Cornell Cooperative Extension
Finger Lakes Grape Program

July 20th, 2022

Finger Lakes Vineyard Update

In the Vineyard

In this Issue:

The Finger Lakes region received some much needed relief in the form of rain on Sunday night and Monday morning. The rainfall totals, however, were highly variable with Hammondsport receiving 2.09 inches while Lodi saw a scant 0.39 inches of rain. Growers should continue to monitor their blocks for signs of water stress especially with the heat the area is experiencing.

At the teaching vineyard we're seeing the start of veraison on Marquette, our earliest cultivar. If Marquette reaches 50% veraison by the end of the weekend it will have been 83 days between budbreak and color change. Looking at our limited data set this puts Marquette more on a 2020 trajectory than a 2019 path, suggesting a possible early harvest. While I'm peering into the crystal ball, if most vinifera were on a similar accelerated path to Marquette we should be seeing veraison in the first to second week of August.

Speaking of berries—our field team has been collecting berry samples each week from four varieties in the hopes of adding one more piece to the puzzle of crop estimation. The table below shows our progress so far. The Michigan State model for berry weights has the 50% threshold being reached for many vinifera varieties between 1000 and 1200 growing degree days (GDDs). In our five years of sampling we've found 1400-1500 GDDs to be close to the mark for the Finger Lakes. Classically, berry weight makes up only around 10% of the totality of factors for crop estimation, but as we've seen in years like 2016 and 2021 it has the potential to be a significant factor in areas with unpredictable rainfall patterns.

Hope everyone is keeping their field teams hydrated. Popsicles and water ice can earn you some goodwill too (to be later spent during harvest).

GDDs	1112	1236	1432
Date	7/7/2022	7/12/2022	7/20/2022
Riesling	0.26	0.38	0.56
Chardonnay	0.40	0.52	0.63
Cab Franc	0.27	0.45	0.56
Cayuga	0.84	1.04	0.96

Remote Sensing for Grape Disease Management

By Kathleen Kanaley and Katie Gold

Many of you have probably heard a little bit about Dr. Katie Gold's research at Cornell Agritech, and I'd be willing to bet the words "remote sensing," "image analysis," and "drones," have come up at least a handful of times. I wouldn't be surprised if many people are also wondering: How will this stuff help me grow grapes in New York? This article is intended to answer that question and serve as an introduction to our research program. If any of this sparks curiosity, please let us know! As a graduate student in the Gold Lab, I am eager for questions, ideas for future projects, and feedback on our work thus far.

"Remote sensing" is a catch-all term that encompasses the many ways we can gather information about something from a distance. In our case, the thing we want to monitor is grape disease. Understanding remote sensing means understanding that the "remote" and "sensing" parts of the phrase reference two distinct activities. "Sensing" refers to *how* light is being measured by a sensor, and "remote" refers to what platform the sensor is mounted on, be it a UAV, satellite, or airplane.

Our lab works primarily with ***optical*** remote sensing a.k.a. cameras and light measuring devices known as "spectrometers." The key difference between the cameras we use and the camera on a cell phone is the range of light that they measure. While a cell phone camera captures the same red, green, and blue wavelengths that we see with our eyes, the cameras in most remote sensing systems measure light beyond the visible spectrum, at wavelengths human eyes cannot see. Plants reflect light at these other wavelengths, primarily in the infrared region.

when crops are stressed - whether by disease, drought, or nutrient deficiency - the amount of light reflected in the infrared decreases, while red and blue reflectance increases (see Figure 1). Measuring these changes in reflectance can serve as a means of identifying a stressed plant.

Hans and Terry Bates have been doing just that with a tractor-mounted camera system at vineyards in the Finger Lakes and Lake Erie region (see the June 22 newsletter and myEV website for more info).

Plants respond rapidly to environmental stressors, including disease. At the earliest stages of infection, before visible symptoms appear, light reflectance changes more subtly, but reliably. This is why advanced sensors capable of measuring reflectance very precisely can be used to detect pre-symptomatic disease.

