Fruit Notes

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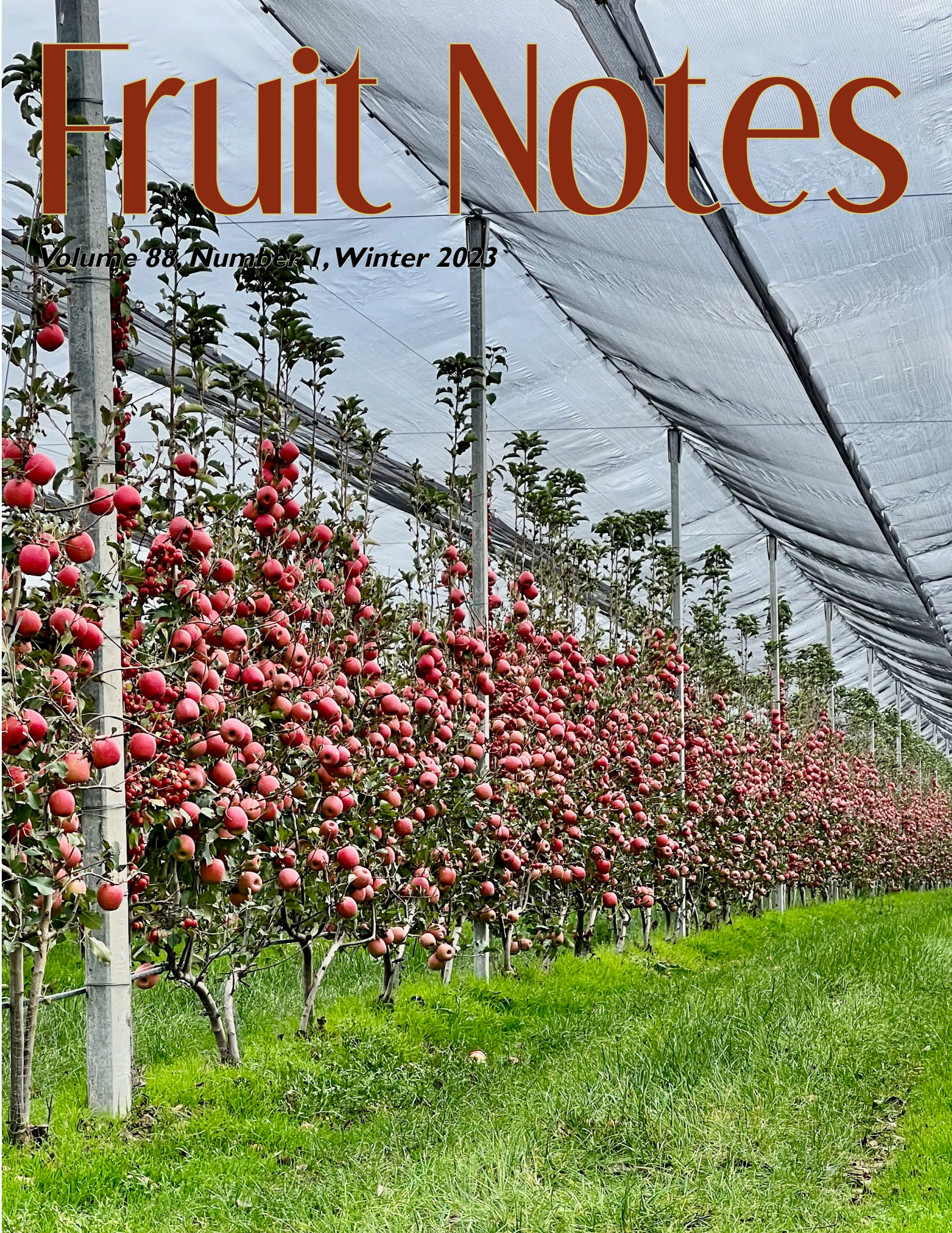

Fruit Notes

Editors: Jaime C. Piñero & Winfred P. Cowgill, Jr.

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Cover: Pink Lady® Rosyglow multi-leader apple trees in Mazzoni Group orchard near Voghiera, Italy, November 2022. Photo by Jon Clements.

Thanks to the generous sponsors of the UMass Fruit Program:

Tree and Fruit Quality Characteristics of New Peach and Nectarine Varieties Evaluated in 2019-2021

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A total of 23 new peach and nectarine varieties were evaluated during 2019, 2020 and 2021. Most of these peach cultivars were released from the Rutgers Stone Fruit Breeding Program including two new exciting peach varieties (Anna Rose and Felicia) released in 2021. These new varieties were created and selected by Joseph Goffreda at the Rutgers Fruit and Ornamental Research Extension Center in Cream Ridge, New Jersey. To understand how best to select and market these varieties growers need to better understand the characteristics of their fruit. We performed several studies to estimate fruit qualities, both chemical and physical, that determine much of the value of peaches.

The main objective of these evaluations of new and advanced selections of peach and nectarines, along with some of the standard varieties, is to assist in the selection of new varieties best suited to New Jersey. Fruits were evaluated mostly at Rutgers Agriculture Research and Education Center (RAREC) in Bridgeton and four commercial sites in southern NJ: Circle M Farms, Fralinger Farms, Larchmont Farms, and Summit City Farms.

Varieties were evaluated in the field for flesh color, crop load, shape, skin color, fuzz, attractiveness, stone characteristics (free, semi-free, or cling), flesh color, and bacterial spot on fruits and leaves. Fruits were harvested based on ground color change and size and after picking, fruits were transported to the laboratory at Rutgers Agricultural Research/ and Extension center. Fruits were then stored in cold storage at RAREC in conventional cold storage (33°F, 95% RH).

Fruit data characteristics measured as juice total soluble solids (TSS) concentration (°Brix) and total titratable acidity (TTA) (%) are also expressed as the TSS:TTA ratio (Table 1). The 2021 season was marked with mostly no frost damage at any of the sites. However, due to labor shortages due to COVID-19, some of the test blocks were not bloom or fruit thinned and that may have affected a few characteristics. Some varieties were compared in relation to varieties with similar ripening dates.

LISTED IN ORDER OF RIPENING, EARLY FIRST


'NJF 20'. Photo by H. Gohil

NJF 20 is a very recently introduced, late June, yellow-fleshed, flat nectarine. It is one the earliest nectarines and has an excellent flavor and firmness. It is very sweet and sub acid. In three out of five years, it had some level of open scars at the distal ends with some level of skin blemishes. Ripens 32 days before Redhaven. Not yet Named, ACNursery lists as NJF-20


'Desiree'. Photo by J. Frecon

Desiree is a late July yellow-fleshed peach. It has a beautiful crimson red on light yellow skin color. The fruit has excellent flavor. Fruit is medium-sized, however

Table 1. Average fruit characteristics of Peach varieties in Southern New Jersey evaluated in 2019-2021 by order of ripening date.

Variety	Total soluble solids (°Brix)	Total titratable acidity (g/l)	Firmness (lb. force)	Diameter (inch)	Weight Oz. (g)
NJF 20	14.2	0.46	10.6	2.4	2.6 (74)
July Rose	12.7	0.87	n/a	2.75	n/a
Brigantine	10.05	1.46	9.05	2.6	6 (172)
Avalon	13.8	1.06	n/a	2.8	3.1 (87)
Evelynn	10.23	0.76	10.35	2.87	7.3 (205)
Felicia	10.83	1.33	8.1	2.3	4.1 (115)
Anna Rose	13.77	0.28	n/a	2.99	7.8 (215)
Redgold	13.1	1.61	8.1	n/a	n/a
Messina	11.4	1.01	n/a	n/a	n/a
August Rose	13.4	0.69	n/a	3.1	9.0 (254)
Lady Nancy	13.3	1.06	7.4	3.1	n/a
Flavor Tops	12.2	1.21	10.2	2.6	3.5 (100)
Gloria	14.2	0.87	10.5	3.1	9.0 (255)
Selena	13.7	1.67	9.85	3.10	8.4 (244)
Flamin Fury Ka-Ching	13.9	2.08	8.5	2.77	4 (114)
Tiana	14.3	1.49	11	2.67	9.6 (271)
Victoria	11.6	1.25	8.1	2.8	4.4 (126)
PF 36	11.7	1.34	n/a	n/a	n/a

compared to other varieties, it is desirable for this season. Fruit has been firm at ripening and has excellent bud cold-hardiness. Ripens 28 days before Redhaven.

Early Star is a yellow-fleshed, freestone peach with traces of red in the flesh. It ripens with PF 5D Big and later than PF 5B. It has a good bud hardiness. Fruit skin has an attractive crimson red overcolor. Inconsistent fruit shape with one side relatively flat, makes it unattractive. Also leaves and fruits were slightly susceptible to bacterial spot. Fruit was developed at a Michigan fruit breeding program. Ripens 20 days before Redhaven.

July Rose is a mid- to late July, white-fleshed, clingstone peach with large fruit size. Fruit ripens 7 days before Redhaven, between Sugar May and White Lady. It has a very attractive scarlet skin. It is a sweet and sub acid peach. Fruits are mostly round, and hang well. Fruit may get bigger, but less sweet if one lets it hang too long. Even poorly thinned trees had medium to large-sized fruit suggesting that thinning has to be heavy in a non-frost year. Tree is highly productive and has low susceptibility to bacterial spot.


'July Rose'. Photo by H. Gohil

Silverglo is a late July, cream-fleshed nectarine. Ripens 1 to 7 days before Redhaven. Lots of pinkish red color and very few skin blemishes. It is the most attractive white nectarine in this season. It has a uniform-sized large fruit and low susceptibility to bacterial spot. It has a very balanced combination of sweetness and acidity.

