



Healthy Fruit, Vol. 28, No. 8, May 12, 2020

Prepared by the University of Massachusetts Amherst Extension Fruit Team

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MDAR PYO Guidance Document Released

The MA Department of Agricultural Resources has released their guidance for pick-your-own (PYO) operations on how to open PYO operations in compliance with CDC guidelines for protecting consumer and worker safety. The complete guidance can be accessed here:

<https://www.mass.gov/doc/mdar-bulletin-16-farm-pick-your-own-pyoagricultural-tourism-activities/download>






Current degree day accumulations

UMass Cold Spring Orchard, Belchertown, MA (Since January 1)	11-May
Base 43 BE (NEWA, since January 1)	328
Base 50 BE (NEWA, since January 1)	127

According to the NEWA Degree Days prediction, by Monday, May 18, we will have reached 416 DD's Base 43 BE. McIntosh apple petal fall should occur 439-523 DD's Base 43 BE.

Current bud stages

Current bud stages. 11-May, 2020, UMass Cold Spring Orchard, Belchertown, MA

				
McIntosh apple King bloom +	Honeycrisp apple 1st king bloom	Crispie pear Late bloom-petal fall	Redhaven peach Late bloom-petal fall	Rainier cherry Late bloom-petal fall

More 2020 bud stages [here...](#)

Upcoming pest events

Adapted from [Scaffolds Fruit Journal](#)

Coming events	Degree days (Base 43 BE)
European red mite egg hatch	231-337
Green fruitworm flight subsides	267-499
Lesser appleworm 1st catch	276-564

Obliquebanded leafroller larvae active	158-314
Oriental fruit moth 1st catch	220-320
Pear psylla 1st egg hatch	174-328
Predator mites observed	211-402
Redbanded leafroller 1st flight peak	232-382
Rose leafhopper nymphs on multiflora rose	239-397
Spotted tentiform leafminer 1st flight peak	267-405
McIntosh bloom	344-415

Upcoming meetings

Thursday May 14 at 5:30 PM. - UMass Fruit Team Zoom Twilight Meeting

One Pesticide Recertification Credit is available.

Please register in advance for this meeting:

https://umass-amherst.zoom.us/meeting/register/tJUpc-2vpzkoGdKe46hMgafzLPQBfK_MtJAP

After registering, you will receive a confirmation email containing information about joining the meeting. We will share program details as soon as we have them all hammered out!

Agenda

5:30pm - Technical difficulties addressed for those needing assistance

5:35 - Welcome & Intro - S. Schloemann

5:45 - Plum Curculio & Internal Leps - J. Piñero

6:05 - Pear Psylla - L. Garofalo

6:10- Disease updates Scab, fireblight and Pseudomonas, Oh My! - L. Garofalo and D. Cooley

6:20 - Changes to the NEWA apple carbohydrate thinning model v2019 and how to use it - J. Clements

6:35 - Blossom/ Petal-Fall Thinning - D. Greene

6:50 Open discussion/questions including MA PYO Guidelines for 2020

Wednesday May 20 at *6pm* - UMass Veg & Fruit Teams co-sponsored Zoom Twilight Meeting

Grower forum on Marketing Adaptations in light of COVID19

What changes have you made or are you considering for your farmstand, market, CSA, or PYO? What is working, and what still needs to be worked out? We'll hear from a few farms who have made some of these changes, and help to answer your questions and brainstorm solutions.

Register to get the sign-in info here:

<https://umass-amherst.zoom.us/meeting/register/tJUkdOygpjojG9JM5eSlxaPH3...>

May 21 - June 30, 2020: Seven webinars focusing on the impact, monitoring, and management of invasive insects in Massachusetts. Topics include the spotted lanternfly, spotted wing drosophila, brown marmorated stink bug, emerald ash borer, gypsy moth, Asian longhorned beetle, and more! Webinars will be held from **Noon-1:00 PM** on [May 21](#), [May 28](#), [June 4](#), [June 9](#), [June 16](#), [June 23](#), and [June 30, 2020](#). Details coming soon!

The way I see it...

Jon Clements

After mostly dodging several bullets, we may finally be out of the woods. If we make it through tonight (13- May) and tomorrow night (14-May). Frost may be prevalent. But let's hope not. At the UMass Orchard, Zestar! are just entering petal fall, Macs are coming into full bloom, Honeycrisp king bloom, pears are bloom to petal fall, peaches mostly into petal fall, and cherries are white bud to petal fall (depending on variety). Bloom generally looks robust with the exception of a few "off" Honeycrisp blocks, and no apparent frost/freeze damage. But we have only been down to about 30 F. to date. Other orchards have been colder, and apple flower bud damage has been observed. Be sure to check your apple blossoms to make sure they are "whole." If any damage is noted, adjust post-bloom crop load management accordingly. (And call your crop insurance agent if you have one. If any frost damage a Promalin (or Perlan) application will help set fruit, even if the ovary/ovules are damaged. 1-2 pints per acre within 24 hours of the frost event. (But wait until unfrozen.) An NAA spray at 10 ppm (4 ounces per 100 gallons) bloom to petal fall spray to start the thinning process is ALWAYS a good idea.

Particularly on Honeycrisp. Hard to see any downside to that. Let's hope the peaches set a crop, weather during bloom has been pretty lousy, but they always seem to pull through it pretty good barring mid-winter cold injury. Onward, let's hope the weather finally warms up and we have some good apple pollination weather during bloom. So we can commiserate about thinning. Speaking of which, see you at the UMass Fruit Team Zoom Twilight Meeting this Thursday at 5:30 PM. Oh yea, don't want to fall asleep reading Healthy Fruit but want the entertaining version? Then [listen to the UMass IPM Fruit Loop podcast...](#)

Insects

Jaime Piñero

Weekly report of insect pest captures in monitoring traps at CSO (Belchertown, MA)

[Period: 5.5 - 5.11](#)

Insect	Average captures/trap	Notes
RBLR	61	Pheromone-baited trap
OFM	1	Pheromone-baited trap
CM	0	Pheromone-baited trap
Spotted tentiform leafminer	93	Pheromone-baited trap
Tarnished plant bug	0.06	Unbaited white sticky cards
European apple sawfly	0.12	Unbaited white sticky cards
Plum curculio	0.5	Odor-baited black pyramid traps

European Apple Sawfly (EAS) just became active!

