



Healthy Fruit, Vol. 31, No. 12, July 11, 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)	10-July (2022)
Base 43 BE	1806 (1829)
Base 50 BE	1167 (1162)

Upcoming meetings

July 12, Wednesday – Annual Summer Meeting of the Massachusetts Fruit Growers' Association, Honey Pot Hill Orchards, 16 Boon Road, Stow, MA. 10 AM to 3 PM. Information and to register for FREE lunch [here...](#)

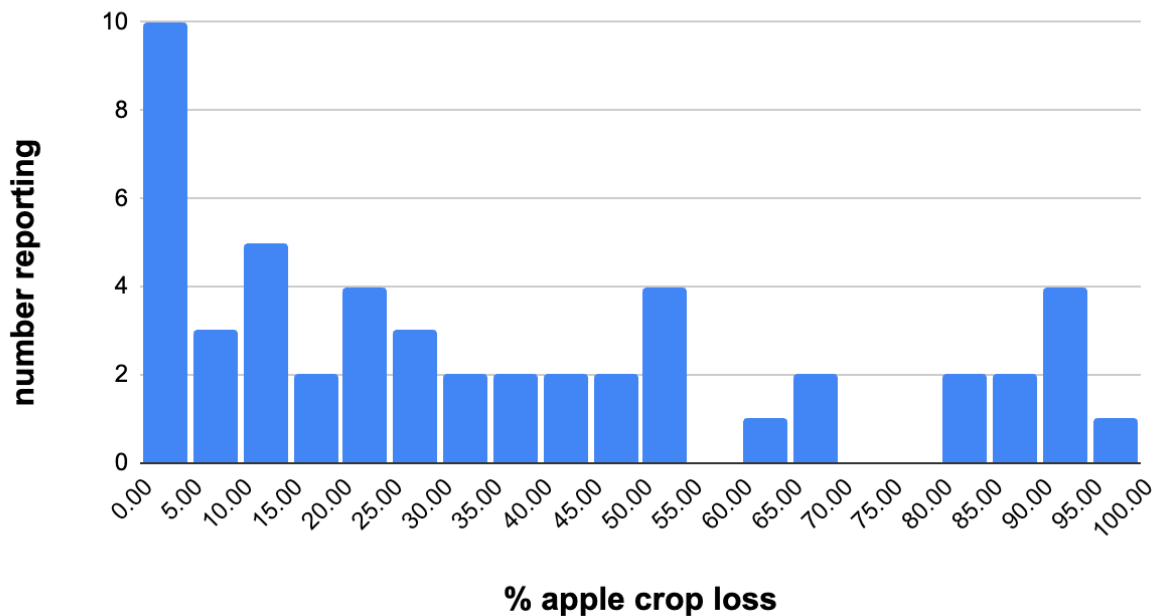
The way I see it

Jon Clements

Not much for you today given the MFGA Summer Meeting is Wednesday, July 12. We have a crowd of 150 attending, so it should be a good show. Going to be hot and sunny as always. (I guess we could use a break from the rain?) If you remember, we asked three off topic questions when we asked you to indicate your attendance (or not) at the Summer Meeting. Below is a breakdown of the responses I thought you might be interested in, with a few comments from me. Otherwise, see you Wednesday...

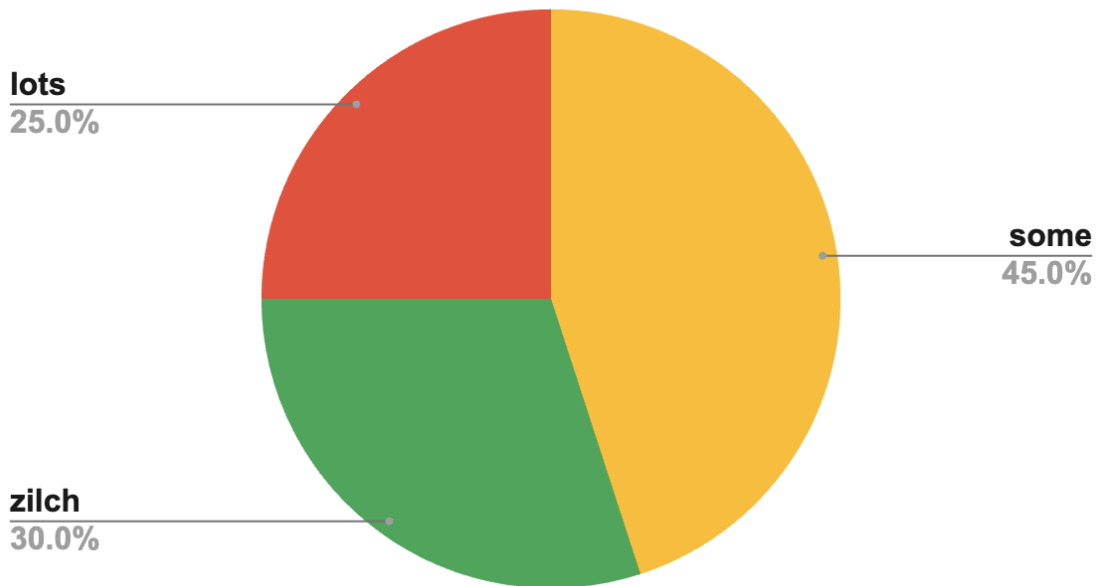
The first question was “what is your best guess estimate for % apple crop LOSS in your orchard from the May 18 freeze event?” Number reporting (vertical axis) is the number of people reporting that % apple crop loss (horizontal axis). I got to say, I – with some help from a few other growers – we were pegging the Massachusetts state-wide crop hit at about 1/3 damage/loss. Guess, what? If I average the responses, it comes out to about 33%. Hmm... If you have not already done so, please fill out this https://umassamherst.co1.qualtrics.com/jfe/form/SV_b2BKrQXOUpV8aNq more comprehensive (and more recent) survey, it’s really the only one that counts, what you see below is just “anecdotal.” 😊