Scarlet Rose is a late July, white-fleshed, clingstone, firm, peach with slight to moderate fuzz. Good aroma and crunchy flesh. It has moderate presence of red flesh. Fruit hangs up to two weeks after maturity without significant loss of firmness. It blooms about a week later than most varieties. It has high sweetness and low acidity, however it is tarter than July Rose. Ripens 1 to 7 days before Redhaven.

TangOs (NJF16): Yellow-fleshed, freestone, flat peach with golden-yellow skin. Fruit ripens 6 days after Redhaven. It is one of the largest flat peaches.

Leathery skin, but acceptable. Fruit develops mango and melon flavor as it ripens, which is a big plus. Excellent combination of high sweetness and acidity. It is kind of a must have variety for road side or farm stands.

'TangOs'. Photo by H. Gohil

Brigantine (NJN102) is a late July, yellow-fleshed, freestone nectarine with spherical to ovate shape. Fruit ripens 5-10 days before Redhaven. It has a fully red-colored skin with traces of red in flesh. Skin free of blemishes. Leaves had low susceptibility to bacterial spot while fruit has moderate susceptibility.


'Brigantine'. Photo by H. Gohil

Avalon (NJN101)is a late July yellow-fleshed nectarine with a semi-clingstone, firm, melting flesh. Fruit ripens near Redhaven. Fruits are medium sized. Few skin blemishes and very attractive with excellent flavor. Trees are very productive and have low susceptibility to bacterial spot.

Evelyn (NJ357) is an early August, yellow-fleshed, firm peach with semi freestone. Ripens 2 days before Redhaven Few varieties tick as many boxes as Evelynn. The full scarlet color with slight greenish-yellowish traces on the skin helps in picking decision. Fruit has sweet and low acidity flavor. Evelyn is already liked by ACN any commercial growers for its firmness and size. Tree is consistently productive and has low susceptibility to bacterial spot.

Felicia was introduced in 2020. It is a late July to early August, yellow-fleshed, firm peach. Ripens 1 day after Redhaven. It has very attractive fruit. It has traditional acidity and sweetness. No bacterial spot observed on leaves or fruits. It has a little bit of a raised suture which is consistent and pronounced.


'Felicia'. Photo by H. Gohil

Anna Rose (NJ360) was introduced in 2020. It is an early August, white-fleshed, freestone peach. Fruit ripens 1 day after Redhaven, near White Lady and before Klondike. Fruit has uniform shape and outstanding color. Fruit is very sweet with low acidity. Tree vigor was very high, crop load was high, and tree easily gets over cropped. Slight incidence of bacterial spot on leaves and even less on fruits. It is an excellent replacement for Klondike, which is a good variety but has a few challenges such as fast softening after harvest. It also crops better than Klondike which also has the problem of greater bacterial spot.


'Anna Rose'. Photo by H. Gohil

Flavor Burst (USDA) is a yellow-fleshed, semi-freestone peach. It is an attractive large peach with great flavor. Fruit ripens 25 days after Redhaven. High sweetness and low acidity. This high cropping variety is susceptible to bacterial spot.

Red Gold is a late august, yellow-fleshed, firm, freestone nectarine with oblong shape. Fruit ripens 15 to 20 days after Redhaven Traditional acidity. High cropping variety. Skin blemishes were observed.

Messina (NJ352) is a yellow-fleshed, firm peach. Fruit is large and has a traditional appearance and excellent combination of sweetness and acidity. Fruit ripens 26 days after Redhaven. This consistently high cropping variety has no bacterial spot on leaves or fruits. This variety is receiving very high marks by growers throughout the Mid-Atlantic region.


'Messina'. Photo by H. Gohil

August Rose (NJ356) is a late season white peach, very attractive, firm-fleshed, free stone peach. It has 60-90% medium red color on cream background. Fruit ripens 31 to 35 days after Redhaven. Fruit is very large, sweet and sub acid. It can fill the gap between Sugar Giant and Snow Giant. It is a highly productive variety.


'August Rose'. Photo by H. Gohil

Gloria is a yellow-fleshed, freestone peach ripening from August 19-22. Fruit is large, globose to slightly ovate, 60-90% scarlet red over orange yellow ground color. Fruit ripens 23 to 30 days after Redhaven. The flesh is very firm with low acidity and good sweet flavor. The tree is vigorous, spreading and very productive with low susceptibility to bacterial spot. A unique variety because of its very attractive color, low acidity and very firm flesh. It is the latest blooming variety in our trials with bloom extending up to 7-10 days. Fruit can hang on tree without losing firmness for up to 7 days after it has achieved commercial maturity. All this makes Gloria a unique variety.Growers and consumers find it hard to tell when ripe as flesh does not soften.


'Gloria' Photo by H. Gohil

MID TO LATE AUGUST VARIETIES

Lady Nancy is a late August, white peach. Fruit is very large, ovate, bright, pinkish red over a creamy white ground color. Fruit ripens 31 to 35 days after Redhaven. It has very good aromatic flavor. It has medium susceptibility to bacterial spot. It is a light cropper in cold climate. Flesh has a prominent yellow streak through the white flesh.


'Lady Nancy'. Photo by H. Gohil.

Flavor Tops is a late August, yellow-fleshed peach. Fruit ripens 31 to 35 days after Redhaven. It has red skin with a yellow background. No bacterial spot on leaves or fruit was observed. The round-shaped fruit has traces of red in the flesh. Excellent tangy flavor. Excessive bloom.

Selena (NJ358)is an early September yellow peach with excellent firmness. It ripens between 'Jerseyqueen' and 'Encore' and 31 to 35 days after Redhaven. Fruit is very large with attractive 50-80% red-on-yellow background. The fruit hangs well on the tree and has excellent flavor and coloring. This variety exhibits low susceptibility to bacterial spot and is a productive choice.

Tiana (NJ359) is an early September yellow peach with freestone and very firm flesh. Fruit ripens between 'Cresthaven' and 'Encore' and 31 days after Redhaven. These large fruits have an excellent balance of acidity and sweetness. Providing exceptional flavor, with beautiful coloration (highly mottled (50-75%) red-on-yellow). This variety exhibits low susceptibility to bacterial spot.

Flamin Fury Ka-Ching is an early September, yellow-fleshed, firm, freestone nectarine. Fruit ripens 31 days after Redhaven. It has melting flesh with traces of red. It has exceptional combination of very high sweetness and high acidity. No bacterial spot on leaves or fruit.


'Flaming Fury Ka-Ching, Photo by H. Gohil.

Victoria (NJ353) is a mid-September, yellow fleshed peach that has an attractive skin with 20-80% medium red on yellow background color. Fruit ripens 45 days after Redhaven. Large fruit with good firmness and flavor. Low susceptibility to bacterial spot and constriction canker and tree is consistently productive. It is one of the very last varieties of the season.

FRUIT GROWTH 'Apple Fruit Set Predictor' app

Jon Clements
University of Massachusetts Extension

The FRUIT GROWTH (FG) app by Joe Ferri – and mentored by his grower brother Tom of TK Ferri Orchard, The Blue Mountains, Ontario, CANADA – is an iPhone/iPad (only, no Android) app that does just what it says: predict apple fruit set based on the apple fruitlet growth rate model. Per the description on the App Store (https://apps.apple.com/us/app/fruit-growth/id1604255929), the FG app features:

- Easy fruitlet size and cluster count input screens.
- Quick apple set prediction results screen.
- Full results easily shared to email addresses and Mac computers.
- The Fruit Growth app accepts fruitlet sizes and cluster counts data to calculate the predicted number of apples that will be set.
- The results are summarized in the calculated results screen. The full results Summary file (.csv) can be shared to an email address, internal device storage or air dropped to a Mac computer.
- The fruitlet size Data file (.csv) can be shared for cut and paste to the Excel Fruit Growth Model (Ferri version).

I used the FG app in 2022 to predict fruit set in two Gala blocks, two Honeycrisp blocks, and one Fuji block. (Across two orchards, results forthcoming in a pending Fruit Notes article.) I found it generally easy to use and once fruitlet growth measurements are made on a given date it gives instant results predicting fruit set so further chemical thinning decisions can be made. One feature of the FG app allows you to do a split tree (top and bottom) calculation predicting fruit set. As you probably know, fruit set is often better in the tops of trees vs. the bottom. Thus you can target and be more effective with your thinning sprays. Below are a few screenshots from my FG app in 2022 (Figs. 1 - 3), and there are a set of excellent screenshots on the App Store (https://apps.apple.com/us/app/fruit-growth/id1604255929) so you can better understand how it works. For reference, per the Ferri's, here are their specific notes on how to use the FG app once you download and install:

