Cornell Cooperative Extension
Lake Erie Regional Grape Program

A cooperative program between Cornell and Penn State Universities, Cornell Cooperative Extension Associations in Chautauqua, Cattaraugus, Erie and Niagara Counties, Penn State Extension – Erie County, NYS IPM Program, National Grape Cooperative, Constellation Brands, Walker's Fruit Basket and growers of the Lake Erie Grape Industry

Annual Report 2019

Grape Harvest 2019 at Cornell Lake Erie Research & Extension Laboratory-photo Kim Knappenberger

Cornell University

Lake Erie Regional Grape Program

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Business Management

Kevin Martin, Penn State University, LERGP, Business Management Educator

2019 Year in Review

Efficient Vineyard: Variable Rate Thinning

Much like 2017, this year was a very good year to illustrate the benefits of variable rate thinning. Reasons for the success of variable rate thinning were different than 2017. This year, excellent fall weather really showed up in fruit quality. In an attempt to manage crop load to an average year, it was easy to over-thin. By using variable rate thinning, not simply farming to block average, a grower can thin less and mitigate the same amount of crop load risk. Thinning this year showed benefits to quality in the first ten days of harvest and return crop. Benefits were subtler than prior years, except in extremely over-cropped vineyards.

The efficient vineyard project has narrowed the scope of its reach as the project enters an extended phase. However, much of the sensor technology that underpins variable rate thinning is now commercially available. Staff at CLEREL continue to have the expertise to process that data. As growers continue to expand data collection in vineyards, the economic benefits of variable rate thinning become clear. Not thinning enough can be a big problem. 2017 and 2019 were both great years in showcasing this technology for another reason entirely. When early season ripening was a problem for some growers this year, it translated not to rejected loads but very late harvests and yield loss. Those that really needed thinning the most, did not realize the extra yield anyway. For those that did thin, it was an easy year to over-do it without the assistance of variable rate technology and data supported decision-making. In order to have a meaningful impact on vine size and vineyard efficiency high quality data is the first step to ensuring that variable rate management is based on meaningful data.

Part of this project also involves learning and developing tools that allow growers to mechanize their application of this data. From an engineering standpoint, variable rate nitrogen is old technology and easy to sell. The commercialization of that technology has already happened. However, a typical vineyard grower, would not likely find any economic impact to that technology.

Our vine size variability rarely relates to nitrogen deficiency. To monetize this technology and make the investment worthwhile we need to focus on crop load. To the extent that this technology allows us to understand the vine size variability and manage yield in a variable way that puts crop load in balance will allow vineyards to produce large (ripe) crops more consistently.

Practically, one way of accomplishing a balanced crop load more efficiently, may be with variable rate thinning. As growers are well aware, thinning is a difficult task to manage. It is often fraught with mixed results. By using data to drive the decision-making process and focusing thinning on areas within blocks, we may be able to improve the results of thinning while thinning less fruit.

2019 Market: Grape Production and Marketability

Average brix for the region has been 16.6 in the juice grape market. With most plants taking in similar brix, National's North East plant has been somewhat higher than average at 16.8 brix. This is up slightly from last year. Growers were occasionally caught with low soluable loads in the range of 14.5 – 15.5 but delaying harvest in certain blocks was enough to ensure most deliveries between 15.5 and 17.5.

Good market news of last year has mostly improved, particularly on the juice side. Volume of sales is up significantly for National Grape and Refresco (formally Cott). Pace of sales and price is on a modest rise for Growers Cooperative. Most importantly for some, Agri-America has processed over 7,000 tons in their newly acquired processing plant in Fredonia, NY (Formally part of Cott/Star). Finding demand for raw product, Agri-America purchased directly from processors that were running out of tank space and waiting for concentrators. These collaborative efforts improved 2019 payments to farmers already.

The wine market, particularly large scale, has softened. We have seen high productivity in recent years from other regions. The market to supply small wineries is becoming increasingly competitive. Even National Grape has entered the space.

Continuing on the theme of last year, wine demand is pointing toward another evolution in consumer taste and behavior. There has been some upheaval in major labels. With the sale of kosher brands from Constellation to Royal, Concord marketing agreements will shift. The rest of production for Constellation is business as usual until there is some finality with the tentative agreement between Constellation and Gallo. We don't know what ingredients (grape varieties) will emerge in new product lines. Depending on the severity of shift in consumer behavior, we actually do not know that new product lines will fully replace the old ones. This is similar to the challenges three years ago in juice. There is a good chance some growers will benefit, while others need to adjust their businesses and acreage.

