



Healthy Fruit, Vol. 28, No. 3, April 7, 2020

Prepared by the University of Massachusetts Amherst Fruit Team

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Current degree day accumulations

UMass Cold Spring Orchard, Belchertown, MA (Since January 1)	6-April
Base 43 BE (NEWA, since January 1)	150
Base 50 BE (NEWA, since January 1)	52

According to the NEWA Degree Days prediction, by April 13 we will have reached 184 DD's Base 43 BE. Half-inch green bud stage should occur 150-221 DD's Base 43 BE.

Current bud stages

Current bud stages. 6-April, 2020, UMass Cold Spring Orchard, Belchertown, MA

				
McIntosh apple Quarter-inch green	Honeycrisp apple Green tip	Crispie pear Swollen bud+	Redhaven peach Swollen bud +	Rainier cherry Swollen bud

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

Upcoming pest events

Coming events	Degree days (Base 43 BE)
Green apple aphids present	111-265
Green fruitworm peak flight	91-226
Pear psylla 1st oviposition	40-126
Redbanded leafroller 1st catch	111-176
Spotted tentiform leafminer 1st catch	120-217
McIntosh half-inch green	150-221

Upcoming meetings

Fruit "twilight" meeting via Zoom, Thursday, April 9, 2020. 5:30 to 7 PM. 1 pesticide recertification credit. <https://umass-amherst.zoom.us/j/770810771>

The way I see it...

Jon Clements

- This WILL be your last Healthy Fruit (HF), unless you go to the UMass Extension Bookstore (<http://umassextensionbookstore.com>) and purchase a new [2020 subscription to HF](#) (\$65, e-mail delivery only) in the next week or two. Alternately, you can send me (Jon Clements, 393 Sabin St., Belchertown, MA 01007) a check for \$65 (tips accepted) made out to 'University of Massachusetts.' Make sure you note it is for Healthy Fruit subscription, and includes your e-mail address. You can also use [this mail-in form](#) to order Healthy Fruit and other UMass fruit publications. You can ignore this of course if you have already sent in your payment. And we very much appreciate your subscription, thanks for supporting the UMass Fruit Team..
- Our fruit “twilight” meeting via Zoom will be this Thursday, April 9, 2020 at 5:30 PM. One pesticide recertification credit will be offered upon successful completion of a quiz. Please review [this short video on using Zoom](#) before joining the meeting. (Thanks Heather Faubert for sharing.) Hope to see you there! Light supper will be served (at your house). We are accepting donation (\$20 suggested) for those receiving pesticide credits. Donate at <https://ag.umass.edu/fruit> using the “Make a Gift” button in the menu bar. Here is the live Zoom link to the meeting: <https://umass-amherst.zoom.us/j/770810771>
- Weather has trended average or even cooler lately. Phenology is moving along, slowly. Climate Smart Farming thinks we are green tip to half-inch green in Belchertown, which is not too far from the truth. The 30-day outlook for April from NOAA made on March 31 shows us warmer than average, however, the 8-14 day outlook for valid April 14-20 (made on April 6) shows us cooler than average. I expect if the latter outlook holds, we will be on track for an “average” bloom date. We’ll see.
- Much trepidation still on how the Covid-19 pandemic is going to affect agriculture going forward in Massachusetts. I’d be leary things are going to get anywhere near back to normal for the foreseeable future. Would be a good time to think about reducing expenses and having a Plan B. There are many information sources out there, frankly, it can be a bit overwhelming. And changes will happen. Let’s just take it one day at a time and stay healthy...please feel free to contact any member of the UMass Fruit Team if you have a production or pest management question in the meantime. We are not getting out much, but we are still on the job!

New England Tree Fruit Management Guide available online

The New England Extension tree fruit specialists -- which include myself, Dan Cooley, Jaime Pinero, and Elizabeth Garofalo at UMass. Mary Concklin at UConn, Heather Faubert at URI, Terry Bradshaw at UVM, George Hamilton and Anna Wallingford at UNH, and Glen Koehler and Renae Moran at UMaine -- have officially launched, and (minimally) updated for 2020 -- an

online edition of the New England Tree Fruit Management Guide. Note that it's easy to print any of the sections, if you want to have old-school reference, for example, to hang on your spray shed wall. Also, it is quite mobile-friendly so make a home screen shortcut to here: <http://netreefruit.org>. The print version has been discontinued, although you may check with your local Extension person to see if they have any print copies left. (Massachusetts does not.)