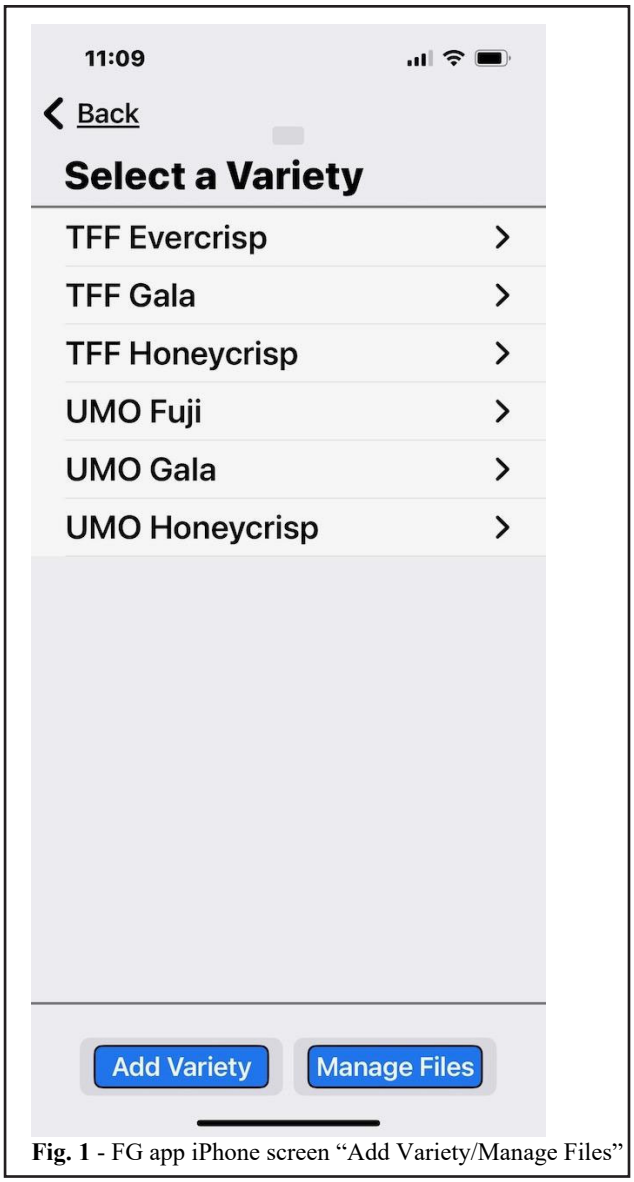

Fig. 1 - FG app iPhone screen "Add Variety/Manage Files"

Fruit Growth Model Notes (Rev 3.0.0)

Select a Variety - to input the fruitlet sizes (Fig. 2)

- Input the fruitlet size and **Enter** button
- For fruitlet size measurement accuracy of 0.5 mm`` (e.g. if 12 is entered 12.0 is stored, if 12. is entered 12.5 is stored)

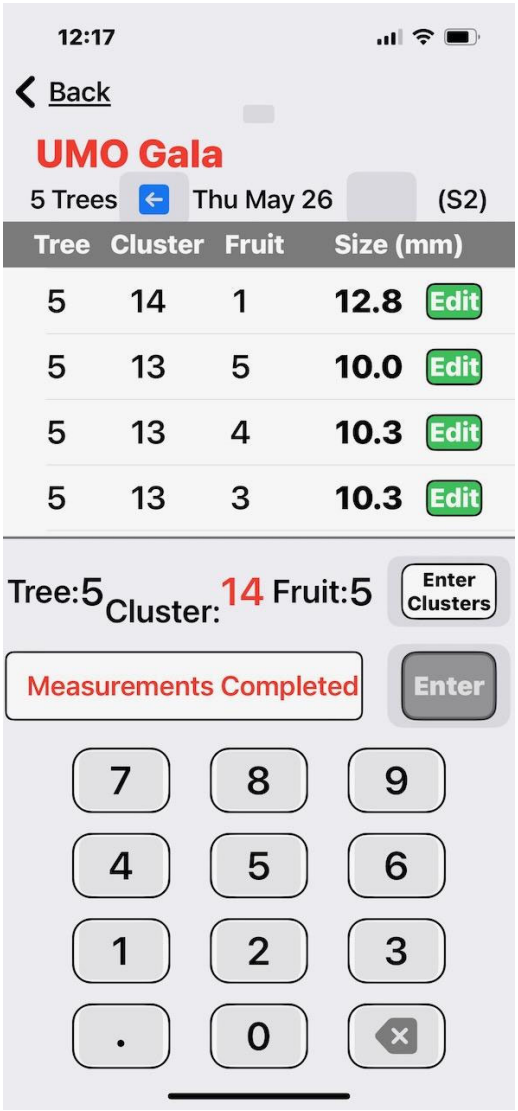

Fig 2. - FG app iPhone screen "Enter measurements"

Note: Once all current measurements are completed, to advance for the next sample date and measurements push the blue right arrow next to the date.

When each tree fruitlet measurements are completed:

- **Enter Clusters** button - to input the number of clusters per tree
- Input the cluster count and **Enter** button
- If two people are counting the clusters, use the + button to add the counts

Note: To delete all the last sample fruitlet sizes and cluster counts push the **Trash** button

Add Variety button (Fig. 1)

- Enter the variety name
- Choose the number of trees to measure
- Choose the split or full tree option
- (Clusters: Tree Bottom 1-6, Tree Top 7-14)
- Save button - save the file name and settings

Manage Files button (Fig. 1)

- Select a Variety
- **Results** button - generate the results summary (Fig. 3)
    - **Share Summary** button- generate the full results summary .csv file
- **Delete** button - permanently deleted the file
- **Import Data** button - import a fruitlet size Data.csv file
- **Share Data** button - generate the fruitlet size data .csv file
- (used to cut / paste into the Excel Fruit Growth Model (Ferri) version)

Joe Ferri is actively updating the FG app, it is up to version 3.0.0. You can download from the App Store, it costs $17.99 but is money well spent. Alone, once set up (see my RECIPE for setting up your trees for using the FG app: https://ag.umass.edu/fruit/fact-sheets/hrt-recipe-predicting-fruit-set-using-fruitlet-growth-rate-model) I can complete a set of measurements per variety/block on a given date in less than an hour. It would go quicker with two people, and you get instant results predicting the fruit set. *How good is that?*

12:01

Back Summary

UMO Gala

FULL TREE

Sample Number

1	2	3	4	5	6	7

Average Apples Per Tree

364	126	189	106			

Average Number of Clusters

83	83	83	66			

Predicted Set (%)

	34.1	50.3	27.6			

Average Growth Rate (mm)

	4.93	4.23	6.29			

Dropping Size: 15 mm

TREE BOTTOM (clusters 1-6)

Average Apples Per Tree

133	51	54	27			

TREE TOP (clusters 7-14)

Average Apples Per Tree

231	117	144	78			

Fig 3. - FG app iPhone screen "Results"

Editors Note (Win Cowgill): I too have used the Ferri App and model, works well, easy to use. Agree two people make it go much faster- one measuring one recording. Note that after doing Fruit Growth rate measurements and modeling for ten years there is one fact that jumps out, and is the reason every grower should measure fruitlets and use one of the computer models for predicting fruit set.

The reason is after you have completed two sets of measurements on a block, maybe 3, you have a "feel" of how your trees are responding to thinners and what fruit is setting. You cannot get that same information by just walking the orchard or driving by with the window down.

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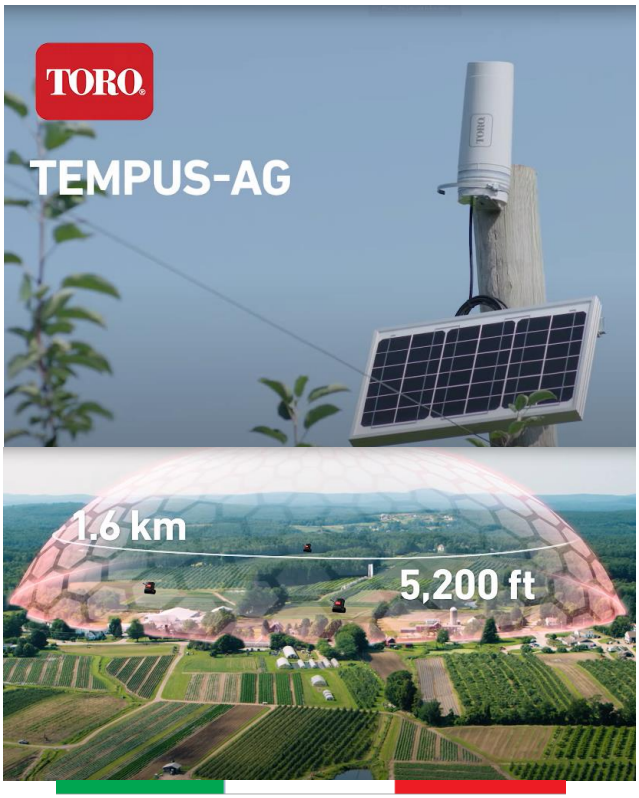

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Rivulis

Southern blight on apples – a new root disease problem for apples in the Northeast

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University of Massachusetts Extension

Southern blight is a root disease on over 500 different plants and crops, including both herbaceous plants such as tomatoes and zinnias as well as woody perennials such as forsythia and, yes, apples. The disease is caused by a fungus, *Sclerotium rolfsii*, and can be a significant problem on several crops. Usually, the fungus infects plants at the lower stem or crown, near the soil line, eventually girdling the plant and causing the leaves to wilt and brown. The first Southern blight symptoms most people see in apples are dying trees. Checking more closely around the crown and roots, white fungal hyphae are usually visible, either as thread-like individual hyphae or in mats. Sometimes small, brown, round structures made by the fungus, sclerotia, are also visible. The fungus can quickly rot roots and crown tissue, rapidly destroying trees. While smaller, younger trees are generally more susceptible, trees that have been in the ground for several years can also be killed.

