Healthy Fruit, Vol. 31, No. 8, May 23, 2023

Prepared by the University of Massachusetts Amherst Fruit Team

Jon Clements, Editor

Current degree day accumulations

UMass Cold Spring Orchard, Belchertown, MA (NEWA, since January 1, 2023)	22-May
Base 43 BE	655
Base 50 BE	340

Upcoming meetings

Every Tuesday at noon (12 PM), beginning April 11 - UMass Fruit Team Open Office Hour. Bring your own lunch. Join Zoom Meeting here: https://umass-amherst.zoom.us/j/97712996237

June 7, Wednesday – The next RIFGA Twilight meeting is June 7th at 6:30 at Rob and Jackie Swanson's Hard Pressed Cider Orchard at 930 Hopkins Hill Road, West Greenwich, RI 02817. You will love seeing their young, organic cider orchard and the NEWA weather station Rob has installed! Two hours of pesticide recertification credits are available.

June 13, Tuesday – The CT Pomological Society will hold a summer field day with vendors/exhibitors, free dinner, educational program. Our speakers include Evan Lentz, UConn; Dr. Jaime Pinero, UMass; Colleen Kisselburgh, Arthur Carroll Insurance; and Micheale Williams, Bishops Orchards. Pesticide credits have been applied for. This event begins at 4 pm on Tuesday June 13, at Belltown Hill Orchards, 483 Matson Hill Rd, South Glastonbury, CT. Registration is required for dinner. To register please click this link https://bit.ly/42lcTZv

The way I see it

Jon Clements

How things change in a week. The record cold morning of Thursday, May 18 did a lot of damage to developing apple fruitlets. When I say a lot, well, it depends on location. You probably know the gist of that. But all orchards likely experienced some damage. What was pretty easy thinning decision-making has become extremely problematic. Needless to say, a block by block assessment of damage needs to be made. Tops of trees may have way more viable apples than bottoms, and a directed thinning spray up there might be advised. I would not be too aggressive overall though. Carbaryl @ 1 quart per acre may be a good/safe choice if unsure what to do. It may take another week to figure out what is staying and what is going, and there will still be an opportunity to do some thinning (6-BA, carbaryl, oil, Accede?) into next week if that is the case. Keep your chin up…

Entomology

Jaime Piñero

Weekly report of insect pest captures in monitoring traps at the UMass Cold Spring Orchard (Belchertown, MA)

Trap-capture data at the UMass CSO. **Period: May 17-23**

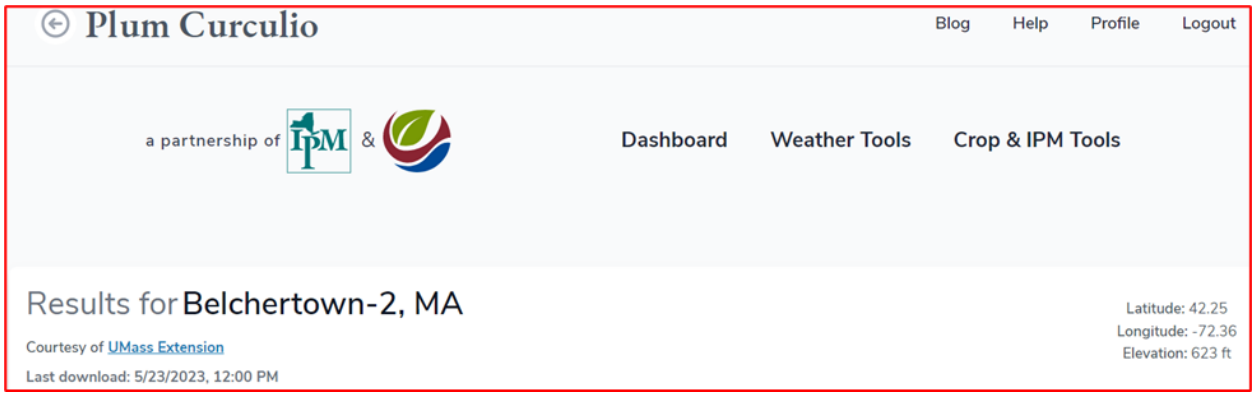
Insect	Average captures/trap	Notes
Obliquebanded leafroller	0	1 Pheromone-baited delta trap
Codling moth	2	1 Pheromone-baited delta trap
Oriental fruit moth	5	1 Pheromone-baited delta trap
Redbanded leafroller	4	By-catch (OBLR pheromone lure)
Plum curculio	—	2 odor-baited black pyramid traps
Plum curculio	0.08	26 unbaited black pyramid traps