The market for smaller wineries is similar. Freeze damage in the Midwest has not impacted demand yet, which exceeded supply. Lake Erie tank space and Midwestern tank space for hybrids exceeded annual demand. Growers expect to see some varieties pick up in price and demand by 2020. Toward the end of harvest, as quantities became known, it appears that supply and demand were closer to equilibrium than last year.

In all, most growers will find this to be their most successful year out of the last five. All major factors that drive profitability were average to above average. Continued growth in price would have the potential to revitalize the industry. In the meantime, the continued search for increasing efficiency will help compensate for stagnation in price.

Focus on 2020: Meeting Labor Needs

Labor needs have continued to intensify for area growers. Crop updates, newsletters and coffee pots all focused on key challenges. These challenges are more intense in NY State than Pennsylvania. Sexual harassment training, worker protection, immigration audits, immigration population size, minimum wage, workers' compensation and unemployment insurance have increased the cost of labor and decreased the availability.

The H2A program has been one area growers are starting to think about looking at. It offers the potential to solve supply constraints on labor. It does nothing to decrease price or simplify regulation compliance.

Compliance will require a significant amount of education in NY or a combination of outsourcing compliance with some education for employers. Business as usual, relying on information from ten years ago, would result in significant regulatory violations in both NYS and PA.

Price of labor is significantly less in PA but with extremely low unemployment and a rising minimum wage in NY, it is no surprise that labor costs are increasing very quickly. As the price of grapes

recovers, LERGP and vineyard operators remain focused on capital investments that save labor. Most farms have removed the low hanging fruit here. Labor savings now will require innovative practices or significant capital investment. If you don't have a deMOGer on your harvester, get one. However, to remain sustainable changes will need to be more dramatic than that.

These are all things we'll cover at the grower's conference this winter, so please join us.

NEWA/VIP

Kim Knappenberger, Program Aid, LERGP

NEWA in Our Region

We started the season with a decent hail storm that did quite a bit of damage around our region. Our Rainwise station at the Portland lab took on a little damage and had a decent sized hole punched in the rain collection bucket. Moving forward from there it was a fairly quiet season as far as taking care of the stations. Aside from the occasional sensor replacement or bucket cleaning, the stations mostly experienced issues with transmitting data. One station just needed to be relocated about 20 feet from its previous position. For the most part a simple restart or ensuring that there was no equipment parked between the station and the IP-100 was all that was needed to restore the flow of data for most of the issues that arose.

A quick update for those who may have noticed… recently there have been server issues that have delayed or interrupted the data flow from the Rainwise stations to the NEWA website. It appears that these issues have been resolved and the stations are reporting as expected. The most noticeable events happened on or around November 7th. If you are a frequent visitor to NEWA and notice missing data, or the data seems like it is not reflecting the true weather conditions, please contact Kim Knappenberger at ksk76@cornell.edu. When a temperature and relative humidity sensor is bad, sometimes the data shows temperatures that are high. Or there may be no humidity data at all. If that's the case, the sensor needs to be replaced. Precipitation is starting to be difficult to record due to the snow, so these results are not an accurate representation of the actual precipitation.

This is a great time of the year to work through problems, get parts replaced or have the stations serviced. Let Kim know if she can help and thank you for your help in keeping the weather data as accurate as possible!

Vineyard Improvement Program

The Vineyard Improvement Program seems to operate quite the opposite of the way a vineyard grows. There is a lot of activity during the late fall/winter and even spring, but it grows dormant over the summer. There hadn't been much activity in the applications for a while during the growing season this summer. Now that harvest is complete there has been an uptick in the amount of inquiries and applications.

In June of this year the first reimbursement for the program was completed. There are 2 other applications currently in the process of being finalized for reimbursement. Our total Concord acreage contracted for removal is just over 159 acres from 14 applicants. Of those 159 acres, over 66 acres are being planted back to grapes. Some will be Concord again (this works for the program if drainage, reorienting the rows, or some justifiable practice to increase profitability is applied). Growers have also replaced the Concords with Aurora, Vincent, Foch, Elvira, Ives, Gruner, and Chambourcin. Other growers are planting peach or apple orchards, and raspberries or other berries. Still others are opting to plant field crops, cover crops or hay. All of these are viable options. The only requirement is that the land continues to be used for agricultural purposes.

This is a great time to make an assessment. If you have some old Concord vineyards that aren't producing well, or at all, this might be the program needed to get you to remove it and decrease the source of pest and disease. To learn more about the program and see if it will work for you, visit our website at lergp.com. Click on the Vineyard Improvement Program button in the middle of the page. If you have further questions, please feel free to contact Kim at ksk76@cornell.edu or call 716-792-2800 ext. 209.

