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Vinews
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When Mildews Roar

Powdery (Figure 1) and downy (Figure 2) mildew can become serious problems in a short period of time. As temperatures fall into the 60 to 80 degree range the threat of infection increases. When high temperatures linger above the 90 degree mark powdery and downy mildew threats are reduced.

A few observations of why mildew problems are roaring.

Early season vine growth and the environment.

The season started with cold temperatures in April that delayed bud burst. Summer temperatures arrived in May and the vines broke bud and shoot growth was off to the races. This hastened vine growth that resulted in some shoot growth being unprotected and opening the door for disease development. It is not unusual for shoots to have 12 to 18-inches of new growth per week when warm/hot temperatures prevail and soil moisture is not limited. It is very important to match spray interval duration with vine growth and not rely on a calendar day schedule.

Powdery mildew and overwintering inoculum. In the latter part of the growing season powdery mildew forms a chasmothecia on infected fruit or foliage. Within the chasmothecia are ascospores that will be released the following spring. The trigger for ascospore release are wetting periods from rainfall or heavy dew. Ascospores will infect developing grape tissues when temperatures are at or above 50º F. Infection by ascospores is the primary infection.

Figure 1. Late season powdery mildew colonies on Chambourcin. Photo credit: D. Volenberg

Figure 2. Sporulating colonies of downy mildew. Photo credit; D. Volenberg.

If the primary infection is not managed, powdery mildew will form colonies that reproduce asexually and form a different spore type called a conidia. These conidia do not rely on wetting source for release and can be dispersed by wind. Unlike many other grapevine disease organisms, conidia do not need moisture on the grape tissue surface in order to germinate and infect the tissue. The conidia prefer high relative humidity above 75% and temperatures between 60 to 85º F. Infection by conidia is often the beginning of an epidemic unless control practices have been put in place.

Management of any pathogen relies on more than just the fungicide. Sprayer calibration and spray coverage are critical in pathogen management.

Sprayer calibration and spray coverage. Sprayer calibration is a process of measuring the amount of carrier leaving the sprayer over a period of time. This in turn is used to adjust your ground speed to apply a pre-determined volume per acre. There is a lot more to consider with air-blast and other associated vineyard sprayers such as fan-speed, fan louver placement etc. Which brings me to spray coverage. Spray coverage needs to be quantified and sprayer adjustments and carrier volume adjusted so coverage is complete in the hard to reach areas of the canopy. These areas are the back side of leaves and clusters. Water sensitive cards placed in the canopy are a great way to visualize spray coverage.

When I have evaluated spray records for vineyards having disease problems this year, the problem often is not chemical selection or spray interval length. The biggest issue is that some growers are using low carrier volumes during full canopy. In most instances, these growers are using air blast sprayers and carrier volumes are 50 to 65 gallons/acre during full canopy. Higher carrier volumes per acre would result in greater spray deposition or simply put, deposit more spray droplets closer together on the grape tissue. Remember, if the fungicide being applied is a protectant and the disease spore lands where a protectant fungicide has not been deposited, an infection occurs.

The thing to remember is to increase spray carrier volume as the canopy increases.

What to do when you have an epidemic of disease in your vineyard. As we all know, managing diseases in the vineyard is about prevention and seldom is research conducted on rescue disease management treatments. Maybe this is a good thing since powdery mildew has the potential to develop fungicide resistance. Do not reach for FRAC 3 (DMI) or FRAC 11 (Strobies) fungicides in which resistance has been confirmed. For powdery mildew, consider using a knock-out fungicide such as potassium salts or sulfur (only use sulfur on grape cultivars that are not sulfur sensitive. Potassium salt fungicides have no protective qualities and follow-up applications should contain a fungicide that is protective. For an outbreak of downy mildew apply a knock-out fungicide of phosphorous acid followed by or tank-mixed with a protectant fungicide.

More often than not, pathogens that develop fungicide resistance are initially confirmed on grape cultivars that are highly susceptible to the pathogen. With a very susceptible host, the pathogen can have multiple generations during the season. The more spores produced by the pathogen, the greater the chance that just one of those spores is resistant. Simply put it all becomes a numbers game. Applying the same fungicide or fungicides from same FRAC group repeatedly reduces the population of susceptible individuals while the number of resistant individuals increase. Over time all that remains are fungicide resistant individuals.