Two adult EAS were captured by white sticky cards at the UMass Cold Spring Orchard. Here is some information about damage caused by EAS, monitoring, and management options:

DAMAGE: Early larval feeding results in brown spiral scars on the skin of the fruit. Later feeding results in larval tunneling in the fruit and exit holes with reddish-brown frass and a strong odor. Larvae will feed on multiple fruits in a cluster.

EAS damage occurs more frequently when bloom time is extended and petal fall insecticide applications are delayed.



Developing fruitlet damaged by EAS larvae.
Photo credit: E. Garofalo, UMass Extension.



Characteristic EAS scar on ripe fruit.
Photo credit: E. Garofalo, UMass Extension.

MONITORING: Place sticky white rectangle traps at head height, on the south side of the tree, & within 18" of the tree drip line. Place traps near a large group of blossoms but remove blossoms within 12" of trap. Place a minimum of 5 traps/block. The action threshold for this pest is an average cumulative capture of 5/trap by petal fall in blocks receiving no pre-bloom insecticide, or average cumulative capture of 9/trap by petal fall in blocks with pre-bloom insecticide.



European sawflies captured in white sticky cards.
Photo credit: Jaime Piñero, UMass Extension.

Significance of the petal fall spray against plum curculio (PC)

The efficacy of management strategies implemented against PC is affected by different factors, such as weather conditions during the period of PC egg-laying activity, the level of PC pressure, and the timing of the sprays.

PC activity and oviposition are greatly affected by temperature. Adults are pretty much inactive when temperatures remain below 50°F. During cool springs, adult movement and oviposition may be lengthy (4—6 weeks), but in warmer seasons, the oviposition period may be relatively short (2- 3 weeks). If the days preceding and following petal fall are at least 80 degrees F, then the petal fall spray is expected to kill the majority of the population. However, cool and rainy weather can result in a prolonged egg-laying period. In that case, anticipate that you may not be able to enter your orchard blocks to apply an insecticide treatment against PC under wet conditions. By all means, do not delay the petal fall spray as PCs are able to cause significant injury in just a couple of days.

Post-petal fall management options for PC

Below, I present five ways in which PC can be suppressed using insecticides targeting adults (options # 1-4) and entomopathogenic nematodes targeting larvae in the soil (option # 5).

(1) PERIMETER-ROW SPRAYS. This approach is commonly used by some growers in New England. Confining insecticide applications to perimeter rows results in significant reduction in insecticide inputs compared with full block sprays. For this approach to be effective, it is important to monitor for fresh PC injury in both perimeter-row and interior-row trees.

(2) ODOR-BAITED TRAP TREES TO MONITOR PC EGG-LAYING. This approach calls for baiting one perimeter-row trap tree (per 1-3 acre blocks) with a synergistic lure, which results in aggregations of adult PCs within the canopies of those trees. A monitoring technique, based solely on observation of fresh PC injury on fruit from odor-baited trees, has proven effective and efficient at determining the need for and appropriate timing of perimeter-row insecticide sprays against PC after whole-block petal fall spray. When PC pressure is very low, as determined by the observations in the odor-baited trap tree, only the petal fall may be required.

Monitoring one odor-baited trap tree in a 1-2 acre block costs about \$ 20, and takes 5 minutes to sample the trap tree (twice a week). The effectiveness of the above approach has been validated throughout New England and New York (2004 and 2005 research). In multiple years (2013-2019) of research, the level of PC injury to fruit sampled from perimeter-row or interior-row trees in trap tree plots did not differ significantly from that recorded in plots subject to conventional management.

We have produced a Fact Sheet that explains this monitoring system step-by-step. You can access this Fact Sheet [HERE](#).

(3) HEAT-BASED OVIPOSITION MODEL. Around 1998, researchers from Cornell University developed a heat accumulation model to determine when control sprays after petal fall are no longer necessary to protect fruit from PC damage. This model is based on the assumption that residues from control sprays after petal fall only need to be maintained on fruit and foliage until about 40% of the oviposition cycle is complete, which is predicted by the model to occur at 340 DD (base 50°F) after petal fall. This model has been evaluated in various locations, including Massachusetts (around 2004-2005) with good results. With this approach, the need and timing of the last (third) spray can be determined on the basis of the heat accumulation model.

Oviposition model steps (summarized):

- (i) At petal fall, apply the whole-orchard insecticide spray
- (ii) On that day, start calculating the accumulation of DD (base 50° F)
- (iii) No additional sprays are necessary whenever the date of accumulation of 340 DD falls within 10-14 days after a previous spray.

(4) ATTRACT-AND-KILL SYSTEM FOR PC CONTROL IN REDUCED-SPRAY ORCHARDS. A novel attract-and-kill strategy involving odor-baited trap trees for direct PC control was

developed around 2006. Such an attract-and-kill approach calls for baiting the branches of several perimeter-row trees with a synergistic two-component lure. Odor-baited trap trees aggregate PCs, and the canopies of such trees are subsequently sprayed with insecticides while the other trees in the orchard block remain pesticide-free.

Restricting post-petal fall treatments to a few perimeter-row trees rather than the perimeter rows or the entire orchard can reduce insecticide treatment by more than 90%. We conducted field-scale research over a 6-year period (2013-2016, 2018-2019) in seven commercial orchards located in Massachusetts, New Hampshire, and Vermont.

