CROP UPDATE
August 12, 2021

Cornell Cooperative Extension
Lake Erie Regional Grape Program

PennState Extension

In this copy:

The Lake Erie Regional Grape Program is a Cornell Cooperative Extension partnership between Cornell University and the Cornell Cooperative Extensions in Chautauqua, Erie and Niagara county NY and in Erie County PA.

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Click here to watch LERGP Podcasts

Check out the new video that Dr. Bates posted on MyEV on variable rate fruit thinning.

Business Management

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

Bulk Juice Harvesting (or Wine?)

I've addressed the efficiency gains in bulk harvesting throughout the years. As we approach the purple stage, it's always a good time to discuss the pros and cons of updating harvest equipment. I'm focused a bit on purple here but it is important to note, wineries in other regions love this equipment. It might not be ideal for delivery to a winery but a winery can take field gondolas directly to the press for small acreage harvesting. Delivery from other growers would be more challenging, without dumping into 1-ton totes. So for most adopters, we can circle back to natives.
I've heard the price of stainless steel is rising. This is a significant development for buying bulk. Remember two things here. Stainless steel is more expensive than it has been in 3-4 years. Purchasing stainless is going to cost more now than it did. Labor on the other hand, the expense we are trying to reduce, is hitting record highs and shows no sign of slowing. While short-term price increases in labor are less dramatic, long-term price trends are the opposite. Stainless is up 0% in 10 years, while labor is up 30%. There is a lot of labor cost built into the manufacturing of bulk containers and carts. The price of transitioning to bulk is up about 15%. Carts for example, are close to $17,000 per cart. Similarly, some truck gondolas are now close to $14,000. While prices are rising quickly, it seems clear that harvest labor prices will exceed these costs over the long-term.

To lower harvesting costs quickly owners need to right size equipment to their operation. As the price of switching to bulk goes up this becomes even more important. We can start with trucks. If a grower is located less than 15 minutes from the processor, one trailer is plenty of harvest capacity for the large majority of growers. The skepticism of this bold statement is palpable; I can feel it. Give me a chance to explain.

We would expect turn time to farm gate to total one hour and thirty minutes or less. This gives the crew a chance to take a lunch break and fill field gondolas for the next load. If necessary, there is also time to move equipment to other farms or do a repair or two. When the truck returns the 2nd load is 30% harvested (or more depending on cart size). Harvest time for two loads including the lunch break is just over 5 hours. With six harvest days per week a grower can easily harvest over 1,000 tons a year with just one trailer.

Some common questions about the assumptions that underline this possibility. Some harvest crews do not operate quite the same way as is assumed above. Turn times are reduced by 40 minutes because bulk loads typically do not require any tie down straps. Some bulk containers do require a couple of tie down straps. That would change things just a bit. Some harvest crews have a runner to help move equipment, put covers on and tie down the load. This would decrease turn times but increase labor costs of traditional harvest by $1.50 per ton.

60% of bulk juice production is close enough to the plant to implement this strategy. At least 50% of harvesters are picking less than 1,000 tons per year. Continuing to use boxes to deliver to wineries and small amounts to other markets can streamline this process further. These growers could have one big day a week where they harvest for a bulk processor and move farms to harvest for a one-

ton tote processor. Growers harvesting more than 800 tons per year will find robust labor savings and could chose to purchase a second trailer to give them more flexibility at harvest. However, I would argue that this flexibility is optional and not financially justified in most years.

When adopting bulk, one should absolutely avoid running 3 field gondolas for a harvest crew 80% -100% of the time. For growers harvesting less than 2,000 tons very rarely (if ever) waiting for a field gondola is not a financial concern. It may feel psychologically inefficient. However, even with those delays the labor per ton is still less than traditional harvest. The idling tractors are idling anyway, because a 2,000-ton harvest crew is not working anywhere near 24 hours a day. For growers harvesting close to that 2,000-ton mark, it may make sense to purchase a third gondola and not use it regularly. It can be reserved for break-downs. It might also help with logistics of moving equipment. Finally, it will give piece of mind if you think you need three carts. I'm very confident you'll find that you don't.

