Cornell Cooperative Extension
Finger Lakes Grape Program

May 6th, 2020

Finger Lakes Vineyard Update

In the Vineyard

In This Issue:

In spite of the brief taste of spring that we got to enjoy this past weekend, early varieties at the Teaching Vineyard in Dresden are still not quite at budbreak. And the weather this week probably won't do a lot to help things move along either, unfortunately. Low temps on Tuesday and Wednesday morning this week didn't get quite as low as some predictions were saying – the only NEWA station that dropped below 32°F was Hammondsport, which hit 29.9° for just one hour early Wednesday morning. Cooler than normal conditions are supposed to be with us through the middle of next week, with the possibility of early morning temperatures dropping to near or below freezing Thursday night/Friday morning. Growers with wind machines should be sure that they are ready for use if the conditions warrant over the next several days.

Budbreak! But just on a renewal cane in our Jupiter table grapes. Still waiting for the buds on the fruiting wires to get there.

Spring Grape IPM Webinar

Many thanks again to everyone who participated in yesterday's IPM webinar, especially our speakers Katie Gold (disease management), Greg Loeb (insect management), Laura Bailey (tree of heaven management), Lynn Sosnoskie (weed management), and Justin Schoff (DEC and WPS updates). As I mentioned, I'm sure we would have all preferred to be at Wagner Vineyards in person instead, but I appreciate everyone's willingness to make the best out of the situation. We had over 100 people registered for the webinar – most were from the Finger Lakes, but we also had participants from Long Island, the Lake Erie region, and as far away as North Carolina and Canada.

There were a number of questions posed to our speakers during the webinar, some of which were answered live during the webinar, but others were answered in writing in the Q&A box as well. Below are the questions that were asked and answered in writing by our panelists yesterday.

What is the best herbicide to use to kill Queen Ann Lace. And when should it be applied?

Hi. This is Lynn the Weed Scientist. I'll need to double check but I think products like simazine or diuron PRE (before seedling emergence) can be effective against germinating seed/emerging seedlings. Glyphosate in early spring or in fall to get rosettes. There are other products that are effective but are not available in grapes. Again, let me double check.

There are three stages of growth where wild carrot can be controlled: early season pre-emergence or post-emergence, established plants with fall herbicide applications and prevention of seedling emergence. The overwintered and established plants are usually the most difficult to control.

In the Vineyards (continued from page 1)

Katie, any recommendations for organic disease management options?

There are a number of products with varying efficacy (copper of course) but one product that I've been pleasantly surprised by recently is LifeGard. It's not a magic bullet by any means, but Wayne's late career results found that it provided comparable control of downy mildew to standard products in mild and moderate years (ranging from moderate to excellent), and excellent control in rotation with revus/zampro even in heavy years. Mild control of powdery in moderate pressure year and vice versa (moderate control in mild pressure year). More details can be found in the article coming out this week. I'm working with Wayne to publish these results and will be building on it further to evaluate its efficacy against black rot alone. We were supposed to do a black rot trial this summer, but it unfortunately had to be cancelled due to dean's requirement to scale back our efficacy trials. Please feel free to reach out with more questions if you have them!

As with all biopesticides, I recommend LifeGard *with the caveat* that it is *not* as effective as a standard product, but if you pursuing organic/biodynamic/biointensive/etc. management it is definitely something you should consider.

Greg, does Intrepid impact fruit flies?
No, it is selective for Leps like grape berry moth.

Please explain what you mean by Intrepid as an insect growth regulator?
The chemical mimics an insect hormone related to molting and messes the larva up so it stops feeding and does not molt correctly.

Greg - any idea about the cost of verdepryn? Per acre/spray?
I am not sure about costs. I would guess on the expensive side of things but I can check.