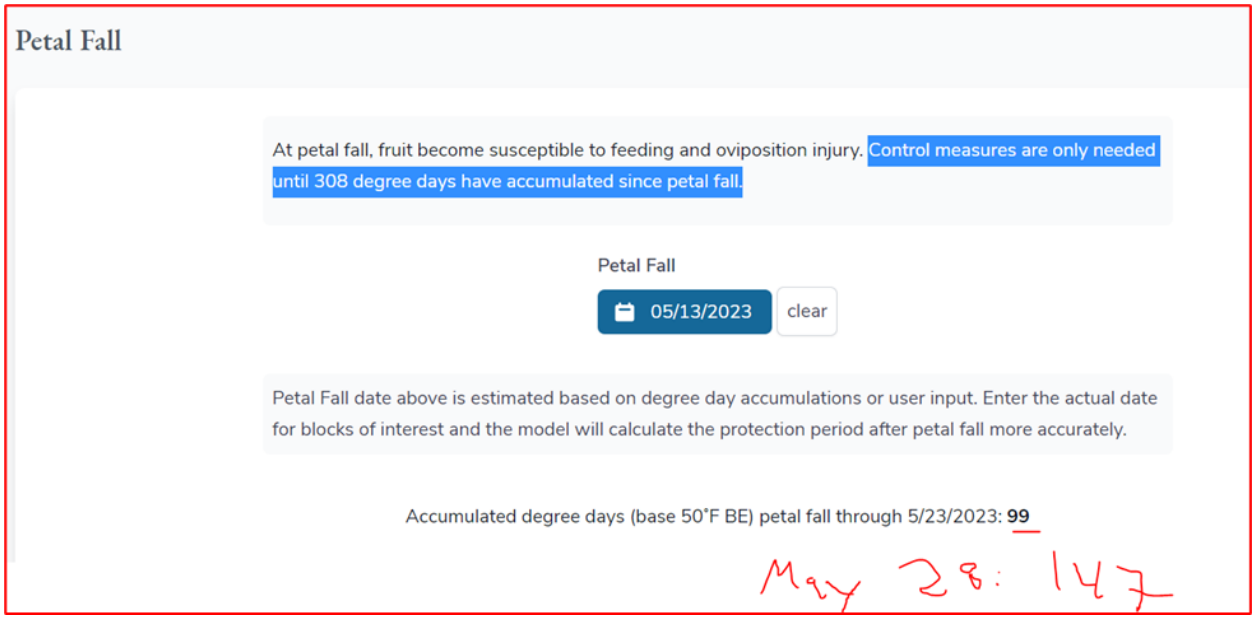
Insect pest activity at CSO.

Plum curculio (PC). PCs continue to move in at a slow(er) pace. For how long should I spray against PC? An oviposition model that estimates when insecticide sprays after petal fall are no longer necessary to protect fruit from PC damage has been developed. This model assumes that residues from sprays applied after petal fall need to be maintained on fruit and foliage only until PC adults stop immigrating into orchards. Data show that this corresponds to the time when about 40% of the oviposition cycle is complete. This is predicted by the model to occur at 308 DD (base 50°F) after petal fall of McIntosh. If you want to use this model, you can start

accumulating DD base 50 starting at petal fall. This is easily done from the NEWA Crop & IPM Tools:

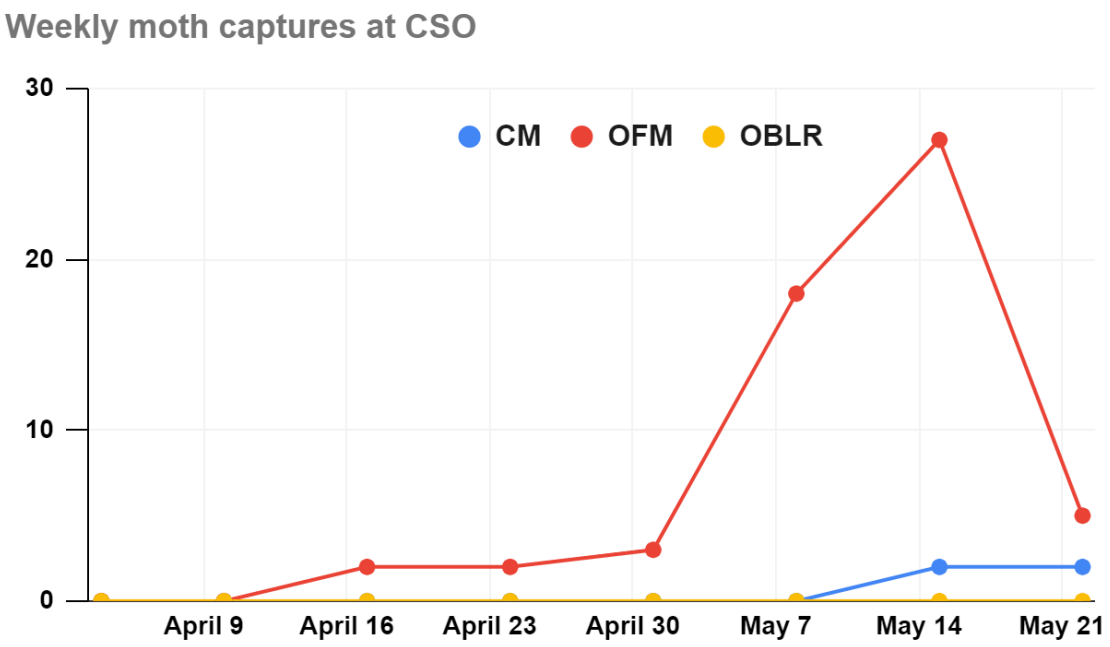
Plum Curculio. This tool uses base 50° F BE degree days to estimate the emigration of plum curculio (*Conotrachelus nenuphar*) into the apple orchard following petal fall, the need for treatment and when treatment can cease.