Insects

Jaime Piñero

Tarnished plant bug (TPB). Perhaps not an insect that has been on your radar in recent years. In 2019, TPB was well controlled in most apple orchards. The average percent injury by early-season Hemiptera (including but not limited to TPB) was about 1.3% in five MA orchards. TPB seems to be more problematic in peaches.

Ground cover management is a critical component of TPB IPM. Avoid mowing or using herbicide between Pink and Petal Fall because disturbance of alternate hosts in the groundcover may cause TPB to move into apple trees.

TPB adults can be monitored using a visual, white sticky trap set at silver tip. The action threshold during tight cluster for apples ranges from a cumulative average of 3 TPB/trap of 5/trap depending on quality standards. The action threshold during late pink ranges from a cumulative average of 5/trap to 8/trap. Examine 10 terminals per block for bleeding buds. The action threshold is 2-3 sap-bleeding sites per 10-terminal sample. TPB activity is highly dependent on temperature, so that 2 or 3 days of warm (50-60 degrees), sunny weather triggers increased foraging and feeding behavior

In late March 2020 we deployed a monitoring system involving 200+ white sticky traps distributed throughout MA (10 orchards) and NH (2 orchards). **Thus far, only one TPB has been detected in one block (4.7.2020) in MA.**

We are also evaluating selected plant volatiles for attractiveness to TPB and European apple sawfly using 40 white sticky cards at the UMass CSO orchard. For the last 2 weeks there has been very little TPB activity: 3 TPB adults have been captured by traps baited with some plant volatiles and unbaited traps have captured zero TPB.

Redbanded leafrollers (RBLR) are active. On April 4th, 7 adult RBLR were captured in a single pheromone trap in southern New Hampshire.

Oriental Fruit Moth (OFM). It's almost time to deploy monitoring traps for OFM! In 2019, the first captures of OFM took place on April 20th in Belchertown.

To monitor OFM, place standard pheromone traps inside the canopy at 5-6 feet high at the pink stage to monitor adult activity. One trap/10 acres is the minimum number recommended for

commercial orchards. A few traps should be placed on the forest edge to intercept immigrating moths. Check pheromone traps at least 3 times a week until biofix is established. The 'biofix' is the date on which pheromone traps sustain a catch of two or more moths. For this, it is necessary to check monitoring traps often (at least three times per week). Begin to accumulate degree days (base 45°F) at biofix. Once the biofix is determined, traps can be inspected once per week throughout the season to establish action thresholds.

Pheromone-baited traps also catch lesser appleworm, so it will be important to know how to distinguish between the two.



The apple lesserworm is native to eastern North America. Adults are gray-brown moths quite similar to OFM but smaller (about 1/3 inch long with 7/16 inch wingspans) and with more brown-orange patches on the wings. When the moth is at rest, a gold band becomes evident across its back. Photo credit: NY State Ag Experiment Station.

Chemical control of OFM can be improved by using pheromone trap data and a degree-day (DD) model to establish optimum timing of insecticide sprays targeting newly hatched larvae. For first-generation OFM, one insecticide spray between 350_{45°} – 375_{45°} DD after biofix is recommended.

Note: Since OFM flight usually begins at bloom, then it is not possible to apply an initial spray to kill adults. No insecticides need to be applied until eggs begin to hatch. The normal petal fall spray should control OFM larvae hatching early in the season.

Are you considering implementing mating disruption for OFM and codling moth? In 2019, in one MA orchard we evaluated the effectiveness of a dual mating disruption system (Trece

CIDETRAK CMDA + OFM MESO) that targeted OFM and CM with 32 dispensers per acre. The dispensers were designed to last the entire season.