White hyphae and small, tan sclerotia from the southern blight fungus around the base of an apple tree. (Photo Kari Peter, Penn State)

People have known that Southern blight can cause problems on apple trees for nearly 100 years. It was a particular problem on nursery trees and young apple trees in the South. The pathogen thrives in warm, moist soil. The optimum temperature for *S. rolfsii* growth is about 85 F, which is a very warm soil, with relative soil water content of 30% or higher (Dong et al. 2022). But it appears, as with the summer fruit rots, the warming climate is making Southern blight more common in the Northeast. Southern blight is a problem in apple production areas around the world, particularly in warmer climates. In a 2008 study, researchers showed that the pathogen doesn't survive the cold winters of North Dakota and Iowa, but did survive in North Carolina and Georgia, supporting the idea that a warming climate may increase Southern blight problems in more northern regions (Xu et al., 2008).

We first discovered a Southern blight problem in apples in Massachusetts in 2017 in a newly planted block. Symptoms developed the year of planting, with many trees rapidly developing brown leaves, and dying back (Figure 1). When trees were dug up, roots were black, and rotted with few fine roots. There were distinct white mycelia or hyphae, typical of Southern blight (Figure 2). Samples were submitted to the UMass Plant Diagnostic Lab, which tested for *Phytophthora* (a possible cause of the root rot), which were negative. The lab noted abundant white mycelia, with small

cream to brown-colored sclerotia growing from rootstocks (similar to those in Figure 3). DNA was extracted and sent to Macrogen for DNA sequencing. The sequences were identified as *Sclerotium rolfsii*, confirming a diagnosis of Southern blight. Since then, Southern rot has been identified in apple in Pennsylvania in 2018 and New Jersey in 2022.

Fig. 1. New apple planting showing tree-dieback caused by southern blight.

Fig. 2. Red arrows pointing to white hyphae in soil from the southern blight fungus. The white at the base of the trunk is paint.

Guides for the management of Southern blight stress not introducing the pathogen. That is, prevention is the best management. That's difficult for a pathogen with so many hosts. And there we really don't know why the disease is showing up in the Northeast more frequently. Where did it come from?

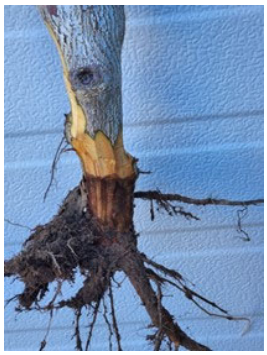

Fig. 3. Apple rootstock completely killed and rotted by southern blight.

It could have been in the soil at or near the planting site. In that case, why didn't it cause problems before 2017? Perhaps new, young trees are more susceptible. Or maybe it's because climate in Massachusetts has gotten warmer (Figure 4). Soil temperature tracks closely with air temperature, and as mentioned above, *S. rolfsii* likes warm climates and soil. Perhaps the fungus has always been in Massachusetts soils, but didn't cause problems because the cool climate, particularly cold winters, kept it in check.

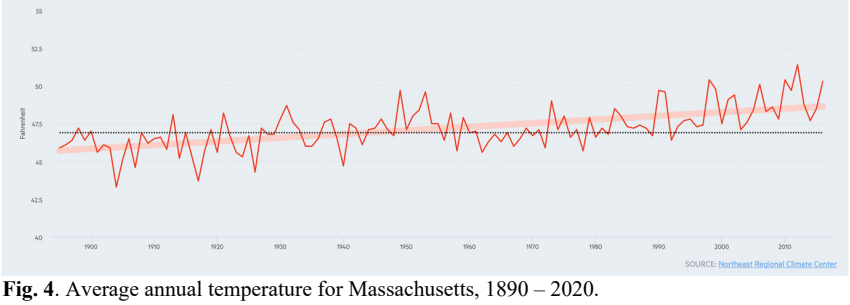

Fig. 4. Average annual temperature for Massachusetts, 1890 – 2020.

It's possible that the fungus came in with the new trees. However, nurseries should notice Southern blight easily, as it is a fast-acting disease that causes rapid decline, particularly on small, young trees. However, the nursery possibility has not been examined. It could be a new strain of *S. rolfsii* that has arisen recently and can survive in the Northeast, or a strain that is particularly pathogenic on apples that has recently moved into the region. Whatever the reasons, Southern blight is here and will probably need to be managed.

Unfortunately, there aren't any fungicides registered for use against Southern blight on apples. There are fungicides that are effective against *S. rolfsii* registered for other crops. Some of these are labelled for use in apples against diseases other than Southern blight but are illegal to use as a soil application in apple orchards. Some biological controls have been shown to be effective against Southern bight, but no studies on apple indicate that they are effective.

Pre-plant fumigation may be useful, though specific trials looking at Southern rot in apples haven't been done. In addition, fumigation involves broadly toxic chemicals, is expensive, and not good for overall soil health.

A cultural control that's useful is keeping the area around tree trunks free of weeds and dead plants. The fungus can grow on dead plant material, and debris and weeds around the base of trees keep humidity higher, which helps the fungus grow.

In addition, inspect newly arrived nursery trees for any signs of the disease, such as the white hyphae or the tan sclerotia. Remove infected trees as soon as they're identified, including the soil in the root zone, and avoid replanting for at least a year.

Presently, there are more questions than answers about Southern blight in apples and what to do to

manage it. Hopefully over the next year or two, studies and registration work will help us better understand the disease, and in particular identify fungicides and/or biocontrols for registration against the disease.

References

Dong, Xl., Gao, Cy., Li, Pl. et al. 2022. Effects of temperature, moisture, substrates and soil coverage on sclerotium germination and hyphal growth of Southern blight of apple in China. Eur J Plant Pathol 162, 477–487 (2022). https://doi.org/10.1007/s10658-021-02418-1

Xu, Z., Gleason, M.L., Mueller, D.S., Esker, P.D., Bradley, C.A., Buck, J.W., Benson, D.M., Dixon, P.M. and Monteiro, J.E.B.A., 2008. Overwintering of *Sclerotium rolfsii* and *S. rolfsii* var. delphinii in different latitudes of the United States. Plant disease, 92(5), pp.719-724.

Peter, Kari, 2020. Apple Disease-Southern Blight https://extension.psu.edu/apple-disease-southern-blight

Highlights of IFTA Italy Study Tour, November 2022

Jon Clements
UMass Extension

From November 11-19, 2022, I had the good fortune to attend the IFTA Italy Study Tour, Bologna to Bolzano. During the orchard visits, I posted a real time highlight from each orchard stop on the IFTA Facebook page (Fig. 1), but I will bounce off those with photos and a bit more detail here.

Figure 1. IFTA Facebook Page, https://www.facebook.com/IFruitTree

Starting off in Bologna, I spent a day at EIMA International 22, the International Agriculture and Gardening Machinery Exhibition (Fig. 2). Simply huge, mostly indoors, many themed buildings. I found a couple toys I wanted, of course I have no money to actually buy them, but it was fun looking.

While still in Bologna, in lieu of spending another day at EIMA, I chose to go with Greg Lang (IFTA Education Director) and a sub-group of circa 40 grower-attendees to (one of) the University of Bologna research farm(s). First stop with Assistant Professor Luigi "GiGi" Manfrini was to look at various peach multi-leader/variety training blocks (Fig. 3). Hmmm,

Figure 3. Luigi "GiGi" Manfrini showing us multi-leader peach training at University of Bologna research orchard.

Figure 2. EIMA International Agriculture and Gardening Machinery Exhibition, November 9-13, 2022.

interesting, I have to say there were a lot of questions here, not always answered, but our host definitely expressed some frustration with tree establishment and getting those many-

leaders (certainly called UFO in stone fruit?) going at uniform spacing and size. I got the impression it was a hands-on experiment.

We also looked at some apples, first with Professor Luca Corelli Grappadelli, an experimental block of trees where the primary objective was disease control (scab and fire blight) by covering the orchard thus eliminating "wetness" (Fig. 4). Unsure how successful it was, but I did notice wooly apple aphids seem to love that protected environment. Corelli also showed us a rover/

Figure 4. Luca Corelli Grappadelli and "GiGi" Manfrini show us disease prevention and multi-leader experimental apple blocks respectively at U. of Bologna research orchard.

robot with autonomous navigation they are working on with an industry partner, purported to have multi-functionality (sensors, flail mowing, etc.) and there was some discussion with him and GiGi about a "smart specialized sustainable" orchard. GiGi also showed us a multi-leader (UFO or 'guyotte') apple system trial. It looked pretty good, I am thinking UFO looks better in apples than stone fruit? And, first detecting a theme here going forward, the sustainable smart orchard and multi-leader trees…

Departed and on the way to Venice for a tourist day, we did a couple orchard stops. First a cherry variety/ training system by Salvi Vivai nursery (Fig. 5). It was

Figure 5. Covered (to prevent rain cracking) experimental sweet cherry variety/rootstock demonstration orchard by Salvi Vivai nursery.

interesting, and I could relate, but not sure what my take-home is/was? Makes me want to grow cherries again, but planting them very close together (SSA?) and on Gisela 3 or 5 rootstocks (depending on variety)? Note to self: don't be a glutton for punishment, just-don't-do-it!

And then a significant planting of 'Rosy Glow' Pink Lady (Cripps Pink cv.) which had not been harvested yet. (Or it might have been first picked?) This was at the Mazzoni Group, a large multi-crop agriculture farm and fruit tree nursery (Fig. 6). Again with some different training systems, bi-baum, guyotte(?), etc. Sorry for lacking detail here. I could not help wondering with the heavy crop load if there would be a return bloom? Interestingly, fruit cracking was a significant issue (Fig. 7), I assume because of the rather wet spring and early summer weather (hot and dry followed by rain?) they seem to have? It was worse, they said in the tops of trees.