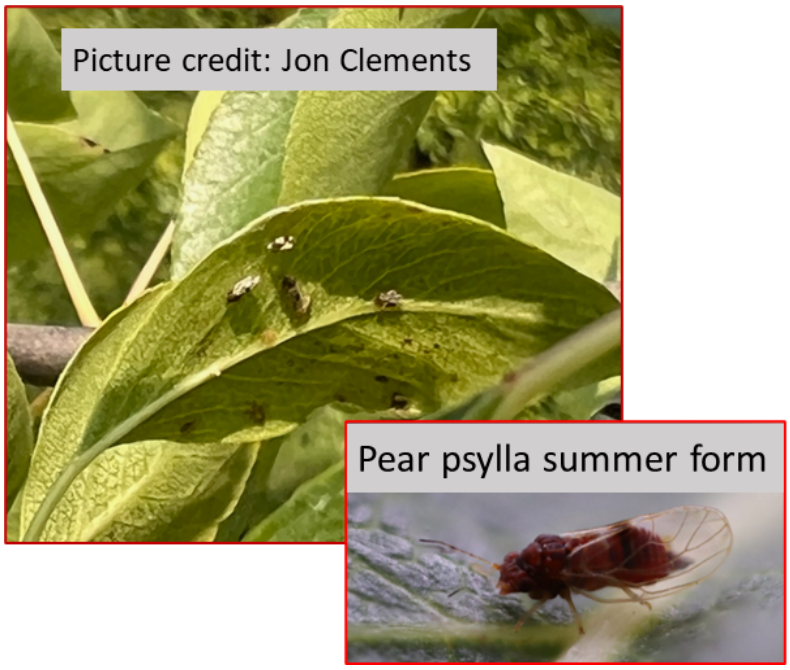


Based on the screenshot, you can see that as of today, only 99 DD have accumulated. By the end of the week, only 147 DD are expected to accumulate. This means that we are posed for a long PC season.

Lepidoptera. See chart below showing that the peak of OFM activity has passed whereas a couple of CM have been captured by one monitoring trap.



Pear psylla. The first generation of pear psylla nymphs have completed development, giving way to the first round of summerform adults. Summerforms will mate, lay eggs, and disperse over the next few weeks or longer. A major challenge to managing the second generation of psylla is the diminishing synchrony among life stages.Summerform adults will continue to lay eggs for multiple weeks, breaking the uniformity often seen in the first generation



CULTURAL CONTROL: Prune new vegetative shoots (water sprouts and suckers). Not only will this promote better coverage, but it removes prime psylla habitat.

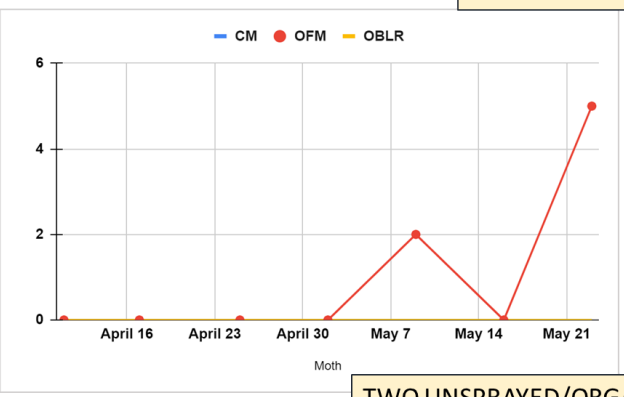
CHEMICAL CONTROL: Materials listed in the NETFMG: Senstar (Pyriproxyfen IRAC 7 + Spirotretamat) - Systemic activity, active in new vegetative growth as well as existing foliage. Fast translaminar movement penetrates leaf tissue to help reach pests that feed on the underside of leaves. Movento: Spirotetramat alone (IRAC 23). Sivanto: Flupyradifurone (IRAC 4D, butenolides).

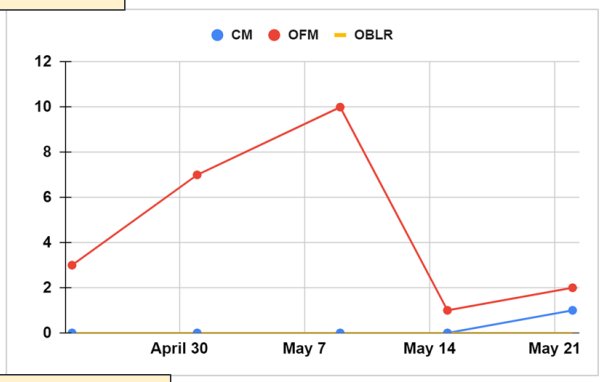
Rosy apple aphid (RAA): RAA has been found in hotspots (picture shows a colony on Gala) at the UMass CSO.

Insect pest activity in <u>other</u> orchards: Some **PCs** (not many) have been found for the past 7 days in unbaited pyramid traps at6 commercial orchards in MA. This is an indication that PCs continue to be active after the petal fall sprays.