% apple crop loss as reported in MFGA survey



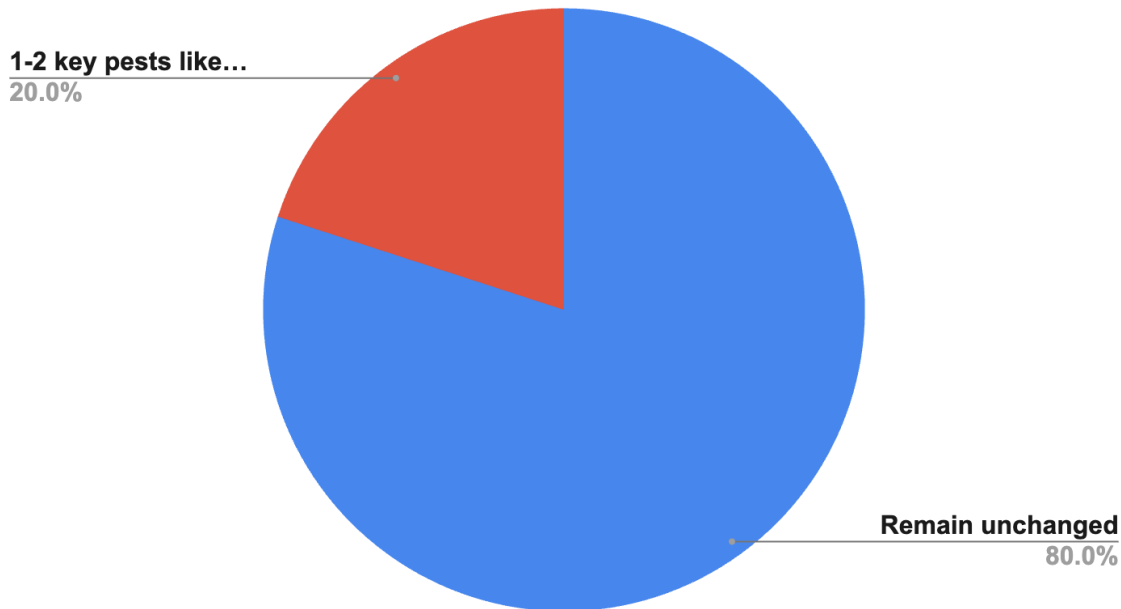
Next totally non-approved, anecdotal survey question “have you seen fire blight in your orchard this year?” Answer distribution below, zilch being “zero,” you can figure out “some” and “lots” I think. Yea, that May 18 freeze event – in addition to diminishing our fresh market crop considerably – was likely equivalent to a fire blight trauma event. Now, we could not ask for much worse weather to keep it spreading, which I suspect it will. Only worth trying to cut it out on young trees on dry days. (When’s that?) I am kind of over it and willing to just let it go for this year, fire blight has been around a long time, yea it might outright kill some young trees, but we just have to keep living with it and managing it the best we can. It’s been a “pile on” kind of year.

have you seen fireblight this year?



Finally, I gave Jaime a shot at submitting a question, "What does your insect pest management look like for the rest of the summer?" There were three options for answering per below chart, the third being "I won't spray any insecticides due to the level of crop loss I experienced" which no one indicated. Looks like the majority will not change much despite the reduced apple crop size? The 20% who said "1-2 key pests" meant 'apple maggot fly mostly from this point on'. Interesting...

your insect pest management looks like for rest of the summer?



Thanks to everyone for filling out the form, not sure I will take result to the bank, but I do think it is a pretty good indicator of the mood out there.

Entomology

Jaime Piñero, Ajay Giri, Heriberto Godoy-Hernandez, Mateo Rull-Garza, Matthew Bley