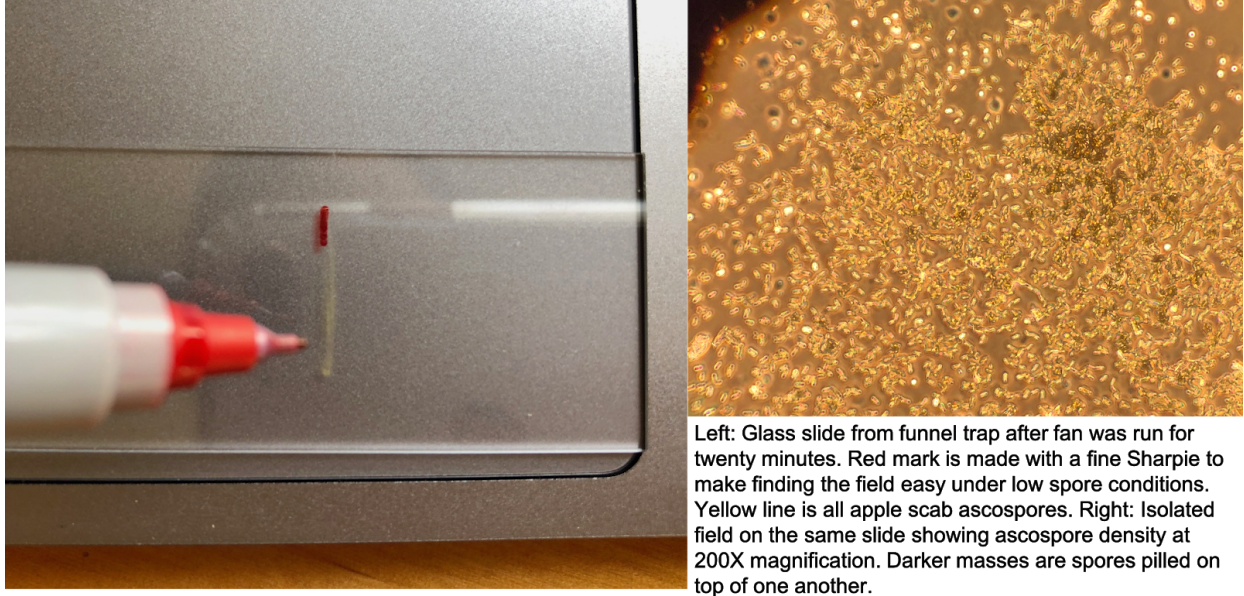
(5) NEW APPROACH TO KILL PC LARVAE IN THE SOIL INVOLVING BIOLOGICAL

CONTROL: Insect-killing nematodes can be applied to the soil in areas underneath the canopies of odor-baited trap trees. Those areas are expected to hold greater densities of PC larvae in the soil compared to any other trees in the orchard. The economic feasibility of using beneficial nematodes applied underneath the canopies of trap trees is very promising because, even if high rates of nematodes are applied, such applications would only need to be made to a small proportion of the acreage. Soon, we will report the results of long-term study that integrates the use of synergistic lures and insecticide applications to the canopies of baited trees and timely application of beneficial nematodes in the areas underneath trap trees to suppress ground-dwelling stages of PC. **This new research supports a multi-stage PC management that can be used in conventional and in organic systems.**

Diseases

Liz Garofalo and Dan Cooley

Apple Scab weekly update:



Ascospore Observation Method and Spore Count			
Date	Petri Plate Assay	Funnel Trap	Total Count
3/31/20	0	0	0
4/7/2020	0	21	21
4/14/2020	1	0	1
4/20/20	162	117	279
4/28/20	95	44	139
5/5/20	89	1421	1510
5/12/20	259	5275	5534



Ed. note: What's this a picture of?

Even if you aren't trained in the fine art of reading ascospore maturity, you can probably see that this is A LOT OF ASCOSPORES! That means scab risk is high with long enough wetting periods. This is a good time to bring out the effective, systemic fungicides. Scab pressure is high, and spraying conditions awful with all the wind. The SDHIs alone (Aprovia, Fontelis, Sercadis), the Qols (Flint, Sovran), or pre-mixes of both (Luna Sensation, Merivon, Pristine) are not only very good against scab, but will pick up mildew and rust. To manage resistance, add the low recommended rate of mancozeb, and make sure to rotate materials.

NEWA is typically ahead of both our observations and RIMpro in ascospore maturity estimates. NEWA estimates accumulated maturity at 75% to 100% (framed in purple in the NEWA forecast images below for Deerfield on the left, Belchertown on the right), depending on the location in MA. RIMpro is estimating about 60% mature. Based on observations and experience, it's unlikely that maturity is near 100% anywhere in MA. That would mean that primary season is done. It is more likely that we will be seeing significant numbers of ascospores released in rains

for at least the next 7 to 10 days.

Apple Scab Results for Deerfield

The Ascospore Maturity degree day model begins at 50% green tip on McIntosh flower buds. To recalculate ascospore maturity for your orchard, enter your green tip date:

Green Tip Date: [Click if greentip has not occurred](#)

Ascospore Maturity Summary								
	Past	Past	Current	5-Day Forecast			Forecast Details	
Date	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17
Ascospore Maturity	82%	84%	86%	87%	89%	92%	94%	95%
Daily Ascospore Discharge	0%	19%	1%	0%	21%	3%	0%	0%
Cumulative Ascospore Discharge	45%	65%	66%	66%	87%	89%	89%	89%

[Ascospore Maturity Graphs](#)

Infection Events Summary								
	Past	Past	Current	5-Day Forecast			Forecast Details	
Date	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17
Infection Events	No	No	No	No	Combined	Yes	No	No
Average Temp (F) for wet hours	-	45	43	49	57	52	59	55
Leaf Wetness (hours)	0	18	1	1	16	10	2	2
Hours ≥90% RH	0	5	0	0	0	3	0	0
Rain Amount	0.00	0.42	0.00	0.00	0.00	Night 65% Day 29%	Night 2% Day 37%	Night 40% Day 40%