Viticulture

Jennifer Russo, Viticulture Extension Specialist, LERGP

The Lake Erie Regional Grape Program was very pleased to announce that Jennifer Russo has joined their team as the new viticulture extension specialist! The viticulture extension specialist at LERGP plays a key role providing growers in the Lake Erie Grape Belt with the latest research-based information to assist them in producing grapes in an environmentally and economically sustainable manner. This position had been vacant for two years.

What a terrific time to join the Lake Erie Regional Grape Program. This growing season was quite the introduction into the challenges and risks that the world of commercial viticulture has to offer. It started off cold and wet, with bloom taking its time to start us off, officially called six days later than the historical average at CLEREL. The wet weather teased our spray programs and challenged our operations. Then there was the initial excitement 30 days post bloom that there was a more than average crop hanging around our region. Management decisions had to be made for the health and sustainability of our vines, as risk management tools, and also what worked best with individual financial goals. Fingers were crossed for a warm and sunny July, August, and September to catch us up on Growing Degree Days aiding sugar accumulation. We were able to stop holding our breaths about the weather because sugars were

reported in good shape across the region in September thanks to the sunny conditions, but forced to hold them again due to end of season wind events that were not kind to many with fruit still hanging. Despite this season's rollercoaster, the Lake Erie Regional Grape Program w was able to work with growers to aid with the goals pertaining to increase yields, product quality, diversification, efficiency of production, profitability and adoption of environmentally sound cultural and pest management strategies.

During my first growing season, my efforts focused on learning the industry and meeting stakeholders: including four winery visits, thirteen coffee pot meetings, 72 farm visits, touring a certified nursery block with Dennis Rak, and attending eight field representative meetings. I am proud to say all of the growers that I visited were incredibly supportive of my efforts and willing to take time out of their busy season to welcome me and show me their operations. Making personal connections and learning about each of their journeys, goals, and tribulations, can only strengthen our program and help to focus my efforts where the industry requires them. Thank you for those who asked me to come out and visit and here's to future visits on farms that are willing and can benefit from our program.

Cornell's Cooperative Extension's Mission Statement reads: *CCE puts knowledge to work in pursuit of economic vitality, ecological sustainability, and social well-being. We bring* ***local experience*** *and researched based solutions together helping families and communities thrive in our rapidly changing world.* I want to bring your attention to the bolded phrase in that mission, **local experience.** That is you. Your knowledge of your industry, your innovation to see a need and fill a need to get the job done, your resourcefulness and perseverance despite nearly stagnant margins inspire me and guide our research efforts and educational programming. That brings me to our CCE Vision Statement: *creating positive change on behalf of families and communities through rigorously tested extension programs to create measurable change…by aligning local needs with the resources and priorities of the land grant system and its state and federal partners*. I am proud to be a part of CCE's Lake Erie Regional Grape Program Team and I am excited about our future working relationship with all of you to help create measurable change in economic vitality, ecological sustainability, and social well-being.

With all of that said, the following are programs and outreach efforts to benefit our region. Our CLEREL team provided four educational tours at the facility and extension/outreach events about Worker Protection Standards and Crop Estimation were hosted with over 90 in attendance. Contributions were made to timely informational Crop Updates and monthly Newsletters, Cornell's Veraison to Harvest publication, press releases, and podcasts.

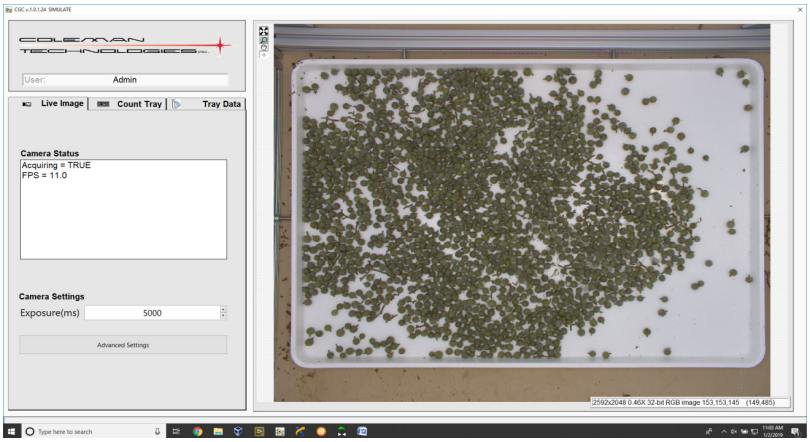
The LERGP extension program is providing the lead for the Vineyard Improvement Program which provides cost share funding to remove Concord acres that have lost contracts, been abandoned, or are under performing. Chautauqua County CCE is collaborating with this project to provide the bookkeeping component for grower reimbursement. Six growers in Chautauqua County have taken advantage of this program with one business having already received the maximum amount of $50,000 for removing and replacing Concord vines with wine varieties.