A more detailed discussion on internal Lepidoptera monitoring and management, including mating disruption, will be presented next week.

Diseases

Liz Garofalo and Dan Cooley

In the game of apple scab, you germinate or you die!



Venturia inaequalis ascospore germinating on the Iron Throne.

Ok, so, that may be a little dramatic, but, the point is, today is the **first day ascospores were observed** in lab tests.

Date	Ascospore Observation Method and Spore Count	
	Petri Plate Assay	Funnel Trap
4/7/2020	0	21

So why no spore in one trap and 21 in the other? The funnel trap is equipped with a small fan that forces the spores that are ready to eject to do that, and concentrates them on a small portion of a single microscope slide. The Petri plate assay (PPA) is more passive. Leaves are

wet, which makes mature spores eject, but onto two slides rather than concentrated on one particular spot. This makes finding them more difficult on the PPA. However, the PPA has been and continues to be considered the “gold standard” in ascospore observation. While the funnel trap makes it easier to find spores when only a few are around, the gentle air pressure generated by the fan may be enough to cause spores that aren’t quite ready to go to eject. While there have been a lot of comparisons of PPA to infections, the funnel trap has not been compared to infection severity or to PPA observations. The bottom line: there are a few mature spores that are on the edge of release in Greenfield. In an orchard with little or no scab last year, this isn’t a big threat, but in an orchard with visible scab last year, it could be a problem.

NEWA Apple Disease Models

Select a disease:
Map
Results
More info

Apple Scab

State: Massachusetts

Weather station: Deerfield

Date of Interest: 4/7/2020

[Calculate](#)

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	4/5	4/6	4/7	4/8	4/9	4/10	4/11	4/12
Ascospore Maturity	3%	3%	4%	4%	4%	5%	5%	6%
Daily Ascospore Discharge	0%	0%	0%	<1%	<1%	0%	0%	0%
Cumulative Ascospore Discharge	1%	1%	1%	2%	3%	3%	3%	3%

[Ascospore Maturity Graphs](#)

Infection Events Summary								
	Past	Past	Current	5-Day Forecast			Forecast Details	
Date	4/5	4/6	4/7	4/8	4/9	4/10	4/11	4/12
Infection Events	No	No	Combined	Combined	Yes	No	No	No

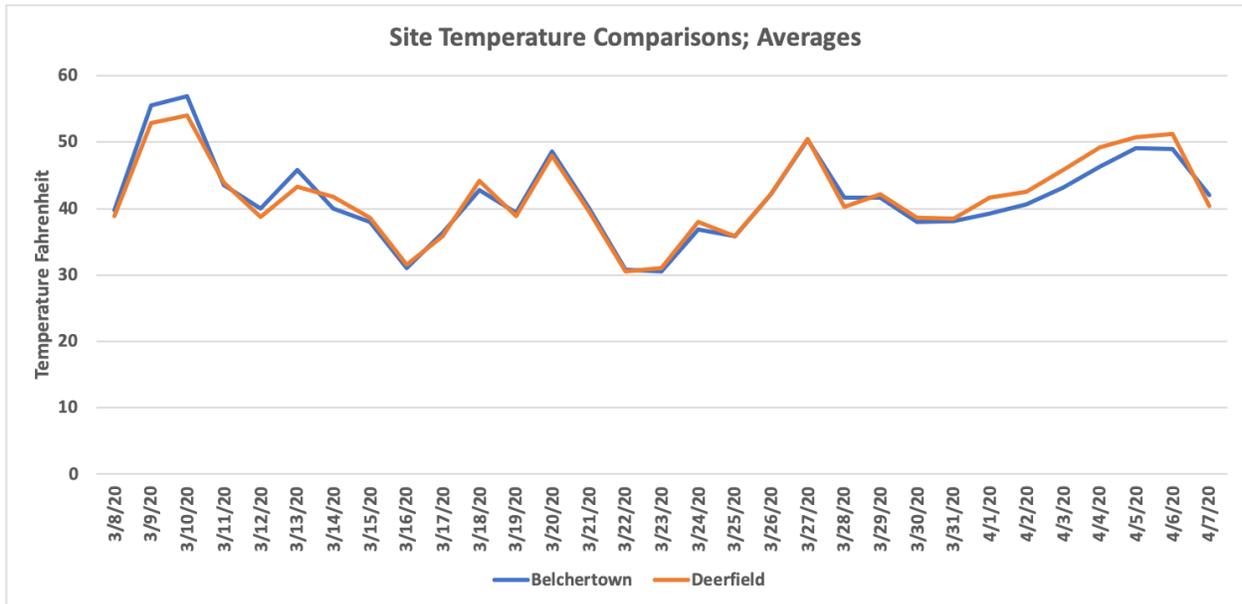
[NEWA](#) apple scab infection potential estimation for 4-7-20, Deerfield, MA. Based on the above information, there is an infection event forecast for the coming rain event (Wednesday-Friday). Note that the “Daily Ascospore Discharge” is estimated to be LESS than 1% for each day of forecast rain, not exactly a major event, up in this neck of the woods. If your climate is warmer, and your trees further along, however, **you may be looking at your first significant infection event** of the season. NEWA estimates ascospore maturity as high as 35% in the earliest orchards in MA. Check a NEWA station in or near your orchard to see what the situation is.

