Healthy Fruit, Vol. 30, No. 14, July 12, 2022

Prepared by the University of Massachusetts Amherst Fruit Team

Jon Clements, Editor

Current degree day (DD) accumulations

UMass Cold Spring Orchard, Belchertown, MA (NEWA, since January 1)	11-July
Base 43 BE	1829
Base 50 BE	1162

Upcoming pest events

Pest	DD's Base 43 F. BE	Recommendation
Apple maggot 1st oviposition punctures	1605-2157	Initial pesticide treatments should be applied as soon as trap catches exceed recommended threshold levels (avg. 5 flies/baited trap). If orchard has no previous history of damage and is not located near any major source of outside AM infestation, spraying orchard perimeters may be sufficient. If trap catches are high and orchard is near outside sources, spray the whole orchard or more perimeter rows.
Codling moth 2nd flight peak	1967-2677	Insecticides should be applied when the eggs from the second generation of CM begin to hatch, which usually occurs about 250 DD after the moth

		flight begins.
Lesser appleworm 2nd flight peak	2144-3071	
Oriental fruit moth 2nd flight subsides	2030-2510	The initial control spray to control the second generation of OFM should be applied. In orchards that have a history of previous fruit infestation from this pest, populations may be resistant to organophosphates or pyrethroids. Therefore, it might be better to use another class of materials against OFM. Eggs from the summer generation of OBLR may also begin to hatch during this time and, if possible, a material should be selected that also will control larvae of this pest.
Redbanded leafroller 2nd flight subsides	2144-2669	
Spotted tentiform leafminer 2nd flight subsides	1985-2343	Sample terminal leaves for sap feeding STLM mines. Apply a control spray if mine counts are above the recommended threshold. It may be necessary to sample again later at 840 DD post-biofix if initial counts of mines are in region 2 of the chart.
White apple leafjhopper 2nd brood nymphs	1827-3105	

* Straight from NEWA Belchertown

Upcoming meetings

2022 Virtual Orchard Meetup Series - Orchard Efficiency: Labor & Technology. July 14. For more information: https://rvpadmin.cce.cornell.edu/pdf/event_new/pdf96.pdf

Thursday, July 14, 2022 – Annual Summer Meeting of the Massachusetts Fruit Growers' Association, UMass Orchard, Belchertown, MA. For more information and to register: Annual Summer Meeting of the Massachusetts Fruit Growers' Association

The way I see it

Jon Clements

It's dry. Much of Massachusetts is currently in a **moderate drought**. The current cumulative water balance deficit as of July 12 at the UMass Orchard according to NEWA is ONLY 113,000 gallons per acre.The way I read it, it would take 6.5 inches of rain to erase that deficit. Of course that is not the way it is supposed to work, I'd settle for an inch of rain over the past six weeks. Did not happen!

Out doing some **summer pruning** on Honeycrisp, I ran across a lot of **wooly apple aphid** colonies on dormant pruning cuts.Not sure what to say other than an insecticide might be wise. Also **mites**, bad enough I could smell them and see their remnants on my hands. Spot treatments advised. Wew have not had bad mites for several years, but it's dry. Also a few **Japanese beetles** are kicking around, being so dry I wonder if that will hamper their population?

Also some sporadic **sunburn**, again on the problem child, Honeycrisp. Where it occurs, it is pretty intense. The solar radiation level has been off the charts I suspect, and the dry air (vs. humidity) makes sunburn more likely. Will be curious how bad it gets as the summer progresses.

Did I mention light cropped Honeycrisp are HUGE already?

Hope to see you at the **MFGA meeting** in Belchertown on Thursday. Cider donuts courtesy of Red Apple Farm, BBQ lunch courtesy of Outlook Farm, and some kind of blueberry dessert (we have been arguing about whether it is crisp, shortcake, or cobbler?) courtesy of Tougas Family Farm. We should be well fed. Two pesticide credits. Oh yea, there is an orchard tour and some kind of speaking program but those are after thoughts! If you did not pre-register, give me a call or drop me an email or text, we can probably fit you in, it's just the UMass people might have to forgo lunch!