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

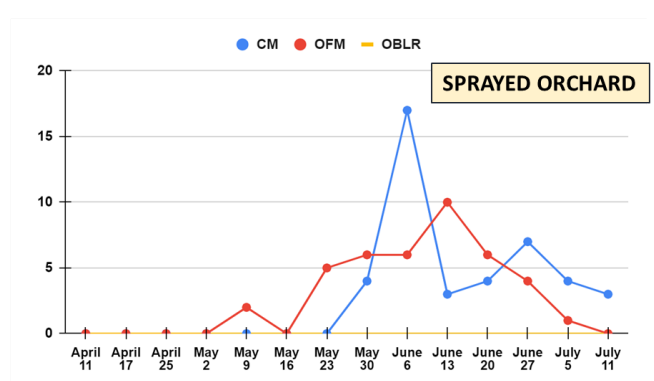
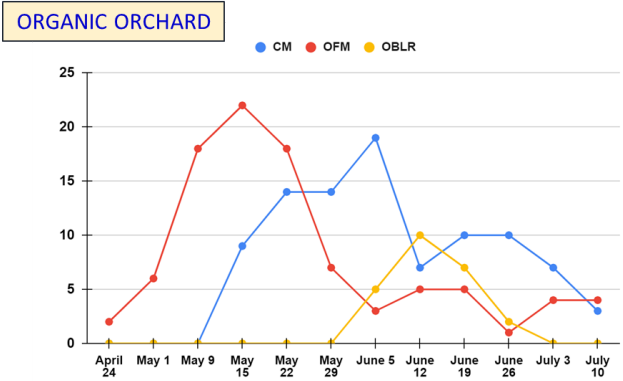
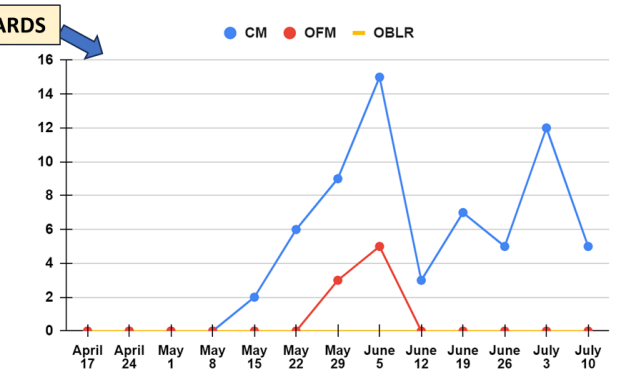
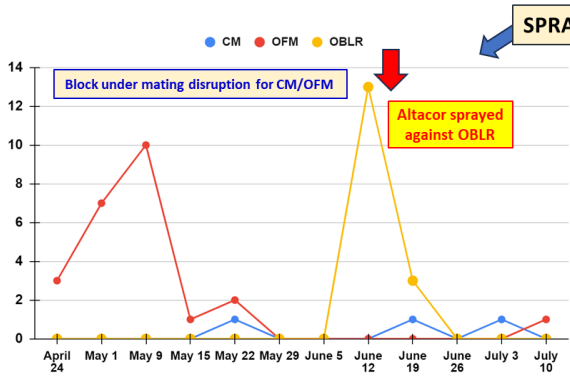
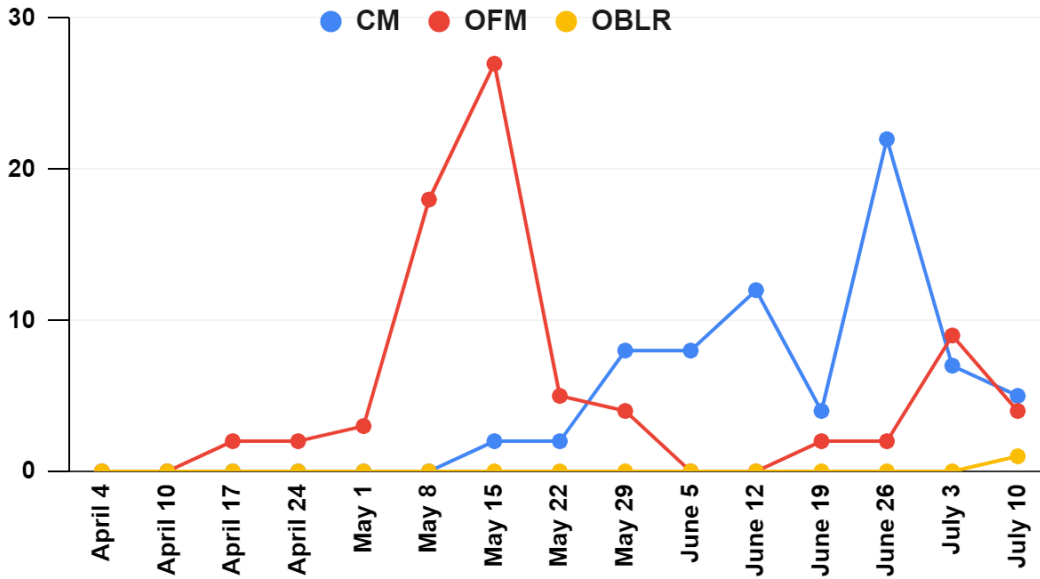
Trap-capture data at the UMass CSO.

Period: Jul 5 - 11

Insect	Average captures/trap	Notes
Obliquebanded leafroller	1	1 Pheromone-baited delta trap
Codling moth	5	1 Pheromone-baited delta trap
Oriental fruit moth	4	1 Pheromone-baited delta trap

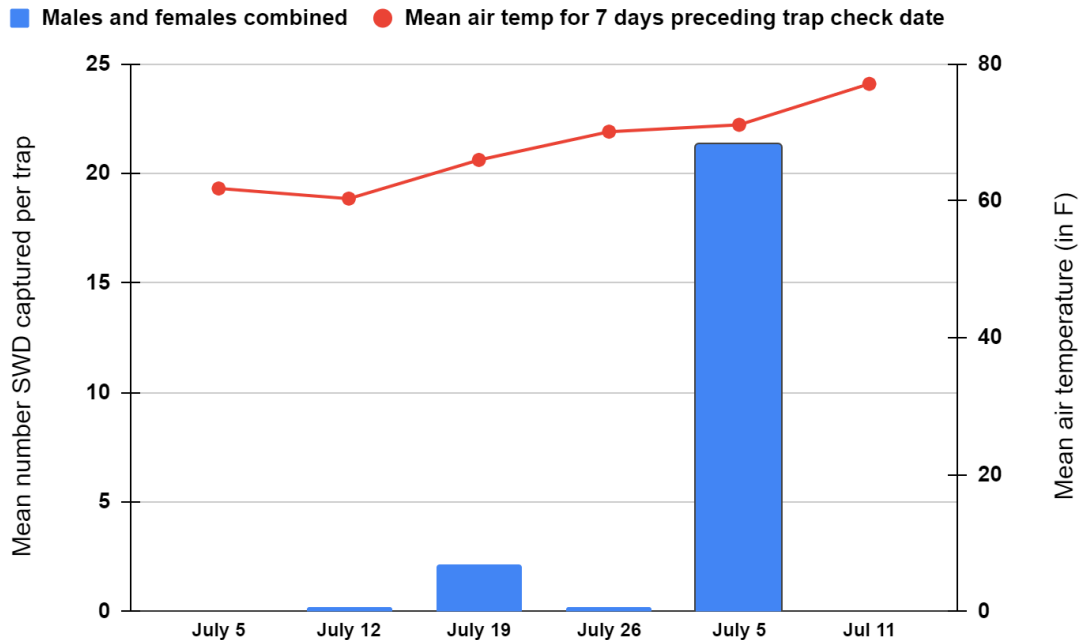
Codling moth (CM), Oriental fruit moth (OFM), obliquebanded leafrollers (OBLR). Over the past 7 days, each of the seven monitored orchards (a couple of them are organic) have seen a sharp decline in moth populations. See charts below (top chart: CSO).

Weekly moth captures at CSO



Spotted-wing drosophila (SWD). Five of the 6 monitored orchards (blocks with cherries, blueberries, strawberries, etc.) are experiencing comparatively high SWD captures. Insecticide coverage is needed to protect the fruit. **REMEMBER:** Adding a small amount of cane sugar (3-4 lbs per 100 gallons of water) to the spray tank mix can improve results.