Time for another bold assertion, what about running just a single cart? I really am not just saying inflammatory things to get a rise out of the audience here. There are 3 instances where it makes sense to run a single cart.

- When low yields are combined with short rows and modern harvesters a single cart easily keeps up. Five ton yields on 70 vine rows will take more than 5 minutes to fill the harvester and offer plenty of time to empty a cart without slowing down the harvester.
- Older harvesters, of course, will need to stop and wait for a cart to return. They can utilize a single cart when total tons harvested average less than 500 tons. An older harvester combined with a larger cart will find that these delays are not significant. When yields are light, costs go down by waiting if the harvest operation is less than 500 tons annually. The total delay during harvest is approximately 7 hours, for a labor cost of $250 per year. All while saving labor costs of $1,000 - $2,000 by reducing the harvest crew size from 3 or 4 to 1 or 2.
- While larger operations may require 2 carts in operation and maybe a 3rd parked in the barn, even the largest operations can successfully run a single cart. When custom harvesting by the acre because of low yields, harvesting small acreage of wine grapes and even harvesting grower owned vineyards after a disaster carts offer speed and labor flexibility that can result in substantial labor savings in unusual conditions.

I assume these carts have a capacity of at least 3 tons. This assumption relates directly to harvest efficiency but there are a wide variety of carts available and in use. The largest carts, not widely used in NY or PA, hold 5 tons. A few growers do have carts that are less than 3 tons. The majority find even 2 of these carts are adequate. If there is any concern that 2 carts are inadequate, make sure carts hold 3 tons and have enough tire to avoid compaction. If extremely remote loading areas are a justification for 3 carts, consider investing in loading areas or charging small customers a fee for remote loading. Loading areas for bulk are significantly smaller and less expensive to construct. We can have more with less stone and available land. These assumptions are adequate to eliminate the need of a 3rd cart. Except in the most extreme examples it takes 7.2 minutes of harvesting to fill a 3-ton cart. Accounting for turning around, unless rows are over 300 vines long, filling a cart takes at least 8 minutes. That provides the 2nd cart with enough time to dump (3 minutes) and drive 2/3 of a mile. At this rapid pace a truck would be full in less than an hour. The typical harvest speed is ½ that.

The assumptions used to measure the needs of harvesters are relatively conservative. While not always completely eliminating harvester slow-downs, the idea is to only permit slow-downs when there is a high degree of probability that profit margins will be much higher with the minor delays. Calculating savings by switching to bulk is highly dependent on individual operations. Farm size relative to the amount of bulk equipment purchased is one key element. The other is the amount of labor that is saved. This will vary significantly from farm to farm. Growers can and realistically should target a payback period of 7 years. This kind of target, with USDA financing, will immediately improve cash-flow. Larger operations will realize a return on investment more quickly. Smaller operations might too, if aggressively sized for efficiency. To benchmark a lean investment in bulk, try to target $40 per ton. Over 10 years the gross capital cost is $4 per ton.

Viticulture

Jennifer Russo, Viticulture Extension Specialist, LERGP

Plant Tissue and Soil Samples

Veraison is just around the corner and grapevine health is dependent on soil nutrients and assimilation. It is important to know your vine and soil nutrient levels for optimal growth and production. Soil samples will tell you what nutrients are available at the time of sampling and tissue samples will reflect the nutrient status in the vine. It is a good idea to take tissue samples at veraison to quantify the vine health. Routine sampling should be conducted every two or three years to ensure that fertilizer inputs are optimized for vine nutrition, and it is important to collect samples at the same growth stage each time to avoid errors due to seasonal nutrient fluctuations. If you are experiencing nutrient deficiency or toxicity in the vine, both soil and tissue (usually petioles) samples will help you understand where the imbalance may be.