	
Wooly apple aphid colony on dormant pruning cut, Honeycrisp on 11-July, 2022	Sun burn/scald on Honeycrisp, 10-July, 2022

Entomology

Jaime Pinero

Mites. A couple of hotspots have been detected at the UMass Cold Spring Orchard and with the prevailing weather mite populations are expected to increase. Management of mites during the growing season is based on scouting and the use of miticides or summer oil treatments. Avoid or minimize the use of pyrethroids or other pesticides highly toxic to mite predators. A single application of a pyrethroid can kill beneficial mite populations. Pyrethroids can also stimulate red mites to reproduce more rapidly and increase the number of generations they have in a season.

<u>Scouting for mites:</u>

July 1-30 thresholds: 5 mites per leaf.

August 1^{st} through harvest: 7.5 mites per leaf.

Populations of predatory mites (e.g., *Amblyseius fallacis*) populations can be monitored at the same time growers are scouting for spider mites since they occupy the same habitat. Initial populations in the spring may be assessed by selecting 10 apple leaves from suckers beneath each of 10 randomly selected trees in a block. Examine the surface for *Amblyseius* moving across the leaf surface. They move faster than pest mites Research conducted in Michigan has yielded tentative thresholds for predicting success of biological control by *Amblyseius*:

- A ratio of predators to prey of at least 1:10 presents a good probability of biological control
- Higher ratios increase the probability of success, in particular on cultivars such as `Red Delicious' where the mites are known to reproduce more.
- Lower predator to prey ratios (e.g., 1:20) may result in successful control on apple varieties that are less conducive to spider mite reproduction than `Red Delicious'.

Miticides listed in the New England Tree Fruit Management Guide

IRAC	Product	Rate/ Acre	REI (hours)	PHI (days)	EFFICACY	Toxicity to predatory mites[1]	COMMENTS
6	*Agri-Mek SC	2.2 to 4.2 fl. oz.	12	28	High	**Moderate** (30-70% mortality)	Add horticultural oil (not dormant oil).
6, 4A	*Agri-Flex	1.5 to 2 oz	12	35	?	?	Must be used with NIS, COC, VOC, MSO wetting agent to avoid illegal residues.
10A	Apollo 4SC	4 to 8 fl. oz.	12	45	High	**Low** (0-30% mortality)	Tank mixing with oil improves control. Primarily an ovicide.
10A	Onager Optek	12 to 24 fl. oz.	12	28	High	?	One application per season. Primarily an ovicide.
10B	Zeal 72WS	2 to 3 oz.	12	14	High	**Moderate** (30-70% mortality)	One application per season.
25	Nealta	13.7 fl. oz.	12	7	High	**Low** (0-30% mortality)	Apply at the first sign of mites, and before the population increases. Do not make more than 1 application before using an effective miticide with a different mode of action.
12B	*Vendex 50WP	1 to 2 lb.	48	14	Low	**Low** (0-30% mortality)	