With all the resistance issues with chemistries, are there bioinsecticides you have looked at (in addition to Grandevo)? This question is in general for grape pests and can apply to biofungicides as well. Do you see more use of biopesticides (physical MOA) for pest management in the future as a method to reduce resistant populations?
[Katie Gold]: Thanks for this question. Greg will address his take on insect pests, but overall I think the biofungicides coming to market right now represent a massive improvement over than the first generation ones. I see biofungicides as important tools moving forward in the grape IPM toolkit, especially in helping to reduce the pressure we place on our high efficacy synthetics so that we can reserve them for use at most important control points when we need them the most. That said, not all biofungicides are created equal, and not all will be able to play this role. But overall I am optimistic! My program will be looking into this in coming years once the world gets a little less crazy.

[Greg Loeb]: Yes, I would concur with Katie that we will likely have more biopesticides/insecticides available that have good efficacy. This is an aspect of my program that I anticipate emphasizing more in the future.

Question for Justin: If we are using an outside team for our vineyard just for a week, do they require the WPS training ?

It depends - the WPS is required 30 days after a pesticide has been applied. After 30 days if no pesticide has been applied then the WPS doesn't apply. So it all depends on when your last application takes place. If it was within 30 days than all of the WPS requirements need to be followed. Hopefully this answers your question. Sometimes if workers are just brought in for harvest then WPS requirements don't need to be followed.

In the Vineyard (continued from page 2)

There were also a few links shared in the chat box during the webinar, and I wanted to be sure to include them here as well:

Tree of Heaven Resources (Penn State)
https://extension.psu.edu/tree-of-heaven
Paraquat Training in English
https://campus.extension.org/enrol/index.php?id=1660
https://www.epa.gov/pesticide-worker-safety/paraquat-dichloride-training-certified-applicators

Paraquat Training in Spanish
https://campus.extension.org/enrol/index.php?id=1811

Enforcement Discretion Letter from DEC
https://www.dec.ny.gov/docs/materials_minerals_pdf/enfdiscretion.pdf

The Vanden Heuvel viticulture research program at Cornell University is conducting a survey to determine grower perceptions of using sheep to mow/sucker in vineyards. The goal of the survey is to guide future research and extension efforts in this area. The survey is completely anonymous. You can complete the survey by clicking on this link: https://cornell.qualtrics.com/jfe/form/SV_80QJfMVgdqIqOOh

Please only complete the survey once for each vineyard operation. If you have any questions, please get in touch with Prof. Justine Vanden Heuvel directly (Justine@Cornell.edu).

Early Season Grape Disease Management, Spring 2020

Katie Gold
Assistant Professor, Cornell University
Cornell AgriTech
Geneva, NY 14456
kg557@cornell.edu

What is the value of early season disease management?

Early season grape disease control is critical for season long protection. Most grape pathogens prefer soft, succulent tissues and immature berries. If disease is allowed to take hold during the early season, late season control will become near to impossible at worst, and incredibly challenging (and expensive) at best. Early season disease control pays for itself. Management in the early season in New York primarily focuses on five diseases: phomopsis, black rot, downy mildew, powdery mildew, and anthracnose. Grapevine varieties differ in their susceptibility to these diseases, but generally speaking, native American varieties are least susceptible, *vinifera* are the most susceptible, and hybrid varieties are intermediate. This article will introduce the five main early season diseases that affect grapevine in New York, discuss cultural practices that can reduce disease inoculum in vineyards, and outline the basics of a strong early season spray program from dormancy until pea-sized fruits. A follow-up article will address late season management from pea-sized fruits to harvest. As a reminder, growers on Long Island should check labels to ensure recommended products in this article are labeled for use on Long Island.

What are we managing for?