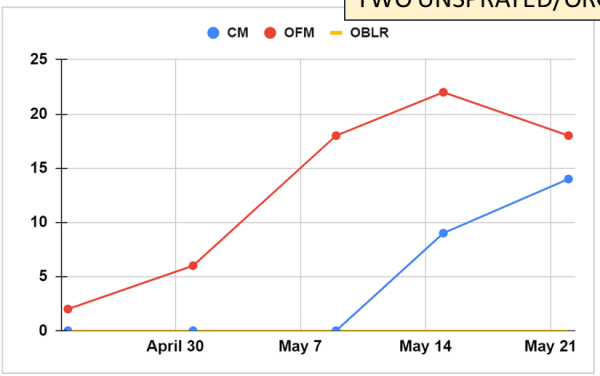
Oriental Fruit Moth (OFM) and Codling moth (CM). Just as I reported above for CSO, the peak of **OFM** activity has passed in most orchards. **CM** numbers are increasing in some locations but less so in sprayed orchards (see four charts below).

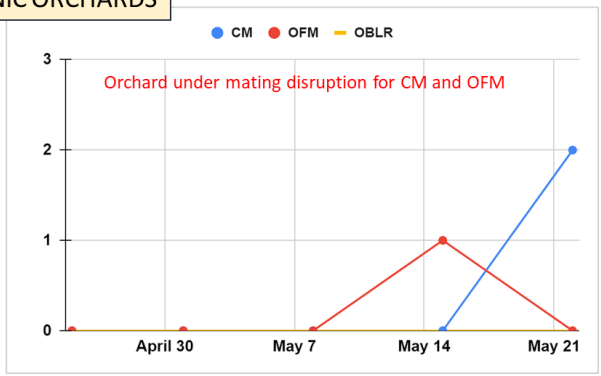
TWO SPRAYED ORCHARDS





TWO UNSPRAYED/ORGANIC ORCHARDS





CM management. If you established a BIOFIX (date of sustained trap catch), then the first spray for CM was recommended at first egg hatch which already occurred at 250 DD (base 50°F) after BIOFIX. High moth pressure may require 2-3 sprays for the first generation.

The vast majority of insecticides used for CM control are aimed at killing larvae, and thus are typically applied beginning at 250 GDD post biofix.

If you are using traps to treat against CM based on **thresholds**, then CM suggested trap thresholds: If > 5 codling moths are caught per trap per week using standard lures, there can be problems in fruit from future generations. If trap counts continue to exceed threshold throughout the season, maintain insecticide coverage on a 2-week interval.

Exirel (cyazypyr) and Altacor (rynaxypyr) belong to the Diamide class of insecticides that work on the insect by activating ryanodine receptors, thus depleting internal calcium and preventing muscle contraction. They provide excellent control of both first- and second-generation CM, as well as OBLR. Verdepryn (cyclaniliprole) should also provide excellent CM control.

The neonicotinoid Assail will provide very good CM control with a residual action of 10-14 days. This compound is primarily larvicidal, but also has some ovicidal activity when applied over the top of the egg. Good activity against PC too!

Should I relax sprays against insect pests given severe crop loss? In the next few weeks, you will know how many fruits are left in your blocks, and this information can be considered for insect pest control given that les fruit resources mean increase pest competition for food. My recommendation is not to relax the sprays.

- **Plum Curculio (PC)**. PCs will continue to damage fruit that remains on the trees unless you actively control them. If one block has no fruit, PCs in that area may move to other blocks. If the remaining fruit are left unprotected, female PCs can oviposit many times in one fruit, and ultimately may result in a much higher percent damage level per fruit than normal, potentially increasing the source of next year's "resident" population.
- **Potato leafhopper (PLH)**. If you reduce or eliminate insecticides for other pests because of little or no crop, PLH should not be ignored. PLH first arrives in late May with southerly-based weather fronts. Those adults lay eggs, which hatch and begin feeding on the phloem of foliage and shoot tips of actively growing terminals in mid-June. Populations vary greatly year to year. PLH often reach high populations by early July. Apple growers should check for PLH during weekly orchard monitoring beginning in early June. Look for curled leaves and shoots that are not growing as vigorously as they should. Control will be particularly important in young blocks that still have space to fill.
- **Obliquebanded leafroller (OBLR)**. We know OBLR is largely a foliage feeder, but can do significant damage to fruit. Fruit damage from the summer generation of OBLR is often related to when terminal growth slows or buds set, forcing larvae from the preferable young foliage to fruit. Light fruit-load conditions like this year should reduce the risk of OBLR damage compared to normal years.
- **Codling Moth (CM)**. Don’t eliminate any sprays against CM. Doing so can lead to very high CM numbers and increases the potential damage for the 2024 season. Growers should also be aware of CM moving in from an orchard with little fruit to a neighboring orchard with fruit. This movement can happen with the first generation but will be more of a concern for second generation CM. If growers have orchards with a crop, they should be conscious of any nearby orchards that may be on a reduced insecticide program because of no crop. If a neighboring block has a few fruits and the first generation CM is not controlled, then the second generation CM will most likely move to neighboring blocks to look for more favorable egg-laying sites. Older orchards generally have higher resident populations than younger blocks.

- **Apple Maggot Fly (AMF)**. We know that AMF builds up in orchards that remain unsprayed, so we may potentially increase AMF in blocks that have some fruit but do not get insecticide sprays. Growers should monitor their apple crop in order to make the decision to spray for AMF in blocks with a harvestable crop.