In the afternoon, we visited C.I.V. - Consorzio Italiano Vivaisti, apple and strawberry breeders "we enhance nature" and nursery (Fig. 8). Think CIVG 198 Modi®. Oh, what can I say? Focusing on "sweet and sustainable" varieties. I'd say half or more of the new apples they showed us were scab-resistant. We taste-tested a dozen or so new apple varieties in their portfolio, many of them numbered so not in orchard production yet. They ranged from "meh" to "pretty good." And got a look at some of their larger plantings for variety evaluation. We could look but not touch…

Departing Venice headed to Bolzano, we had a choice of going on a just-apples (Jeff Cleveringa lead) or an apple-cherry tour (Greg Lang lead). Actually being a glutton for punishment, I chose the apple-cherry tour. Sorry again, lacking many details here, but I will do my best. First stop was an experimental orchard site that (apparently) was a collaboration of Societa Cooperativa Agricola and the Edmund Mach Foundation (Fig. 9), which "promotes and carries out research, scientific experiments, education and training activities as well as providing technical assistance and extension services to companies." We got a talk about apple production practices in the Trentino region from Tommaso Pantezzi, Centro Trasferimento Tecnologico, Fondazione Edmund Mach – Instituto Agrario San Michele all'Adige, and Nicola Andreatti, from Fondazione Edmund Mach. (It might, however, be the grower whose orchard we were in according to Greg Lang?) Also, we

Figure 6. Still to be harvested Pink Lady cv. 'Rosy Glow' at the Mazzoni Group. Note hail nets, a standard practice in Italian apple orchards.

Figure 7. Close up of Pink Lady cv. 'Rosy Glow' at Mazzoni. Note unexplained cracking of apples, but it might be their humid weather conditions in the region.

Figure 8. Variety demo and tasting of named and numbered C.I.V apples followed by tour of variety evaluation apple orchard blocks.

Figure 9. Societa Cooperativa Agricola and the Edmund Mach Foundation hosts in commercial apple orchard blocks in Trento region, including multi-leader.

saw MORE multi-leader 'guyotte' style apple trees!

For the cherry stop, up the road a ways, we were (after a long hike uphill) hosted by Angela Gottardell, Centro Trasferimento Tecnologico, Fondazione Edmund Mach – Instituto Agrario San Michele all'Adige in a cherry systems trial (Fig. 10). The usual suspects, spindle, bi-axis, KGB (Kym Green Bush), and SSA (super slender axe). Looked like SSA and bi-axis were outperforming (in terms of cumulative production) the KGB and spindle. Would have been ` interesting to see these trees pre-harvest.

Last orchard stop before landing in Bozano was the Laimburg Research Centre (Fig. 11). After an introduction by Dr. Walter Guerra, head of the Institute for Fruit Growing and Viticulture, three research orchard block visits stood out. First, the Laimburg Integrated Digital Orchard, LIDO for short. Not to be confused with LIDAR, LIDO is an outdoor orchard 'laboratory' focusing on "the latest, state-of-the-art technology available on the market." Just planted with 'Rosy Glow' Pink Lady trained as 'guyotrees' the orchard was equipped with all sorts of sensors communicating over a long range low power wireless network. Also an overhead, fixed spraying set up for pest control. Checked all my boxes. Next a robotic harvester was a big hit with the group, however, it was in a test stage demo mode, yup, it picked apples. That's all I can say. Far more interesting to me was the training system demo by Dr. Christian Andergassen, fruit physiologist at Laimburg (Fig. 12). There he was comparing apple yield and quality of Fuji and Pink Lady apples grown to traditional (for Italy) tall-spindle vs. various multi-leader approaches, including 'bi-baum' and 'guyotree.' Bottom line through the early production years? Fruit quality and yield was superior in the many-leader 'guyotree' system. He pointed out, however, that it depends on variety, Fuji being more vigorous and being less suitable to many leaders than Pink Lady. I think anyway…

We finally made it to Interpoma 2022, the apple trade show (Fig. 13). Words can't quite describe, suffice it to say it is THE International trade show about all things apple and pear, but of course with a focus on what's going on Italy-centric. I should do a word cloud about Interpoma. Wait, maybe I will! Followed by a few pics from the venue, Fiere Bolzano…

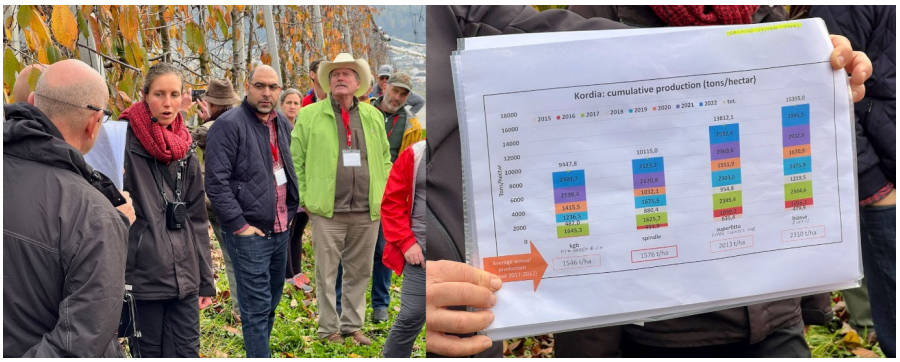

Figure 10. Angela Gottardell, Fondazione Edmund Mach – Instituto Agrario San Michele all'Adige hosts us in a cherry systems trial.

Figure 11. Laimburg Integrated Digital Orchard (LIDO) "smart" orchard equipped with sensors of all sorts and overhead fixed spraying plumbing.

I do want to thank IFTA (of course), Onward Travel (Molly, Kat, and Barbara), Greg Lang (IFTA Education Director), Jeff Cleveringa (IFTA President) for putting this together and (mostly) pulling it off without a hitch. 150 are a lot to herd and keep happy. Highly recommended if you have the opportunity to go on a future IFTA International Study Tour led by Onward Travel, wherever you go? (Hint: Norway, South Africa?) And thanks to Jim Krupa for putting up with me as his roommate for eight nights! For a bit more on my IFTA excursions, including this study tour to Italy, visit my jmcextman blog: https://jmcextman.blogspot.com/

Figure 12. Dr. Christian Andergassen, fruit physiologist at Laimburg is comparing apple yield and quality of Fuji and Pink Lady apples grown to traditional (for Italy) tall-spindle vs. various multi-leader approaches.

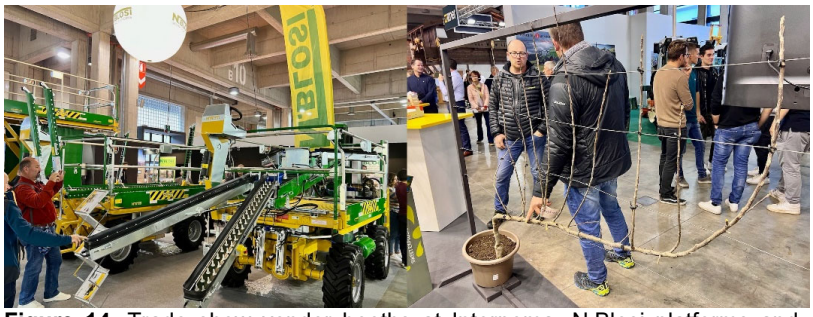

Figure 14. Trade show vendor booths at Interpoma: N.Blosi platforms and 'guyotte' multi-leader apple tree.

Figure 13. The "apple variety garden" trade show club apple variety vendor booth at Interpoma, November 17-19, 2022, Bolzano Italy.

The 2022 Grape Growing Season in the Northeast

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This article details: a) our 2022 grape growing season in the Mid-Hudson Valley, and how that relates to those farming in Massachusetts, Upstate New York, and New Jersey, and b) how our changing climate may impose more hardships on our future fruit farming operations. For many of us in the Northeast, 2022 was a very difficult year. This article analyzes the weather patterns of the 2022 growing season using data from the National Weather Service (NWS) regions of Albany, New York (Mid and Upper Hudson and Mohawk Valleys and Berkshire Mountains) and Boston (Eastern and Central Massachusetts, Rhode Island, and Northern Connecticut). This is a valuable way to see how last year's wide variation in temperatures and rain fall impacted our grape and other fruit crops. There were notable differences in how weather patterns affected the Boston NWS region as compared to the Albany NWS region.

I start with the Mid-Hudson Valley (Albany NWS region), since this bears directly on my observations: January 2022, was 4.7 degrees cooler than average, with 50% less rain than "normal". Both February and March were a bit warmer with slightly more rain than normal. In April 2022, while our temperatures were average, we had 60% more rain. This was followed by May, June, July, and the first two weeks of August, where we witnessed daily temperatures that were on average three to four degrees above average, with 50 to 60 % less rain. This combination of hotter days with no rain lead to our summer drought conditions.

The drought ended abruptly in Mid-August and September, the start of our much earlier harvest season, when we received almost 50% more rain in this time period than normal. In November, when cooler Fall weather should have arrived so that our vines could harden off for the winter, we were almost 4 degrees warmer than normal. This trend continued for most of December. Hence, while our vines had nominally hardened off, they were not optimally hardened off. The warm weather continued until December 23rd, when the Christmas Eve Massacre bomb cyclone hit, with air temperature plunging from 53 to 9 degrees F in just 14 hours. These fridge temperatures lasted for three days, then for the rest of December and the first part of January, temperatures were again much higher than normal with bouts of rain.