Sampling at veraison may provide an understanding of the grapevine macronutrients assimilated during rapid vine growth from bloom to veraison, such as nitrogen, phosphorus, and potassium (Schreiner et al. 2006). Sampling should be conducted at approximately 50% véraison (50% color change/softening). If you are observing or suspect a nutrient deficiency, then collect samples from healthy vines and samples from suspected troubled vines so a comparison may be made. Please feel free to contact me for assistance with grapevine tissue collection. Reports from analytical service labs include analysis of N, P, K, calcium (Ca), magnesium (Mg), sulfur (S), manganese (Mn), zinc (Zn), boron (B), and copper (Cu). If you would like recommendations tailored to your results, please place my email address on the form at the time of submission or send me the electronic results. Nutrient sufficiency ranges have been previously defined in regions of the eastern and western United States (Bates and Wolf 2008, Davenport and Horneck 2011, Schreiner and Skinkis 2019).

Selecting the Vines:
Select an area containing at least 30-50 vines of the variety to be sampled if possible. These 30 vines should be representative of: (a) a problem area, or (b) the average of the vineyard. The final fertilizer suggestions will apply ONLY to the area represented by the selected vines. Watch Petiole Sampling Here

Select 30-50 vines to represent the sample. If more than one area or block is being sampled, give each area a REFERENCE NUMBER and record this number for future reference. If you have the fields identified with either a number or a letter, this may be used for the reference number. When the diagnosis sheet is returned, it will refer to this field number/name.

Be sure to maintain thorough records of your sampling dates, techniques, and locations. Maintaining proper records will enable you to observe patterns over time and to treat specific areas in a timely and efficient manner.

Remember: Soil analysis in addition to petiole testing will provide the most accurate picture of what's going on in your vineyards. A soil or petiole test alone will not necessarily indicate whether a vine requires a specific nutrient or if the soil requires a change in the pH.
Collecting Petiole Samples:

Time Of Collection. Collect petiole samples at bloom or 70 – 100 days after bloom (late August or early September). Samples should not be taken after harvest.

Materials Needed: A 2 or 3 brown paper lunch bag.

Procedure:
At BLOOM select a leaf opposite a cluster. At 70-100 days AFTER BLOOM, select the youngest mature leaf on a shoot bearing a cluster. Leaves should be well exposed to light and free from injury and disease. The petiole is the slender stem that attaches the leaf blade to the shoot.

Remove and discard the leaf blade and keep only the petiole. The 60-100 petioles constitute the sample. Place all 60-100 petioles in the paper bag and mark the identification number on the bag.

Collect no more than 2 leaves from each vine. Be sure to collect petioles throughout the vineyard to obtain a representative sample of the block capturing variation of high, medium, and low performing vines.

Wash The Petioles before they wilt to remove spray residue and dust. This may be done by dipping the petioles in a weak detergent solution (a couple of drops of detergent, etc., in 2-3 cups water) and then rinse quickly and thoroughly with clean water. Do not allow the petioles to remain in the detergent or rinse water for more than one minute. Blot the petioles dry on a paper towel or clean dish towel then place them loosely in the bag. Allow the petioles to dry at room temperature until they become crisp, or for a faster drying time, place bags in oven at 200°F for 30 minutes.

Basic Soil Sampling Instructions: WATCH SOIL TESTING VIDEO

Tools:
- Spade and trowel or soil probe
- Plastic bucket
- Sampling bags (in kit)
- Sampling sheet (in kit)
- Pencil or pen and permanent marker
- Plastic re-sealable bag

*Sampling techniques may vary slightly, depending on where they are submitted, so be sure to follow the proper instructions. This set of methods is based on the Cornell Nutrient Analysis Laboratory's (CNAL) protocol.

Methods:

- Timing of soil sampling: Although soil sampling can be completed at any time of year, it is best to sample when soil is not too wet or to dry.
- With a spade, dig a hole about 12 inches deep. Use the trowel to scrape along the side of the hole from about 0 to 8 inches below the surface into a container. Use this same technique for the subsurface sample (8 to 24 inches). Be sure to label separate samples.
- A soil probe can be used to collect soil from 0-8 inch and 8-24 inch depths, and be sure to keep surface and sub-surface samples separate.
- Place 1.5 cups dry soil into a labeled plastic bag and fill out forms completely for more accurate recommendations. Contact Cornell Lake Erie Research and Extension Laboratory

for necessary forms and shipping information at (716) 792-2800.
- (For CNAL) Seal the form in the envelope provided and seal the plastic bag with the soil sample in the mail bag. Be sure to keep the mail bag attached to the envelope, which should be filled out properly.