RIMpro indicates no chance of infection in Belchertown, while NEWA has ascospores at about 10% maturity, with an infection Wed. through Fri. This is usual for these two systems: NEWA generally estimates a higher risk than RIMpro early in the season, while RIMpro extends primary season longer.

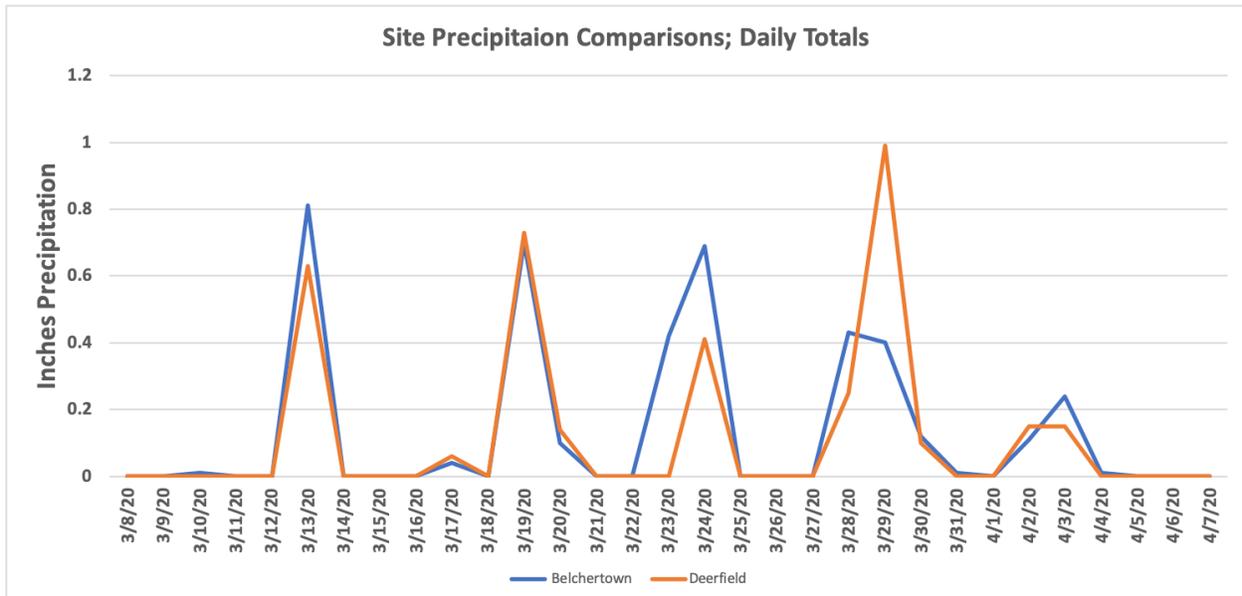
The average temperature in Belchertown from March 8-April 7 is 41.72°F. The average temperature from March 8-April 7 in Deerfield (closest reliable station reading available) is 41.91°F. Total rainfall at the two locations from March 8-April 7 is also very similar; 4.09" total in Belchertown and 3.61" in Deerfield. Bud stages remain a *little* behind what is happening in Belchertown (full disclosure my only apple phenology observations are from the one single solitary Mac in my backyard). As you can see in the picture of buds below, Greenfield phenology is a little behind the pics Jon shared from Belchertown, earlier in the newsletter.