Except for a few notable deviations, a similar weather pattern occurred in the Boston NWS region as was the case in the Albany NWS region. That is, a January with cooler temperatures and less rain, followed by a relatively "normal" February and March. However, April was different in the Albany NWS region when compared to the Boston NWS region in that instead of having an average temperature with 60% more rain than normal, it was warmer, but the region received 36% less rain. This means that going into the summer months, the Boston NWS region already had a rain deficit that heightened its summer drought conditions. Hence, the Massachusetts drought started in April, not May and lasted for the entire summer including August and September. After September, the Boston NWS region got some rain, but still much below its normal levels. The Christmas Eve Massacre bomb cyclone in the Boston NWS region was slightly more moderate than that which occurred in the Albany NWS region.


Red Currant on 1/5/23 responding to above-average temperatures starting on 12/28/22.

It is during these difficult growing seasons, which with climate change may occur more frequently, that we can learn much about the fruits that we grow and their capacity to sustain punishing heat, drought, floods, fungal diseases, and insect pressure and still produce an economically viable crop in a sustainable manner.

The 2022 Growing Season

Here is how some of our grape varieties reacted to this year's summer drought, September floods, warm Fall that hindered the hardening off of grape wood, only to experience a Christmas Artic blast. At my farm in Athens, New York, we evaluate over 100 different varieties of French-American and Native American inter-specific hybrids, many that were developed in the 19th century in the Hudson Valley and Eastern Massachusetts. For more information on these grape varieties, ckick HERE.

Overall, our grapes were harvested 7 to 10 days earlier than normal with higher sugar levels. This "normal" harvest date, over time, has been gradually occurring earlier and earlier each year. This year, our harvest dates were historically much earlier. Our production was about 30% less because the grape berries, for most varieties, were smaller. With the summer drought, bird and other wildlife damage was extremely high as the wildlife needed moisture obtained from such fruits to combat very high temperatures and lack of water.

There were variations in ripening times, berry size, and production levels depending on the genetic heritage of each hybrid grape variety. The genetic heritage of most of my French-American and Heritage Native-American hybrid vines comes from the grape species *Vitis aestivalis, V. cinerea, V. labrusca, V. riparia, V. rupestris,* and *V. vinifera.* Each of these grape species have their own growth attributes.

Vitis riparia heritage varieties such as Baco Noir and Bacchus came in at least 10 days earlier than normal with deep berry skin color and higher sugar levels. Our Baco Noir was picked on August 29th, about 11 days earlier than normal, however, the birds did not seem to attack it as they normally do. While our Foch, was harvested on September 2nd, about seven days earlier, we harvested earlier because of severe bird damage that was being sustained. Historically, about 40 years ago, Baco Noir was harvested in the third week of September, while Foch was harvested in the second week of September. It seems that the change in climate and weather patterns has led Baco Noir to be harvested three weeks earlier than it had been, while Foch is harvested only one week earlier than it had historically been harvested. Hence, we now harvest Baco Noir at least 10 days before Foch.

The *Vitis aestivalis and rupestris* heritage varieties Burdin 6055, Chelois and Pallmer, which historically have been harvested in the third and fourth week of September were harvested about 7 days earlier. These varieties were not adversely affected by the excessive summer heat, drought, or subsequent wet conditions we experienced this September. This may be because Chelois, Burdin 6055, and Pallmer have in their ancestry *Vitis aestivalis,* which is drought resistant and *Vitis rupestris,* which tends to have a tap root that reaches deep in the earth for water. The production levels of Burdin 6055, Chelois, and Pallmer were not substantially reduced by 2022 growing standards, compared to my other grape varieties.

However, many of our Vitis *labrusca* varieties such as Concord, Delaware, Iona, and Jefferson, in reaction to the excessive heat and lack of water, pretty much shut down this summer to preserve water. These varieties did not dry up or advance in their ripening, they simply stopped growing and ripening until the rains came back in September. Hence, our Concord, Delaware, Iona, and Jefferson harvest occurred only about four to five days earlier than in previous years, with similar or lower sugar levels, which bucked the 2022 trend of varieties being harvested 7 to 10 days earlier than normal. We had to pick the *labrusca* varieties earlier than we would have liked to with lower sugar levels, because of the massive bird damage that they were sustaining.

The drought also affected berry size of different grape varieties in different ways. While *Vitis riparia* varieties such as Baco Noir and Bacchus had berries that remained small, they continued to ripen, even at an accelerated pace. While *Vitis aestivalis and rupestris* varieties such as Chelois, Burdin 6055, and Pallmer berries were of normal size and not affected by the lack of water. I was not able to ascertain the effect that the significant rains had on berry splitting, as by the time the September rains came, the wildlife was aggressively having a field day stripping the vine of much of its fruit. However, it looks like that Chelois, Burdin 6055, and Pallmer would not have experienced any berry splitting.

Here is a summary of how the 2022 growing season weather affected other commonly-grown grape varieties in New England, Upstate New York, and New Jersey. Chambourcin was harvested on September 17th, about 7 days earlier with lower sugar levels of 18 brix. Leon Millot (Wagner clone) was picked 8 days earlier on

August 29, with sugar levels at 18 brix. Here again, with the massive bird pressure on a black variety like Leon Millot, we were forced to pick this variety earlier than we would have liked to. Noiret was picked on September 6th, 9 days before normal, with sugars above average at 18 brix. Agawam, the E. S. Rogers hybrid of Salem, MA, was picked on September 6th, about 5 days early, with sugar levels at 17 brix. Baco Blanc, a grape used in France to make brandy, came in 10 to 17 days early on September 11th, with slightly fewer sugars at 14 brix.

While there are many Minnesota hybrids grown in New England and Upstate New York, I do not grow any, so it is hard for me to comment on them. My understanding is that Minnesota red varieties such as Frontenac and Marquette which ripen by late mid-season, predictably were harvested about 7 to 10 days earlier than normal this year with very high sugars. The Minnesota white hybrids tend to ripen earlier than the Minnesota red varieties, hence they too came in much earlier with very high sugars.

From these observations, it is clear that our very warm and bone-dry summer affected the harvest dates of most of our French-American and Hudson Valley & New England Heritage grape varieties, but in different ways depending on their genetic ancestry.

Wildlife Damage to the Vineyard

The effects of our summer drought on our wildlife populations, nesting patterns, and migration patterns was significant. The drought severely reduced food sources for most bird and wildlife populations. Further, the increased heat increased the demand for water. This meant that bird populations were very aggressive in eating our grapes. Even two sets of bird nets, while it hindered bird damage, did not stop it. Further, for late ripening varieties, such as Verdelet, Diana, or Goethe, I did not even get to net them because the sugars were too low, so I thought, to attract birds for a feast. However, while these grapes were unripe with few sugars, the birds ate anything they could find as they were so hungry and thirsty.

Each year has its own mix of wildlife populations that can threaten a vineyard. These populations rise and fall based on communal diseases that each species faces and climatic conditions which leads to a natural ebb and flow of such populations. Because of the scarcity of food and browse caused by the drought, for the first time, we had a bear on our property, who was looking for food.

Due to climate change, especially this year, it was very hard to predict which grapes the birds and wildlife would attack first. This was because many grape varieties ripened in a sequence that was out of order due to drought conditions and wildlife hunger that made it unpredictable which grape varieties would be attacked first.

Conclusions

The lessons that growers need to take away from the 2022 growing season:

1. Growers need to be very aware of our changing climate and weather patterns and how that affects wildlife populations, migration patterns, and what and when they feed. These wildlife factors will influence how to manage and preserve your crop.

2. With our changing climate, growers need to be more flexible and willing to alter how and when they prune, spray, harvest, and manage their vineyards so that they can produce an economically viable crop.

3. Look at your current mix of grape and other fruit cultivars and accept the fact that this mix of grape varieties and other fruits that you grow will need to be continuously monitored and changed.

4. The stress that our changing weather patterns is putting on our vineyards and fruit farms is also putting additional personal stress on our growers and their families as well. Growers should have a solid mental health support network to cope with our more stressful lives.

With our changing climate, many changes will need to be considered so that profitable fruit farming in the Northeast can continue in the future. While we have challenges ahead, I am quite confident that we are up to this challenge.

This article is based on field studies, observations, measurements, and recordings taken on my farm Cedar Cliff Vineyards, Athens, New York from the years 2010 to the present. During this time period, I recorded the grape bud break dates, flowering dates, and harvest dates, including sugar levels for over 100 different varieties of French-American and Native-American hybrids, including 19th century Heritage grape varieties bred in the Hudson Valley and Eastern Massachusetts.

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2021 New England and New York Grape Production Survey

Elsa Petit[1], Zoe Robinson[1], Jessica Ellis[1], Max Resnick[1], Amber Ali[1], Sonia Schloemann[2]

[1]***Stockbridge School of Agriculture, University of Massachusetts Amherst***

[2]***UMass Extension***

The cold and disease-conducive climate of New England and New York has long been a challenge for commercial grape growers. New practices have been developed to counter those challenges. Traditionally, the European cultivars of the species *Vitis vinifera* have been used in viticulture. In regions where winters are too cold, growers cannot rely on the *V. vinifera* cultivars. Thanks to breeding programs using American and Asian grape species with cold and disease resistances, grape production is now possible in New York and New England [1].