NEWA –
Keeping the 23 weather stations in the Lake Erie region providing up to date and accurate information requires regular maintenance and upkeep of both the station and the communications

equipment. During this quarter there have been a number of issues that needed attention. Calls were made to the owners of the Lake City, PA; Ransomville; Watkins Glen; Lansing; Silver Creek; Westfield; and East Westfield stations. In most cases the issues could be handled over the phone with the owners of the stations. Often the issue seems to be the internet connection of the IP-100. In some cases, there has been equipment parked between the station and receiver that blocks the signal.

During a visit to Niagara County, we were informed of an interest in setting up a station. This would be in an underrepresented area. The owner was sent information regarding the possibility of purchasing a HOBO station. No confirmation yet as to whether or not they are going to follow through.

NEWA is not just for the growing season as you can access hourly weather data throughout the year, so it is the perfect site to consult if you need to know how cold it got, and how long it stayed there. NEWA also provides the ability to go back through the growing season and retrieve both weather and pest model information by date. This feature is invaluable to help determine what happened if your spray program did not perform like expected. This project is supported by the Lake Erie Regional Grape Research and Extension Program, Inc., NYS Wine & Grape Foundation and the NYS IPM Program.



Crop Estimation with the Cornell Grape Counter

Industry funded grants supported the development of a new viticulture tool at CLEREL. In a joint effort with Coleman Technologies, the development of the Cornell Grape Counter (CGC) Machine 2.0, with the incorporation of digital scale for instant sample weights and accurate berry count, aided with industry stakeholder crop estimation. The principal outcome of improved crop estimation is savings to stakeholders including optimized scheduling of labor, efficient coordination of space for fruit and juice, improved delivery scheduling, reliable reporting to government agencies and distributors, early projection of revenues, proactive filing of crop insurance claims if the estimate is critically low and a reliable basis to make crop reduction decisions if the estimate is critically high.

The CGC system employs computer vision to automate the tedious process of counting and sizing grape crops and accurate weights. A custom image-processing algorithm was developed to automate the grape counting process. Software was created to export data for user analysis and as a viticulture tool. With manual assist, the CGC machine can achieve >99.5% accuracy and takes 2-5 minutes to count a tray of 3-5k grapes, which historically was counted by hand.

Often, the most practical way to decrease the margin of error is to increase the sample size. The time savings that the CGC allows could be allocated to the collection of more samples to obtain a more precise crop estimation. Though this work is tailored to Concord growers, it would be easily applicable to other juice, wine, or table grape production systems. The development of an accurate automated berry counting machine with accurate sample weights would streamline the estimation process improving efficiency with savings in labor improving profits.

Coffee Pot Meetings – Coffee Pot meetings start the first Wednesday in May with morning meetings only and switch over to morning and afternoon meetings in June when we hit the critical times of the growing season. Coffee Pot meetings provide growers and the LERGP team a chance to learn from each other, as there is no set agenda. Questions from participants guide the conversation and reflect what growers see as the most pressing needs. Meeting at grower venues help to make each Coffee Pot unique as the large geographical area of the Lake Erie grape belt exposes the diversity of growing conditions and pest pressures between the different areas of the Lake Erie Region.

Weekly Coffee Pot meetings wrapped up for the 2019 season at the end of July. A total of thirteen meetings were held in the 5 counties involved in the LERGP; Chautauqua, Cattaraugus, Erie and Niagara Counties in New York and Erie County in PA. A total of 261 growers and members of the grape industry attended the Coffee Pot Meetings held during the growing season across the Lake Erie grape belt. Current events and situations in area vineyards were topics of conversation along with education on using crop insurance as a risk management tool. New York growers had the opportunity to obtain 1.0 NYSDEC Pesticide Applicator Recertification Credit in at each meeting.

The annual LERGP Twilight Meeting and Erie County Hort Society BBQ was held on July 31 with 250 participants. Those attending the meeting heard the latest updates on changes to the Worker Protection Standard as well as late season disease and insect management. New York growers had the opportunity to obtain 1.0 NYSDEC Pesticide Applicator Recertification Credit.