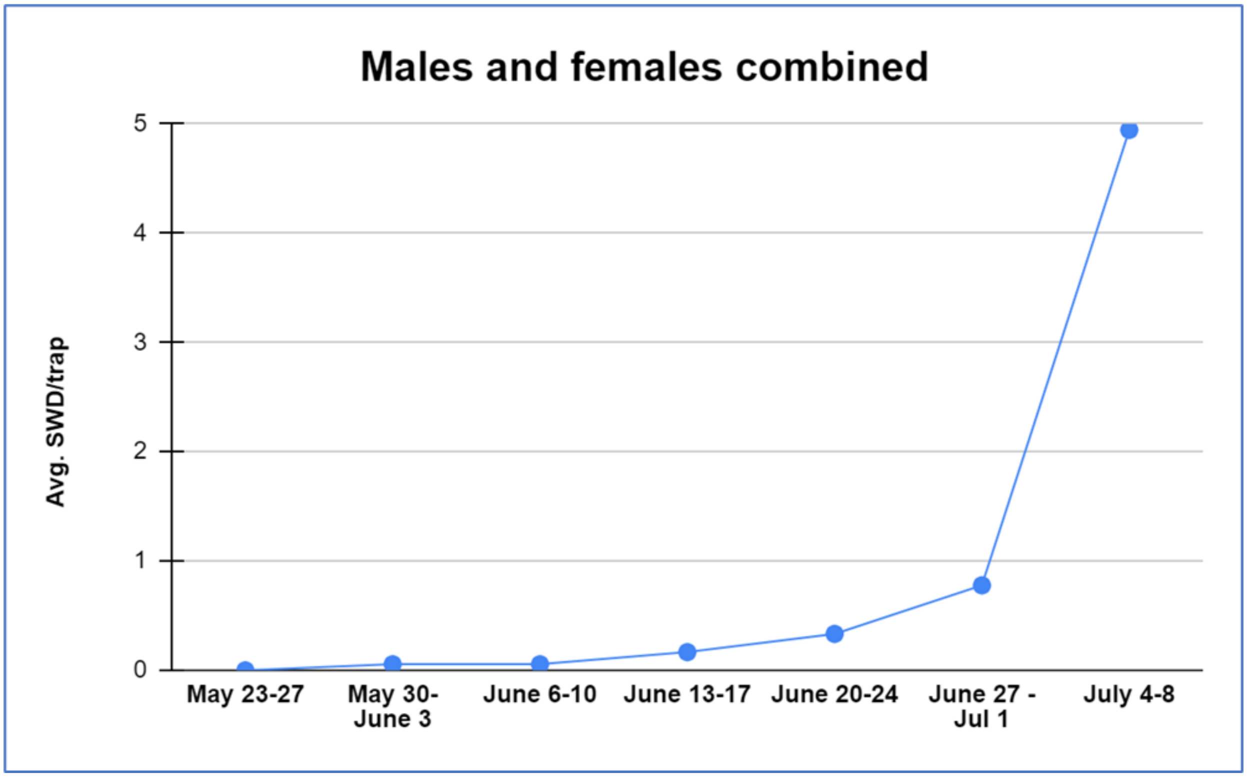
20B	Kanemite 15SC	31 fl. oz.	12	14	High	**Low** (0-30% mortality)	
21A,39	Magister	32 to 36 oz.	12	7	?	?	One application per year. Also manages powdery mildew.
21A	Nexter SC	11 to 17 oz.	12	7	High	**Moderate to High** (more than 70% mortality)	Use higher rates in mature trees with dense foliage.
21A	Portal 0.4EC	2 pt.	12	14	High	**Low** (0-30% mortality)	
23	Envidor	16 to 18 fl. oz.	12	7	High	**Low to Moderate**	
29	Omega	13.8 fl oz	12	28		?	Not labeled for other tree fruits
none	Acramite 50WS	.75 to 1 lb.	12	7	High	**Moderate** (30-70% mortality)	
NC	SuffOil-X	1-2%	4	0	?		**OMRI** listed

[1]Source: Cornell University (2020)

"You can end up with more than 80x more overwintering red mite eggs after a pyrethroid spray in the late summer or fall," Dr. David Biddinger, PennState.

Spotted-wing drosophila. SWD populations started to increase this past week (see chart below). In one week, 12 monitoring traps caught 36 males and 53 females. While trapping can be used as a monitoring tool, commercial producers of highly susceptible small fruit crops should initiate SWD sprays when the fruit become susceptible. On these crops, the initial spray is applied a week before the expected first harvest. Sprays need to be in place prior to oviposition (egg laying), and coverage needs to be thorough as the adults often hide in the dense portions of the canopy. So, high pressure and spray volume will be needed to reach these difficult to reach spots and provide thorough coverage. Even the best of the insecticides will not consistently last more than 7 days so, at a minimum, weekly applications are needed. With heavy rains, sprays need to be reapplied.

Producers must rotate among insecticides with different modes of action (IRAC Group) to prevent/delay resistance. A general rule of thumb is to switch modes of action with each new pest generation, which would mean switching to a new IRAC insecticide group each week. Since this pest can complete a generation in less than two weeks, we need to switch modes of action weekly and have multiple types of insecticides available.