Download Time: 5/12/2020 8:00

Apple Scab Results for Belchertown-2

The Ascospore Maturity degree day model begins at 50% green tip on McIntosh flower buds. To recalculate ascospore maturity for your orchard, enter your green tip date:

Green Tip Date: [Click if greentip has not occurred](#)

Ascospore Maturity Summary								
	Past	Past	Current	5-Day Forecast			Forecast Details	
Date	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17
Ascospore Maturity	74%	77%	79%	81%	84%	88%	91%	93%
Daily Ascospore Discharge	0%	15%	<1%	0%	20%	3%	0%	0%
Cumulative Ascospore Discharge	46%	62%	62%	62%	82%	85%	85%	85%

[Ascospore Maturity Graphs](#)

Infection Events Summary								
	Past	Past	Current	5-Day Forecast			Forecast Details	
Date	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17
Infection Events	No	No	No	No	Combined	Yes	No	No
Average Temp (F) for wet hours	-	47	42	51	57	52	60	56
Leaf Wetness (hours)	0	8	4	1	16	10	2	2
Hours ≥90% RH	0	2	0	0	0	4	0	0
Rain Amount	0.00	0.12	0.00	0.00	0.00	Night 65% Day 37%	Night 2% Day 27%	Night 40% Day 40%

Download Time: 5/12/2020 12:00

Fire Blight. People have been wondering whether there's a risk of fire blight now, with bloom and some rain, and in some places, a little hail. The short answer is no. Over the last week, temperatures have rarely gotten above 60, and have plunged down to freezing or below. That means that the *Erwinia* bacteria in flowers and other apple surfaces, the EIP, is 0. The cold has done them in. It's very similar to a few years ago when in spite of heavy inoculations in our tests, the weather was too cold for the bacteria to grow and infect. Keep an eye on the weather, as the situation can change quickly if temperatures warm into highs of 70 to 80, and nights don't get down below 50.

Pseudomonas Every now and again, we have a bloom time that is just right for blossom blast caused by *Pseudomonas syringae*. We are in the midst of just one such season. *Pseudomonas*, unlike *Erwinia* does its damage during cold, wet bloom periods. These frosty temperatures we have been experiencing are just what is needed to cause the bacterium to do damage. The symptoms look very uncomfortably like those caused by *Erwinia*, often causing growers who are finding dieback to be concerned about a fireblight outbreak. How to proceed if symptoms are observed? 1) Remember, temperatures have not been conducive to fireblight! 2) Cut out affected tissue as it may otherwise become an entry point for opportunistic fungi later in the season. 3) Overhead irrigation during freeze events can reduce damage. Turn sprinklers on prior to temperature dropping below 34°F and keep them going until temps have climbed back up well over 32°F.

Horticulture

Thinning Recommendations for May 13, 2020

Duane Greene

Weather over the week has again averaged cooler than normal. This has resulted in flower development being delayed. In most orchards flower development, even in the most advanced orchards, has not proceeded beyond petal fall. Therefore, most of the information on chemical thinning in last week's Healthy Fruit is valid for this week as well. The weather remains cool and unfavorable for a positive thinner response. However, the weather forecast for the end of the week and into next week is for improved and warmer temperature. This is an opportunity that should not be missed. Bloom and petal fall applications should be part of your thinning strategy this year. We do not know what opportunities the weather will provide for thinning later.

There have been reports of frost in some areas or in blocks in an orchard. This is obviously of concern when considering application of a thinner on trees where there is visible damage to some flowers. The most conservative thing to do under these circumstances is to wait until petal fall to make a chemical thinning application, if one is warranted. At that time you will have the opportunity to see more clearly how the frost damage manifests itself and you will also have the benefit of being able to make a judgement about how favorable the bloom period was for pollination and bee activity in your orchard. If the cooler-than-normal weather pattern persists this month, as it is predicted by the National Weather Service, thinning will be difficult at best. Therefore, if there appears to be two or more viable flower in a cluster it is suggested that you apply a thinner. I have observed situations in the past in frost damaged orchards where no thinners were applied at either bloom or petal fall and extreme oversetting resulted. Admittedly, it is very difficult to make an early chemical thinning decision on frost-damaged trees. It is always a guessing game to try to determine how many frost damaged flowers will persist. If flowers are weakened and not killed then cool and non-stressful conditions after bloom will favor development of these weakened flowers or young fruit.

Review of Thinning options using Hormone sprays available for Bloom and Petal Fall

NAA - This is a workhorse thinner for this time of year. I recommend applying at 10-12 ppm. It may be applied at bloom, petal fall, at bloom and petal fall or at petal fall with carbaryl.

NAD - This is an underused thinner that is very safe (will not over thin). For those who are nervous about applying bloom or petal fall thinners, you can rest after application of NAD. It may be applied at bloom, petal fall, at bloom and petal fall or at petal fall with carbaryl. You should apply this at 50 ppm, the highest rate allowed on the label. If you use a lower rate you will probably be disappointed in the thinning results.

Carbaryl - This has been the standard thinner used in New England for many years. It is considered a mild thinner which leads to its popularity. With very few exceptions, carbaryl should not be the only thinner orchardist should depend upon to single-handedly do all thinning on a variety. [Carbaryl applied at petal fall will also provide 5-7 days of insecticide activity when applied at a higher rate.]

Ethephon - This is a thinner that is used by few but it can be very effective. I recommend use of this at bloom at 1 pint/100 gal (300 ppm).

Use of Caustic Bloom Thinners

These are a good option where temperatures are too low for hormone-type thinners to be very effective. However, they may also be helpful under most circumstances. In situations where dormant pruning and bud counting were not used to lower potential crop load in heavily blooming trees using caustic thinners may be your best option. There are several choices available.