Note: For more accurate results in vineyards that are not uniform, select the most uniform blocks from which to sample and combine 5 to 6 samples from within a block, mix them thoroughly, then submit 1.5 cups of that as one sample. For instance, a vineyard with sandy loam soil at one end and more clay at the other, submit two samples for the two blocks within that vineyard. To really capture the variation in your vineyard blocks and gain a higher resolution, I recommend that you grid sample 1-acre blocks. This can be done on a rotating basis, choosing sections of the farm to do each year. A 150 acre farm could be broken into 50 acres/year.

Additionally, to determine your soil type, you can obtain a soil survey map from your county extension office, or you can use the USDA's Web Soil Survey page Click here for USDA Web Soil Survey to zone in on your land and determine soil type.

References

Bates, T., and T. K. Wolf. 2008. "Nutrient Management." In Wine Grape Production Guide for Eastern North America, edited by T. K. Wolf. Ithaca, N.Y.: Natural Resource, Agriculture, and Engineering Service (NRAES) Cooperative Extension.

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Schreiner, R. P., C. F. Scagel, and J. Baham. 2006. "Nutrient uptake and allocation distribution in a mature 'Pinot Noir' vineyard." HortScience 41:336–45.

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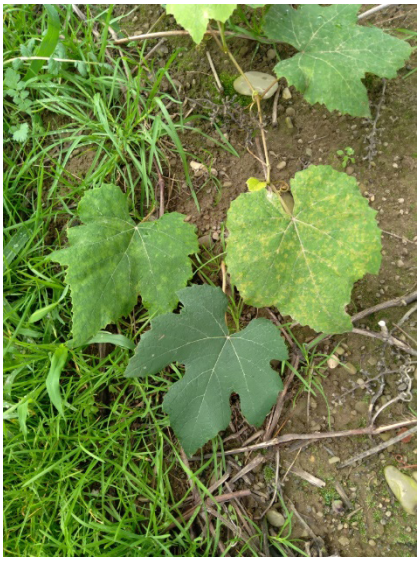
PA Update

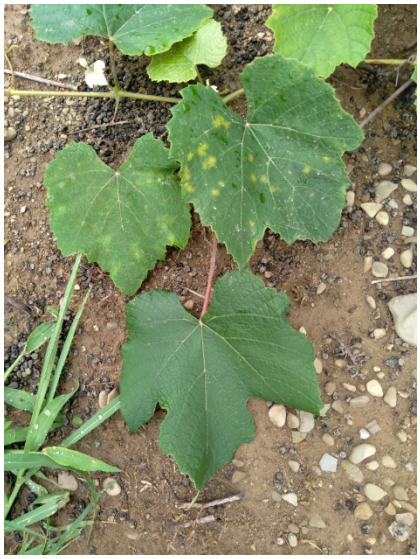
Bryan Hed, Research Technologist, Lake Erie Grape Research and Extension Center

Weather: At our location by the lake, our August rainfall to date is at 1.26". Growing degree accumulations (gdds) for August are at 250.7, and we have accumulated 1895 gdds since April 1. Our short-term forecast is wet for Friday, August 13 (50-60% chance of rain), but dry and sunny for Saturday/Sunday, with temp highs in the low 80s-upper 70s over the next 3 days (nice).

Diseases: After 8 days of dry weather, rains have returned this week, as well as the threat of downy mildew. Continue to scout your susceptible vineyards regularly for symptoms of this disease. Recent symptoms of downy mildew have been reported on leaves in area vineyards of susceptible varieties (Niagara, Catawba, Delaware, V. vinifera), a result of wetting periods at the end of July and the first of August. Rains on August 10-12 have likely generated more infection on unprotected leaves in susceptible vineyards, so be vigilant about scouting and protecting those leaves from downy mildew.

How do I tell downy mildew from powdery mildew?