Phomopsis: Phomopsis is a significant problem on Concord and Niagara grapes, though hybrid and *V. vinifera* grapes are susceptible as well. Phomopsis can infect all succulent tissue on grapevines when conditions are favorable. Infections that occur on the developing rachis when clusters first become visible at about 3" shoot growth are most damaging and can result in severe fruit loss. Additionally, infections at the base of green shoots will weaken them and make them more susceptible to breakage. Broadly, cordon-trained vines will be more susceptible to phomopsis buildup than cane pruned vines, because more old wood that can harbor inoculum is retained. Phomopsis is particularly efficient at colonizing dead wood, so infected wood left in the trellis can serve as a source of infection for years to come. Removing dead canes, arms, and pruning stubs will significantly reduce phomopsis initial inoculum. Several fungicides provide effective control. Mancozeb, captan, and ziram are all effective protectants against Phomopsis, but will not rescue an established infection. Strobilurin fungicides, Pristine, Abound, Flint, Quadris Top, as well as Sovran have all been shown

Phomopsis Cane and Leaf Spot, photo by P. McManus University of Wisconsin-Madison

to provide moderate control, but they should not be relied upon in place of a protectant during critical times of year (3-5" shoot growth). Copper provides minimal control.

Black Rot: If early season diseases were competing in the Olympics, Black Rot would easily claim a spot on the podium. Black rot thrives in humid climates and is prevalent in the eastern industry. Under NY conditions, berries are highly susceptible to black rot from cap fall until 3-4 weeks (Concord) or 4-5 weeks (*V. vinifera*) later. After this point the berries begin to lose susceptibility and will become resistant/immune after an additional 2 weeks. While black rot can be spread by spores blowing in from distant infections on wild grapevines, it is most frequently started from mummified berries left by the previous year's infections (see subsequent section on cultural management for sanitation recommendations). Infection will spread from leaves to the fruit and can result in complete crop loss under severe conditions. Protectants mancozeb and ziram have been shown to provide effective control. Captan is less effective but will provide some control. Copper only provides slight control. Unlike powdery and downy mildew, the DMIs and strobilurins will generally provide strong black rot control. High efficacy products include Abound, Aprovia Top (and to a lesser extent Aprovia), Pristine, Quadris Top, Inspire Super, Revus Top, Luna Experience (rate dependent), Luna Sensation (rate dependent), Rhyme, Topguard EQ, Sovran, Rally, Miravis Prime, Mettle, Flint Extra, and tebuconazole.

Black rot, photo by P. McManus University of Wisconsin-Madison

Downy Mildew: Downy mildew is caused by an oomycete (fungal-like) pathogen and thrives in warm, humid regions. While all five of the early season grape diseases can result in significant crop loss if unmanaged, mismanaged downy mildew can result in total vine loss. Under the right conditions, downy mildew infections can "explode" and defoliate grapevines prematurely, making them more susceptible to winter injury/kill. Severe downy mildew pressure in the prior season will likely result in an abundance of primary inoculum to control in the following year's early season. Early season, primary infections begin when spores spread from leaf litter on the ground to young leaves and clusters, beginning about 2-3 weeks prior to bloom. Suckers or volunteer seedlings are often the first infected because they're closest to the ground. Unfortunately, sanitation and dormant sprays have no effect on downy mildew, but early season cultural management for other diseases provides an

Downy mildew on clusters, photo by P. McManus University of Wisconsin-Madison

opportunity to scout for these primary infections to see if your management to date has been effective.

Early season downy mildew management is essential for effective season-long management. If downy mildew is mismanaged in the early season and becomes established, these infections will produce secondary inoculum season-long whenever conditions become conducive, resulting in cascading late-season epidemics. Secondary inoculum release is triggered by warm, humid nights with rain shortly thereafter. Without rain, most secondary inoculum will stay in place and die the next day when exposed to bright sunlight. However, these spores can survive and remain infectious for several days between rainfalls if conditions remain cloudy. All *V. vinifera* clusters are highly susceptible beginning when they first appear until approximately 4-5 weeks post-bloom. Berries become resistant to direct downy mildew infection at this time, but pedicels and foliage will remain susceptible long after.