- ATS- ammonium thiosulfate (2-3 gal per 100 gal)
- Lime sulfur 2-4 lb per 100 gal
- Lime sulfur 1.5-2 lb per 100 gal plus 1.5 -2 % oil.

Improvements to MaluSim (Cornell Apple Carbohydrate Thinning Model)

Jon Clements

In the most recent Fruit Quarterly (Vol. 28, No. 1, Spring 2020) Dr. Terence Robinson and co-authors introduce some improvements to the Cornell Apple Carbohydrate Thinning Model, also known as MaluSim. If you remember, MaluSim is a decision support tool to help make effective chemical thinning applications based on predicted thinning efficacy. Inputs to the model require temperature and sunlight which are derived from a NEWA weather station. Outputs include a daily Thinning Index and recommendation to increase or decrease chemical thinner rates. Many apple growers have indicated the MaluSim (Apple Carbohydrate Thinning) is one of the most widely used decision support tools on NEWA:

- [Apple Carbohydrate Thinning v2019 on NEWA](#)
- [2019 NEWA Impact Report for Massachusetts](#)

The rationale behind Robinson making these changes/improvements to MaluSim are based on their annual study from 2000 to 2011 where experimental thinning treatments (using carbaryl, NAA, and 6-BA) were applied to apple trees in Geneva, NY and annual data on flower bud density and then cropping (yield, fruit size) was recorded. Weather data was input into MaluSim where a daily carbohydrate balance during the chemical thinning period was calculated and compared to the crop load at harvest. It turns out:

- The greatest effect on fruit set was timing of chemical thinning application, with the best thinning occurring at 200 to 250 degree days (Base 39 degrees F.) Note that king fruit diameter centered about 12 mm during this window. (I remember my MSU colleague Phil Schwallier, who has done many chemical thinning trials over the years, saying he has consistently got the best results when chemical thinners were applied when fruitlet size was 10 to 12 mm.)
- Initial flower counts (bloom intensity) have to be taken into the equation too. When there are more flowers, more aggressive thinning is needed vs. having fewer flowers.
- Carbohydrate balance also had an effect on fruit set, but was much reduced (or non-existent) outside of this degree-day window of 200-250 DD's.
- And, the actual daily carbohydrate balance should be expanded to a longer period before and after the thinning application compared to the "old" MaluSim which used a 4 day running average to compute the daily carbohydrate balance.

So, based on this research the new Cornell Apple Carbohydrate Model on NEWA (Apple Carbohydrate Thinning v2019) was modified as follows:

- Users must input % flowering spurs before running the model, with four choices: 76-100%, 51-75%, 26-50%, or 0-25%. (Note the user must also input green tip and bloom dates.)
- Degree Days are automatically calculated, summed, and highlighted in the DD column when they are in the range of 200-250 DD's (Base 39 degrees F.) from bloom.
- Calculation of the "Thinning Index" (daily carbohydrate balance) is expanded to seven days (two days before the day of thinning to four days after)
- And, thinning recommendation, taking into account % of spurs that are flowering, DD's from bloom, and carbohydrate balance over seven days (all per above) will be color coded red=high risk of over-thinning, yellow=caution, possible over-thinning, green=expect good thinning, and blue=little or no thinning expected.

In 2019 the older Cornell Carbohydrate Thinning Model will be replaced by the new and improved Apple CHO Thinning v2019 MaluSim model and you are advised to use that. Note that CHO thinning is also available in the Malusim app available on both iOS and Android smartphones for mobile access to thinning recommendations.

The screenshot shows a web browser window displaying the NEWA website. The browser's address bar shows the URL `newa.cornell.edu/index.php?page=station-pages-ma`. The page header includes the Cornell University logo and a search bar. Below the header, there is a navigation bar with links for Weather Data, Pest Forecasts, Station Pages, Crop Management, Weather Stations, and Help. The main content area is titled "Weather Stations in Massachusetts" and features a list of weather stations on the left and a map of Massachusetts on the right. A dropdown menu is open over the map, listing various tools and services, with "Apple CHO Thinning v2019" selected. The map shows various locations in Massachusetts, including Amherst, Boston, and Springfield, with weather station icons marked on the map.

Weather Stations in Massachusetts

- Amesbury
- Amherst (UM ALC)
- Ashfield
- Barnstable County Farm
- Bedford
- Belchertown
- Belchertown (OrchardWatch-North)
- Belchertown (OrchardWatch-South)
- Belchertown-2
- Beverly
- Bolton
- Boston (Weld Hill)
- Boston Logan
- Chatham
- Chicopee Falls
- Deerfield
- Dracut
- E Milton Blue Hill
- East Bridgewater (CN Smith Farm)
- East Falmouth
- Easthampton
- Falmouth Otis AFB
- Fitchburg

Map

Click on a weather station icon to view the weather station's home page.

- Apple Carbohydrate Thinning
- Apple CHO Thinning v2019
- Apple Pollen Tube Growth
- Apple Irrigation
- Apple Evapotranspiration
- Apple Frost Risk
- Growing Degree Days
- Degree Day Calculator
- Turf Evapotranspiration Map
- Soil Temperature Map
- Other Crop Tools
- Critical Temperatures

`newa.cornell.edu/index.php?page=apple-thin-new`

Apple CHO Thinning v2019 on NEWA (newa.cornell.edu)

Cornell Apple Carbohydrate Thinning Model

State:

Weather station:

Select Date:

Map Results More info

Apple Carbohydrate Thinning Model for Belchertown-2

Change green tip and/or bloom date and click "Calculate" to recalculate results.