Woolly apple aphid (WAA). Monitor for WAA in mid-late summer when, if present, colonies of nymphs or adults become most visible.

Because of poor correlation of above and below ground populations, there is only a tentative treatment threshold of 50% of pruning wounds. Sample 10 possible infestation sites per tree on at least 10 trees per block. Should WAA infestations appear on substantial numbers of leaf axils of terminals or fruiting spurs, treatment may be warranted to reduce possible injury to developing buds.

WAA are resistant to many commonly used insecticides. Best control is obtained when insecticide is applied in July when small WAA colonies appear on periphery of canopy, but this is before colonies are easily visible. Insecticides with systemic activity can be applied to soil to manage WAA infesting roots. The table below presents the insecticidesavailable against summer pests listed in the New England Tree Fruit Management Guide.

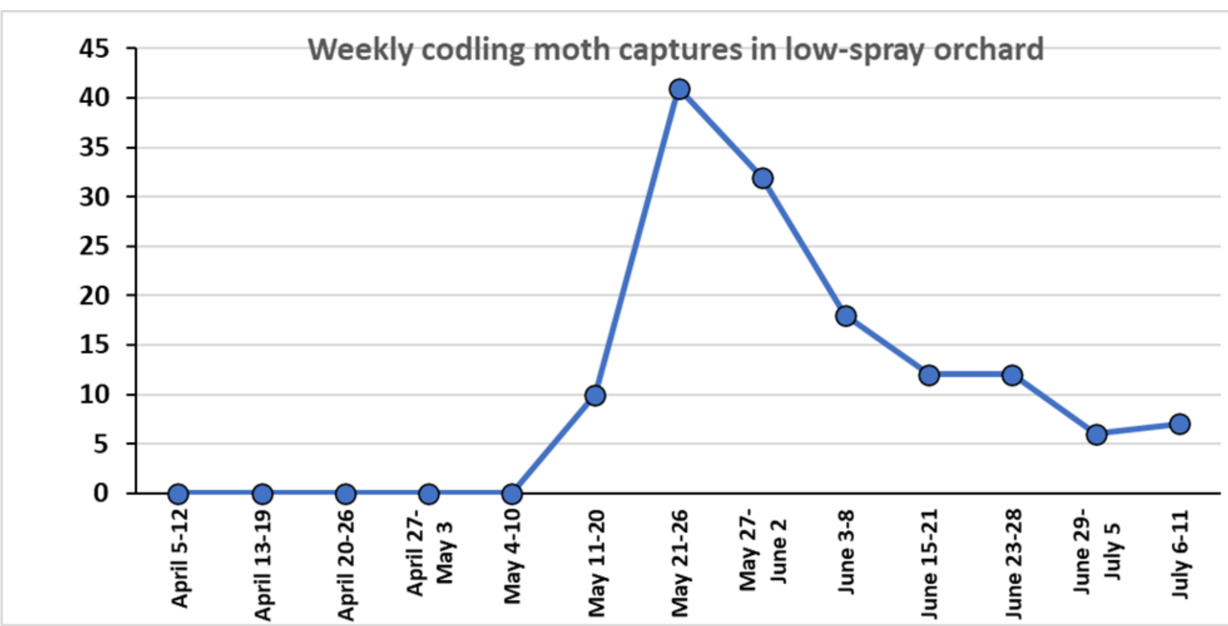
Apple maggot fly (AMF). Except for one block at the UMass Cold Spring Orchard that has high levels of AMF activity, any other orchard in Massachusetts where we are monitoring is below action threshold.