Practices that encourage air circulation and speed drying time can reduce disease pressure, but will not replace the need for chemical control. All systemic fungicides for downy mildew management are prone to disease resistance development and should be used in rotation within a sound, integrated pest management program. Protectants used to control Phomopsis and/or black rot early in the season, such as mancozeb and captan, will also provide good preventative control of downy mildew. Ziram provides some control of downy mildew, but is not as effective as mancozeb and captan. Copper provides good control, but it should be noted that that copper can cause injury to the foliage at the time of season when downy mildew management is most essential (succulent leaves). Zampro, Revus, and Revus Top (the mandipropamid component) provide excellent downy mildew control. Ranman provides good control. Phosphorous acid (PA) products (such as Phostrol) provide good preventative and post-infection control ("kick-back"). As a caveat, overuse of phostrol as a curative has led to reports of slippage across the state. Phostrol should be used with caution as a curative on mild infections and NOT USED on moderate to severe infections. Late career studies from the Wilcox program found that the biopesticide LifeGard provided comparable control to standard products in moderate disease pressure years, and excellent control when used in rotation with FRAC 40 products (Zampro, Revus) in moderate and high pressure years. These findings suggest LifeGard could be particularly useful for growers pursuing low-input/biointensive management. That said, it should still be used with caution for downy mildew and *always* in rotation with synthetic protectants and systemics. Ridomil remains the best fungicide ever developed for downy mildew control, but is extremely prone to resistance development (and expensive), and should never be used more than once per season. Ridomil should NOT be applied to raging infections. **We no longer recommend DMI or strobilurin fungicides for downy mildew control.**

Downy mildew on foliage, photo by D. Gadoury, Cornell University

Powdery Mildew: Powdery mildew is, without a doubt, the most important fungal disease of grapevine worldwide. Uncontrolled powdery mildew can destroy infected clusters and cause "diffuse" cluster infections that increase susceptibility to bunch rots. Leaf infections limit photosynthesis and reduce fruit quality, vine growth, and winter hardiness. In general, *V. vinifera* are most susceptible to powdery mildew infections, hybrids are intermediate, and natives least. Both humidity and shade promote powdery mildew development. This is because powdery mildew is inhibited by sunlight, so maintaining an open canopy that allows sunlight to penetrate into the canopy will reduce disease pressure, but will not replace the need for chemical control. Unlike downy mildew, rainfall is not necessary to spread powdery mildew. However, research has shown that powdery mildew disease severity is twice as great at a relative humidity of 80% versus an RH of 40%. The risk of rapid powdery mildew development increases in vineyard sites and canopies with poor air circulation and increased microclimate humidity, and seasons with frequent precipitation.

Powdery mildew on foliage, photo by P. McManus University of Wisconsin-Madison

Berries are extremely susceptible to powdery mildew infections initiated between immediate pre-bloom and fruit set. *Vinifera* berries begin to lose susceptibility after that, and become relatively resistant about 4 weeks after their individual flowers open. Concord berries become highly resistant/immune about 2 weeks after flowering. Early powdery mildew infections on fruit are one of the worst things that can happen in a vineyard, and can cascade quickly into total crop loss under conducive conditions. Keeping leaves virtually free of powdery mildew going into pre-bloom helps assure there will be minimal inoculum to infect new berries during the critical immediate pre-bloom through early post-bloom period when susceptibility is highest.

Early-season sprays are critical on susceptible varieties in order to avoid cascading epidemics in the later season. Early-season sprays during the first few weeks of shoot growth will be particularly important in blocks with late season powdery mildew in the prior year. Unfortunately, fungicides that provide preventative control of the other early season diseases such as mancozeb, captan, and ziram DO NOT provide effective control of powdery mildew. Fortunately, elemental sulfur provides highly effective preventative and curative powdery mildew control with low risk of disease resistance development. Sulfur will provide excellent post-infection control when applied up through the time that young colonies start to become obvious. Post-infection sprays applied to heavily-diseased tissues are much less effective, so sulfur should not be relied upon

Powdery Mildew on foliage and clusters, photo by W. Wilcox Cornell University

for eradication in these instances. Rainfall will wash off sulfur coverage, leaving new shoot growth unprotected, so sulfur must be applied frequently to provide effective season-long control. Additionally, some grape varieties are susceptible to foliar injury from sulfur, and sulfur applications should be avoided on these varieties.