The chart below shows the average number of SWD captured per trap across 6 MA locations. The red line represents the mean air temperature for the week preceding a trap check date. Except for CSO, we still don't have the full SWD counts for the current week.



Diluted Concord grape juice laced with table salt (2%) is highly SWD-selective. As I mentioned before, at each location we have two SWD traps. One trap is baited with diluted Concord grape juice laced with table salt (2%) and fermented for one week before deployment. The second trap is baited with a commercial (Scentry) lure. As shown in the table below (data from CSO, for this current week), the trap baited with Concord grape juice captured 21 times more SWD (64 SWD) than the trap baited with the Scentry lure (3 SWD). And the Scentry lure-baited trap captured 15 times more non-target insects than the trap baited with grape juice.

This exemplary result demonstrates, once again, the ability of home-made traps (which are very inexpensive: cost: \$ 0.09 per trap) to trap-out SWD.

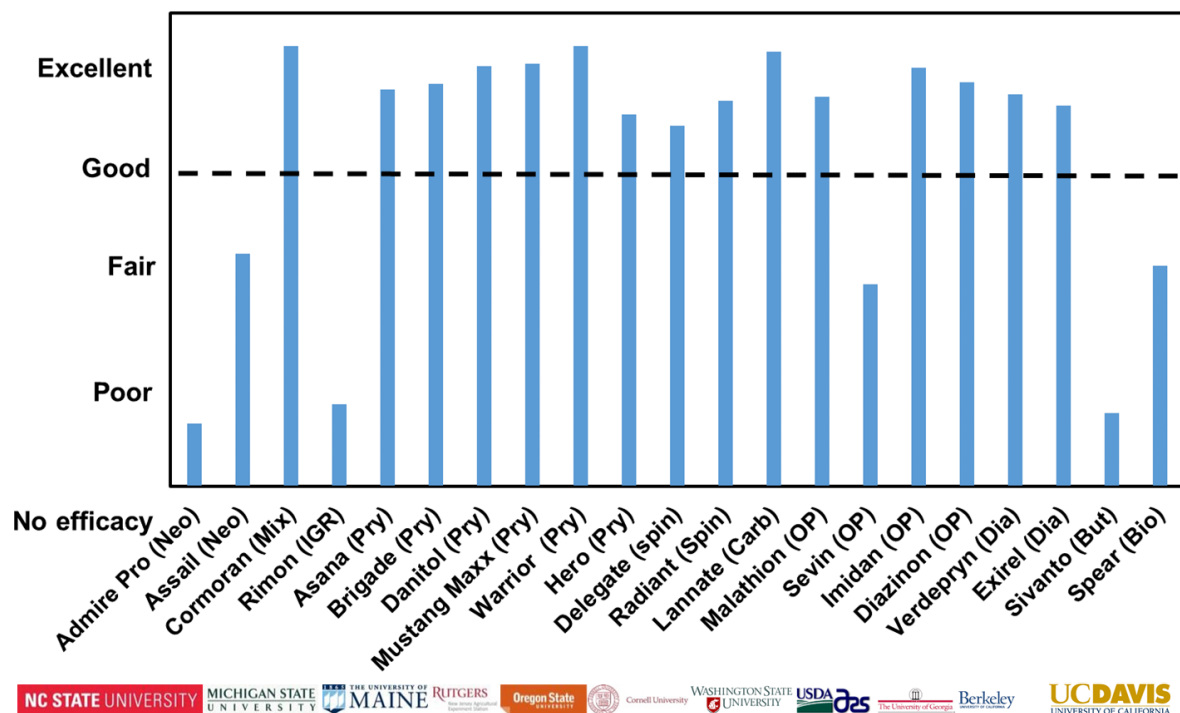
	Male_SWD_7.10-23	Female_SWD_7.10-23	Non Targets_7.10-23
1 wk old, 2% Salt	14	50	30
Scentry lure	1	2	455

Below are the 2020 summary rankings of insecticide efficacy against SWD. Such rankings have not been updated yet. You can see that the most effective insecticide types include organophosphates, pyrethroids, Cormoran (acetamiprid + novaluron - an insect growth regulator), Delegate (active ingredient: spinetoram),