Because the grape industry in New England and New York is relatively new, it is small compared to California and Washington. For example, there were 35,000 acres of bearing grapes and an average yield of 5.34 tons per acre in 2017 in New York, compared to 829,000 acres with an average yield of 7.82 tons per acre in California[2]. In New York, that area decreased 6% between 2015 and 2017, from 37,000 acres in 2015 to about 34,700 acres in 2017, while in California it decreased 3% in 2017 from 856,000 acres in 2015[2] to about 830,000 acres in 2017. When looking at the yield in tons per acre, in New York, the yield increased by 37% from 3.92 to 5.34 tons per acre in 2015, while in California, the yield decreased by one percent from 7.93 to 7.82 tons per acre in 2015. Data is missing on the reason for these changes. Data on acreage and production is also missing for the states of New England. As an emerging industry, support and data for viticulture in the Northeast is crucial. In August 2021, several commercial grape growers were surveyed regarding the age and size of their vineyard, whether they grow other crops or run a nursery or a winery, the varieties they grow, and the challenges they encounter. This survey's goal is to quantify the state of the industry in New England and New York to help growers respond to an economic and/or environmental sustainability need. This survey also has informative value more broadly, as worldwide viticulture is shifting to use more diverse and disease resistant cultivars to respond to a need to reduce pesticide usage and a growing awareness of environmental sustainability.

Materials and Methods

In August 2021, a survey was created by the University of Massachusetts using Qualtrics and distributed to commercial grape growers in the New England region and New York state. Responses came in from 102 individuals, 29 non-commercial grape growers were removed, leaving 79 responses from commercial grape growers.

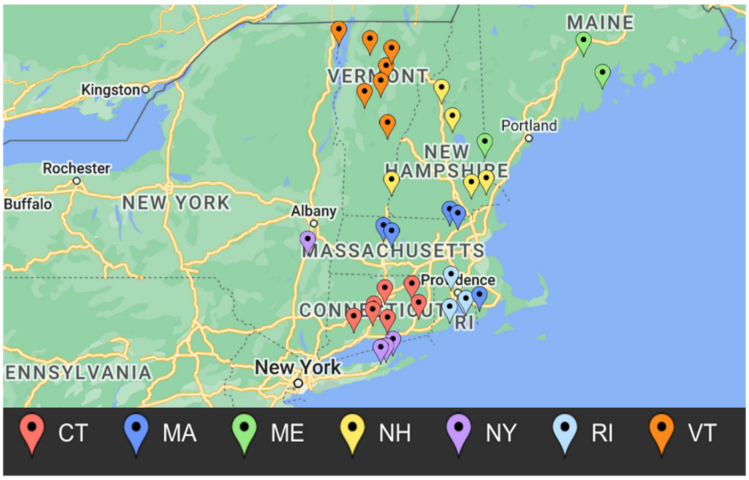


Figure 1. Map showing vineyards with available location information.

Results

1. Location, Age and Size of Vineyards. Among the 79 vineyards that responded, 35 vineyards gave location information. Vineyards were reported to be in various towns throughout Connecticut (7), New Hampshire (5), New York (4), Maine (3), Massachusetts (5), Rhode Island (4), and Vermont (7) (Figure 1).

The average age of the vineyards was 17 years. Fourteen percent of the vineyards are 4 years old or less. It is important to note that vineyards start being at full production after 4 years. About a third of the vineyards are between 5-10 years, which means they are young operations but at production stage. More than half (55%) of the vineyards were more than 10-year-old, which means they are mature vineyards (Figure 2).

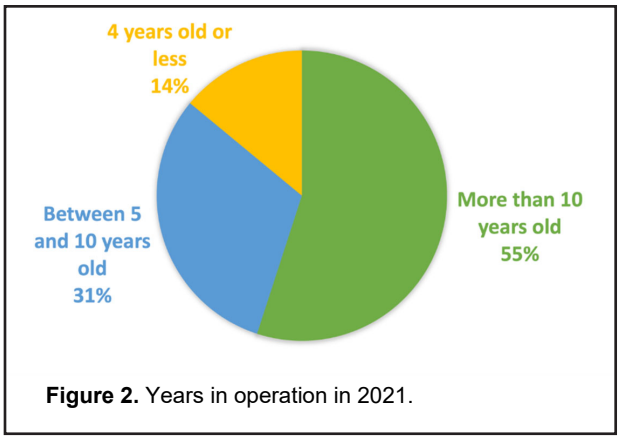


Figure 2. Years in operation in 2021.

On average vineyards were 12 acres. The biggest vineyard was 185 acres. Half of the vineyards were less than 3 acres (Figure 3). One third of the vineyards had over 7 acres and most of those largest vineyards were in the range of 10-20 acres.

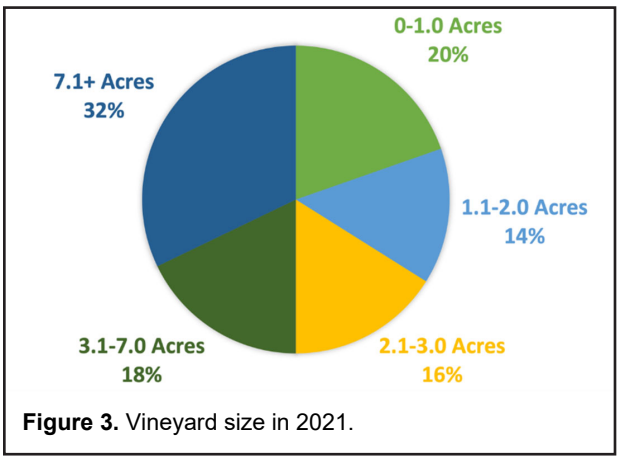


Figure 3. Vineyard size in 2021.

2. Other businesses than grape production

2.1 Other crops. On average, the vineyard represented 73% of the agricultural operations with about half of the growers (n=39) only growing grapes and nothing else. Those who did grow other crops grew in order of importance: small fruits (n=20), vegetables (n=17), apples and pears (n=15), and stone fruits (n=10).

2.2 Nursery. 11% (n=9) reported operating nurseries for an average of 16 years and the percent acreage of their operations dedicated to their nurseries was an average of 35%. Two respondents indicated that their entire agricultural operation was dedicated to their nurseries. Vines grown in the nurseries were used for own-rooted American hybrid wine grapes, own-rooted American hybrid table grapes, rootstocks, grafted American hybrid wine grapes, and grafted European wine grapes. No respondents reported growing grapes for use as grafted American hybrid table grapes, own-rooted European table or wine grapes, or grafted European table grapes.

2.3 Winery. 50% (n=40) of respondents reported operating wineries for an average of 14 years. Operations with a winery have a significantly larger size vineyards (Figure 4).

3. Grape varieties used. Among the vineyards surveyed, most vineyard acreage is taken up by European wine grapes (303 acres, 54%), followed by American hybrid wine grapes (252 acres, 45%), and American hybrid table grapes (10 acres, 2%) (Figure 5).

The varieties that take up the most acreage are, for European wine grapes, Merlot (yield 5.11 tons/acre), Cabernet Franc (yield 3.46 tons/acre) and Chardonnay (yield 4.14 tons/acre), for American hybrid wine grapes, Petite Pearl (6.8 tons/acre) and Itasca (8.67 tons/acre) and for American hybrid table grapes, Mars (yield data not available), Concord (yield data not available) and Niagara (yield data not available) (Figure 6).

4. Challenge for a sustainable vineyard management

4.1 Growing organic grapes. Only two respondents (out of 79) reported being certified organic, and non-organic respondents reported an average of 31.64% likelihood of considering becoming certified organic.

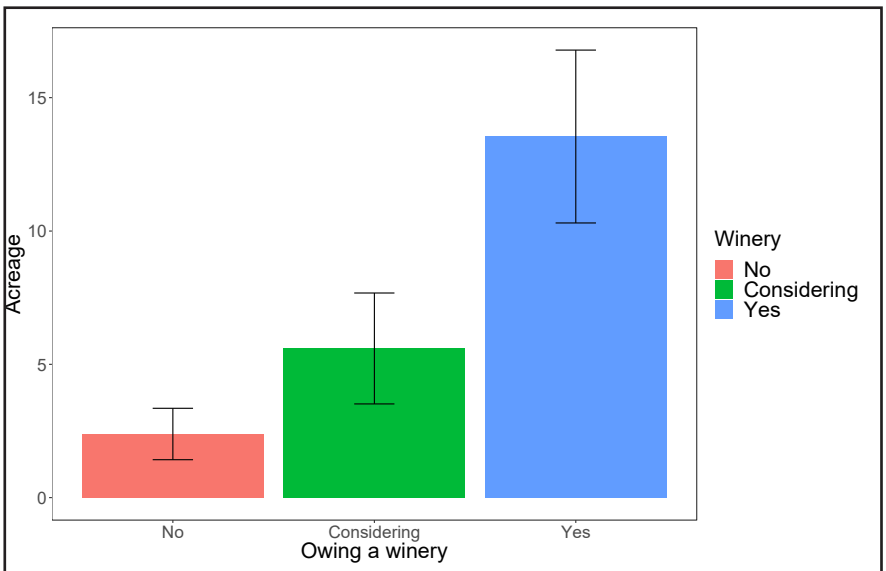


Figure 4. Owning a winery, considering owing a winery or not owning a winery according to the size of the vineyard in acres. Bars represent error bars.

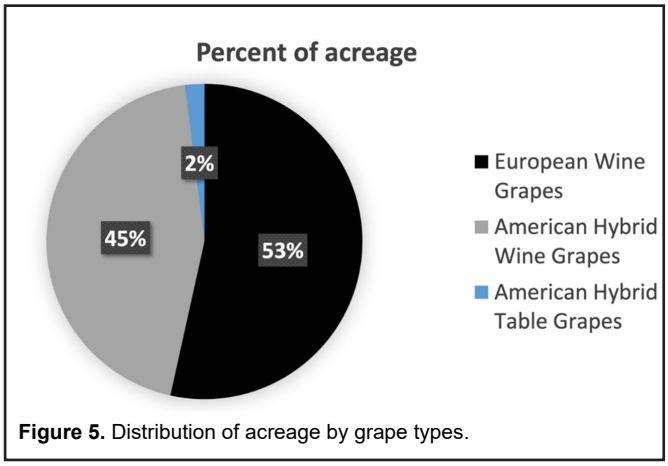


Figure 5. Distribution of acreage by grape types.

