Subject: Grape Notes, Vol. 11, No. 2, April 25, 2016
From: Sonia Schloemann <sgs@umext.umass.edu>
Date: 4/25/16, 10:39 AM
To: umassfruit@umass.edu

Good morning,

Please find below an excellent review of early season disease management in grapes from the Lake Eerie Regional Grape Program in NY and PA.

~ Sonia

UMass Extension
CENTER FOR AGRICULTURE

2016 Pre-Bloom Disease Management Review

Bryan Hed, Lake Eerie Regional Grape Program

Spring has arrived, but it sure doesn't feel like it in many parts of the Northeastern U.S. However, the cool weather is buying us some extra time that can be used to review our pre-bloom disease management plans and familiarize ourselves with all the tools at our disposal. First, if you haven't done so yet, acquaint yourself with the NEWA website (**N**etwork for **E**nvironment and **W**eather **A**pplications) found at http://newa.cornell.edu. This is your annual reminder! On the home page is a map of the U.S. with every location of a weather station (391 locations!) that can be tapped into for historical and 'up to the hour' weather data. From the convenience of your computer screen, you can view weather information from eastern Nebraska to the eastern seaboard, and many places in between. In connection with each weather station is a pest forecast to help you make insect pest and disease management decisions. Use your cursor to navigate the map and click on the weather station nearest you (denoted by a leaf/rain drop icon) to view nearby temperature, rainfall, leaf wetness duration, wind speed, etc. Clicking on 'grapes' under 'crop pages' will give you access to disease forecasting models for Phomopsis cane and leaf spot, black rot, and powdery and downy mildew. You can also access the grape berry moth degree day model that will improve your timing of grape berry moth insecticide sprays later this summer. Research has shown that use of the berry moth model can improve control of this pest (and of the Botrytis and other rot that develops as a result of the damage it causes) without any increase in your management costs. Each model forecast is accompanied with helpful disease management messages and explanations. This is a great way to make use of one of those cold, rainy mornings to educate yourself and prepare for the challenges ahead.

Disease concerns during early shoot growth stages

Phomopsis cane and leaf spot is our first concern during the early stages of growth in

late April and early May. This is because inoculum sources overwinter in woody tissues (alive and dead) right on the vine, and often on wood you can't just prune out (basal nodes on year-old canes). Infected wood releases spores of the fungus during the first rain periods in spring. The inoculum sources which appear as dark scabby lesions on the first few inches of year-old canes, may be just millimeters from the first susceptible green tissue after bud break (Figure 1) and spores can infect within relatively short time periods (24 hours) at very cool temperatures (upper 40s). An examination of your vines now can provide you with some idea of the amount of inoculum present in your vineyard, and the need for early fungicide applications to prevent infections in the cluster zone. Look specifically for lesions along the first (oldest) few inches of year old canes (again, see Figure 1). Also, old pruning stubs are classic sources of inoculum, and according to work performed at Cornell University, dead wood is probably the most potent source of spores of *Phomopsis* as the fungus grows and sporulates especially well on this material; removal of all dead wood from the trellis at dormant pruning will help control this disease. Where inoculum sources have built up in the trellis (which is particularly a problem in machine pruned vineyards) applications of mancozeb, ziram, or captan during early shoot growth stages are a cost effective way to control shoot and cluster stem infections (Figure 2) that can lead to crop loss. It will also help to prevent the build-up of inoculum on tissues that you can't just prune out during dormancy (those first 4-5 nodes of shoots that you need for next year's crop!).

Figure 1. Note the dark brown lesions on the first few internode regions on these Chancellor canes. The lesions are from *Phomopsis* infections that occurred during early shoot growth in the previous year (when these were green shoots). The buds present are just ready to burst open with new shoot growth that will be very vulnerable to infection during subsequent rain periods.