The use of curative post-infection powdery mildew material with a protectant, especially at critical times when grape tissue is most susceptible, can help control disease infections that have already occurred. All systemic fungicides for powdery mildew management are prone to disease resistance development and should be used in rotation within a sound, integrated pest management program. Repeated use of any single chemistry will eventually result in resistant strains of powdery mildew that can no longer controlled with applications of fungicides within that chemistry. At least two, and preferably more, FRAC groups should be used on a rotational basis to avoid or delay the onset of resistance. FRAC 11 (strobilurin) resistance is becoming more and more of a problem across the US, and the eastern industry is no exception. Therefore, **DMI and strobilurin fungicides should NOT be relied upon alone for powdery mildew control.** Pre-mixed strobilurin fungicides such as Pristine (strobilurin + SDHI), Quadris Top, Topguard EQ, and Luna Sensation provide good powdery mildew control. SDHI fungicides and pre-mixes such as Endura, Aprovia/Aprovia Top, Pristine, Luna Experience, Rally, and Miravis Prime provide good to excellent control. Vivando, Prolivo, Sovran, Quintec, and Gatten (newly labeled for NY) all provide excellent control. Pre-bloom applications of stylet oils can provide good to strong powdery mildew control, but can cause damage on certain varieties, or burn when over used. Late career studies from the Wilcox program found that LifeGard provided slight foliar control in a moderate disease pressure year, and moderate foliar and cluster control in a light pressure year. These findings suggest it could be particularly useful for growers pursuing low-input/biointensive management. That said, LifeGard should be used with caution for powdery mildew and always in rotation with synthetic protectants and systemics.

Anthracnose*:* Anthracnose isn't the worst of the early season diseases by any means, but when it's a problem, it's a problem. Historically, anthracnose was only considered to be an issue on Vidal, Reliance, and seedless varieties, but outbreaks have become more common in recent years in New York with the increasing prevalence of cold-hardy varieties. Cold hardy varieties with *V. riparia* in their background such as Marquette (particularly susceptible), Frontenac, La Crescent, Edelweiss, Esprit, Brianna, St. Pepin, and Swenson White tend to be susceptible. It has been noted that wild grapes near the vineyard can serve as a reservoir. All succulent parts of the plant, including fruit stems, leaves, petioles, tendrils, young shoots, and berries, can be attacked, but lesions on shoots and berries are most common and distinctive. A liquid lime sulfur dormant spray is the most reliable and effective management option for established, difficult to control populations. Early season sprays of mancozeb, captan, or ziram targeting Phomopsis have been noted to provide significant control of anthracnose despite not

Anthracnose on clusters, photo by P. McManus University of Wisconsin-Madison

being listed on the label. Rally, Mettle, Pristine, and Revus Top are all labeled for anthracnose control, and most DMI or sterol inhibiting fungicides have shown adequate control.

A strong spray program begins with cultural control.

Diligent cultural management will ensure that your fungicide program is set up for success from the outset. Pruning, training, and sanitation are your first line of defense against all five early season grape diseases regardless of whether your operation is conventional, organic, or biodynamic.

Pruning: Anthracnose, Phomopsis, and powdery mildew all overwinter in the cane bark and will release spores with the spring rain that can infect susceptible early growth tissue. Early season pruning can help reduce initial inoculum levels for these diseases. All prunings should be chopped, shredded, and/or destroyed to remove bark and pathogen. Ideally, prunings should be removed from the vineyard, though this practice can be costly. If you are pursuing biodynamic or organic management, you might want to consider total removal if you have had persistent problems with cane-overwintering diseases.

Training: Canopy management can significantly aid in early season disease control. Any practice that opens the canopy to improve air circulation and reduce drying time of susceptible tissue will broadly reduce disease incidence and severity. For powdery mildew, canopy management practices such as utilizing a VSP training system, shoot thinning, and basal leaf removal at fruit set can significantly reduce fruit disease severity. Broadly, any practice that increases sunlight exposure on leaves or fruit will reduce the severity of powdery mildew on those tissues, independent of spray coverage. Additionally, training to improve airflow will have the added benefit of improving fungicide penetration. When this improved spray coverage factor is considered, the benefit of canopy management for powdery mildew control is not only compounded, but extended to other diseases as well.