Niagara leaves: In all three photos, the upper left is powdery mildew; upper right is downy; lower center is healthy.

Note that downy mildew lesions are more clearly defined, with more vivid, sharper edges. Powdery mildew lesions have “blurry” or more diffuse edges.

All this wet weather over the past several weeks has pushed downy mildew to ‘center stage’. Therefore, I am reposting some information from a previous update that I hope will be helpful in managing this disease as it pops up in Lake Erie vineyards. I’m concerned mostly about susceptible wine varieties here, but susceptible natives like Niagara and Catawba may also be very much at risk…

‘The pathogen that causes downy mildew is dependent on wet conditions; without a wet plant surface through which spores need to swim to reach infection sites (stomates), no infection takes

place. The fruit of most varieties are resistant to direct invasion by this pathogen by about 3-4 weeks after capfall. In other words, a developing berry is only susceptible to direct penetration of the pathogen from about the time the flower cap comes off (at the beginning of bloom) to about 3-4 weeks later (end of June/early July, on average). However, the cluster stems may remain susceptible for a couple weeks or more after fruit are resistant, and for this reason, fruit infection and loss can continue to occur from cluster infections 4 or 5 weeks after capfall. Once we get past the critical sprays for fruit protection, scouting for the distinctive white 'downy' sporulation on the undersides of leaves and on clusters and cluster stems is very important, and yields valuable information with regard to future need to spray. Growers of susceptible varieties do well to keep closely monitoring their vineyards for active sporulation and use that information in combination with the DMCast model on NEWA (http://www.newa.cornell.edu/) to determine if and when infection periods have occurred or will occur.'

'Leaves will remain susceptible all season, though they do become less susceptible as they age. For this reason, the limiting or elimination of new shoot growth by veraison, through good nutrient and/or canopy management (or by heavy crops), can help to reduce the supply of susceptible tissue in the vineyard during ripening, and make post veraison control of this disease more manageable. I have gone into vineyards in late August-early September and observed that downy mildew was largely present on new shoot growth, but not on mature leaves at older nodes. There were at least two reasons for this: i) new shoot growth is more susceptible than older, mature growth, and ii) new shoot growth, unless just sprayed, is unprotected or less protected by previous fungicide applications. Symptoms on mature leaves in late summer may appear different from those on young leaves in early spring.'

'The sight of active, white sporulation on green vine tissues means the downy mildew pathogen is capable of spreading quickly under wet conditions, and that sprays for downy mildew should continue, especially for susceptible varieties. Even humid nights that result in heavy dews by morning, can continue to fuel downy mildew development, generating fresh sporulation that can spread the disease rapidly when plant surfaces are wet. If you let downy mildew get out of control, it can strip vines of their leaves and in the worst cases, effectively end fruit ripening for the year, and shoot ripening for next year's crop. Your grapevines go into winter dormancy in poor condition, and are more vulnerable to damage by severe cold, leading to crown gall and expensive trunk renewal the following season, with little or no crop to pay for it; all that stuff is connected, so you want to keep downy mildew under very tight control, especially on Vitis vinifera.'

'Chemical control: Your list of chemical control options will start to dwindle as we get within 66 (Mancozeb products, Ridomil MZ), 42 (Ridomil copper), 30 (Ranman, Reason), 21 (Ziram), and finally 14 (Revus, Revus Top, Zampro) days of harvest. There is also the list of strobilurin containing fungicides that control downy, mainly Abound (not in Erie county PA) and Pristine. However, be aware that widespread resistance to strobilurins by the downy mildew pathogen has been documented in many places in the Northeast, and so this class of fungicides may not be among your best options. In the end you'll be left with Captan, copper, and phosphorous acid products (0-day pre-harvest interval), which have their own shortcomings, discussed below.'