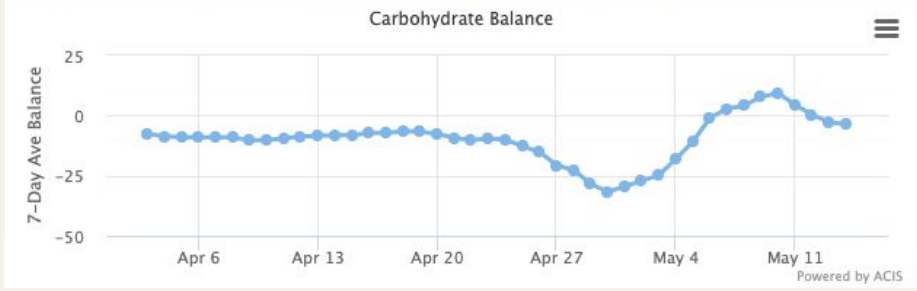
Green tip date	Bloom date	Percent Flowering Spurs	Calculate
<input type="text" value="04/01/2020"/>	<input type="text" value="05/12/2020"/>	<input type="text" value="76-100%"/>	<input type="button" value="Calculate"/>

Note from the model developer (March 22, 2018):
 • The apple carbohydrate model simulates the response to weather of trees that are healthy with normal vigor and bloom, no significant water, nutrient or winter or spring freeze stress, and no significant carry-over stress from a previous year that will change tree responses. We are less confident in the model if temperatures are extremely cold or hot. Each orchard is unique, so use this tool, as any other, in the context of your own experience. For more information click on the "More Info" tab.

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Balance (g/day)		Accum 4°C Degree Days (since bloom)	Thinning Recommendation Red=Danger of overthinning; Yellow=Caution; Green=Low Risk of overthinning)
				Daily	7-Day Ave		
5/11	59	38	11.4	-3.97	4.46	0.0	-
5/12	54	37	16.9	9.96	0.34	3.6	Increase Chemical Thinning Rate by 30%
5/13	60	30	25.3	22.47	-2.73	6.8	Increase Chemical Thinning Rate by 30%
5/14	66	39	24.1	5.93	-3.61	14.2	Increase Chemical Thinning Rate by 30%
5/15	75	49	11.7	-35.88	-	26.9	-
5/16	75	47	24.1	-7.83	-	39.0	-
5/17	67	50	15.5	-9.81	-	49.7	-
5/18	69	51	16.2	-10.1	-	61.2	-

Text color represents expected thinning efficacy:
 Blue=Mild; Green=Good; Orange=Very good; Red=Excessive



Apple CHO Thinning v2019 Model Results for Belchertown-2 (UMass Cold Spring Orchard) on 12-May, 2020

Small Fruit Update

[Sonia Schloemann](#)

PYO Update: MDAR has released their **PYO Guidance Bulletin** this week. To see the full text click [here](#). We will make time at the end of this week's Zoom Twilight Meeting (see details above in the Upcoming Meetings section), to field some questions related to this guidance. There will also be another opportunity to discuss this and other marketing-related topics on May 20th (also, see details above in the Upcoming Meetings section).

Crop Conditions:

Weather: Cold weather in the last week has resulted in some damage in berry crops that were at or near bloom (e.g., row covered strawberries and early blueberries), but the extent of the damage is unclear at this writing. Many strawberry growers successfully irrigated for frost protection but some had difficulty with wind and saw spotty damage. Some used one or more layers of row cover for frost protection. New plantings are going in. **June-bearing strawberries** continue to grow with flower trusses fully visible in the crowns or beginning to extend and expand. Row-covered fields are advanced and in bloom. Tonight may also be a frost night. The frequent wetting in cold conditions and already saturated soils may bring on a risk of root problems in fields that are prone to them. Bacterial [Angular Leaf Spot](#) may also become a problem, especially if we continue to experience frequent wetting periods through bloom. Where this is a concern copper sprays should go on before bloom. **Brambles** are leafing out with a 4-6 inches of shoot growth showing on most varieties. Flower buds are visible in early florican varieties. Blackberries are further along. New primocanes are up in many varieties. Now is a good time to fertilize Brambles. **Blueberries** are in Pink to Bloom and growers should make sure to have their pollination services (i.e., honey bee or bumble bee hives), in place. [Mummy Berry](#) is still a threat where visible shoot strikes are found. In addition, as bushes enter the bloom period, Botrytis Blossom Blight and Anthracnose infection periods are also a concern. Frost damage, even if it is sub-lethal, can predispose this tissue to infection so prompt use of fungicide materials with some translaminar or kickback activity is recommended where that is a concern. See the current [New England Small Fruit Management Guide](#) for recommended materials and rates. Watch out for PHIs for some materials. They may be too short on some materials for early season varieties. Also, as we enter the bloom period pheromone traps for [Cranberry Fruitworm and Cherry Fruitworm](#) should be put out. These allow growers to set a biofix for calculating spray timing based on Growing Degree Days (GDD). **Grapes:** Buds are beginning to swell and push new shoots. This will accelerate with the warm weather predicted over the next week. Rapid shoot growth can pose a challenge with fungicide coverage as new tissue is exposed after spray applications are made. The time between bud break and bloom is an important one for disease management, especially for [Phomopsis](#),

[Downy Mildew](#), [Powdery Mildew](#) and [Black Rot](#). See last week's issue of [New England Grape Notes](#) for a good article about early season disease management in grapes.



Figure 1) Strawberry flower truss emerging from crown (left); Blueberry in late pink (center); Blueberry in bloom (right). Photos: S. Schloemann 5/7/2020



Figure 2) Lingonberry flowers pre-bloom (left); 'Prelude' red raspberry flower clusters emerging and separating from shoot tips (center); 'Marquis' grape buds swelling (right). Photos: S. Schloemann 5/7/2020

Hawkeye's corner (notes from the field)

Liz Garofalo

I spy...



If you missed any **Phomopsis infections** during pruning, you may want to get them out now. They will be more easy to spot now that the rest of the tree has leafed out. Remember these leftover infections can potentially disperse spore to new growth creating more infection!

There are still a few **bees** on the wing, in spite of this crummy weather. Fingers crossed, we may make it through this mess yet!