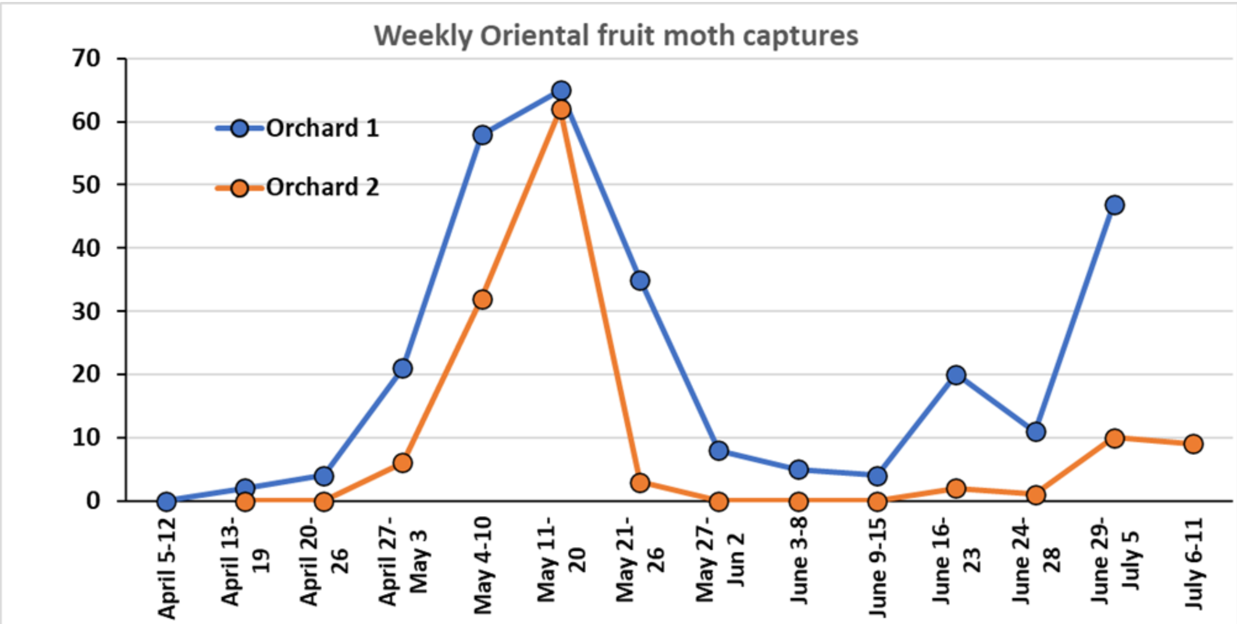
The most recent trapping data (July 4-8, 2022) show zero AMF captures in 11 blocks, and average captures less than 0.5 AMF per trap in 6 blocks.

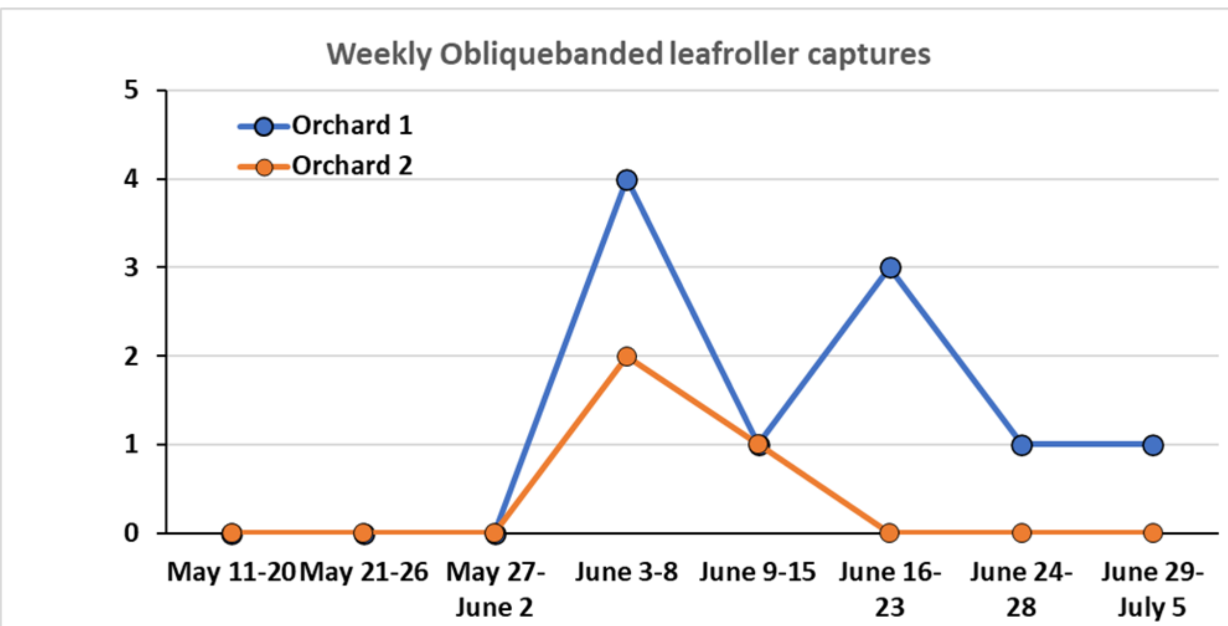
- Recommended treatment threshold is an average of 2 AMF per unbaited trap or 5 AMF per baited trap.
- Trap captures for a week following insecticide treatment are ignored. Subsequent sprays can be applied once the threshold is reached again