McIntosh, Greenfield MA 4-7-2020. Just shy of ¼" green.



Average temperatures in Belchertown (blue line) and Deerfield (orange line) from March 8-April 7, 2020. While there are a few isolated days where it was several degrees warmer in Belchertown, Deerfield, on average is only 0.2°F warmer (remember last week Deerfield was 0.2°F cooler?).



Total precipitation from March 8-April 7 in Belchertown (blue line) and Deerfield (orange line). Again, some significantly different individual events. overall, Belchertown received only 0.48" more rain in total than Deerfield.

Horticulture

Jon Clements

Increasing branching and shoot growth on young apple trees

If you want to increase branching on 1-year old wood (last year's shoot growth) that is overly vigorous (a whip) and is likely to turn into blind wood:

- BEFORE bud-break: paint the area of shoot where branching is desired with 4 oz. of Maxcel (or Exilis) in one quart of white (or gray or brown) latex paint. Use a small brush or roller.
- AFTER bud-break: spray on an application of Maxcel* at a rate of 1.6 to 3.2 oz per gallon using a backpack sprayer, treat the area where branching or enhanced shoot growth is desired

If you want to break "paradormant" buds on 2-year old (or older?) sections of blind wood:

- HALF-INCH green stage: aggressively notch (see picture, use a sharp utility knife) just above live paradormant bud and then spray (backpack or hand sprayer, don't over-saturate) with a solution of 9 oz Maxcel PLUS 3 oz Promalin

If you want to increase shoot elongation and growth in newly planted apple orchard or young (non-bearing) apple orchard:

- Spray green shoots (backpack or airblast) with a solution of Maxcel or Promalin (Promalin increases shoot elongation, Maxcel increases shoot breaks) at a rate of 1.6 to 3.2 oz per gallon. If apple trees are bearing, limit application rate to 1.28 oz. per gallon. Note that Maxcel or Promalin application might cause thinning in bearing apple trees.

For more information: [F-140 Branching Young Apple Trees with Plant Growth Regulators](#)

*Note that Valent USA products are not the only solution, Fine Americas makes 6-BA and GA-7 products too, Exilis and Perlán, read label for specific use recommendations which generally mirror those of Maxcel and Promalin respectively.



“Paradormant” live bud on 2-year old wood, notches with utility knife and ready for spray application of Maxcel plus Promalin (courtesy Byron Phillips)

Small Fruit Update

Sonia Schloemann

Crop Conditions: Warmer weather is pushing bud growth along now. Be sure your spray equipment is calibrated and ready to go. The dormant season application window is closing for most crops and materials. Order scouting supplies (traps, pheromones, etc.) and anticipated spray materials and store properly. Also, pollinators are flying on warm days. Be aware of this when making spray applications.

Strawberries: Mulch should be off now with this warm weather and plants are starting to push new growth from the crowns. Check the field for areas of weak plant survival. Also look under leaves for evidence of overwintered two-spotted mite activity. Predatory mite releases may be needed a bit earlier this year than ‘normal’. Early season herbicide applications can be made now. See the [Strawberry Weed Management](#) section of the New England Small Fruit Management Guide (NESFMG) for recommended materials and rates. Planting new fields will begin when soil conditions improve enough to allow for tractor work.

Brambles: Green tissue is visible on floricanes. It looks like there’s relatively little winter damage this year thanks to the mild winter. This is also a good time for early season weed

management for Brambles. See the [Bramble Weed Management](#) section of the NESFMG for recommended materials and rates.