'Products like Ridomil (the mefanoxam component), Ranman, Reason, Revus/Revus Top, Phos acid products, and Zampro, are more rainfast than the 'old standard' surface protectants like copper, mancozeb, ziram, and captan, but contain chemistries that are prone to the development of resistance. Therefore, they should not be used to put down an epidemic, which will only speed up the resistance development process. Even phosphorous acid products can be lost to resistance through

repeated applications on a diseased vineyard, so keep downy mildew well under control. The resistance prone materials (Ridomil, Ranman, Reason, Revus/Revus Top, Zampro, Phos Acid products) are best used to maintain a clean vineyard, NOT to put down an epidemic. Conversely, the surface protectants would be least risky in terms of the development of resistance and can be an effective means of controlling downy mildew late into the growing season. Just be aware of seasonal limits, so plan ahead as best you can.'

'Here are some precautions to consider with use of the 'old standard' surface protectants:

Captan is toxic to plants, and for that reason, is formulated to remain on the surface of the plant as a protectant. Tank mix partners, like oils, solvent based insecticides, and emulsifiable concentrates, may enable captan to penetrate into plant tissues which can lead to plant injury. Therefore, oils and some liquid insecticides should not be applied with Captan or within 14 days of a Captan application. Check out this link from Dan Ward. Always read the label carefully.

There is the concern for plant injury by copper applications, which will be exacerbated by application under slow drying conditions and application to wet canopies (for example, don't make applications to dew covered canopies in the early morning). The addition of lime to the application raises the pH of the spray solution, reduces the solubility of the copper, and reduces the chances for plant injury by copper.

Consider that copper is poisonous to yeasts and that excessive copper residues at harvest can interfere with fermentation, and wine stability and quality. Unfortunately, it's impossible to predict how high residues will be on fruit at harvest; that's going to depend on the copper formulation (some of the newer coppers utilize lower copper concentrations, but may also be more rainfast), rate of material used, number and timing of applications made, spray coverage, and amount of rainfall from application to harvest. I am not aware of any information that establishes a nice, clean cut-off date or pre-harvest interval for avoiding excessive copper residues at harvest, but I have heard that cutting off copper use about a month before harvest may be sufficient in most cases.

There is also evidence that late Captan sprays can delay fermentation and have negative effects on wine quality, but the consequences seem less severe and irreversible than those associated with copper use. For more on this, consider this online article by Annemiek Schilder, former fruit pathologist at Michigan State University.

'If you are protecting a non-bearing, young vineyard from downy mildew (you're not selling/harvesting a crop), you can continue to use mancozeb products to control downy mildew past the 66-day pre-harvest interval. You can also consider using mancozeb after harvest to keep canopies clean of downy mildew and 'firing on all cylinders' until that first frost. The longer your vines can continue to produce and store carbohydrates after harvest, the better prepared they'll be to withstand winter cold without damage (and the crown gall that follows).'

For powdery mildew on natives, its still all about keeping leaves functional to the point where the crop will get ripe on time. The bigger the crop (compared to your average) the longer you're going to want to protect canopies from this disease. Copper/lime sprays do a pretty good job of maintaining Concord leaves clean of powdery mildew, if they're already clean. And, they will do very well on downy mildew for susceptible varieties like Niagara and Catawba. And, there are no issues with pathogen resistance to copper. On the other hand, a tank mix of the synthetics (in one of our current trials, we achieved about 50% control of powdery mildew on Concord with a tebuconazole

product like Tebustar) with a foliar fertilizer like harvestmore (or harvestmore alone) tends to slow the development of powdery mildew and help to manage the development of resistance.. A material like Nutrol (with a surfactant) will likely do the same thing. However, none of these inputs will guarantee that you'll ripen that huge or bigger-than-average crop this year; they're only insurance policies designed to improve the odds in your favor, in spite of the weather. The weather will still play a huge role in the ripening of our crop: the larger the crop, the larger the role of the weather. As we near veraison, its critical that the weather is conducive to ripening during that first few weeks of the ripening period. Lets hope for plenty of sunshine during the remainder of August/early September.