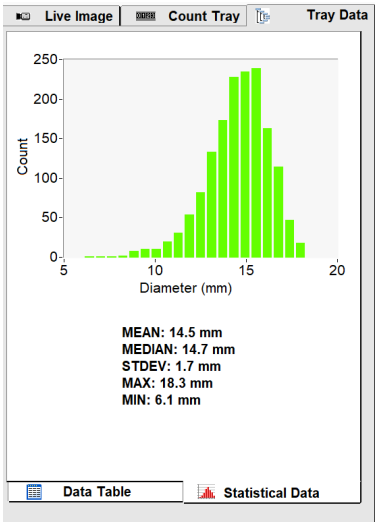
Efficient Vineyard – The loaner sensor program continued in 2019 with 10 growers scanning 635 acres, which is double the amount of growers in 2018. The loaner sensor program is provided at no cost to the grower as part of the USDA/NIFA SCRI project “Efficient Vineyard”. A member of the LERGP extension team will come out to the vineyard, install the sensor, train the operator on turning the machine on and off, and when the scan is completed will come back to remove the equipment. After scanning their vineyards, participants receive a map that provides an indication of relative vine size. While the map does not provide the actual vine size (unless pruning weights are taken to calibrate the scan) it does provide an indication of areas where vine size is smaller relative to the other vines in the vineyard. As shown in the figure, areas of blue have larger vine size relative to areas of red and yellow. Focusing in on the red and yellow areas allows you to identify trouble spots in a vineyard and troubleshoot what might be limiting vine size in those areas. It is then easier to

make an informed decision on whether it is economically feasible to manage that area differently. This project is funded by USDA/NIFA Specialty Crop Research Initiative.

Video Podcasts and Facebook – The LERGP Extension team continues to produce and post weekly video podcasts on a variety of subject areas from crop estimation to late season weed management. The podcasts have been especially useful in getting the word out on Spotted Lanternfly, the latest invasive species posing a threat to our grape industry.

Thirteen weekly podcasts on IPM, business management, production practices and the Efficient Vineyard project were produced and placed on the team's website, LERGP.com bringing the number of podcasts available to 138 that can be found at https://lergp.com/podcasts.

Check out the program on the CLEREL Facebook page and you will find a cornucopia of information from food safety at Thanksgiving and webinars on topics important to growers to the Vineyard Improvement Program and items of general interest like "wrapping bee hives for winter". Like us on Facebook.



Nutrient Recommendations

The LERGP continues to offer soil recommendations to area growers. Over the 2019 growing season, we submitted 195 soil samples and numerous petiole tests to Cornell University and made recommendations based off the tests. Our LERGP is available for any questions that growers have on their results, and we develop a nutrient management plan that fits the grower's need. Growers are educated on how to accurately measure vineyard nutrient requirements and efficiently apply what is needed. This outreach effort provides specific nutrient recommendations that meet grape vines' needs and limit excess nutrients that could find their way into nearby watersheds.

Moving forward, the grape program plans to continue research and extension efforts that create awareness and accuracy of nutrient application. Soil types and vine size change throughout the vineyard, so applying a set rate over the whole vineyard is inefficient. Advances in sensor technologies are heading toward variable-rate nutrient applications that apply fertilizer based on vine size and/or the soil type. Other research efforts are looking at cover crops as a way of producing and recycling soil nutrients naturally, which could decrease the amount of fertilizers grape growers would need to apply.

PA Update

Andy Muza, LERGP Extension Educator, Penn State University

2019 Vineyard Scouting – A Recap of Crop Updates

Vineyard scouting was conducted weekly at various sites extending from Girard/Lake City area to North East, Pennsylvania. The objective was to provide timely information, throughout the season, on potential/developing pest problems in vineyards. Monitoring of vineyard blocks began in May and continued until the beginning of October. Scouting information along with accompanying photos of pest problems, obtained during the weekly monitoring, were reported in the Crop Updates.
The following is a recap of scouting information from the 2019 Season which was reported in the Crop Updates from May 2nd – October 3rd.

INSECTS

Grape flea beetle & Climbing cutworm - The first Crop Update that I reported was on May 2nd. At this time Concords were in the bud swell stage and growers were reminded to scout for 2 pests that feed on grape buds – grape flea beetle and climbing cutworm. A week later most Concord blocks were past the bud swell stage where the threat of economic injury was of concern.

Rose Chafer – beetles began emerging about June 13th which was about 5-7 days later than we usually begin seeing this pest. A week later beetles were still found feeding on flower clusters. Scouting, especially in vineyards with a history of problems or blocks with sandy soils, should begin about 7-10 days before bloom and continue for about 2 weeks after bloom. Infested areas can lose extensive numbers of flower clusters if beetles are not detected early and treated.