Blueberries: Bud development is mainly at budbreak with some early varieties/locations a little further along. This is a key time to watch for mummy cups from [Mummy Berry](#) beneath the bushes. In areas where mummy berry was a problem last year and it's possible to apply mulch now (where it's not too wet!), you can cover cups with mulch. Alternatively, cultivation or raking of the area beneath the bushes can disrupt the mushroom cups (apothecia), and reduce spore release. Where MB was a problem last year be ready with spray applications for the shoot strike phase of mummy berry when green tissue is exposed. More on this next week. Finally, early season weed management is also still possible now. See the [Blueberry Weed Management](#) section of the NESFMG for recommended materials and rates.



Figure 1) Photos from 4/6/20; Left – Strawberries w/ mulch pulled off; Middle – ‘Natches’ Blackberry shoot growth; Right – Raspberry shoot growth. (Photos: S. Schloemann, UMass Extension)



Figure 2) Photos from 4/6/20; Left – Black raspberry shoot growth; Middle – Blueberry shoot growth; Right – Elderberry shoot growth. (**Photos:** S. Schloemann, UMass Extension)

Hawkeye's corner (notes from the field)

Liz Garofalo

No field visits for this week (yet...).

Guest article

TREE DECLINE AND NOVEL VIRUSES

David Rosenberger, Plant Pathology, Highland, dar22@cornell.edu

Reprinted from [Scaffolds Fruit Journal](#), Vol. 29, No. 3

In [last week's issue of Scaffolds](#), I summarized some information from a conference on apple decline that was organized by Dr. Kari Peter and held in Winchester, VA, last December. The article last week focused on the potential relationships between herbicides and young tree decline. This week I will summarize some of the information on novel apple viruses that was presented at that meeting, along with other recently published information on new apple viruses. Relevant literature citations are included in a slightly expanded version of this article that will be posted later this week on my blog: <http://blogs.cornell.edu/plantpathvhl/blog>.

At the meeting in Winchester, Dr. Kari Peter provided some background on tree decline problems in Pennsylvania and described how associates in the Pennsylvania Department of Agriculture and USDA were able to find a previously undescribed luteovirus in some of the declining trees. Dan Donahue from the Eastern NY Commercial Horticulture Program described tree decline in the Hudson Valley and showed the multi-year progression of tree decline in a Zestar orchard near Hudson, NY. Dr. Ruhui Li from USDA reported on the genomes of apple

luteovirus and another new virus, CCGaV, which was also found in apples. None of the presentations provided any clear linkages between new viruses and apple tree decline.

None of the newly discovered viruses mentioned at the workshop or described in recent literature have so far been shown to cause new diseases in apples, although several are associated with previously known diseases that were assumed to have viral etiologies but for which no virus had ever been described. The initial reports on new viruses of apple provide no information on the worldwide distribution of these viruses or on differences in cultivar and rootstock susceptibilities. Thus, at this point no one knows if these novel viruses really do anything harmful to our modern apple cultivars and rootstocks.

Based on what I have been able to learn, it seems quite possible that all of the new viruses are latent in most apple cultivars, just like the four previously-recognized latent viruses: apple stem pitting virus (ASPV), apple stem grooving virus (ASGV), apple chlorotic leafspot virus (ACLSV), and apple mosaic virus (AMV). The common latent viruses are not totally benign because they can cause significant yield reductions, and AMV can cause leaf symptoms in some years. However, they generally do not cause tree death or decline except for trees of uniquely susceptible cultivars or rootstocks.

The new viruses that are currently being described may eventually be shown to fit into one or more of the following categories: (i) They may have little or no effect on trees; (ii) They may cause yield losses like other latent viruses in apples; (iii) They may weaken trees, thereby making them more susceptible to winter injury, herbicide damage, black stem borers, etc; (iv) They may cause graft union disorders that directly result in tree decline and death; (v) They may contribute to obscure fruit markings and/or apparent variability in germplasm of some cultivars (e.g., Honeycrisp). Determining which viruses are associated with which of the above possibilities will require a lot of money and many years of research.