Codling moth (CM), Oriental fruit moth (OFM), obliquebanded leafroller (OBLR). While CM numbers continue to be relatively low, OFM populations started to increase two weeks ago. OFM suggested trap thresholds: If apples and peaches have > 10 moths per week for the 2nd-4th flights, there is a potentially treatable population. In peaches, if there are >15 moths per trap per week for the first flight, there could be potential fruit infestation problems if control steps are not taken.

In the case of OBLR, 2022 seems to be a year of overall low activity. As shown in the bottom figure, OBLR captures in two orchards with a history of OBLR activity are very low, and of erratic nature.







Summer insecticide spray table. Source: New England Tree Fruit Management Guide. *This list is not exhaustive for every active ingredient or labeled product. No endorsement of products mentioned is intended, nor is criticism implied of products not mentioned.*

SPRAY TABLE FOR APPLE INSECT PESTS (SUMMER). Source: [New England Tree Fruit Management Guide] **HIGH** - **MODERATE** EFFECTIVENESS

	Active ingredient	IRAC	Apple maggot	Stink bugs	Codling moth	Oriental fruit moth	Obliquebanded leafroller	San Jose scale	Wooly apple aphid	Potato leafhopper
Intrepid 2F *(IGR)*	Methoxyfenozide	18			M	M	H			
Dipel DF **(OMRI)**	B.t.	11A			M	M	H			
Assail 30SG	Acetamiprid	4A	H	M	H	H		M	M	H
Delegate 25WG	Spinetoram	7			H	H	H			
ALTACOR 35WDG	Chlorantraniliprole	28			H	H	H			
Avaunt 30WDG	Indoxacarb	22	M		M	M				H
Exirel	Cyantraniprole	28	M		H	H	H			H
Imidan 70W	Phosmet	1B	H		H	H		M		
Movento 240SC	Spirotetramat	23						H	H	
Voliam Flexi WDG	Thiamethoxam + chlorantraniliprole	28 + 4A		H	H	H	H			H
Belt 4SC	Flubendiamide	28			H	H	H			
Danitol 2.4 EC	Fenpropathrin	3		M	H					
Actara 25WDG	Thiamethoxam	4A		M						H
Entrust SC **(OMRI)**	Spinosad	5			M	M				
Admire PRO 4.6SC	Imidacloprid	4A					H	M	M	H
Verdepryn 100SL	Cyclaniliprole	28								
Spear-Lep	GS-OMEGA/ KAPPA-HXTX-HV1A (peptide)	32			?	?	?			
Senstar	Pyriproxyfen + Spirotetramat	23 + 7C			Suppression only			Suppression only	H	

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Pathology

Dan Cooley

Ed. note: No pathology update.

Horticulture

Jon Clements

McIntosh predicted harvest date…

The formula (Central New York) = 201.53 - 0.16FB -1.08MT-30 where FB = date of McIntosh Full Bloom (+ 3) and MT-30 = average daily temperature for the 30-day period following bloom. (https://ecommons.cornell.edu/handle/1813/3299)
For Belchertown, FB = May 10 + 3 = 13. MT-30 = 65. So, the formula: 201.53 - 0.16(13) - 1.08(65) = 129 days. From May 10 that predicts **September 16** as the LAST day for McIntosh harvest destined for CA storage. (Who stores in CA anymore?)