Pathology

Jaime Piñero / Jon Clements

A note on monitoring closely for disease symptoms after a frost

Information from Dr. Michelle Warmund, University of Missouri:

Monitor plants closely for disease symptoms throughout the growing season. Some insects are attracted to damaged tissue and some diseases are favored by weakened, frost-injured tissue. For example, peach, nectarine, apricot, plum, and cherry are often susceptible to *Luecostoma* canker (also known as *Cytospora* canker) after cold injury. During the growing season, *Luecostoma* cankers often produce an amber-colored ooze (Figure 2). These cankers are very difficult to control and form on branches and trunks of trees once they enlarge. As the canker spreads, it can kill the affected limb or tree.

Minimize water stress during the growing season by irrigating fruit trees during dry periods. Apply water slowly beneath the canopy of the tree. Continue to irrigate until mid-November during droughty conditions. Because floral initiation begins in the growing season before the year of flowering, it is important to minimize stress to promote cropping in the subsequent year.

Figure 2 Amber-colored ooze exuded from a Luecostoma canker on the trunk of a fruit tree that developed after cold injury.

Horticulture

Jon Clements

Apple - fruit Below pics taken morning on 23-May.

Honeycrisp	Rubymac McIntosh	Buckeye Gala

May 18 freeze preliminary post-mortem (if there is such a thing)

Just some observations, correct or not, TBD. Listed below are low temperatures observed across MA (and a few other New England locations) from NEWA weather stations the morning of May 18. Amherst and Northbridge get the prize in Massachusetts at 26 degrees F.. Based on this Table, we can expect 90% kill of flowers/buds/fruitlets(?) at 25 degrees F. 10% kill at 28-29 degrees F. The amount of damage to apples varies depending on site and height in the tree, but it seems the damage was greater than expected. Why? Well when that kind of data is collected, it is just an average, do deviations are included in that average. And what other weather factors come into play? Humidity/dew point? Wind? And what about tree disposition to damage? Don't forget we hit 90 back in April just over a month ago. A lot to unpack here, it will be done over time. Best estimate as to loss of apple crop, upwards towards 35%. So we got ⅔ of a crop? Time will tell, it might turn out better than we think? For orchards that were impacted by freeze, however, I'd be turning all but the top nozzles off if I was doing any chemical thinning, or choose to forgo altogether (posing a certain risk to).

Going forward, what to do about extreme weather? We lost both the peach crop and at least some of the apple crop. Climate change? Global warming? Whatever, strategies to reduce weather-based frost/freeze risk?

Plant only on the best sites, clearly orchards located at lower elevations or in cold pockets had the most freeze damage. At the UMass Orchard in Belchertown, if ALL our apples were on the hill east of Sabin Street we would have a full crop. To the west, below Sabin Street in the "flats," damage is probably 80%. I have 9 weather stations (well actually there are 12, but not including those here) the low temperature up on the hill was 31, but at the lowest elevation down the hill it was 8. A difference of 3 degrees F. Critical difference.

Wind machines and overhead irrigation work. IF you have a plentiful water supply and reliable distribution and sprinklers for the latter, and deep pockets ($$$) for the former. Under tree sprinkler systems are used on peach orchards in the southeast somewhat successfully.

Helicopters? I wonder how that would go over with the neighbors?

Smudge pots or other heating devices? Frankly, I am not sure what the legalities of open burning are in Massachusetts? Pretty sure it is illegal, but not sure about if there is an agricultural exemption. In New Jersey, they have to get a special proclamation (initiated by Extension) to burn.

Covered production? Becoming more widespread worldwide. While visiting a cherry orchard in Michigan last February covers (Anti-Frost Voen, see picts)) were being used to prevent both rain cracking and frost protection. In fact, they had little self-feeding pellet heaters under the covers.

Interesting, and for high value apple crops (like ours) needs further consideration. Also presumably used for hail protection?

Crop insurance is more important than ever. Buy maximum coverage, just factor it into the cost of production and raise your prices (if you can)!

I'm betting **hi-density, shorter, narrow canopy orchards are more prone to freeze damage**? Hmmm….

Bare ground middles? - sod/grass radiates heat more than bare ground. Where practicable (flat ground where erosion is not an issue and where drainage is very good), are bare ground orchards worth considering? No more mowing. No dandelions or clover or other nasty broadleaf weeds. Hmmm…

NEWA weather station lows (degrees F.) for May 18, 2023. Note that most NEWA weather station temperature sensors are at approximately 6 feet above ground level (well at least that is the recommendation).

MASSACHUSETTS	NEW HAMPSHIRE
Amesbury - 31	Concord - 27
Ashfield - 28	Goffstown - 29
Bolton - 30	Hollis - 28

Hawley - 27 Richmond - 25 Deerfield - 28 South Deerfield - 29 Amherst - 26 Easthampton - 28 Westfield - 30 Phillipston - 29 West Brookfield- 28 Belchertown 2 - 28 Belchertown - 29 Belchertown OWN - 30 Belchertown OWS - 29 Chicopee Falls - 28 (airport) Dracut - 28 East Bridgewater - 30 Harvard - 33 (sensor mounted high) Harvard - 29 Ipswich - 32 Lakeville - 36 Methuen - 31 Middleborough - 28 Northboro - 31 Northbridge - 26 Plympton - 29 Sharon - 30 Stow - 29 Stow (Shelburne) - 29 Tyngsboro - 30 (overhead sprinklers on) Waltham - 31 Wareham - 33 Worcester - 35 (airport)	Plainfield (Lebanon) - 25 Walpole - 26 CONNECTICUT S. Glastonbury - 33 Southington - 32 Storrs - 32 Woodstock - 32 VERMONT Bennington - 31 Dummerston - 28 Essex - 25 Shoreham - 30 Putney - 24 S. Burlington - 29