Japanese Beetle – a few Japanese beetles were observed on July 8th in Concord vineyards. By July 15th, congregations of beetles and leaf feeding were evident in scattered pockets in various vineyard blocks. Scouting for further buildup in population levels was advised, especially in young vineyards and wine blocks, to determine if treatment was needed as the season progressed. But, by the first week in August the number of Japanese beetles in Concord and Niagara blocks noticeably declined.

Grape Leafhopper – leaf feeding, by both adults and nymphs, was observed at a handful of sites by July 25th. By the first week in August at 2 sites, where GLH populations and crop levels were high, insecticide applications were advised. However, population levels remained low in the majority of vineyards throughout the season.

Figure 1. Grape berry moth eggs on Concord berry. Photo – Andy Muza, Penn State.

Grape Berry Moth – Tim Weigle's Crop Updates during the season alerted growers about the timing of insecticide applications for GBM according to degree day accumulations (810 DD and 1620 DD) from NEWA sites throughout the region. I also reported on August 15th that it was, "**Time to apply an insecticide application for the third**

generation at SEVERE / HIGH RISK sites." Scouting during that week revealed that grape berry moth eggs were not hard to find at Severe and High Risk sites (Figure 1). The Crop Update on 8/15 also advised to scout low and intermediate risk sites to determine if these areas may also need an insecticide application. By August 23rd all High/Severe risk sites should have received an insecticide application for the third generation of GBM. I reported on still finding GBM eggs at this time. The last Crop Update was on October 3rd and Concord harvest was under way. During that week I checked at least 5 High/Severe Risk sites in Erie County, PA. and each site had high levels of GBM injury.

DISEASES

Phomopsis – At the beginning of the season the abundance of Phomopsis cane lesions throughout vineyards in the Lake Erie Region indicated that inoculum levels ranged from moderate - high (Figure 2). Therefore, Phomopsis management was addressed in Crop Updates in May (5/9 – 30). Growers were advised to be prepared to apply a broad-spectrum protectant fungicide application (i.e., mancozeb, captan, ziram) when shoots were around 3 inches long, especially if an extended period of wet weather was predicted during this time.

Figure 2. Phomopsis lesions on Concord canes. Photo – Andy Muza, Penn State.

By the last week in May leaf lesions were visible on basal leaves. Crop Update 5/30 stated that it was important that rachises and pedicels (berry stems) were protected until Phomopsis spores are depleted (i.e., about pea-sized berry stage). Growers were reminded of the importance of the Immediate Prebloom fungicide application (Crop Updates 6/6 & 6/13) and First Postbloom fungicide spray for management of Phomopsis, black rot, downy mildew and powdery mildew. Also, considering the wet, humid conditions in June (Crop Update 6/20), a second Postbloom fungicide spray was highly advised in another 10-14 days.

Figure 3. Concord berries with black rot. Photo – Andy Muza, Penn State.

Black Rot – Crop Updates 5/23 & 30 advised that vineyard blocks that had black rot problems in the 2018 season should receive a protectant fungicide application when new shoots are about 10" – 12" long. At this time, a mancozeb application was suggested since this is the most effective and economical broad-spectrum protectant fungicide against black rot, Phomopsis and downy mildew. Concord berries are susceptible to infection up to 5-6 weeks after bloom, so the July 19 Crop Update indicated there was still a 2-3 week period for berry infections to occur in the Lake Erie Region (Figure 3). At this point in the season, black rot still posed a potential threat: in areas near wood lines; blocks that have a history of black rot problems; and blocks where more than a scattering of symptoms could be found.

Downy Mildew – From the beginning of the season the threat of any downy mildew problems in Concord vineyards was minimal. Downy mildew pressure remained low in Concord vineyards throughout the season. By July 25th downy mildew lesions were finally observed on leaves in a Delaware block. The following week leaf lesions were found in a Niagara block. Periodic thunderstorms during the last week in July were enough to keep alive the threat of downy mildew in blocks of Niagara, Catawba and other highly susceptible wine varieties. However, the potential threat did not materialize and downy mildew remained low in the region.

Powdery Mildew – Powdery mildew leaf infection levels were still low in Concord vineyards as of July 19th. However, at this point in the season, our concern was the potential crop size and the amount of powdery mildew leaf infections that could occur for the remainder of the season. Research has shown that good powdery mildew control can be essential for ripening fruit when cropping levels are high. Therefore, the extension team urged growers to conduct crop estimations starting at 30 days postbloom to determine potential crop size. The need for additional fungicide applications in Concord vineyards would depend on crop load and the amount of PM leaf infections in **your** vineyard(s) as the season progressed. Fortunately, scouting throughout the season revealed low – moderate levels of powdery mildew in most Concord and Niagara vineyards. As Bryan Hed comments in his newsletter article, “despite the late start, despite the larger than average crop, a nearly ideal ripening period made a nice difference.”