Sanitation: Sanitation is essential for effective black rot and Phomopsis management, and will improve season long anthracnose and powdery mildew management. Black rot overwinters in mummified fruit ("mummies") in the vine and on the ground. These mummies will release spores with the spring rain once temperatures become conducive. It is critical to remove mummies from the canopy and ideally from the ground and burn, bury, or compost them to destroy. Why take the time to remove mummies from the canopy? Canopy mummies will produce 10-20x more spores than mummies on the ground, and will continue to do so beginning from budbreak through veraison. The spores they produce will "rain down" and hit the most susceptible, young tissue. Ground mummies are less of a concern than canopy mummies because they decompose much faster and will not produce spores after bloom. The spores that they do produce are less likely to be splashed up onto the trellis and onto susceptible young tissue than canopy mummies. The exception to this is if the weather has been dry, then ground mummies will remain an inoculum source for longer. Dropping mummies to the ground (but not right below the vines!) is better than leaving them hanging in the trellis if you cannot remove them from the vineyard entirely. If you had a significant black rot problem in the prior season and/or are pursuing low input management, consider taking the time to remove ground mummies in addition to your canopy mummies. Removal of black rot mummies via early season sanitation is ESSENTIAL for all growers pursuing organic/biodynamic/low input management.

Designing a robust early season program

Disease	Dormant	1-5"	6-10"	Pre-bloom	Bloom	1-2wk Post-bloom	Pea-sized
Anthracnose	X	X	X	X	X	X	X
Phomopsis		X	X	X	X	X	X
Black rot			X	X	X	X	X
Powdery mildew			X	X	X	X	X
Downy mildew				X	X	X	X

The overall goal of your early season (and full season) program should be 1) simultaneous control of the most important diseases, 2) fungicide resistance management, and 3) economic sustainability. Diversification is key - an effective spray program will include BOTH protectants and post-infection materials, as well as BOTH contact and systemic materials. The four most critical sprays for early season disease management for downy mildew, powdery mildew, and black rot are immediate pre-bloom, bloom, 1-2 weeks post-bloom, and pea-sized fruits. As a rule of thumb for *V. vinifera*, cover should be maintained from 4" shoots through pea sized fruits and thereafter whenever weather is wet/humid. This period of the early season is the time to use the best fungicides, the highest rates, and follow all the recommended cultural management practices.

Sprayer calibration: When is the last time you calibrated your sprayer? If you can't remember, it's likely time. Ideally, sprayers should be calibrated annually. Proper sprayer calibration will ensure that the product you're applying can do the job you've paid for it to do. Maximizing spray coverage through proper sprayer calibration will maximize the dose of fungicide the pathogen is exposed to at any given rate of application. Remember, fungal pathogens only respond to the dose of product applied to the part of the plant where infection is taking place, not the dose of product you placed in the spray tank. The FRAME Network released an informative article that can be found here on the important role sprayer calibration and proper application play in preventing resistance development. Andrew Landers from Cornell additionally has a wide array of helpful vineyard spraying articles that can be found here.

Fungicide resistance considerations to remember as you design your program:

- **Low risk is NOT the same as no risk!** ALL fungicides for grape disease management have varying capacity to lose efficacy due to resistance development.
- **A durable spray program will include both contact protectants and systemic fungicides for post-infection activity**
    - Rotate at-risk fungicides with effective, unrelated materials.
    - Apply at-risk materials in combination with another unrelated fungicide that's active against the target disease, either through tank mixing or use of a pre-packaged product containing two or more effective ingredients.
- **DMI (FRAC 3) and strobilurin (FRAC 11) products should NOT be relied upon alone for powdery OR downy control**
- No more than 2-3x per season and never twice in a row
    - DMI (FRAC 3) – high resistance risk
        - DMI resistance (FRAC 3) in both powdery and downy mildew is present at varying levels throughout NY. The one exception to this appears to be difenoconazole (the "top" in Quadris Top & Revus Top), which still provides good control on powdery mildew even when other DMIs

appear to be "slipping." That said, it is **RISKY** to rely on difenoconazole alone to control powdery mildew.