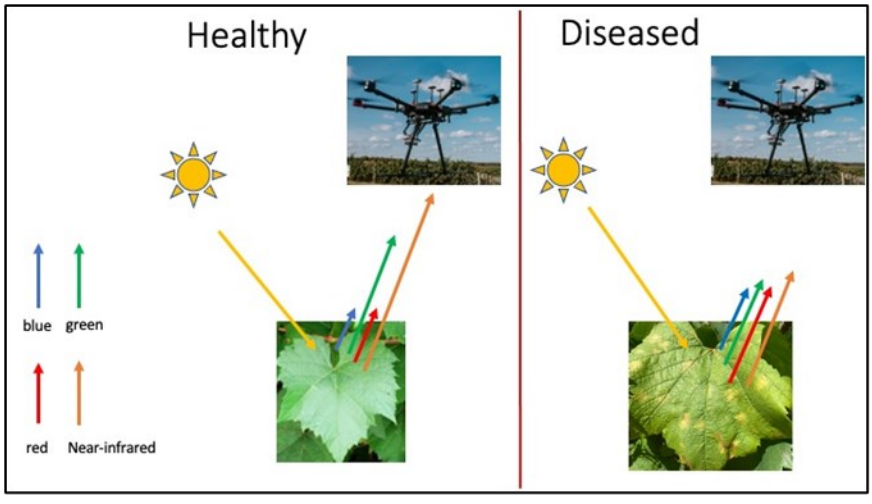

Figure 1. Reflectance in the blue, green, red, and near-infrared for healthy vs. diseased grapevine. The camera mounted on the drone registers the amount of light reflected in each waveband.

Remote Sensing for Grape Disease Management

By Kathleen Kanaley and Katie Gold

Rather than examining each plant in a 100-acre vineyard for disease symptoms, what if we could use aerial imagery of the same area to quickly identify high risk zones with early signs of infection? We have a ways to go to make this happen, and achieving this goal is the driving force behind much of my research in the Gold Lab.

This summer I am testing a dual-camera system mounted on a UAV that is capable of scanning two acres in under 10 minutes. In addition to visible and infrared light, the second camera measures thermal radiation from the canopy. Disease can cause vines to “heat up” as they decrease photosynthesis, and we want to know if we can detect this temperature shift based on thermal imagery.

How do we test whether we can use remote sensing to accurately track disease? Every week from June through August, we visually assess and rate downy mildew and powdery mildew severity at the pathology vineyard in Geneva. The UAV flies over the vineyard within 24 hours of scouting, and at the end of the season we compare the scouting records to our image data and link changes in reflectance with symptoms observed on the ground.

We are coordinating these efforts with data collection using the PhytoPatholoBot (PPB), an autonomous vineyard robot that collects side-canopy imagery of the vines. The PPB is able to identify downy mildew lesions just as accurately as an expert scout looking at the same imagery. We will use this ground data to further validate our UAV and satellite imagery of the research vineyards.

The goal here is to pinpoint changes in light reflectance that correlate closely with disease severity. We can use this relationship to estimate disease pressure based on images of a vineyard. Remotely-sensed images could then be converted to a map of disease pressure that growers can use to quickly identify “hot spots” and tailor management accordingly.

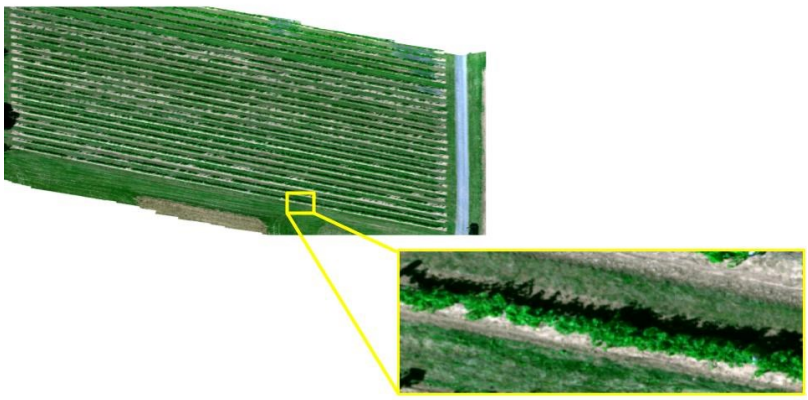

Figure 2. Aerial image of the Cornell pathology vineyard in Geneva, NY, acquired June 17, 2022.