Disease management is the major challenges for growers impeding them from growing grapes organically, followed by insect and weed management (Figure 7).

The diseases that were economically or agronomically most significant to vineyards operations, were by order of importance: downy mildew, black rot, and powdery mildew (Figure 8).

Diseases that growers also indicated the highest levels of interest in learning treatment options for were anthracnose, crown gall, and sour rot. Ultimately, however, 50 of the 56 responses to a question asking growers to rate out of 100 their satisfaction with their overall disease management program were in the range of 50+, with 34 of those responses in the 75+ ranges, indicating that, for the most part, growers are mostly satisfied with their disease management. Issues that growers did still have with their disease management programs were cost and added difficulty due to bouts of wet weather.

Insects and mite pests are another challenge that are faced by grape growers. The pests that were economically or agronomically most significant to their operations, were, by order of importance: Japanese beetle, yellow jacket, and grape berry moth (Figure 9).

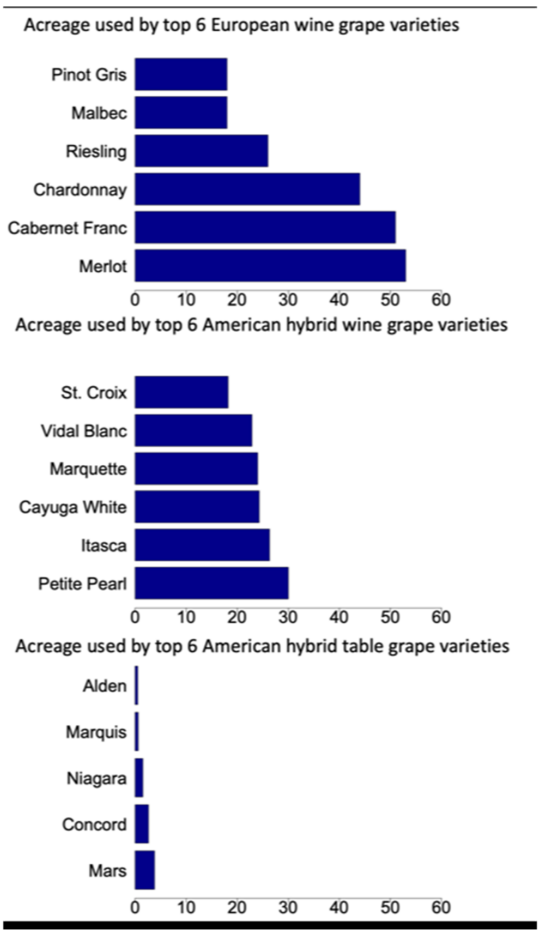


Figure 6. Acreage occupied by 6 top varieties in each grape category, European wine grapes, American hybrid grapes, American hybrid table grapes.

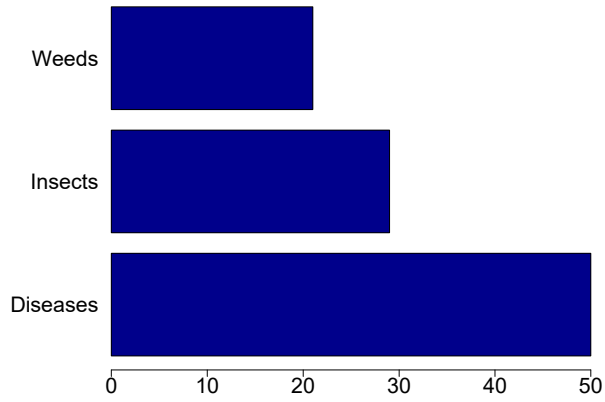


Figure 7. Number of growers responses for each type of challenge impeding them from growing grapes organically.

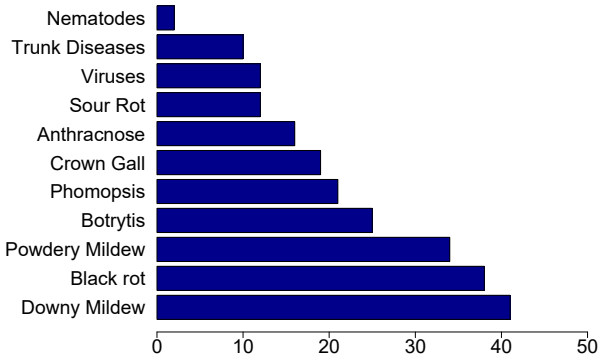


Figure 8. Number of growers responses for which disease was most important economically or agronomically.

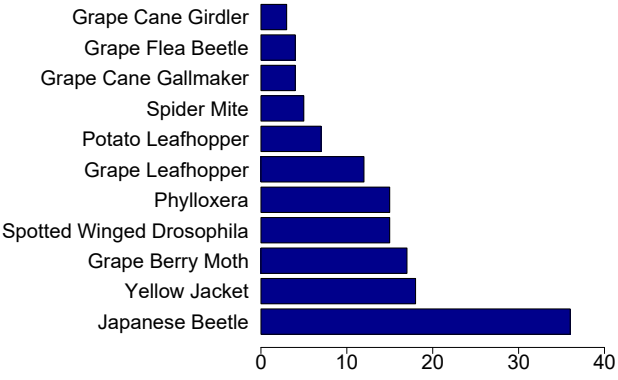


Figure 9. Number of growers responses for which pest was most important economically or agronomically.

Conclusions

In 2021, 79 grape growers in New England and New York responded to a survey. About 45% of vineyards were young operations, indicating that the industry was still developing. Vineyards were small on average (12 acres). 50% of the respondents, typically the larger operations, also owned a winery. The surveyed acreage was split about evenly between European and American hybrid wine grapes. Yet, European had a much lower yield (4 tons/acre) than American hybrid wine grape varieties (8 tons/acre). The biggest challenge for organic production was disease management. American hybrid varieties, with their higher yield and disease resistance, are a better choice for the New York and New England region for environmental sustainability. Future research should address whether the American hybrid varieties are also more economically sustainable. Other research should also focus on finding organic solutions against the main diseases, downy mildew and black rot.

Acknowledgments

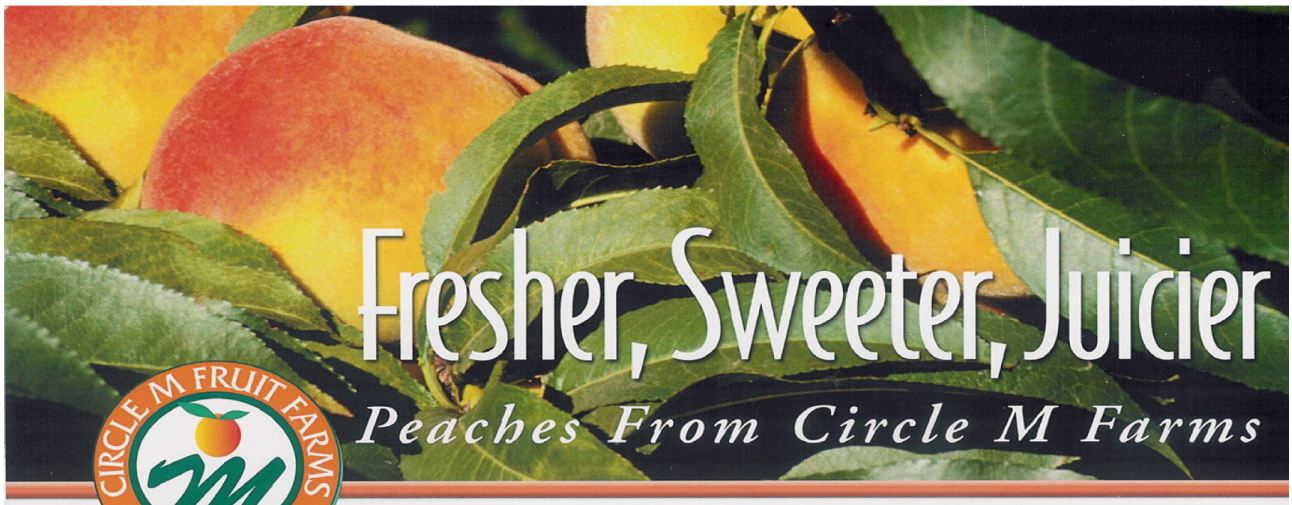
Thank you to all the grape growers and wine makers who answered this survey. Your input was vital to show to policy makers and industry leaders the current state of the New England and New York grape and wine industry. Special thanks to Terry Bradshaw, Mary Conklin, Heather Faubert, Caitlin Gold, David Handley and Becky Sideman for distributing the survey to their list of growers.

References

[1]Reynolds, A. G. & Reisch, B. I. in *Grapevine Breeding Programs for the Wine Industry* (ed Andrew Reynolds) 345-358 (Woodhead Publishing, 2015).

[2]*Noncitrus Fruits and Nuts 2017 Summary*, https://www.nass.usda.gov/Publications/Todays_Reports/reports/ncit0618.pdf, (2018).

Zoe, Jessica, Max, and Amber aare undergraduate students at the University of Massachusetts Amherst.



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