- Strobilurin (FRAC 11) – high resistance risk
  - **Do not apply without an unrelated tank-mix or pre-mix partner! FRAC 11 resistance is becoming more and more prevalent industry-wide and can hit like a ton of bricks with no warning.**
- SDHI (FRAC 7) – moderate to high resistance risk
  - Stewardship of these high efficacy products is critical!!
- Zampro and Revus/Revus Top (FRAC 40) – moderate to low resistance risk
  - Resistance has been documented in the eastern industry in recent years - low risk is not the same as no risk!!

- No more than 2x per season and ideally not twice in a row
  - Prolivo and Vivando (FRAC 50)
  - Quintec
- Ridomil should NEVER be applied more than once per season!!

Dormancy: An early season dormant spray should be considered to 1) clean up a serious anthracnose problem or 2) if you are pursuing organic/biointensive production. A dormant spray will not replace the need for in season sprays and will likely not be economical if you well-controlled fungal diseases in the prior season. Dormant sprays are most effective for anthracnose control, but will have activity on Phomopsis, powdery mildew, and black rot as well. Dormant sprays have no impact on downy mildew. If you meet the conditions for a dormant spray, use liquid lime sulfur at an approximate rate of 5-10 gallons/acre but check the label to ensure proper protocol. Although lime sulfur may be considered an organic treatment, it is a highly caustic and corrosive material that can cause irreversible eye damage and skin burns. As with all pesticide products, users should follow precautionary statements and use personal protective equipment (PPE) described on product labels.

One to five inch shoot growth: This is the most critical time of season to control phomopsis, especially in blocks with a history of this disease, *especially* for Concord and Niagara growers. Although several products containing Group 3, Group 7, and Group 11 fungicides are labeled for control of Phomopsis, these are all weaker than the protectants (mancozeb, captan, and ziram) and should not be relied upon at this growth stage for Phomopsis control. Anthracnose control is needed at this stage as well, but a protectant spray for Phomopsis should take care of this. If temperatures remain above 50°F for long stretches of the day during this growth stage, you may want to consider including a product for powdery mildew control on highly susceptible *vinifera* cultivars, especially in blocks that had significant foliar powdery mildew late into the prior season.

Six to ten inch shoot growth: *Vinifera* cultivars and highly susceptible hybrids need powdery mildew and downy mildew control beginning at this stage. This is one of the best times to use JMS and other oils, or other eradicant materials, against young powdery mildew infections that are just getting started. Now is the time to start thinking about downy mildew control. If you have a susceptible variety, rainfall has been greater than 0.1", and temperatures above 52°F have occurred recently or are anticipated, then include a downy mildew product in this spray. This is

especially important if downy mildew was prevalent in the prior season. Phomopsis infections on rachis and fruit can still be a concern at this stage in wet years, particularly in blocks with history of the disease. Anthracnose should be controlled at this stage by growers for whom this is a concern. Black rot control can likely wait until the next growth stage unless it was a significant problem last season (high primary inoculum levels) and weather is wet (conducive environment).

Immediate pre-bloom to early bloom: THIS IS THE MOST CRITICAL TIME OF YEAR TO CONTROL POWDERY MILDEW, DOWNY MILDEW, AND BLACK ROT. USE YOUR BEST MATERIALS AND DON'T CUT ANY CORNERS ON RATES, SPRAY COVERAGE, OR INTERVALS!!! THIS SPRAY SHOULD INCLUDE BOTH A CONTACT PROTECTANT AND SYSTEMIC/CURATIVE. This spray is also important for Phomopsis and anthracnose, but it is likely that the products chosen for downy, powdery, and black rot will cover them. If you miss this spray, you're going to have a rough year.