2020 summary rankings of insecticide efficacy against SWD

10 states: CA, OR, WA, MI, ME, NY, NJ, NC, GA, FL
19 state x crop combinations

Courtesy of
Dr. Philip Fanning
University of Maine

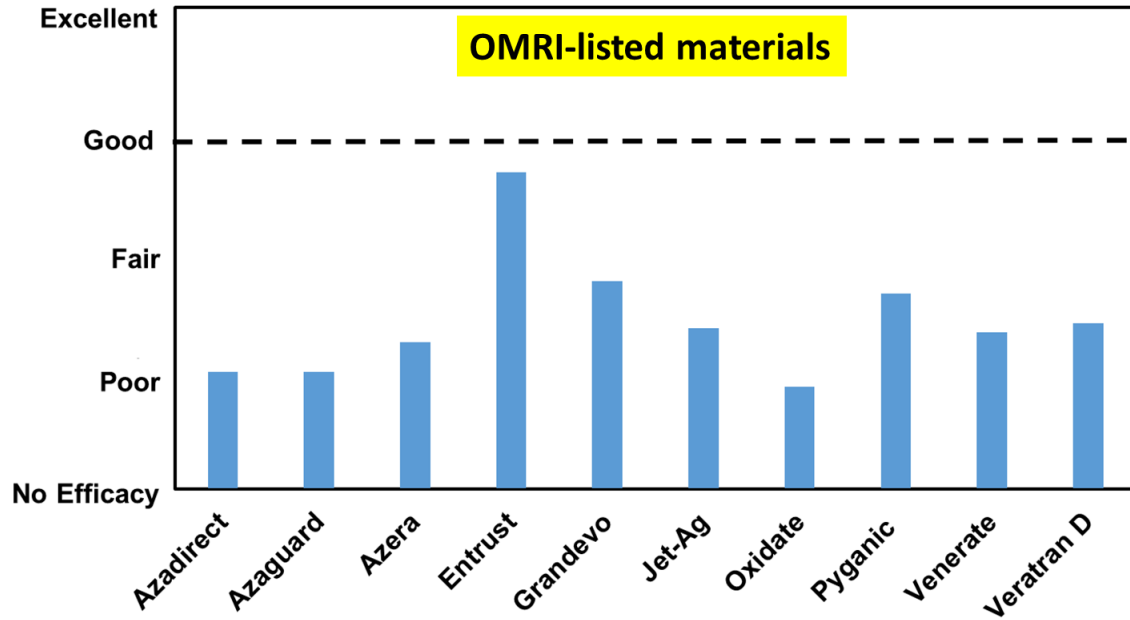


In terms of options for organic growers, the best material is Entrust (a.i.: spinosad). No other organic options are more effective or at least as effective as Entrust.

2020 summary rankings of insecticide efficacy against SWD

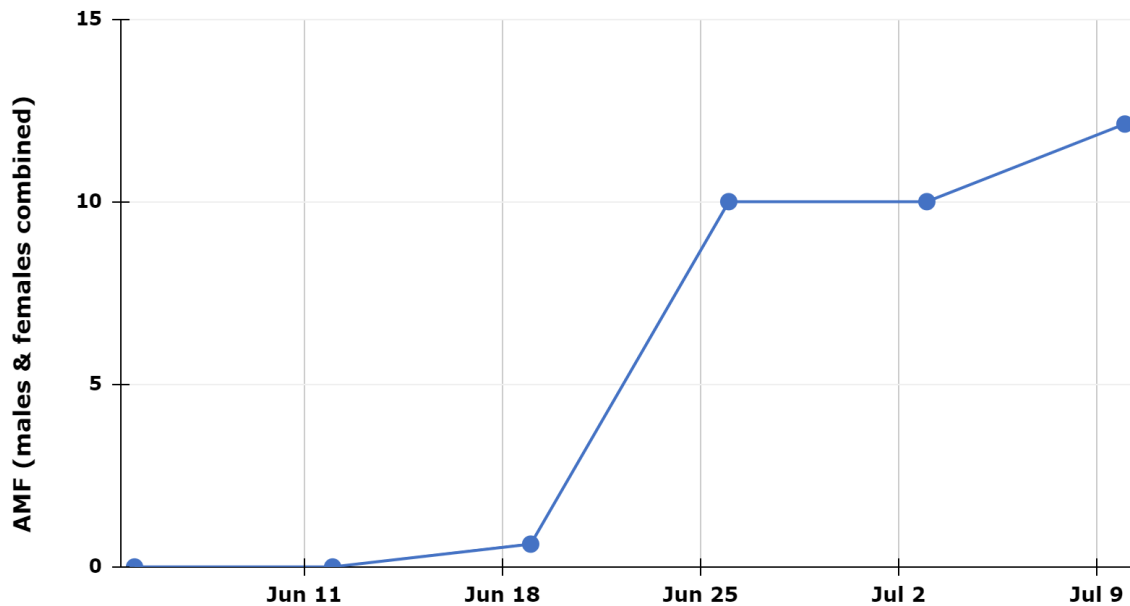
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Courtesy of
Dr. Philip Fanning
University of Maine



Apple maggot fly. AMF risk is very low this week. AMF captures have been spotty - we recorded AMF in only 3 out of 10 blocks See chart below for a view of the temporal pattern of AMF captures in one block at the UMass Cold Spring Orchard.

AMF (males & females combined) at CSO (low-spray block) by week



FREE EPNs! BASF kindly donated 1.5 billion EPNs (*Steinernema carpocapsae*) for Extension/demonstration purposes. If you have an apple block that is a hotspot for plum curculio, and you have some time to apply EPNs, please let me know tomorrow at the MFGA summer meeting. I have six trays available, each tray contains 250 million EPNs.

- **EPN application against plum curculio larvae/pupae in the soil needs to be done ASAP. Rate: 1 tray is enough to treat 250 m² (= 2,700 ft²)**
- **NOTE THAT EPNs CAN BE APPLIED AGAINST BORERS (DOGWOOD, PEACHTREE, CLEARWING).**
- According to the label, EPNs can also be applied against codling moth larvae in the fall. CM larvae overwinter in the soil, and on tree trunk crevices.
- To apply:
 - Remove filters that are 50 mesh or finer from application equipment and nozzles.
 - Do not exceed 300 psi pump pressure
 - Do not use in application systems where nozzle aperture is smaller than 0.5 mm.
 - Agitate nematodes constantly during application
 - Surface spraying equipment: Use a minimum volume of 200 gallons per acre
 - Airblast spraying equipment: Use a minimum volume of 400 gallons per acre

For more information about BASF beneficial nematodes click [HERE](#)

[BASF Millenium® Advanced Biocontrol for Peachtree Borer](#)

Apply nematodes in the spring and/or fall to target larvae in tree trunks and surrounding soil: Mix 1 tray of Millenium in 200 gallons of water. Using a high volume single nozzle hand gun applicator, apply Millenium at a rate of 1.25 million nematodes per tree. Apply in an application volume of no less than 100 gallons per acre or at least one gallon to the base of each tree covering an area of 2 feet in diameter. Keep soil moist for 10-14 days. Applications should be made when soil temperatures are above 57°F (14°C) and at least one week after application.

[BASF MILLENIUM® Biocontrol for Ground-Dwelling Insects](#)

I guess I am using too much space for this week's Healthy Fruit. **SEE GUEST ARTICLE** that discusses "*Insects and Rapid Apple Decline. Is there a relationship?*" and two summer borers.

Pathology

Dan Cooley and Jon Clements

Summer diseases, summer fungicides. Yes, the rain's not normal. It's frequent and heavy, which increases risk from fungal diseases, the summer spots and rots. Specifically, sooty blotch/flyspeck, and white rot, black rot and bitter rot.

