Vinews
Viticulture Information News, Week of 8 June 2015
Columbia, MO

Downy and Powdery Mildew

Often confusion exists in identifying grape diseases based purely on appearance. This is especially a true for Downy and Powdery mildew that appear to the naked eye to have similar colored and structured mycelium (dense downy or powdery growth). Determining which mildew problem is impacting your vineyard is important since a number of fungicides only control powdery or downy mildew.

Scouting and Risk

When scouting for downy mildew if you find 2 or more chlorotic, oily spots per 50 vines then your vineyard is at risk. Especially when weather patterns are wet, humid, and warm.

The goal of managing both powdery and downy mildew is to prevent an infection from occurring. Often however, either powdery or downy mildew infections occur even with the best disease management programs. This may result from a sprayer malfunction, weather events prevented timely applications of fungicide cover sprays, large rainfall events washed off protective sprays from grape tissues, or poor spray coverage. Regardless of the reason why an infection occurred, management of the disease is dependent on identifying the causal agent and applying a control strategy.

Identifying downy or powdery mildew based on plant symptomology

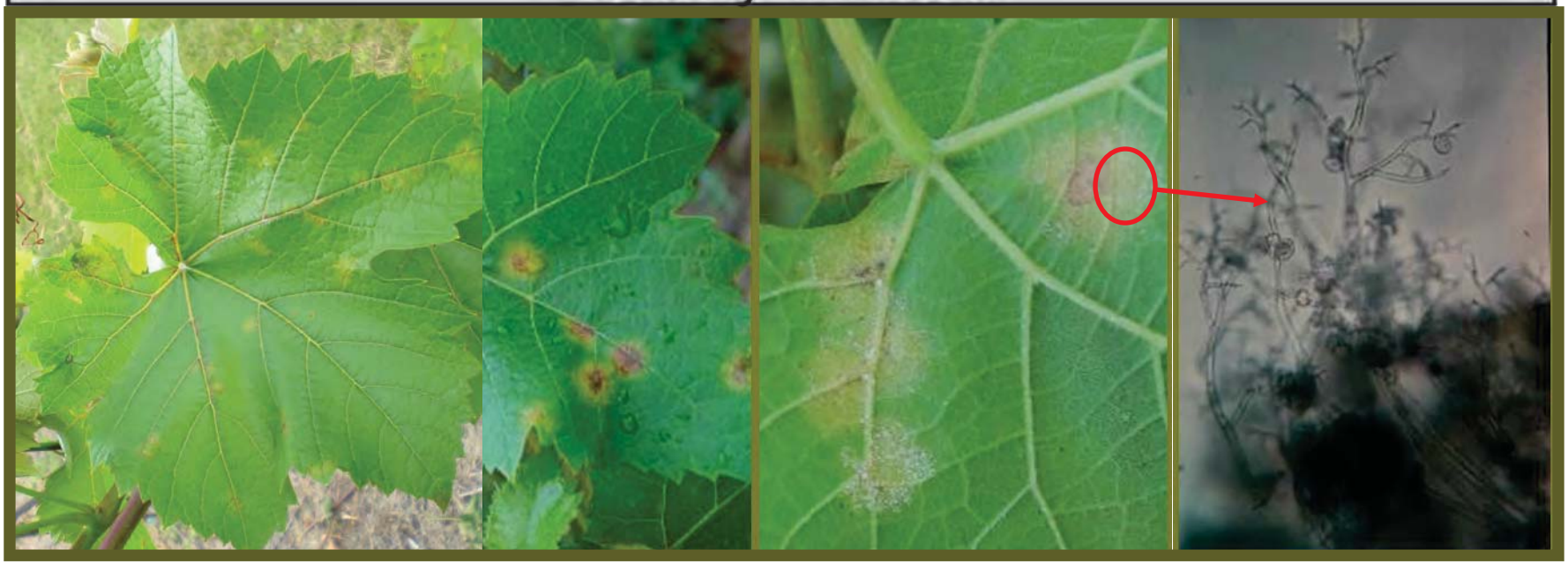
The disease symptoms that first appear on grape tissue are different for downy and powdery mildew. A downy mildew infection on leaf tissues results in yellow, chlorotic, oily spots that appear on the top surface of the leaves. These oil spots will appear different on different grape cultivars based on the susceptibility of the cultivar to downy mildew. For example, on the highly susceptible cultivar such as Valiant the oil spots are typically larger compared to oil spots that appear on a more resistant grape cultivar such as Norton. If the infection has progressed, a white mycelium or “downy” patches develop on the bottom of a leaf. Downy mildew will only form white mycelium or “downy” patches on the bottom of the leaf since that is where stomata are located. The stomata are where downy mildew starts the infection process. Grapes leaves do not have stomata on the top surface of the leaves unless the leaves are galled by foliar phylloxera. Foliar phylloxera takes over the grapes physiological processes and this results in stomata forming on the top surface of grape leaves. These stomata on the top surface of grape leaves can result in downy mildew infections and the development of downy mass on the top surface of grape leaves. Obviously this compounds the problem of identifying powdery or downy mildew in vineyards that are also impacted by foliar phylloxera.