Guest article

Frost Warnings and Tools for Frost Protection in Apples and Pears

by: Amanda Green, Tree Fruit Specialist, OMAFRA

Ed. note: an abbreviated version of above follows because it is a useful summary as we get into our most frost prone time of year to do damage to apple and pear buds. Read full article here: <https://onfruit.wpcomstaging.com/2020/05/06/frost-warnings-and-tools-for-frost-protection-in-apples-and-pears/>

Low nightly temperatures are expected for the rest of the week. There are frost warnings for many areas of Southwestern Ontario tonight as the forecast will be down to 0 to -1°C tonight, 0 to -2°C on Thursday in many areas of Western and Central Ontario. Temperatures are expected to be the lowest on Friday night with the temperature lows forecasted to be -2°C from Essex to Middlesex Counties, -3 to -4°C from Elgin to Waterloo, Niagara and along Lake Ontario, up to Ottawa and -6°C in the Georgian Bay area. Please make sure to check your local forecast. Critical temperatures for frost damage in apples and pears can be found [\[here\]](#). Green tip occurred earlier than normal, the cool temperatures through April have slowed down bud progression but many areas in Ontario may have their crop at a vulnerable stage for these temperatures that are forecasted for this week. There are fairly effective methods available to protect your crop against frost listed below if temperatures are a few degrees below critical temperatures and/or an inversion temperature layer is present. The most effective tools for frost

protection require the most infrastructure and many acres are not protected as it requires a significant investment. You may be looking at alternative options that may help protect your orchard from frost, like spray products that may provide frost protection or be used as a rescue spray. Descriptions of these products and preliminary trial results will also be covered in this article.

Most Effective Tools

Wind Machines

Wind machines are very effective at providing protection when there is an inversion layer on still nights by mixing the warmer air on top with the colder air below. Temperature inversions can be up to a 5-10° C difference between ground level and 20 m. For [more information on using wind machines please see the factsheet](#).

Overhead Irrigation

Overhead irrigation has been an effective frost protection method used on strawberries in Ontario and in apples in Washington State but is not commonly practiced in Ontario for apples. Overhead irrigation works to protect the crop by latent heat releasing when water changes state from liquid to solid. This works similarly to how steam can burn your hand as it condenses into a liquid. You have to be cautious with overhead irrigation as you need to make sure you can deliver enough water for the entire time, until ice begins to melt. The amount of water that needs to be applied per hour per acre depends on the wind speed and temperature. For more information on [overhead irrigation for frost protection please see this factsheet](#).

Last Resorts

Helicopters

Helicopters work similarly as wind machines with mixing the air when there is an inversion layer resulting in warming the air down by the crop. The set back to using helicopters is that they are expensive and cost hundreds of dollars per hour to rent.

Under-the-Tree Irrigation

Another method to protect your crop with irrigation is under the row irrigation. This would work similarly to overhead irrigation in that as the water changes state from liquid to solid, latent heat is released. It may not be as effective as overhead but there is less risk of freezing your crop if you run out of water. Even having wet soil from irrigating your orchard the day before a frost event may help.

Orchard Heaters or Fires

Orchard heaters or fires can be used to try to raise the temperature in the area around the crop. This can be fairly inefficient as the heat will rise straight up and may have little effect on raising the temperature around the crop.

Spray Products

Promalin [or Perlan] can be used in apples as a frost rescue spray by promoting parthenocarpic (fruit with no seeds). It can improve fruit set when flowers are damaged but not completely killed by frost. The downside to parthenocarpic fruit is that they don't size as well and will have a limited shelf life but some fruit in this condition is better than no fruit at all, especially if you have an on-farm market.

After a frost event, Promalin can be applied from pink to petal fall within 24 hours after a frost event with a single application of 1.2 to 2.3 L of product per hectare. Do not apply to frozen foliage, blossoms or developing fruit. Allow trees to completely thaw prior to application. Do not use a surfactant. If you are unable to apply Promalin within 24 hours of a frost event, apply Promalin as soon as possible as you may still get the frost rescue benefits up to 6 days after the frost event, according to Steve McArtney who presented this data in his presentation at a spring thinning meeting in 2019.

Pristine fungicide (Boscalid and Pyraclostrobin) works by inhibiting the mitochondrial breathing chain at the level of the b/c1 complex for improving the tolerance of plants to low temperatures (Rademacher et al. 2009). It is sold as a fungicide but may help with frost protection. When tested in the field by Dr. David Rosenberger et al. from Cornell, the seed count was higher in trees treated with pristine but there was no yield benefit to using Pristine. For more information on this trial please see:

<http://www.northeastipm.org/neipm/assets/File/TFWG-Rosenberger-Pristine-Frost.pdf>.

Zinc and Copper work by inhibiting ice-nucleating bacteria and can be applied the night before. Water melts at 0°C but does not necessarily freeze at 0°C (Snyder and de Melo-Abreu, 2005). If water is homogeneously pure it won't freeze until very low temperatures (Snyder and de Melo-Abreu, 2005). With foreign particles like ice-nucleating bacteria, ice can start forming at higher temperatures below zero (Snyder and de Melo-Abreu, 2005). At temperatures above -5°C, ice-nucleation bacteria cause ice formation on plant surfaces; damage is more likely when the concentration of ice-nucleation bacteria is high (Snyder and de Melo-Abreu, 2005). The theory behind applying zinc and copper is to inhibit the bacteria and will prevent ice from forming at temperatures just below zero (Snyder and de Melo-Abreu, 2005). There is mixed and limited evidence on the effectiveness of using zinc and copper.