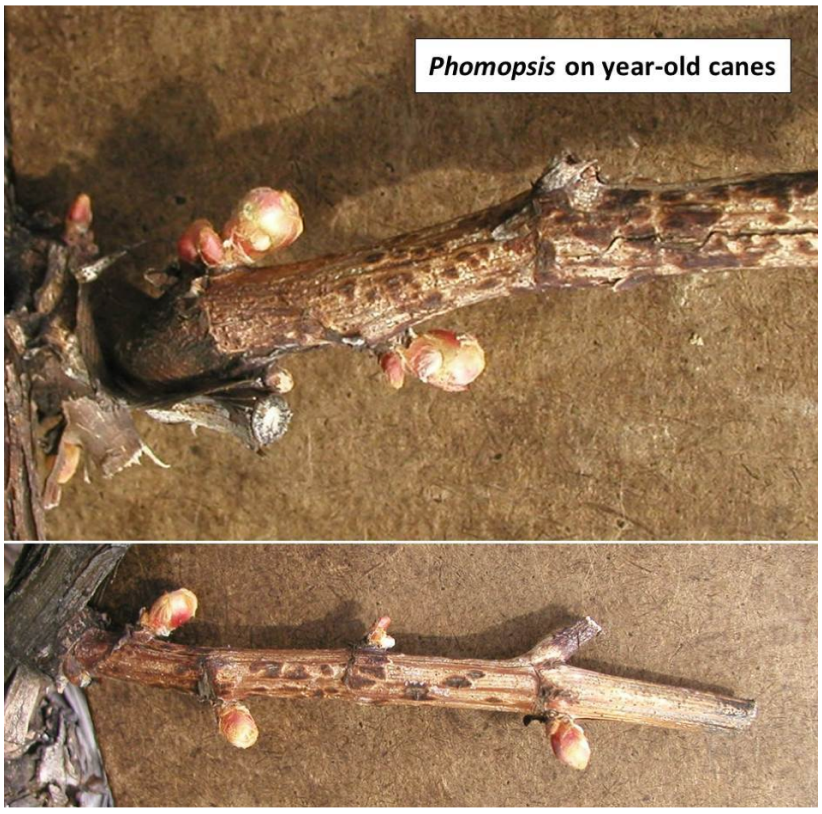
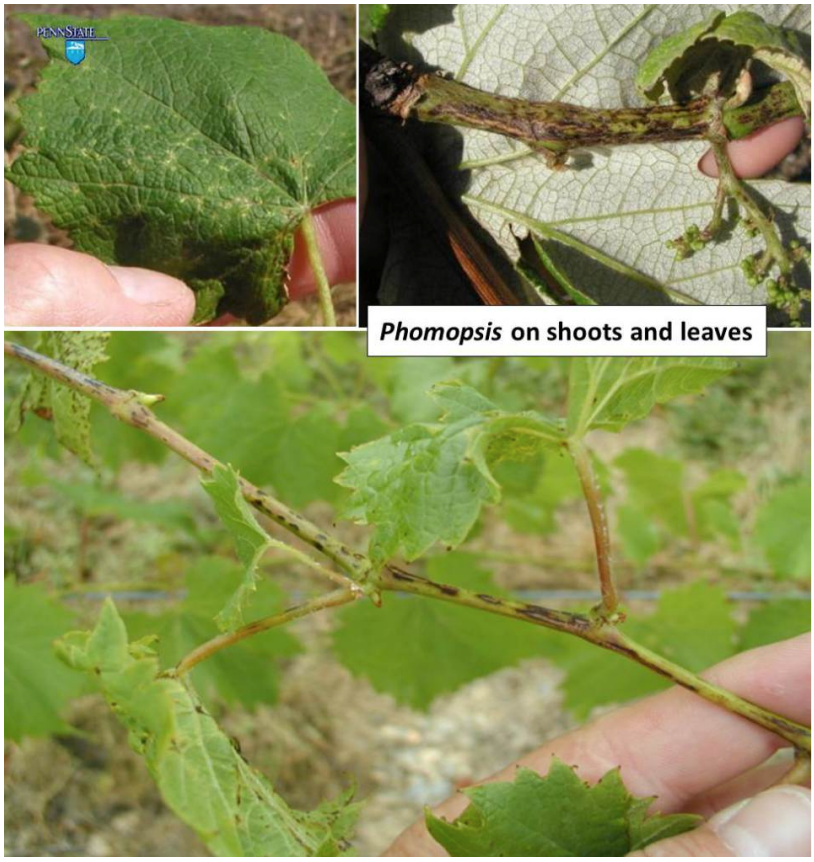


Figure 2. Although the 1" shoot stage can be vulnerable to damage from this pathogen, the more critical stage is at 3-6" shoots, when more shoot, leaf, and cluster tissue is exposed and is highly susceptible (below).