Chemical Thinning Reflections for May 23, 2023

Duane Greene

Mother nature complicated the lives of tree fruit growers in the Northeast this past week by bringing down cold arctic air that resulted in widespread and significant frost damage to fruit. The extent of the damage was influenced by the microclimate in orchards. It appears that growers are universally asking what to do? Frost at this stage in fruit development is extremely rare thus guidance from previous and similar events is just not there. In general, damage is

most severe in the bottoms of trees and it becomes progressively less severe higher up in the tree. This has prompted some growers to ask if applying chemical thinners to just the tops of trees may be a viable approach to applying thinners, if the situation warrants it. The answer to this question appears to me to be related to how your sprayer is nozzled. Usually a sprayer is set up to deliver a higher portion of the spray to the tops of trees since spurs are stronger there and more difficult to thin. Frost damaged fruit on the lower portion of a tree will be even easier to thin now. If you can make an application of a thinner to the tops of the trees and can minimize drift down then spraying tops of trees may be an option to you. Only individual growers can answer this question.

To begin with, the 2023 thinning season has been challenging in that we have not experienced weather that is conducive to good thinning. In fact, the NEWA carbohydrate thinning model has suggested that growers should increase the rate of thinners used by 30% for the entire thinning season so far. Many orchardists have trees with fruit in the 7-11 mm fruit size range and because of the heavy bloom and initial set, the crop load must be reduced. This coming week will probably be the best opportunity that you will have to effectively thin your trees unless the weather changes dramatically. Do not pass up this opportunity to thin.

One can view this frost event as another form of thinner application. Generally, when a thinner is applied it requires 3-4 days for the thinner to start to work and then 4-5 days for the thinner to manifest its effectiveness by lowering fruit growth of the fruit that are destined to drop. The frost event occurred at the end of last week. Starting now you should be able to identify fruit that will drop and make an assessment of how much more thinning you may need to do. Under normal circumstances this is a challenging task. This year it is more complicated because none of us know how much more susceptible the frost damaged fruit are to thinner and rates that we normally apply. There are clues to look for. If spur leaves are damaged (crinkled and smaller) and fruit is visibly injured, then chances are fruit will be thinned much easier. It is also difficult to determine how many ovules in the fruit have been damaged. I do not have any easy answers for you since the answer for each orchard will likely be different and within each orchard the answer will be different for individual varieties and blocks. Since the frost event did occur 5 days ago, we should have a very good idea now or in a day or two about how many fruit will persist. You should be able to thin for the next few days while fruit are in the size category where they are susceptible to most thinners.

I suggest that you should not let this thinning opportunity pass even though the conditions are not ideal. Since the temperature is marginal to achieve good thinning, I suggest that you embrace a more aggressive approach to thinning this coming week. Carbaryl and NAA at a relatively high rate may be good choices. Since the temperatures will cool, MaxCel may not be the thinner of choice this week.

Guest article

insects

MDPI

Article

Management of *Panonychus ulmi* with Various Miticides and Insecticides and Their Toxicity to Predatory Mites Conserved for Biological Mite Control in Eastern U.S. Apple Orchards

Neelendra K. Joshi [1,*], Ngoc T. Phan [1] and David J. Biddinger [2,3]

[1] Department of Entomology and Plant Pathology, 217 Plant Sciences Bldg., University of Arkansas, Fayetteville, AR 72701, USA
[2] Fruit Research & Extension Center, Entomology, Pennsylvania State University, 290 University Dr., Biglerville, PA 17307, USA
[3] Department of Entomology, 501 Agricultural Science & Industries Building, Pennsylvania State University, University Park, PA 16802, USA
* Correspondence: nkjoshi@uark.edu or neeljoshi1005@gmail.com

Research article summarized by Matthew Bley (mbley@umass.edu), a graduate student at Stockbridge.

Introduction

European red mite (ERM), *Panonychus ulmi*, is an invasive pest of tree and small fruit crops. ERM eggs overwinter on the branches and rough bark of trees; beginning to hatch at Tight Cluster until Bloom in apple. Immatures and adults will then feed on host leaves, sucking out the cell contents (including chlorophyll), reducing the photosynthetic capability of the tree. An ERM infestation can cause a decrease in crop load, fruit quality, size, yield, and interfere with next year's bloom and bud development. In apple orchards, there are usually 8 to 10 generations a year. Because of ERM's virility and short life cycles, these mites are known to rapidly develop pesticide resistance.

Fortunately, ERM can be biologically controlled through predation when maintaining a 1:10 ratio of predatory mites:ERM. Using different or new miticides can change the predatory mite species. Currently, the primary predators for ERM are pesticide tolerant predatory mites *Neoseiulus fallacis* and *Typhlodromus pyri* (*T. pyri*).