The rest of this article describes several of the new apple viruses that have recently been reported from various locations around the world. But first, some background on modern virus detection methods may be helpful. As I understand the process (and this is an over-simplification), virologists today collect plant tissue, grind it up, and determine the sequences of all of the nucleic acid chains or snippets present in the sample. Computer programs can quickly sort through all of the nucleic acid sequences and discard any that match parts of the apple genome. The remaining sequences are then sent through a different computer program that looks for matches or similarities with all known viruses. Further work is then required to prove that the actual virus suggested by this process is present in the trees.

Following is a description of several new viruses reported in apples over the past few years:

- Apple luteovirus (ALV) was discovered in PA and is a member of a virus group that is usually transmitted by aphids. A different luteovirus has long been known to infect barley, and several others have recently been detected on stone fruits. ALV has been

detected in several commercially propagated apple cultivars in PA, WV, and NY, and in a number of different rootstocks in Korea.

- Citrus concave gum-associated virus (CCGaV) was detected in apples on the west coast in 2018. Previously, it was discovered in citrus trees affected by a graft-transmissible disease called concave gum-blind pocket that was described more than 80 years ago. Diseased citrus trees have trunk abnormalities (distortion, uneven growth). It is called an "associated" virus because, although found in diseased citrus trees, it has not yet been proven to actually cause the disease. CCGaV is similar to other viruses in the bunyavirus group that, prior to the discovery of CCGaV, consisted mostly of arthropod-borne or rodent-borne viruses that caused various diseases in humans. The bunya-like viruses in woody plants are distinct from bunyaviruses previously described in human medicine. They are called "bunya-like" because they have not yet been officially classified as bunyaviruses.
- Apple rubbery wood-associated viruses (ARWaV- 1 and ARWaV-2) are also new bunya-like viruses associated with a long-known graft-transmissible disease called apple rubbery wood. Because it was graft-transmissible, the causal agent was long assumed to be a virus and was called ARWV. It was shown to cause some apple cultivars (especially the indicator cultivar "Lord Lambourne") to lose wood stiffness. Trunks and scaffolds of affected susceptible cultivars bend down and trees are stunted. In Washington State, two forms of ARWaV were discovered in several Honeycrisp trees. One west coast researcher at the conference last December told me that he suspects that it is widespread in Honeycrisp. However, it does not cause the rubbery wood symptoms or any other symptoms in Honeycrisp so far as anyone knows at this point. Older studies showed that trees of some cultivars with ARV had reduced yields, and in one case it increased the susceptibility of the apple rootstock MM.104 to *Phytophthora* root rot. Finding ARWaV in apples is disheartening because, as with most of the latent viruses, clean stock programs in the 1960s and 1970s had pretty much eliminated this virus from commercially produced nursery stock.
- Apple geminivirus (AGV) was found in seven apple cultivars, including Gala and Fuji, in various provinces in China. Gemini viruses are DNA viruses long known to cause diseases in vegetable crops and that more recently were found in citrus and grapes. Its importance in apples remains unknown.

There are additional reports of other newly discovered viruses in apples, in some cases, with still obscure linkages to previously known graft-transmissible diseases of apples. The list will undoubtedly continue to grow. A report in 2006 stated that there were approximately 4,000 known viruses, of which 1,000 occurred in plants. However, after molecular methodology was adopted for studying viruses, a publication in 2013 estimated that there was likely to be at least 320,000 undiscovered viruses in mammals, with many thousands more in plants and other non-mammalian life forms. Determining which of these new viruses are important and which can

be ignored is a daunting task, not only for apples and other major crops, but also for human survival, as illustrated by our current struggles with Covid-19.

Facebook Me



Jos de Wit ▶ Fruitconsult BV Randwijk

57 mins · 🌐



A flower button from Wellant in green button. Second picture was cut the button and also a lot of damage. While Wellant, during the frost nights, was still far back in development. (7 April 2020)

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Let's hope that does not happen here, barely out of green tip.



Useful links

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

Scaffolds Fruit Journal: <http://www.nysaes.cornell.edu/ent/scaffolds/>

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

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[Acimovic Lab at Hudson Valley](#)

[Peter Jentsch's Blog](#)

The next Healthy Fruit will be published on or about April 14, 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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