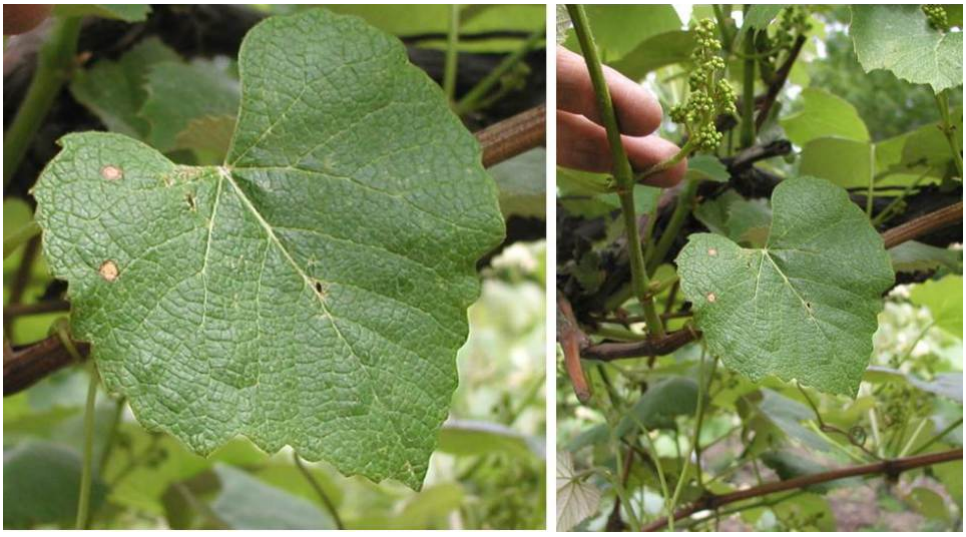


Sprays for powdery mildew may be prudent during early shoot growth for *Vitis vinifera* cultivars and highly susceptible hybrids, especially in vineyards where control of this disease may have slipped last year (lots of overwintering inoculum). Unlike the fungi causing Phomopsis and black rot, the powdery mildew fungus has to have live grape tissue to grow and reproduce. It survives the winter by going dormant itself, just like their grapevine host. According to work at Cornell University overwintering inoculum will come primarily from infections that occurred before Labor Day of last year. This is because infections that occurred after that, likely do not have time to prepare for winter dormancy and overwintering survival. Then, during the following spring, primary infection periods occur with the completion of two simple weather factors: at least a tenth of an inch of rain with temperatures above 50 F. When those two factors occur in concert, overwintering inoculum (spores of the fungus) has been unleashed from its dormant stage and the potential for infection is there if green tissue is present. Applications of sulfur, oils, Nutrol, and potassium bicarbonate materials can be good choices for mildew management early on. Remember to read labels and be aware that you can't mix sulfur and oils, or oils and captan. Powdery mildew is rarely a concern during the early shoot growth stages for growers of juice grapes, especially in the cooler Lake Erie region of Pennsylvania.

As for black rot, scout your vineyards for old fruit mummies and clusters (infected from the previous season) in the trellis. **Removal of ALL** old cluster material before bud break

is *essential* to maintaining good control of this disease. Once on the ground, mummies/clusters can be buried with cultivation, reducing or eliminating their capacity to fuel new infections in spring. As I mentioned in last year's blog, a fungicide application for black rot may not be necessary at these early shoot stages **IF** good control of this disease was achieved the previous year **AND** conscientious trellis sanitation has been implemented. On the other hand, the importance of early shoot infections should not be underestimated. For example, inoculations we performed at these early shoot growth stages (from early May to early June) simulating wet weather and an overwintering inoculum source (mummies) in the trellis, went on to produce leaf and shoot infections in the cluster zone (Figure 3) that released spores during early berry development stages and resulted in crop loss of 47-77%! An application of mancozeb, ziram, or captan for *Phomopsis* will also provide control of early black rot infections.

Figure 3. Early black rot leaf infections in the cluster zone provide inoculum that can add to problems with controlling fruit infection after capfall. The two small tan lesions on the leaf at node 2 are just inches from the developing inflorescence found at node 3. These lesions will release spores during rainfall periods that could easily be splashed to highly susceptible cluster stems pre-bloom, and developing fruit after capfall. Resulting fruit infections will lead to crop loss.