Remote Sensing for Grape Disease Management

By Kathleen Kanaley and Katie Gold

While we anticipate several more years before all of these tools are accessible to every grower, it is important to investigate the utility of these datastreams now. Airborne remote sensors can cover much more ground than we can on two feet. The ability to rapidly generate a map showing likelihood of infection across an entire vineyard could help direct scouts where to look first for disease, rather than searching at random. Sensors that measure light beyond the visible spectrum pick up changes that we cannot see. Once we understand which of these changes signal infection, we can use remote sensing as an early warning system to curb epidemics before they spread too far. Tackling disease early paves the way for lower pressure and fewer sprays later in the season, as well as better-targeted applications of resistance prone chemistries. This would yield financial, environmental, and personal benefits for grape growers by freeing up time and energy for other critical management activities. In sum, by helping us understand where and when infection occurs, remote sensing could significantly reduce the uncertainty and expense of early disease detection.

Scouting for downy and powdery mildew to validate UAV measurements at the Cornell pathology vineyard.

Kathleen Kanaley is a graduate student in Katie Gold's grape pathology lab at Cornell AgriTech. Contact Kathleen by email at kk697@cornell.edu.

Cornell Cooperative Extension
Pesticide Safety Education Program

General Pesticide Tank Mixing Order

Below is a generic tank mixing order to follow when using water as the carrier. These generic steps should only be used when mix order is *not* otherwise specified. You must follow pesticide product label tank mixing instructions first and foremost.

Additional resources: Water quality (https://www.extension.purdue.edu/extmedia/ppp/ppp-86.pdf); Compatibility (https://mdc.itap.purdue.edu/item.asp?itemID=23204)

1. Read all product labels
2. Conduct jar test
3. Agitate liquids in containers per label
4. Add water at 50% total volume
5. Start agitation before first product
6. **Add products in order based on formulation**
7. Add remaining water
8. Inspect for incompatibility, check pH & water hardness

This handout was provided by Mary Centrella, Pesticide Safety Education Program, at the June 28 Tailgate Meeting. We appreciate Mary letting us distribute it in the Vineyard Update this week.

Pesticide Safety Education Program (CCE-PSEP)

525 Tower Rd, CALS Surge Facility, Ithaca, NY, 14853

607-255-1866

Upcoming Events

Don't forget to check out the calendar on our website (http://flgp.cce.cornell.edu/events.php) for more information about these and other events relevant to the Finger Lakes grape industry.

FLGP In-Person Tailgate Meeting

Tuesday, July 26 *4:30 – 6:00 PM*

Gene Pierre's Fox Vineyard

5895 Route 21S, Naples, NY

Our next in-person Tailgate Meeting for 2022 will be held on Tuesday, July 26 at Gene Stanbro's vineyard in Naples. The agenda for these meetings is very loose, so please come with your questions, observations, opinions about what's going on in the vineyard. The DEC has approved the meeting for 1.25 pesticide recertification credits (Categories 1a, 10, 22).

FLGP Virtual Tailgate Meeting

Tuesday, August 9 *4:30 – 6:00 PM*

Via Zoom

Our final virtual Tailgate Meeting of 2022 will be held on Tuesday, August 9. As always, the agenda for these meetings is very loose, so please come with your questions, observations, opinions about what's going on in the vineyard.

Participants will need to register before attending their first virtual meeting in order to receive the Zoom link. Registration for the online Tailgate Meetings is only required once – the link you receive when you register will work for all four online meetings this year.

Online Tailgate Meeting Registration: https://bit.ly/3M2peJp

The virtual and in-person Tailgate Meetings have been approved for 1.25 pesticide recertification credits. We will also need to receive an image or photocopy of your pesticide license before the first meeting that you attend. These images/copies can be sent to Brittany Griffin at bg393@cornell.edu. More information will be included in your confirmation email.

Upcoming Events

Don't forget to check out the calendar on our website (http://flgp.cce.cornell.edu/events.php) for more information about these and other events relevant to the Finger Lakes grape industry.

Pre-Veraison Vineyard Management and Site-Cultivar Selection Workshop

Wednesday, August 3 8:30 AM – 6:30 PM

Vox Vineti

49 Sproul Rd., Christiana, Pennsylvania 17509

Cost: $30 per person

Registration Deadline: Wednesday, July 27

Join Penn State Extension Grape and Wine team members and grape and wine industry stakeholders and regional experts for **Pre-Veraison Vineyard Management**. The main focus of the morning and early afternoon will be reviewing approaches to site selection and options for matching cultivar and vineyard design to the vineyard site. In the mid-afternoon, vineyard pest management updates will be given and winemaking strategies with underripe fruit will be reviewed.