Frequent, heavy rain increases disease risk in a few ways. First, fungi love wet weather - it helps them infect and makes them grow. Second, heavy rain washes off fungicides. While systemic fungicides get inside the waxy layer and even deeper, given enough rain they still can wash off. There isn't much good information on how much rain it takes to remove a given fungicide. A general and loose rule of thumb says that depending on the fungicide, one to two inches of heavy rain will wash off enough so that it's no longer effective.

To help fungicides stay on or in leaves and fruit, it's best to use high label rates, and give the fungicides some time to dry and/or be absorbed before the next forecast rain. Find a dry window and spray. Of course, when it rains two out of three days, that means frequent sprays. So this year, it's not unusual to be into 5th, 6th, 7th, or even later cover sprays at this point.

That creates another problem, restrictions on either the number of sprays or the total amount of a given fungicide that may be used in a season. In the table below are the fungicides that are most effective against summer diseases, with the maximum number of applications allowed per season, if there is one, and the maximum amount of material that may be applied per acre per season.

Fungicide	FRAC	Rate per acre	Max. # apps. per season	Max. amount per acre per season
1. Topsin M WSB	1	12-16 oz	none	4 lb

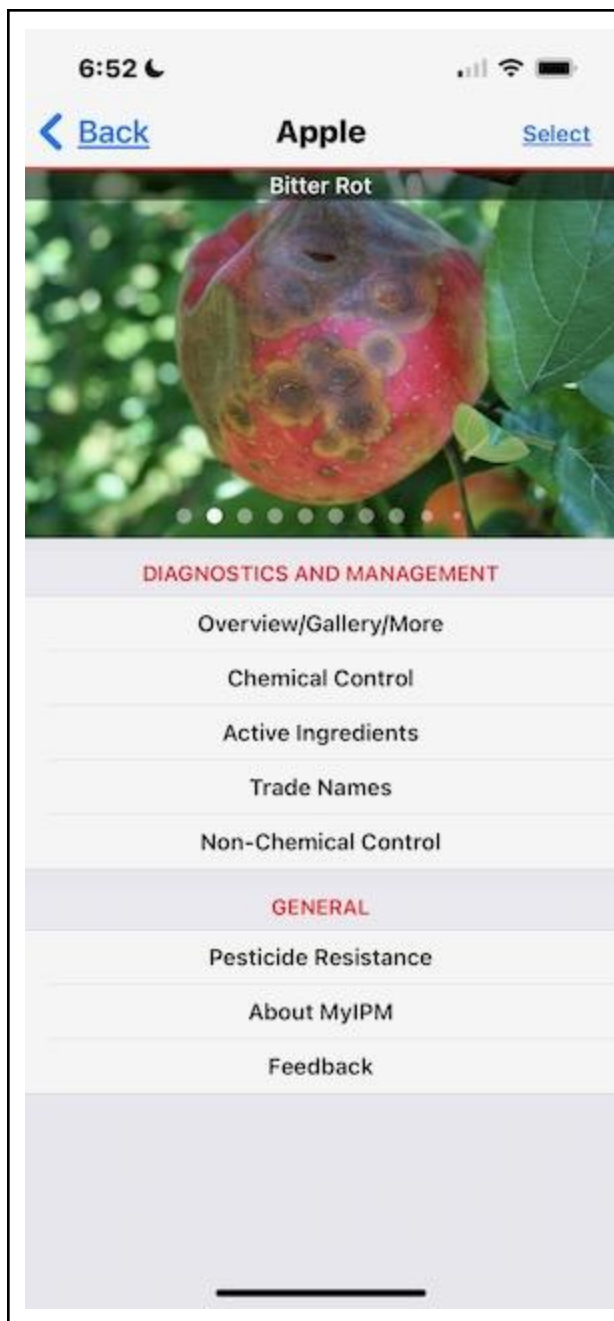
2. Luna Sensation	7+11	4-5.8 fl oz	4	21 fl oz
3. Merivon	7+11	4-5.5 fl oz	4	22 fl oz
4. Pristine	7+11	14.5-18.5 oz	4	74 oz
5. Flint Extra	11	2.9 fl oz	4	10.5 fl oz
6. Omega 500F	29	10-13.8 fl oz	13	138 fl oz
7. Captan 80WDG	M4	2.5-5 lb	none	40 lb
8. Ziram 76DF	M3	3-6 lb	none	42.4 lb

To maximize effectiveness, and minimize the risk of resistance, it's important to do the following.

1. Mix any material from the first five fungicides listed with either Captan (2.5-5 lb) or Ziram (3 lb) or Omega (10-13.8 fl oz).
2. Alternatively, apply only Captan (5 lb) or Ziram (6 lb) or Omega (13.8 fl oz).
3. The maximum number of applications of the FRAC 11 fungicide Flint Extra is 4, and the label says "Do not apply more than 4 applications of FLINT Extra or any other Group 11 fungicide per year". For example, you can't legally make 4 Flint Extra applications, and then spray another Pristine, Luna Sensation or Merivon application.
4. Pre-mix labels don't clearly restrict the total number of applications per year for all pre-mixes, though it does limit any one to 4. If the goal is to reduce the risk of resistance, then don't apply more than 4 applications total the pre-mixes (Luna Sensation, Merivon or Pristine) per year.

Captan and Ziram are the long-standing mixing partners for resistance management. They're multi-site fungicides which makes them far less likely to cause resistance than single-site fungicides, such as the first five in the list. Omega is relatively new, but also multi-site, a good fungicide against summer spots and rots, so makes a good mixing partner as well.

Ed. note: I am going to put in a plug for the MyIPM app available on either [Google Play](#) or [App Store](#). Lots of useful management and pesticide info there with a bent on preventing resistance development. Screen shot below.