At about 10-12" shoot growth or the 5-6 leaf stage: The importance of applying sprays at this stage is also dependent on the level of overwintering inoculum, that is, the level of control maintained the year before. In other words, if you had trouble controlling diseases last year, a fungicide spray at this time is going to be more critical than if you kept your vineyard clean last year. This is particularly true for the more susceptible *V. vinifera* and French hybrid varieties.

This stage also marks the point at which the downy mildew pathogen first becomes active. The first infections arise from inoculum that has overwintered on the ground; leaves and other plant material that was infected during the previous season. Therefore, vineyards that developed a fair amount of leaf/cluster infection last year will be at higher risk than vineyards in which infections were controlled. Infection of grapevines by downy mildew is very dependent on the creation and maintenance of wet plant surfaces by rainfall. Pay close attention to spring precipitation periods: when temperatures are above

52 degrees F during rainfall, infective spores are produced that cause the first infections. Spring leaf infections are identified by the classic yellow oil-spot symptom on the tops of leaves (Figure 4), coinciding with white, downy sporulation of the pathogen on the undersides of leaves. Inflorescences can be blighted and show sporulation as well. Sporulation occurs through night time hours under high relative humidity, and is often readily apparent during a morning scout of the vineyard. First symptoms are most likely to be seen on leaves close to the ground or on sucker growth (because the pathogen comes from the ground) in wetter areas of your vineyard (because of longer hours of wetness after rainfall and higher humidity in these areas); start your scouting there first. Like a flame, the downy mildew pathogen kills everything it 'touches', and infected material eventually turns brown and dies, as if scorched by fire. Good control early is very important in years with frequent wetness. Under optimum temperatures of 70-75F, only an hour or two of plant surface wetness may be required for infection to occur. Once established, downy mildew can spread very quickly under wet, warm conditions; it only requires 4-5 days at those optimum temperatures for new infections to go on to produce more spores for the next round of infections.

Mancozeb products offer some of the best control options for downy mildew, while also controlling Phomopsis and black rot infections at this time. Ziram is a little weaker on downy mildew, and Captan a little weak on black rot, but these may also be a viable option at this stage if these diseases are not a huge threat at this time (but they are all a priority at this time on *Vitis vinifera* and susceptible hybrids). Keep in mind that all these materials are surface protectants; they do not penetrate plant tissue (they are designed that way because they can injure plant tissue) and are therefore subject to wash-off by rainfall. This means that under heavy, frequent rainfall conditions, application intervals will need to be squeezed down from 14 days to more like 7-10 days between sprays, especially for highly susceptible varieties. Other options for downy mildew exist that are more rainfast, like Presidio, Revus, Revus Top, Pristine, Reason, Zampro, Ranman, and the phosphorous acid products.

Keep in mind that shoots are growing at break neck speed at this time of year, and may double or more in length within a short period of time. This leaves increasingly larger amounts of unprotected, highly susceptible tissue within that typical two week fungicide interval, regardless of what fungicide is used.

Figure 4. Yellow oil-spot symptoms of downy mildew on young spring leaves.


One last reminder with regard to black rot that I mentioned earlier; black rot leaf infections at this time will create more sources of inoculum in the cluster zone (often on leaves at nodes 4-7) and can make black rot control more problematic during the fruit protection period (after capfall). If you see lesions on leaves in the cluster zone, make sure your subsequent black rot sprays are applied effectively and timely over the next several weeks during the fruit protection period.

Powdery mildew (Figure 5) should also be addressed at this time for *Vitis vinifera* and susceptible hybrids, but this disease is much less of a concern for juice grapes. Sulfur is an inexpensive option for powdery on non-sensitive varieties at this time and a reliable standard, even at cool temperatures. The sterol inhibitor fungicides may also be good choices at this time, providing they are still effective in your vineyard. The sterol inhibitor and strobilurin fungicides have been in use for many years in Pennsylvania vineyards and are considered at high risk for the development of resistance by the powdery mildew fungus. Research at Virginia Tech and Cornell has indicated that powdery mildew resistance to strobilurins is common in parts of those states. On the other hand, resistance appears to be less common in Pennsylvania, for the moment. If you suspect powdery mildew resistance to these materials in your vineyard and you are applying them for the other diseases they still control, apply them in a tank mix with another active ingredient for mildew (like sulfur) or discontinue their use and use an alternative active ingredient. Just because we have few documented cases of powdery and downy mildew resistance in Pennsylvania at present, be vigilant in your observations regarding potential resistance and control failure. This is even more critical for the next two fungicide application timings; the immediate pre-bloom/first post bloom sprays, where fruit protection ($$$$) is top priority.