PA Update

Bryan Hed, Research Technologist, Lake Erie Grape Research and Extension Center

First a recap of our weather at the North East lab for 2019:

Heat Accumulation (growing degree days (gdds)): After experiencing the three hottest growing seasons in at least the past 20 years (2016-2018), 2019 represented a step down to just slightly above average. And, the best part is that the heat came on just when we needed it. The season started out with below average gdds in May and June but gained momentum from July all the way through October. And even though we were running a bit late on veraison and a bit heavy on crop, the 2019 season finished up nicely for the majority of grape growers in the Lake Erie region. From our perspective here at the North East lab, it was one of the largest Concord crops we’ve had. And yet, we had no trouble making sugar by early October, despite the late start. As the Halloween storm swept in November, the heat shut off abruptly and completely; we haven’t had a single growing degree day in November…which is actually quite unusual here by the lake.

A comparison of this year with last year, shows some interesting contrasts. We started both years with 50% bud break around May 9. However, 50% bloom, veraison, and harvest all occurred about 11 days earlier last year than this year, due to a large difference in crop load and heat accumulation between years. This year was nearly 400 gdds short of last year’s heat, from May 1 through September! Most of that difference in gdds occurred - you guessed it - during May and June. So, despite the late start, despite the larger than average crop, a nearly ideal ripening period made a nice difference. Sometimes you just need a break...and we got it this year.

Rainfall: Despite what we perceived as a relatively average year for heat, rainfall in 2019 was about 2 inches below average from May through September, and over 3 inches below what we recorded during the very hot season, last year. In 2019, monthly rainfall was a roller coaster ride; low during May, high during June, low during July, etc. Fortunately, none of the highs and lows were all that outrageous, and what you lacked in one month, you made up for in the next month. There was little evi-

dence that vines had descended into serious stress in any place, even where cropping was heavy.

Diseases: Grape disease pressure during the growing season was relatively modest in the Lake Erie region in 2019. The worst disease issue I witnessed this year along the lake was the development of crown gall in vineyards; probably a result of the cold winter extremes we experienced at the end of January. Around here, crown gall results when a vine is infected with the bacterium, *Agrobacterium vitis*, AND it suffers severe winter cold damage to older wood, usually the lower part of the trunk, near the soil surface (or just above the snow line). This combination results in an explosion of undifferentiated callus cells at the wound site that fails to repair the damage to conducting tissues and leads to trunk failure and collapse of the vine. I saw this most commonly in wine grape vineyards, particularly plantings of *Vitis vinifera*. However, Niagara and even Concord can suffer from this condition, and it is probably most commonly encountered on sites that are overly wet (poorly drained) and where cold air pools/fails to drain off.

As for the more typical stuff we deal with every year, like powdery and downy mildew, black rot, and Phomopsis, I have to say that levels of these maladies were relatively low, and easy to control in 2019, along the southern lake shore. What was particularly helpful for growers in this regard, was the distinct dry period from bloom through the middle of July, that occurred this year (and has occurred to some extent for the past 4 years here), when only about three quarters of an inch of rain fell over a three and half week period. That period marks the window of time when fruit of all varieties are most susceptible to all these diseases. Therefore, dry conditions at that time are ideal for healthy crop development.

Rains returned from the middle of July through August. But as we moved into ripening at the end of August, we entered another dry, warm period; only 2.04 inches of rain at our location in September (less than half our average rainfall) with well above average heat accumulation. Interestingly, September has been well above average for heat accumulation for the past five seasons. Relatively warm and dry conditions continued to prevail through most of October, until Halloween brought the house down with 2-3 inches of cold rain. Its been cold and wet ever since…

Next, here's a brief recap of the results of some of our disease management trials this year.

Evaluation of fungicides for control of powdery mildew on Concord grape. Lake Erie region grape growers seem to be a little more inclined to try the succinate dehydrogenase inhibitor (SDHI) fungicides this year, so we ran a simple trial to compare standard fungicides (Quintec (4 fl oz) and Vivando (10.3 and 15.4 fl oz)) with a couple of the SDHIs (Endura (4.5 oz) and Luna Experience (6 fl oz)) for fruit protection. Basically, the SDHIs performed best, Quintec fell in the middle, and both rates of Vivando were at the low end, being significantly less effective than the SDHIs, Endura and Luna. However, disease pressure was relatively low this year, and overall, the practical differences between treatments were rather small.