A precautionary treatment of Abamectin, a miticide in the Avermectin family, has become more commonly used in eastern US apple orchards for ERM. This study set out to evaluate (1) if the control of early treatments of Avermectin-based pesticides is similar to that of IPM threshold miticide applications; (2) the efficacy of 10 different miticides on ERM, and (3) the non-target impact of these apple miticides on predatory mites populations (*T. pyri*). 11 treatments were applied to randomized blocks and weekly counts of ERM's, ERM eggs, predatory mites (*T. pyri* species), and overwintering eggs were taken.

Table 1. Description of pesticide treatments and application rates used for controlling *Panonychus ulmi* populations in apple orchard.

Trmt #	Treatment	Manufacturer	Active Ingredient	Amount/Acre	Grams Active Ingredient/Acre	Date of Application
1	Nealta 200SC +Tactic	BASF Loveland Products, Inc	cyflumetofen organo-silicone surfactant	405 mL 473 mL	81 g –	11 Jul
2	Nealta 200SC +Cohere	BASF Helena Agri-Enterprises, LLC	cyflumetofen surfactant	405 mL 473 mL	81 g –	11 Jul
3	DPX-RDS63 200SC	DuPont Crop Protection	dicloromezotiaz	610 mL	121.5 g	11 Jul
4	Delegate 25WG	Corteva Agriscience	spinetoram	147.4 g	36.9 g	11 Jul
5	Bifenture 2EC	United Phosphorus, Inc.	bifenthrin	379 mL	90.8 g	11 Jul
6	Portal 0.4EC	Nichino America, Inc.	fenpyroximate	946 mL	45.4 g	11 Jul
7	Zeal 72WP +LI-700	Valent USA, LLC Loveland Products, Inc	etoxazole non-ionic surfactant	85.1 g 473 mL (0.25% *v*/*v*)	61.2 –	11 Jul
8	Gladiator 0.25EC +JMS Stylet Oil	FMC Corporation JMS Flower Farms, Inc	zeta-cypermethrin + avermectin B1 mineral oil	533 mL 3785 mL (1% *v*/*v*)	78.0 g + 5.0 g –	22 May
9	Agri-Mek 0.15EC +JMS Stylet Oil	Syngenta Crop Protection, LLC JMS Flower Farms, Inc	abamectin mineral oil	355 mL 3785 mL (1% *v*/*v*)	6.4 g –	22 May
10	Envidor 2SC	Bayer CropScience	spirodiclofen	533 mL	127.8 g	11 Jul
11	Untreated Control	–	–	–	–	–

Results and Discussion

Precautionary Avermectin-based pesticide treatments (8 and #9) were applied on May 22nd and the other active ingredient treatments were applied on July 11th. Avermectin-based pesticide treatments provided effective control of the ERM population throughout the season. These treatments had significantly low ERMs (Figure 1) and eggs (Figure 2) per leaf. Other active ingredient treatments were not as effective in reducing ERM populations. Treatment #7 was especially worse at controlling ERM and had significantly higher overwintering eggs compared to all other treatments. Notably, all treatments did not conflict with *T. pyri*'s ability as a biological control of ERM as they did not reduce the predator:prey ratio (*T. pyri*:ERM) below the 1:10 ratio.

Unfortunately, the active ingredient of Avermectin pesticides is not systemic and can only absorb into the leaf tissue during a brief period in spring when apple leaves are new and tender (timing is generally limited from petal fall to approximately 10 days later). During this period, ERM population is typically low as they are hatching, making population assessments very difficult. Precautionary insecticide applications made before surveying pest population levels goes against IPM's criterion. Early season thresholds and monitoring techniques need to be developed to most effectively implement Avermectin-based pesticide control strategies for ERM.