Redhaven peach predicted harvest date…

The predictive equation is D = -0.0386x + 234.9, where x is the cumulative degree-days (DD) base 50 degrees Fahrenheit from Jan. 1 through June 3 and D = the estimated harvest day of year (e.g., Jan. 1 = 1 and Dec. 31 = 365 in a non-leap year). The estimation is for the onset of the main season Redhaven harvest, not including fruit with split pits that typically ripen several days earlier than undamaged peaches.(https://www.canr.msu.edu/news/2016_michigan_peach_harvest_date_prediction) For Belchertown, x = 426. So, the formula: -0.0386(426) + 234.9 = -16.4 + 235 = 219. **August 7** is 220 Julian calendar days out from January 1, so that is when we will be harvesting Redhaven peaches in earnest.

Note that both these dates are slightly ahead of last year. Other factors that have a profound effect on fruit maturity include crop load, pest control, variety, and PGR use (ReTain).. Oh yea, being economically ripe often factors into the when to harvest decision :-)

Honeycrisp foliar tissue test time is NOW!

Word coming out of Cornell is that if you are going to collect leaves for leaf nutrient analysis/tissue testing, the time is NOW for Honeycrisp vs. the typical time of last week in July/first week in August. Stick with that timing for other varieties though. The reason being is the Honeycrisp “yellows” will get worse and can affect the nutrient content of leaves. You need to collect at least 50 leaves from the mid-point of this year's terminal growth. Don’t use insect damaged or otherwise diseased/unhealthyt leaves unless you are trying to diagnose a problem. A tissue test to guide fertilizer applications should be done by block and variety every three years. Note you can collect the leaves now, gently wash and dry, and send in later for analysis. I collected Honeycrisp leaves yesterday, 11-July, and will get in the mail to Waypoint Analytical when they are fully dried out.

Guest article

From: The impacts of climate change on the abundance and distribution of the Spotted Wing Drosophila (Drosophila suzukii) in the United States and Canada, by Aaron B. Langille, Ellen M. Arteca, and Jonathan A. Newman.

Should I expect more or less spotted-wing drosophila as climate changes?

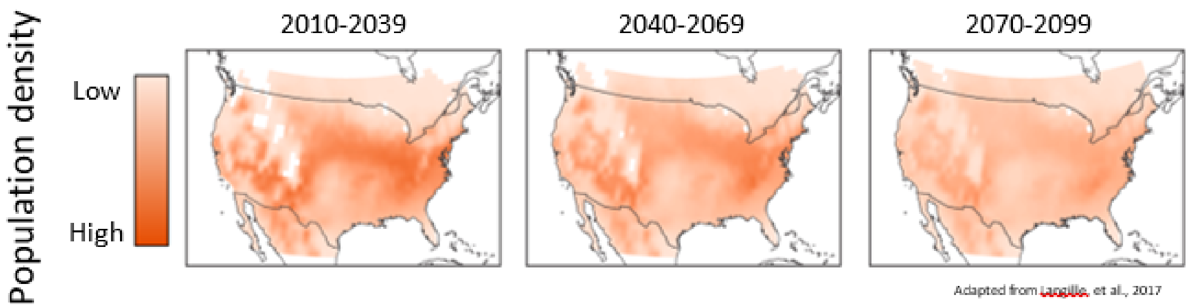
Mateo Rull-Garza and Jaime Pinero

Climate change has resulted in annual increments in average temperatures at a global scale. Among the consequences of global warming, animals accustomed to previous environmental conditions are forced to adapt to an increasingly warm climate. For example, increases in temperature can affect the prevalence of different pests; namely, spotted-wing drosophila (SWD). Past laboratory research has revealed that optimal temperatures (meaning, the temperatures at which reproduction thrives) for SWD range between 21-29 degrees Celsius (70-84 degrees Fahrenheit). Anything below or above this range detriments various aspects of their reproduction. By taking these measures of SWD reproduction and combining them with computationally-derived models (essentially, mathematical estimates of real-life ecological data), Langille and colleagues were able to generate predictions about how global warming may impact changes in SWD prevalence in the next few decades.