Bloom: While not discussed in detail in this article, the bloom spray is particularly important for botrytis. Vangard (or Inspire Super), Switch, Scala, Elevate, Pristine, Rovral/Meteor/iprodione generic, and Luna Experience applied around the bloom period often provide beneficial control of botrytis on susceptible varieties, particularly in wet years. If sulfur was the only powdery mildew material in your immediate pre-bloom spray, it's best to reapply about now on highly susceptible viniferas rather than wait until post-bloom. If this is the case, keep your spray interval short, *especially* if it's rained since your last application or is expected to soon.

One to two weeks post-bloom (10-14 days after your pre-bloom spray): THIS IS A CRITICAL TIME OF YEAR TO CONTROL POWDERY MILDEW, DOWNY MILDEW, AND BLACK ROT. USE YOUR BEST MATERIALS AND DON'T CUT ANY CORNERS ON RATES, SPRAY COVERAGE, OR INTERVALS!!! THIS SPRAY SHOULD INCLUDE BOTH A CONTACT PROTECTANT AND SYSTEMIC/CURATIVE. If weather has been warm and cloudy, increase either the rate or quality of your powdery mildew material for highly susceptible varieties. If you haven't controlled for botrytis yet, this spray should include a material for that (especially if weather has been favorable). If you miss this spray, you're going to have a rough year.

Three to four weeks post-bloom (pea-sized fruits): This is still an important stage for early season disease control, but the most critical time of year for fruit infection prevention has passed. *Vinifera* varieties will still require black rot control, especially if weather has been wet. Natives and resistant hybrids can now likely move forward without black rot specific products *unless* there is a strong history of disease in the block. At this point and throughout the rest of the season, try to avoid applications of fungicides at risk of resistance development if there's enough powdery mildew present in the vineyard that it's easy to spot without even trying.

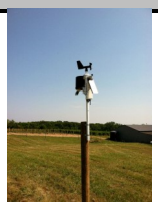
Sources: The information presented in this article is primarily sourced from the body of work of my predecessor, Professor Emeritus Wayne Wilcox, as well as the 2020 New York and Pennsylvania Pest Management Guidelines for Grapes.

2020 GDD & Precipitation

FLX Teaching & Demonstration Vineyard – Dresden, NY					
Date	**Hi Temp (F)**	**Lo Temp (F)**	**Rain (inches)**	**Daily GDDs**	**Total GDDs**
4/28/2020	56.9	32.9	0.00	0.0	5.6
4/29/2020	65.0	41.5	0.00	3.3	8.9
4/30/2020	63.0	52.2	0.97	7.6	16.5
5/1/2020	60.5	47.3	0.01	3.9	20.4
5/2/2020	66.8	41.3	0.01	4.1	24.5
5/3/2020	74.8	52.6	0.00	13.7	38.2
5/4/2020	51.6	39.1	0.01	0.0	38.2
Weekly Total			**1.00”**	**32.5**	
Season Total			**2.63”**	**38.2**	

GDDs as of May 4, 2019: 72.6

Rainfall as of May 4, 2019: 2.76”



Seasonal Comparisons (at Geneva)

Growing Degree Days

	2020 GDD [1]	Long-term Avg GDD [2]	Cumulative days ahead (+)/behind (-) [3]
April	12.0	63.8	-23
May	20.8	254.4	-14
June		480.2	
July		643.6	
August		592.2	
September		358.3	
October		110.0	
TOTAL	32.8	2502.6	

[1] Accumulated GDDs for each month.

[2] The long-term average (1973-2019) 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

Precipitation

	2020 Rain [4]	Long-term Avg Rain [5]	Monthly deviation from avg [6]
April	2.54”	2.83	-0.29
May	0.02	3.16	
June		3.60	
July		3.42	
August		3.23	
September		3.53	
October		3.42	
TOTAL	2.56	23.19	

[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

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

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

flgp.cce.cornell.edu

YouTube

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