And lastly, in wine varieties, especially those that produce tight clusters, Botrytis specific fungicides should be applied around veraison to manage bunch rots. However, they will only be effective if you're spraying for bunch rots caused by Botrytis. In warm, wet harvest seasons, sour rot caused by non-Botrytis fungi and bacteria can also be a problem and cannot be controlled with Botrytis specific fungicides. That said, work at Cornell University by Megan Hall and Wayne Wilcox showed that controlling fruit flies (with insecticides) during the latter part of the ripening period (beginning around 15 brix) can significantly reduce sour rot development. Adding sterilants or antimicrobials like Oxidate or Fracture to the mix, can improve control above insecticides alone. However, be aware of the fact that fruit flies reproduce rapidly and can develop resistance to insecticide chemical classes in short order; always rotate insecticide chemical classes when spraying for fruit fly/sour rot control. There are no resistance issues that I know of associated with the use of the antimicrobials.

PA Update

Andy Muza, LERGP Extension Team & Penn State Extension- Erie County

In the Vineyard (8-12-21)

Grape Berry Moth

This week (8/9) I was only able to check 3 High Risk sites for grape berry moth (GBM) eggs on berries. At all 3 sites, at least a few eggs were found. However, at a Severe Risk site egg laying was extensive (Figure 1). Last week (8/2) at this site, when GBM degree days (DD) had reached 1533, eggs were found on 28% (7/25) of the clusters. This site reached 1624 DD on 8/6 and by 8/9, when GBM DD had reached 1706, eggs were found on 92% (23/25) of the clusters. (Note: Clusters examined for eggs on both 8/2 and 8/9 were within the first post length from a border with woods). This indicates that egg laying can be dramatically different from block to block depending on history of GBM infestations and population levels.

Figure 1. Three grape berry moth eggs and larval entry hole injury on a Concord berry. Photo – Andy Muza, Penn State.

Depending on where your vineyards are located in the region, 1620 GBM DD has been reached either sometime last week or this week. The NEWA site at Burt, in Niagara County, NY near Lake Ontario, is the only station that has yet to reach 1620 DD.

According to the GBM DD Model, contact insecticides, (e.g. Imidan, pyrethroids such as Danitol, Baythroid, Brigade, Mustang Maxx, Sniper, etc.) should be applied between 1621 - 1710 DD in High/Severe Risk vineyards or where scouting found more than 15% damaged clusters. (See Table 4.2.2 on pages 63-64 in the 2021 New York and Pennsylvania Pest Management Guidelines for Grapes to determine which insecticides are designated as ingestion required (I), contact activity (C) or both (I,C). As of today (8/12) there are still 10 NEWA sites in the region between 1621 - 1710 DD. **It is important to check the GBM Degree Day Model in NEWA http://newa.cornell.edu , choosing the closest station near your vineyard, for specific timings for an insecticide application.**

Downy Mildew

This week (8/9) downy mildew (DM) lesions were found on young leaves in 2 Delaware blocks (Figures 2 & 3- on following page). The frequent showers/thunderstorms this week has again raised the potential for DM infections throughout the region. Continue to scout vineyard blocks with DM susceptible varieties (i.e., Niagara, Catawba, Fredonia, Delaware, Chancellor, *V. vinifera* varieties) to determine if DM infections are present and manage accordingly.

Figure 2. Downy mildew lesions on upper surface of a young Delaware leaf. Photo – Andy Muza, Penn State.

Figure 3. Downy mildew sporulation on the underside of a young Delaware leaf. Photo – Andy Muza, Penn State.

Other links of interest:

LERGP Web-site:

Cornell Cooperative Extension website:

Cornell CALS Veraison to Harvest Newsletter:

Efficient Vineyard:

Appellation Cornell Newsletter:

COVID-19 resources:

Need information? View the following Cornell CALS and CCE Resource Pages Updated Regularly

General Questions & Links:

https://eden.cce.cornell.edu/

Food Production, Processing & Safety Questions:

https://instituteforfoodsafety.cornell.edu/coronavirus-covid-19/

Employment & Agricultural Workforce Questions:

http://agworkforce.cals.cornell.edu/

Cornell Small Farms Resiliency Resources:

https://smallfarms.cornell.edu/resources/farm-resilience/

Financial & Mental Health Resources for Farmers:

https://www.nyfarmnet.org/

Cornell Farmworker Program

www.farmworkers.cornell.edu

www.trabajadores.cornell.edu (en espanol)