First, the researchers looked at one of their models specific to New Jersey and found that, despite some minor variations in the predicted temperatures across a summary year, climate change may affect fruit readiness dates: due to higher early-year temperatures, a high-climatic-impact model predicts earlier fruits (14 days at a maximum) when compared to a mid, and low-impact models. However, once fruiting occurs, fruits are predicted to ripen more quickly in the mid and low-impact models when compared to the high-impact model. When it comes to SWD population levels, the high-impact model predicts a steeper growth in population starting in late-May when compared to both mid and low-impact models, but this population growth quickly wanes, and SWD population levels begin to decline early in the year; by mid-July. On the other hand, SWD population levels continue to increase for both mid and low-impact models, and both of these population estimates peak in early September. The low-impact model predicts the highest populations, when compared to the other models. In summary, although the warmer temperatures at the beginning of the year predicted by the high-impact model encourage early fruiting and hence a steep increase in SWD population, the high temperatures mid-summer fall outside optimal SWD reproduction parameters and hence limit their growth. To be exact, the number of days with an optimal temperature range for SWD drop from 74, to 62, and to 47 days for the low, mid, and high impact models, respectively.

Although insightful as a case study, it is impossible to predict with absolute certainty what the severity of climate change will be and which model will produce the most accurate predictions. Because of this, Langille and colleagues averaged their data to get a more general understanding of the impacts of climate change on some regions of Canada, the U.S.A. and Mexico. To try and understand the relevance of the results that will follow, picture the following: each model that the researchers employed is a thin cloth of a different color, with each color representing a different scenario for the prevalence of SWD in North America. What the researchers did (metaphorically) was stack all of these thin cloths on top of one another, and look at the overall color of all the cloths together. Indeed, this is not far from the way the researchers represented their SWD population data, as you can see in the heat map below, where darker red colors mean high population density, while light colors mean low population density. The predicted data was further broken down for three time periods.

Across all models, the distribution of SWD populations are predicted to concentrate around the South-West, the Midwest, and the South Atlantic of the United States, but the population density across these regions shifts considerably between the three time periods. On the one hand, the results suggest that various regions of North America may already be experiencing or will experience peak SWD populations within the next two decades. After this, increasing global temperatures will likely make many warm regions of North America unsuitable for SWD reproduction. Indeed, as we move further into the 21st century the combined models predict a considerable drop in population growth potential; meaning, how likely it is that a SWD population will thrive. On the other hand, as temperatures increase some regions in south Canada may become more suitable for SWD reproduction, but many of these regions are not at present known for their soft-skin fruit production industry.



Finally, it is important to note that the data generated by these models does not consider many factors that can affect SWD population growth potential. To name a few: evolutionary adaptation could push the upper limit of optimal temperatures for SWD reproduction and make them more resilient towards increasing temperatures. The models also do not consider migrations of local populations to other regions, nor does it consider humidity or short-term temperature fluctuations that invariably affect how optimally SWD populations can grow and become a detrimental pest.

Useful links

UMass Fruit Advisor: http://umassfruit.com
Network for Environment and Weather Applications (NEWA): http://newa.cornell.edu
Follow me on Twitter (http://twitter.com/jmcextman) and Facebook (http://www.facebook.com/jmcextman)
The Jentsch Lab (Peter Jentsch, Poma Tech)
Acimovic Lab (Srdjan Acimovic at Virginia Tech)
Tree Fruit Horticulture Updates (Sherif Sherif at Virginia Tech)
App store: Malusim (iOS and Google Play); Fruit Growth Model (iOS); Orchard Tools (iOS); MyIPM (iOS and Google Play); Eco Fruit/Apple App (iOS and Google Play) Note: for iOS apps search the App Store on your iOS device.

The next Healthy Fruit will be published on or about July 26, 2022. 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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