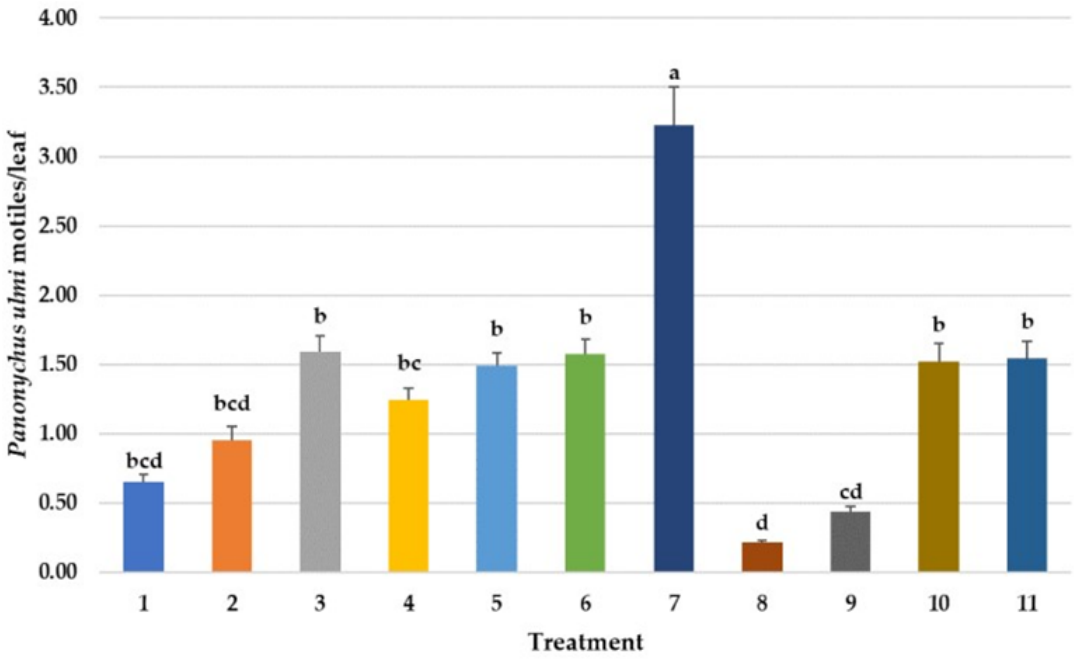


Figure 1. Mean number of *Panonychus ulmi* motile stages per sampled/leaf over time in different pesticide treatments. Repeated measures ANOVA–Means followed by the same letter(s) are not significantly different (Fisher's Protected LSD, $F(10,746) = 5.66$, $p < 0.001$,). Bars show the means and the error bars show standard errors. Treatment #1: cyflumetofen organo-silicon surfactant; #2: cyflumetofen surfactant; #3: dicloromezotiaz; #4: spinetoram; #5: bifenthrin; #6: fenpyroximate; #7: etoxazole non-ionic surfactant; #8: zeta-cypermethrin + avermectin B1 + mineral oil; #9: abamectin + mineral oil; #10: spirodiclofen; #11: untreated control.

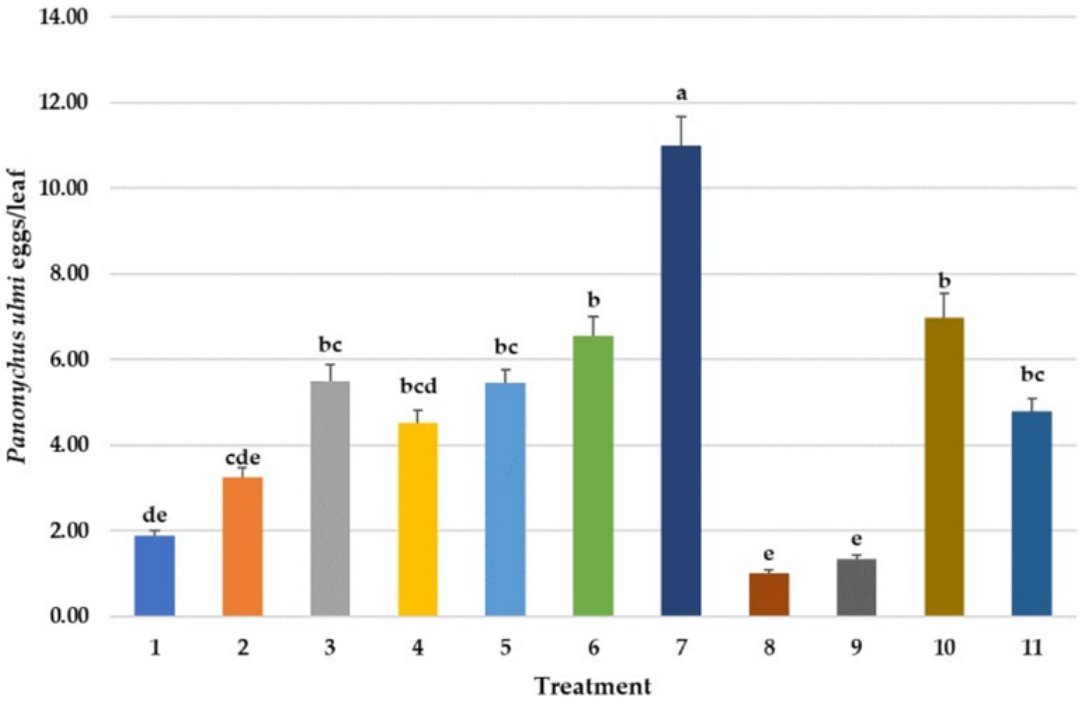


Figure 2. Mean number of *Panonychus ulmi* eggs per sampled/leaf over time in different pesticide treatments. Repeated measures ANOVA–Means followed by the same letter(s) are not significantly different (Fisher's Protected LSD, $F(10,746) = 9.15$, $p < 0.001$). Bars show the means and the error bars show standard errors. Treatment #1: cyflumetofen organo-silicon surfactant; #2: cyflumetofen surfactant; #3: dicloromezotiaz; #4: spinetoram; #5: bifenthrin; #6: fenpyroximate; #7: etoxazole non-ionic surfactant; #8: zeta-cypermethrin + avermectin B1 + mineral oil; #9: abamectin + mineral oil; #10: spirodiclofen; #11: untreated control.

Citation: Joshi, N.K.; Phan, N.T.; Biddinger, D.J. Management of Panonychus ulmi with Various Miticides and Insecticides and Their Toxicity to Predatory Mites Conserved for Biological Mite Control in Eastern U.S. Apple Orchards. Insects 2023, 14, 228. https://doi.org/10.3390/insects14030228

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The Jentsch Lab (Peter Jentsch, Poma Tech)
Acimovic Lab (Srdjan Acimovic at Virginia Tech)
Tree Fruit Horticulture Updates (Sherif Sherif at Virginia Tech)
CCE ENYCHP Tree Fruit Blog

The next Healthy Fruit will be published on or about May 30, 2023. In the meantime, feel free to contact any of the UMass Fruit Team if you have any fruit-related production questions.

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