Fire blight - resistance testing

There continue to be a lot of fire blight problems, but we talked about where we think they started, and what can be done to try to get rid of them, last week. If you do have fire blight, we want to let you know that, thanks to funding from a SARE grant, Quan Zeng of the Connecticut Ag Experiment Station is testing fire blight samples in New England for streptomycin resistance. If you suspect streptomycin resistance, or simply want to make sure it's not an issue for you, send samples to Quan. You can use this FedEx account, and charge the recipient:

1163-2926-3

Quan Zeng
123 Huntington Street
New Haven, CT 06511

Please send fresh samples. The very best have fresh ooze, or infected fruit. Anything that is still moist will work, but it's very hard to get any results from dried up leaves and shoots.

Horticulture

Jon Clements and Dan Cooley

Not much good to report on the horticulture front based on the past couple weeks. At least three orchards – but I am sure there are more out there – reporting symptoms of RAD/SAD or whatever you want to call it. Rapid or Sudden Apple tree Decline - rapid and sudden are pretty much the same. It's usually called a disease, but it has connections to a lot of horticultural practices, and so we'll talk about it here.

Briefly, so you can be out there looking for it and considering the cause of R/SAD, here are symptoms/causes/remedies (although remedy is a bit optimistic). BTW, I'd like to know if you are seeing similar R/SAD in your orchard. Some links to my pictures of symptoms and a nice webinar out of University of Wisconsin may be worth watching. See below.

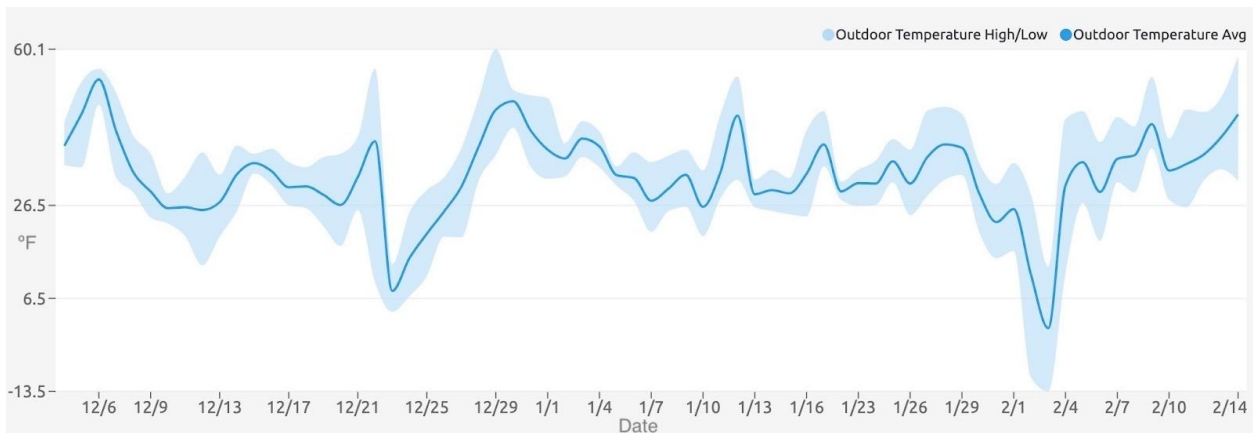
Symptoms

- Apparently healthy young trees rapidly develop yellowing of foliage, followed by reddening, then defoliation, and tree death in as little as 2 weeks.
- Declining or dead trees in a block often mixed in with healthy trees, though they often are in groups spread around the block.
- Most often on young (2 to 8 year), hi-density plantings on M.9 rootstock, but G.41 and G.11 rootstocks not immune.
- Cankers sunken, darkened areas on trunk and rootstock around the graft union that are brown, hard underneath. Bark flaking, shredding around graft union, extending up the tree.
- Roots appear healthy, with an explosion of rootstock sucker growth though the rest of tree is in rapid decline.

Possible causes

- Diseases?
 - Viruses? Haven't found anything specific.
 - Fire blight? Maybe, particularly if on M.9 rootstock, but that is actually pretty easy to diagnose. Even though we are seeing a lot of fire blight in the orchard(s) this year, so far fire blight has not been found in the current round of typical RAD/SAD symptoms.

- Insects?
 - Borers? Ambrosia beetles? Have been mentioned, but ambrosia beetles may come in after the fact. If you have dogwood borer you should not, period.
- Rootstock susceptibility? Yes, M.9 and G.11 and 41. Not 100%, but close.
- Environmental stress?
 - Climate change creating more extremes, rapid changes? That's happening.
 - Winter injury? Some think that's the whole issue. Take a look at the chart below. There are two rapid drops in temperature, one on Dec 22-23 and the other on Feb 3-4, following relatively warm weather, including our warmest Jan on record in Massachusetts. Those quick drops can damage trees.
 - Fluctuating soil moisture? Maybe, especially if it's dry enough to stress a tree like last year, and wet enough to stress a tree like this year.
- Us?
 - Herbicide injury? Yea, maybe, but you are told to not spray contact herbicides on young, green bark, right? Are mistakes being made?
 - Overcropping young young trees? Maybe a contributing factor. Add it to tree stress from any of the above, maybe it pushes the tree over a "tipping point" making something happen at and around the graft union.
 - Other poor management? Oh boy, so many factors could be at play there. What about planting apple trees where the ground is a bit "wet?" What about over-fertilization pushing growth well into the fall? Or fungicide sprays keeping trees greener going into fall compared to what they might do otherwise?



Possible remedies

- Overall healthy trees are the first line of defense. Will leave it at that.
- Plant best sites, with adequate pre-plant soil prep, organic matter, pH, etc. If you even think it is a bit wet, it is too wet! Minor changes in elevation (several hundred feet) can be a big difference in how cold it gets, plant high vs. low. Climate change and extreme weather fluctuations are here to stay so it is even more important to plant only on the best sites, especially given the cost of establishing a modern apple orchard.
- Plant only certified virus-free nursery stock (if you can get it).