The event will begin at Vox Vineti for the morning sessions. The mid-morning and afternoon sessions will be held at 1723 Vineyards.

The workshop agenda, information on speakers, and registration information can be found at https://extension.psu.edu/pre-veraison-vineyard-management-and-site-cultivar-selection-intensive.

Cornell AgriTech 140th Anniversary Open House: From research to your plate

Saturday, August 13 10:00 am – 3:00 pm Cornell AgriTech campus

630 W North Street, Geneva NY

Event link: https://cals.cornell.edu/cornell-agritech-140th-anniversary-open-house

Learn how science happening on the Cornell AgriTech campus impacts New York food and agriculture. Faculty, students, and staff will showcase their scientific research, give tours of our facilities, research fields and greenhouses and demonstrate how important (and fun) science really is. Below is a sampling of some activities and displays that will be offered (subject to change).

- Look through a high-powered microscope at New York crop diseases.
- Discover how various food and craft beverage companies produce some of your favorite products deliciously and safely through our expertise and innovation.
- Find out how we develop new apple, grape and vegetable varieties and visit some of our world-renowned germplasm repositories.
- Peruse the many weeds growing in our area and get some tips and tricks on how to manage them.
- Meet some "friendly insects".
- Watch us operate drones and robots used to analyze crop health.

The open house is open to all audiences and all are encouraged to visit our campus for a fun-filled educational day. Parking is available at Jordan Hall at 630 North St. Geneva, NY. No registration required.

Go to Top

2022 GDD & Precipitation

FLX Teaching & Demonstration Vineyard – Dresden, NY					
Date	**Hi Temp (F)**	**Lo Temp (F)**	**Rain (inches)**	**Daily GDDs**	**Total GDDs**
7/13/2022	79.7	65.3	0.03	22.5	1268.5
7/14/2022	78.6	62.1	0.00	20.4	1288.9
7/15/2022	81.5	55.4	0.00	18.5	1307.3
7/16/2022	84.6	62.4	0.00	23.5	1330.8
7/17/2022	89.1	62.8	0.53	26.0	1356.8
7/18/2022	80.4	67.5	0.63	24.0	1380.7
7/19/2022	90.3	67.6	0.00	29.0	1409.7
Weekly Total			**1.19”**	**163.7**	
Season Total			**10.15”**	**1409.7**	

GDDs as of July 19, 2021: 1415.6

Rainfall as of July 19, 2021: 12.56”

Seasonal Comparisons (at Geneva)

	2022 GDD [1]	Long-term Avg GDD [2]	Cumulative days ahead (+)/behind (-) [3]
April	58.3	62.9	-2
May	337.8	254.6	+7
June	506.9	484.1	+6
July	393.4	645.5	+5
August		595.7	
September		359.9	
October		112.8	
TOTAL	1296.4	2515.5	

[1] Accumulated GDDs for each month.

[2] The long-term average (1973-2021) GDD accumulation for that month.

[3] Numbers at the end of each month represent where this year’s GDD accumulation stands relative to the long-term average. The most recent number represents the current status.

2022 GDD & Precipitation

Precipitation

	2022 Rain [4]	Long-term Avg Rain [5]	Monthly deviation from avg [6]
April	2.00”	2.83”	-0.82”
May	1.66”	3.09”	-1.43”
June	5.18”	3.52”	+1.66”
July	0.93”	3.46”	
August		3.22”	
September		3.46”	
October		3.47”	
TOTAL	9.77”	23.05”	

[4] Monthly rainfall totals up to current date

[5] Long-term average rainfall for the month (total)

[6] Monthly deviation from average (calculated at the end of the month)

Additional Information

Become a fan of the Finger Lakes Grape Program on Facebook, or follow us on Twitter (@cceflgp) as well as YouTube. Also check out our website at http://flgp.cce.cornell.edu.

Got some grapes to sell? Looking to buy some equipment or bulk wine? List your ad on the NY Grape & Wine Classifieds website today!

Cornell Cooperative Extension
Finger Lakes Grape Program

The Finger Lakes Grape Program is a partnership between Cornell University and the Cornell Cooperative Extension Associations in Ontario, Seneca, Schuyler, Steuben, Wayne and Yates Counties.

Hans Walter-Peterson—Team Leader
Donald Caldwell—Viticulture Technician

flgp.cce.cornell.edu

"Cornell Cooperative Extension is an equal opportunity, affirmative action educator and employer"