Pathogens that develop resistance to strobilurin and other QoI fungicides such as Abound, Flint, Sovran, Reason and Pristine (only one component of Pristine, pyrclostrobin) have qualitative resistance. If you applied one of the fungicides above and no control occurred of the pathogen, there is good chance the pathogen may have developed resistance to the fungicide. Do not repeat an application of the fungicide or a fungicide within the same FRAC code. Instead consider applying a knock-down fungicide tank mixed with a protectant fungicide.

A couple things that you need to keep in your mind as the season winds down.

- If you have an epidemic of powdery mildew in your vineyard this fall, the problem will remain and roar back next season. The overwintering chasmothecia that develop as late fall approaches will overwinter in the deep bark recesses of the trunks and cordons. These will be the source of spores (ascospores) next season for primary infection.

- Although harvest may be over in some vineyards, green tissue remains. These tissues are just as susceptible to pathogens even though the grape berries have been removed.

- If you did apply FRAC code 3 or 11 fungicides this year, and observed reduced control of a pathogen, fungicide resistance may have developed and you need to develop a spray plan that incorporates other fungicides for control for 2019.

- If downy mildew is a problem after harvest, mancozeb containing fungicides can be applied as long as the seasonal limit per acre is not exceeded.

SAVE THE DATES

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Updates from Megan Hall, Viticulture Research

Remember to rotate insecticides

There are some preliminary reports from the Finger Lakes region of New York that *Drosophila* (fruit flies) found in a block of grapes exhibiting sour rot symptoms were still present and feeding 24 hours after an application of Mustang Maxx (zeta-cypermethrin), indicating that these flies may have developed resistance to this chemical. Further tests are being conducted to see if this, in fact, the case. Regardless of whether resistant flies are present or not, it is important to practice good management strategies and rotate the use of different insecticides from different IRAC groups, instead of repeatedly applying the same one. Mustang Maxx is in IRAC group 3A (Pyrethroids and Pyrethrins), which also includes the following insecticides labeled for use on *Drosophila*: Baythroid (beta-cyfluthrin), Brigade (bifenthrin), Danitol (fenpropathrin), and Pyganic. It's best to rotate with an insecticide outside of this IRAC group, such as Delegate (spinetoram).

Bitter Rot

On my trips around Missouri this summer and fall doing work with sour rot, I found that many of you are getting pretty good control of sour rot, only to be left with an abundance of a different disease on your fruit. I've taken samples from a few vineyards, of Bitter Rot (*Melanconium fuligineum,* synonym: *Greeneria uvicola*), primarily. The distinguishing characteristic are these black pustules that form on mature grapes (usually over 8 Brix), and eventually leads to mummified berries within a cluster that closely resemble Black Rot (*Guignardia bidwellii*). If you got good sour rot control this year, but noticed a lot of dark, rotted berries that didn't smell like vinegar, I would definitely consider adding some sprays targeting Bitter Rot (such as Mancozeb or Captan) into your spray schedule next year in early to mid-summer. Also, feel free to send them to my lab for diagnosis. My photo below.

Bitter Rot *Melanconium fuligineum* is apparent in many vineyards around Missouri this season. Photo credit:

Cumulative Growing Degree Days for the Seven Grape Growing Regions of Missouri from April 1 to October 1, 2018.

Region	Location by County	Growing Degree Days[1]		
		2018	2017	30 Year Average
Augusta	St. Charles	3820	3797	3513
Hermann	Gasconade	3701	3589	3347
Ozark Highland	Phelps	3896	3887	3567
Ozark Mountain	Lawrence	3918	3834	3577
Southeast	Ste. Genevieve	3829	3821	3553
Central	Boone	3885	3725	3454
Western	Ray	3671	3523	3329

[1]Growing degree days at base 50 from April 1 to October 1, 2018. Data compiled from Useful and Useable at https://mygeohub.org/groups/u2u/tools . Click on link below to determine growing degree days in your area.

To determine the number of growing degree days accumulated in your area since April 1. Use this tool.

Please scout your vineyards on a regularly scheduled basis in an effort to manage problem pests. This report contains information on scouting reports from specific locations and may not reflect pest problems in your vineyard. If you would like more information on IPM in grapes, please contact Dean Volenberg at 573-882-0476 or volenbergd@missouri.edu