- Maybe avoid M.9 rootstock as some people say that is the main problem. But Geneva rootstocks have not been out there for a long time nor in many different locations. TBD on those. Geneva's might be more susceptible to winter/cold injury, although M.9 is no shining star in that regard. G.41 in particular may harden off late? Budagovsky 9 (or 10) might be the safest bet, but you need to try really hard to grow those trees.
- Manage fire blight rigorously, bloom strep sprays when the weather-based models call for it.
- Paint trunks white or use white tree guards to help prevent large temperature fluctuations in the trunk during the winter that can result in cambium injury/death with subsequent pathogen (white, black rot) invasion causing cankering.
- Herbicides. Read the label, note it says do not spray on "green" trunks. This includes glyphosate, glufosinate-ammonium, and yes, paraquat. Otherwise known as Roundup, Rely, and Gramoxone. Thick coat of white paint is OK, but plastic tree guards for the first couple years are better. Avoid *blasting* the rootstock/trunk with these contact herbicides as the trees get older.

Guest article

By Jaime Piñero (see references below).

Insects and Rapid Apple Decline. Is there a relationship? Rapid apple decline" (RAD) describes a decline and collapse of young apple trees. Jon and Dan already commented on RAD symptoms and potential causes. What I found intriguing is that cankers and shedding are usually visible at the graft union, and wood necrosis progresses upstream to the trunk of the tree.

Despite extensive speculation on the potential causes of RAD, the causative agent is still unknown. No common root rot pathogens or nutrient deficiency has been associated with RAD. Cultivar-rootstock incompatibility, extreme weather conditions, wood-boring insects, and pathogen infection have all been proposed as possible causes. Wood-boring insects can also cause serious damage or death of apple trees and have been identified in trees with RAD. Insect infested trees usually have a sickly appearance, a sparse and pale-colored foliage, and can die with a heavy fruit crop during the fruit maturation stage. Although insect borer injury to the graft union or trunk has been reported in RAD-symptomatic areas, it is believed that insects take advantage of already declining trees, and compound the injury by providing an entryway for destructive fungi.

So, one scenario proposed by plant pathologists and entomologists is this: Abiotic stressors, such as winter injury, and drought stress are a likely precursor to RAD symptoms. Once a tree is weakened, viruses, opportunistic fungal pathogens and ambrosia beetles are believed to hasten tree decline. Although some research has shown an association between ambrosia beetles and RAD, this does not necessarily mean the beetles cause RAD.

Dogwood borer and Black stem borer. Several species of borers attack apple trees in New England, especially young trees. Dogwood borers are probably most damaging, but round-headed apple tree borers, apple bark borers, flat-headed apple tree borers, and leopard moths can also be found. Black stem borers, a tiny bark beetle, has recently been attacking stressed apple trees in New England. Here, I will briefly focus on the dogwood borer and the black stem borer.

Dogwood borer. The dogwood borer, *Synanthedon scitula*, has the broadest host range of the clearwing moths and is considered to be an economically important pest of many ornamental, fruit, and nut trees. The female moths lay their eggs in bark crevices, especially around healed wounds and burr knots. In dwarf trees they are found predominantly near the base of the trunk. In large trees, they are often near large healed pruning cuts and limb injuries. The caterpillars hatch and the cycle continues. There is just one generation per year.

Monitoring. Peak moth activity will happen soon. Species presence and flight activity can be monitored with pheromone traps.

Management. Because dogwood borer adults emerge in late June (perhaps earlier on recent years?), then insecticide sprays need to target peak moth flight. One insecticide we recommend is acetamiprid (Assail 30SG and its generic version ArVida). The label directions for use are for a first spray to tree trunks after adult DWB emergence, followed by a second application 14 - 21 days later. Assail is registered for use in stone fruits, but borers are not listed on the label. There are several older insecticides that list borers on their label, but we do not have supporting performance data to make recommendations.

Non-chemical management. Consider using mating disruption. This tactic has proven to be effective for dogwood borer when orchards are of sufficient size (> 5 acres) and shape (square or rectangular).

Entomopathogenic (= insect-killing) nematodes can be used to suppress borers.



Black stem borer. Very small – about 2 millimeters – ambrosia beetle (*Xylosandrus germanus*) that attacks stressed and apparently healthy trees. The beetles can cause severe damage to young trees with trunk diameters of less than 2.5 inches. The insect is rarely seen outside of its galleries and only females emerge from the galleries they create to infest new trees. Signs of infestation include round entrance holes that are approximately 1 millimeter in diameter, toothpick-like strings of compacted boring dust and frass emerging from the holes, and sometimes weeping or oozing of plant sap from the holes

Monitoring. Look for signs of black stem borer infestation within 3 feet of the ground and use a simple trap to capture females. Cut two to four windows in the body of a plastic 1- or 2-liter bottle that has a cap. Hang it in the orchard upside down at a height of 1.5 to 3 feet, near wooded areas or in low areas where trees are prone to cold injury and where there are trees with signs of infestation.

Bait the trap with ethanol using one of the following three methods:

1. Squirt about a quarter cup of ethanol-based hand sanitizer (unscented) into the cap end (bottom) of your trap.
2. With the bottle capped, pour in a cup of cheap vodka through one of the holes made in the side of the trap.
3. Purchase a ready-made ethanol lure to hang inside the trap and fill the bottom of the trap with soapy water.

If using hand sanitizer, traps must be checked daily because the sanitizer will form a crust on the surface after 24 hours. If using vodka or a purchased lure, traps should be checked at least once per week. Beetles are very tiny and require the use of a microscope and training to identify them correctly to species.

Management. For black stem borer management, apply insecticide when adult beetles are first caught in traps. Once beetles are inside trees, insecticides are ineffective because larvae do not feed on plant material.

References:

Eaton, A. 2016. Borers in New Hampshire Apple Trees [fact sheet]

New England Tree Fruit Management Guide

Peter, K. 2019. Apple Disease - Rapid Apple Decline. Penn State Extension.

Useful links

UMass Fruit Advisor: <http://umassfruit.com>

Network for Environment and Weather Applications (NEWA): <http://newa.cornell.edu>

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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 August 1, 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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