Immediate pre bloom/first post bloom fungicide application.

The immediate pre bloom (just before the beginning of capfall) and first post bloom (7-14 days later) fungicide applications are the most important applications you'll make all year, regardless of variety grown and disease pressure. These two sprays are designed to protect your annual investment (fruit) from all the major fungal diseases (Phomopsis, black rot, downy and powdery mildew) and cost cutting over these two sprays will often

result in economic losses (unless you can reliably predict bone dry weather). There is little or nothing to be gained by doing these two sprays 'on the cheap', even if disease control was 'stellar' last year. This is because young fruit of every variety are most susceptible to all the major diseases during the period stretching from bloom (capfall) to about 2-3 weeks after bloom. I cannot overemphasize how important it is to apply your most effective materials at this time. This is generally a good time to try some of the newer active ingredients in products like Vivando or Torino (for powdery mildew only), Revus Top (for powdery and downy mildew and black rot), Inspire Super (for powdery mildew and Botrytis), Luna Experience (wine grapes only, for powdery mildew, Botrytis, and black rot) and the newer downy mildew materials (listed above). Just remember that you will need to limit the use of these materials to about two applications per season for resistance management purposes. Sulfur can also be included in a tank mix (on non-sensitive varieties) to further improve control and aid in managing powdery mildew resistance, especially in cases of high disease pressure on highly susceptible varieties. Make sure sprayers are properly calibrated and adjusted for best coverage on a bloom-period canopy, spray every row at full rates and shortest intervals, and NEVER extend the interval between these sprays beyond 14 days.

Some growers may be thinking of applying the phosphorous acid products (aka phosphites, phosphonates) for downy mildew at this time. These products are readily absorbed into plants and are rain-fast, effective, and relatively pleasant to work with. However, if you use these materials at this time, be mindful that they provide only limited protection against new infections (7-10 days under high disease pressure). They can provide excellent control of downy mildew under very high disease pressure, but that level of control can deteriorate after 10 days leaving a way in for the pathogen and potential crop loss.

Bloom may also be a time when Botrytis infections can become established in clusters. These infections do not immediately rot fruit, but remain dormant until activation during the ripening period. Though this is mainly a concern for growers of bunch rot susceptible varieties, a bloom spray for Botrytis can significantly impact fruit health and crop loss at harvest.

Figure 5. Powdery mildew symptoms on grape.

I am anticipating a new material, Aprovia, to be available for 2016, mainly for powdery mildew. This material is related chemically to Boscalid (found in Endura and Pristine) and Fluopyram (found in Luna Experience).

Finally, a shortened recap of some relevant main points from last year's blog.

1. Good overwintering inoculum control (good control last year, good trellis sanitation) will make seasonal disease control more effective and more forgiving ('I can't get a spray on because it won't stop raining; good thing I controlled diseases well last year'); consider it an insurance policy.
2. Early spray programs are relatively inexpensive. If disease control was lacking last year, higher overwintering inoculum levels will require that you fire up your seasonal spray program earlier this year, especially if conditions are wet.
3. The bloom and early post bloom periods are the most critical for protecting your crop ($) against all diseases; it is never cost effective to cut corners during those stages of crop development.
4. Scout your vineyards and develop your skills at identifying diseases. Focus on vineyard areas where disease control has been most challenging. Know what plant parts to examine for first symptoms and at what stage of plant growth to anticipate seeing them.
5. Know your fungicides; their strengths, weaknesses, specific diseases they control, their tank mix partners and their rotational partners for resistance management.
6. Read labels
7. Make good use of the NEWA system. It will help you make pest management decisions while teaching you a little about pathogen and insect pest biology, and it's free!

Some information in this blog was gleaned from the New York and Pennsylvania Pest

Management Guidelines for Grapes. This publication is an excellent source of research based information designed to help commercial growers make important grape production decisions. Copies can be purchased at the Cornell Store at https://store.cornell.edu/p-193185-2016-new-york-and-pennsylvania-pest-management-guidelines-for-grapes.aspx

As we get closer to bloom, another article will be posted to cover important disease management concepts for the post-bloom period.

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