).

The researchers found that the Magister treatment was the most effective at decreasing TSSM nymph populations on 16 and 23 August, and adults on 23 August. Additionally, no SWF nymphs were recorded with Magister in 23 August and for adults on 16, 30 August and 6 September.

The above are just the highlights of the study. To access the entire publication, click HERE.

*MAGISTER® SC (active ingredient: Fenazaquin) is a novel foliar miticide belonging to the chemical class named quinazoline, active against spider mites (Tetranychidae), broad mites (Tarsonemidae), flat mites (Tenuipalpidae) and Eriophyid mites.

Washington State Pre-bloom Pear Psylla Management Program, 2023

Robert Orpet, Louis Nottingham, and Molly Sayles, Washington State University
Kaolin clay (Surround WP or Surround CF) is the core of any spring pear psylla management program. Kaolin is highly effective at keeping pear psylla adults off of trees and reducing egg lay. Particle films reduce pear psylla adult colonization and egg lay by 80–100%, which reduces pear psylla pressure for the first generation.

Additional insecticides in spring sprays can improve pest suppression, but tank mixes of multiple broad-spectrum insecticides are largely redundant with each other and with kaolin.

Read the full article HERE.

IPM Around the World (J. Piñero)

How is IPM Adoption Promoted in Europe?

Here are some examples. Each year, ACTA, France's association of agricultural technical institutes, facilitates a series of thematic days across the country as part of the campaign to encourage the adoption of IPM. In France, pesticide users and sellers and agricultural advisers require certification. This qualification is delivered through specialised trainers and the e-PIC programme targets these trainers through a three-pronged approach.

First, trainers must complete an online course. These courses are available for both beginners and more advanced learners and are seen as a good first step since online learning is flexible (available 24/7), practical (teaching material remains available after the course is completed) and can offer a wealth of information (resources and documents regularly updated).

Beginners are introduced to the principles of IPM (prevention, surveillance, decision making, alternative methods etc.) plus modules introducing them to systems approaches, the resources available for building their training programme and IPM in specific agricultural or non-agricultural sectors. More advanced learners can select modules addressing IPM in agricultural or non-agricultural sectors or a mix of the two and must complete courses on IPM in these sectors or courses addressing key IPM themes.

A new introduction in the e-PIC programme are winter videoconferences designed to introduce trainers in mainland France to the work being done in the country's extensive experimentation systems and their results. Typically, facilitators establish the problem and its context, explain the experimentation being done, present the initial results and offer conclusions and examine future prospects. A second session seeks to encourage dialogue, with participants'

questions being addressed, specific points developed and discussions between participants is encouraged.

Thematic days continue to play a central role in e-PIC and have now been boosted by the addition of serious games to their learning activities. Thematic days takes place across France and its overseas territories (Indian Ocean and French Caribbean events will be held later this year), addressing a particular sector. These include days dedicated, for example, to arable crops, vegetable production, viticulture and arboriculture. Each day follows a similar pattern, with participants given regulatory updates, before hearing from actors who have been involved in IPM experimental activities. Participants then visit experimental or production sites before tackling learning activities.

The entire article can be accessed HERE.

Sustainable Apple Disease Management in China: Challenges and Future Directions for a Transforming Industry

By Xiaofei Liang, Rong Zhang, Mark L. Gleason, and Guangyu Sun, *summarized by J. Pinero*

China produces about half of the world's apple supply. However, apple growing in China differs sharply from that in western countries in terms of the prevalent diseases and corresponding management strategies. For instance, family-owned small-scale orchards dominate China's apple industry, and manual bagging of fruit has been a long-standing practice for controlling fruit diseases. In recent years, rural labor shortages have been increasingly challenging the traditional production system, and China's apple industry is experiencing a rapid transition to much larger-scale enterprises featuring high-density orchards with advanced automation and mechanization. Associated with this transition are new challenges and grower demands that are changing the face of apple disease management.

For researchers and extension specialists, several prioritized research directions are highlighted in the article: (i) virus and viroid eradication programs and nursery stock health improvement, accompanied by ready access to virus-free planting stock, is critical for the success of the entire industry; (ii) resistance mining and utilization of genetic resistance against prevalent field diseases should be considered as important as fruit quality and yield during the breeding process, and disease resistance evaluation should be integrated into the early phase of current breeding schemes; and (iii) field trials on the pesticide control of foliar and fruit diseases should be performed in a more systematic manner so that reliable, grower-oriented guidelines for integrated disease control can be formulated and disseminated.

Driven by worsening rural labor shortages, China, the largest apple-producing country in the world, is experiencing a massive transformation toward industrialized apple production.