In another trial, we evaluated Harvestmore Ureamate - a popular foliar fertilizer - for its effect on yield and as a suppressor of powdery mildew. Over three years, we compared a solo program of (1) Harvestmore Ureamate (5 lbs/A), with (2) a conventional rotational program of Quintec (4 fl oz), Vivando (10.3 fl oz), and Tebustar (4 oz), and (3) a combination of 1 + 2 (the conventional program tank mixed with Harvestmore). It came as no surprise that combining a conventional rotation with Harvestmore was the most effective for controlling *fruit infections* of powdery mildew in every year (the more you apply, the less disease you have). Harvestmore alone provided an annual average of about 27% control, whereas the conventional program doubled control to 55%, and the combination improved control to an average of 65% over three years, when compared to an unsprayed check. I should add that the spray program for powdery mildew in this trial was very minimal (one pre-bloom and two post bloom

sprays) and was primarily aimed at controlling fruit infections rather than leaf infections. After all, one should focus SDHI application on the critical fruit protection period. Nevertheless, control on Concord *leaves* followed a similar pattern, at least for a few weeks after the last spray. But by mid-September, control of leaf infections was lost in all treatments, when compared to the check (which is typical of any spray program that ends with the 2nd post-bloom spray).

We also examined yields (on balanced pruned vines) over the three years in this trial but unfortunately did not see a yield benefit to adding Harvestmore Ureamate to a conventional spray program in any of the three years, *using the minimal spray program*. I would add though, that you are more likely to see yield benefits by continuing sprays for powdery mildew, deeper into the season, to keep leaves and cluster stems cleaner. Cleaner leaves will ripen a larger crop faster and cleaner cluster stems will maintain better cluster integrity against fruit drop late in the season.

Evaluation of a new fungicide for powdery mildew control. There's a 'new kid in town'…a new sterol biosynthesis inhibitor fungicide that performed very well in our 2019 trial for powdery mildew control on Chambourcin grape. It's also been tested for a couple of years by Wayne Wilcox at Cornell, with similar results: excellent powdery mildew control. I have not yet seen any data with this product for black rot control however, but black rot is listed on the label. The new product will be called Cevya (mefentrifluconazole), and with a federal label, it is slated for use in PA in 2020, but not yet in NY. In our trials to evaluate phytotoxicity to native and hybrid grapes, it appears to present no injury issues to varieties like Concord, Niagara, Chancellor, Chambourcin, Vignoles, and Vidal, even when applied multiple times at higher than label rates. However, it will **not be labeled (at least initially) for use on labrusca or labrusca hybrid grapes.**

Evaluation of black rot resistance among grape varieties with potential for organic wine production. Black rot is the 'Achilles heel' of the organic grape grower here in the wet, humid eastern US, due to favorable climatic conditions for the pathogen and the fact that there are no really effective fungicides to control this disease in an organic production system. We planted 7 grape varieties in four replicated complete blocks to examine their sensitivity to black rot. Six varieties were chosen based on their supposed low sensitivity to black rot (from previous researchers) and their popularity for wine production in Pennsylvania. The seventh variety (Concord) was included as a high susceptibility check for comparison. Varieties were challenged with the pathogen by hanging black rot fruit mummies over vines, throughout the fruit development period. Vidal, Elvira, and Cayuga were the winners, showing a high level of resistance to black rot fruit rot over two years; 82, 90, and 97% less black rot fruit rot, respectively, than Concord. In contrast, Corot noir, Noiret, and Traminette developed 0, 0, and 33% less black rot fruit rot than Concord. In other words, fruit loss to black rot was actually higher on Noiret and Corot noir than on Concord, in both years. Traminette was previously rated as moderately susceptible, but actually developed more black rot than Concord in one of the two years. This was surprising since Corot noir and Noiret were previously rated as moderately and slightly susceptible, respectively (See table 3.1.1 in our NY and PA Pest Management Guidelines for Grapes, page 13). Concord, is rated highly susceptible, and rightly so, as that has been our experience over many years. **Conclusions:** Vidal, Elvira, and Cayuga might be good candidates for organic wine production, since their average fruit losses to black rot over two seasons (unsprayed with mummies in the trellis) appear to be relatively low; just 1.1, 3.5, and 6.2%, respectively, compared to Corot noir, Concord, Noiret, and Traminette at 43.6, 34.1, 45.2, and 22.9% fruit loss, respectively. Cayuga, Elvira, and Vidal are also able to tolerate applications of sulfur and copper/lime (of which there are many OMRI listed formulations), for adequate powdery and downy mildew control.