Preliminary Product Spray Trial for Frost Protection

In May, 2017, there was a frost forecasted to occur in apple growing areas in western Ontario further from the Great Lakes. This frost was forecasted within enough days to acquire product and set up a trial on products that may provide protection or rescue from frost. Temperatures did not go low enough to cause significant economic damage but there was enough damage to provide some preliminary research results. The products that were trialed were:

- Pristine fungicide (Boscalid and Pyraclostrobin) applied 2 days before frost at 1200 g/ha

- Promalin (6-BA and GA4+7), a plant growth regulator applied at 2.3 L/ha the morning after frost
- A combination of Copper and Zinc (CuMax (4.2% Cu) and ZincMax (10.2% Zn and 0.5% B) applied in the afternoon 2 days and 1 day before frost at a rate of 2.5 L of CuMax and 1.2 L of ZincMax per ha

Sites were chosen based on areas that were expecting the lowest temperatures that were at their most vulnerable stage.

Results

Bud Damage

There was some damage that resulted at both sites; Site 1 had 15% damage in the untreated check and Site 2 had 2% damage in the untreated check when evaluated 4 weeks after frost. Both the Zinc + Copper and Promalin treatments significantly reduced the amount of bud damage to 8% and 6% respectively at Site 1. At Site 2, there was slightly more damage with the Zinc + Copper treatment at 4 % damage compared to the untreated check with 2 % damage.

Pre-Harvest Evaluation

In August, the number of fruit per pre-selected branches were counted and fruit was collected to evaluate the number of seeds and the fruit size. At Site 1 there was 2X the amount of fruit per branch with the Pristine and Zinc + Copper treatments than the untreated check and the Promalin treatments. There was no difference in the fruit count at Site 2. The seed count per apple was reduced with the Pristine and Promalin treatments compared to the untreated check at Site 1 by approximately 1 and 2 seeds, respectively. However, the opposite occurred at Site 2 with Pristine and Promalin having, on average, approximately 1 seed per fruit more than the untreated apples. Fruit diameter across the treatment were fairly similar at both sites, there was a slight decrease in fruit diameter with the Promalin treatment at Site1 and with the Pristine treatment at Site 2.

Conclusions

Overall, each treatment did show a benefit in using the product, however one needs to keep in mind that conditions for damage were not very severe (Table 3). Also, this is only one year's worth of data. Promalin treated fruitlets showed the least percent damage 4 weeks after frost but the number of fruit per branch in August was similar to the untreated check; damaged fruitlets could have already dropped by the time of bud damage evaluation which occurred 4 weeks after the frost event. Pristine had the highest number of fruit per branch but lower seed count per fruit at Site 1. The Zinc+ Copper treatment had less bud damage, more apples per branch and unaffected average fruit seed count and fruit diameter compared to the untreated check.

Acknowledgements

Special thanks to the two grower co-operators who allowed a block of apples to be trialed on and applied all of the treatments.

Also thanks to the companies who donated the products to be trialed: Valent BioSciences, BASF and NutriAg

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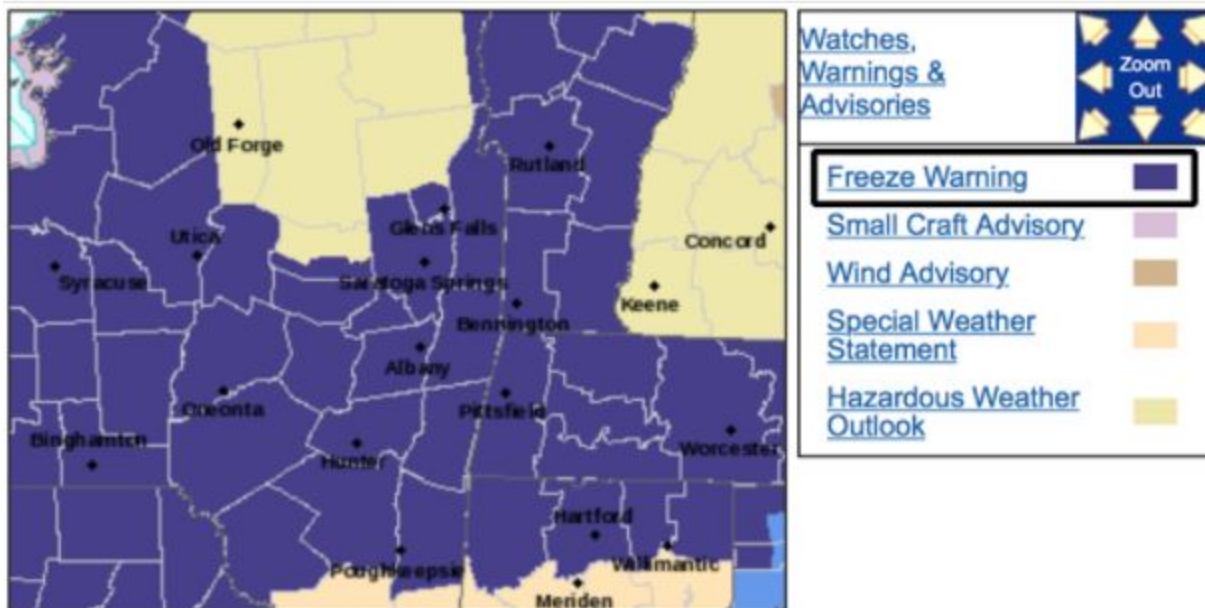
Dave Hayes The Weather Nut

52 mins · 🌐



FREEZE WARNINGS HAVE BEEN HOISTED REGION-WIDE, HEADS UP TO ALL IN THE WMASS REGION, INCLUDING SVT, TACONICS, BERKSHIRES, LITCHFIELDS, HILLTOWNS, THE VALLEY, SOUTHWEST NH, NORTHERN CT AND CMASS... LET FOLKS KNOW... 1:20PM TUES...

Good afternoon everybody, although some wind gusts to 20mph or so are possible early this evening, winds are expected to slacken, and this will provide clear, calm and dry conditions for temperatures to drop to the upper 20s to low 30s, and frost is ... **See More**



Last Map Update: Tue, May. 12, 2020 at 1:12:04 pm EDT

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The next Healthy Fruit will be published on or about May 19, 2020. 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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