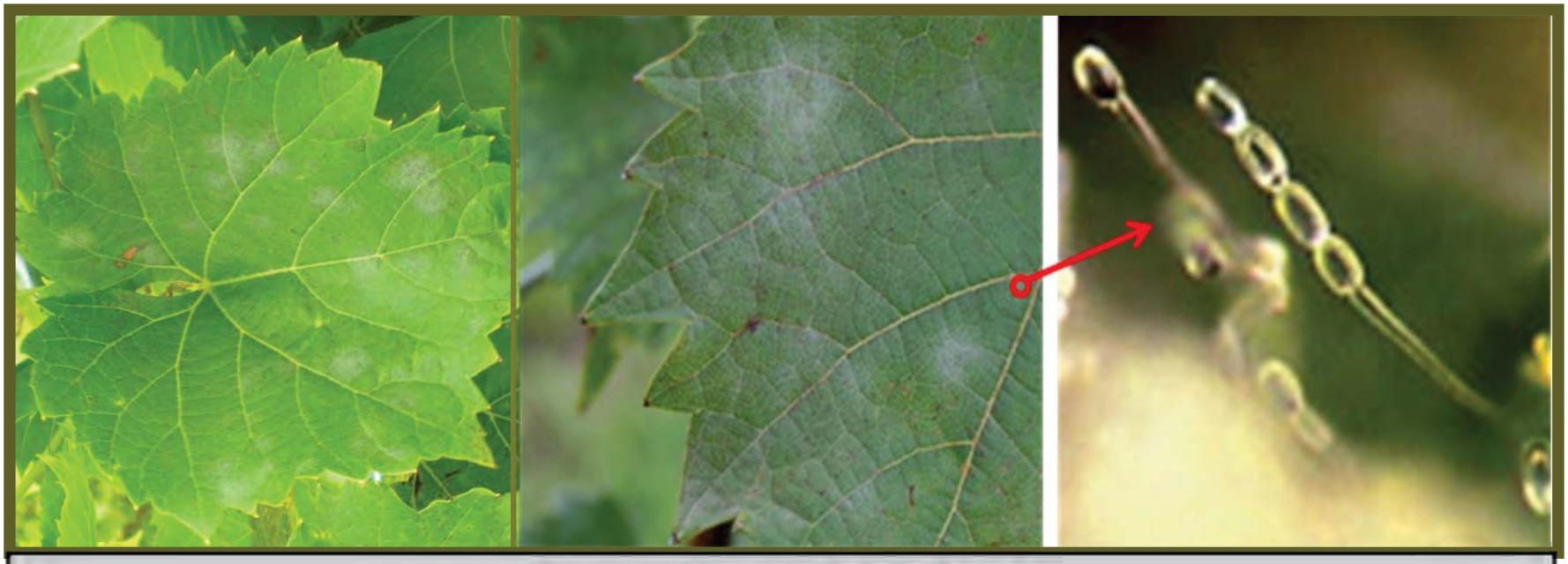
The first symptoms of powdery mildew that are visible are the white mycelium or “powdery” patches that can occur on either the top or the bottom of a leaf. If you see white mycelium or “powdery” patches on the top of the leaves then you likely have powdery mildew. When scouting for powdery mildew, look at leaves within the interior of the canopy that are shaded. The powdery mildew fungus seldom will be found on leaves directly exposed to intense sunlight since sunlight is detrimental to powdery mildew.

A sure way to differentiate downy mildew from powdery mildew is to exam the fruiting structures using hand lens or a compound microscope. Downy mildew fruiting structures look like a small tree with several branches and attached to these branches are single, round spores or sporangia. In comparison, powdery mildew will have a single stalk (conidiophore) with several barrel shaped spores (conidia) stacked on top of each other (See page 2 for pictures).

Continued on page 5

Downy Mildew





Powdery Mildew

Comparison of downy and powdery mildew

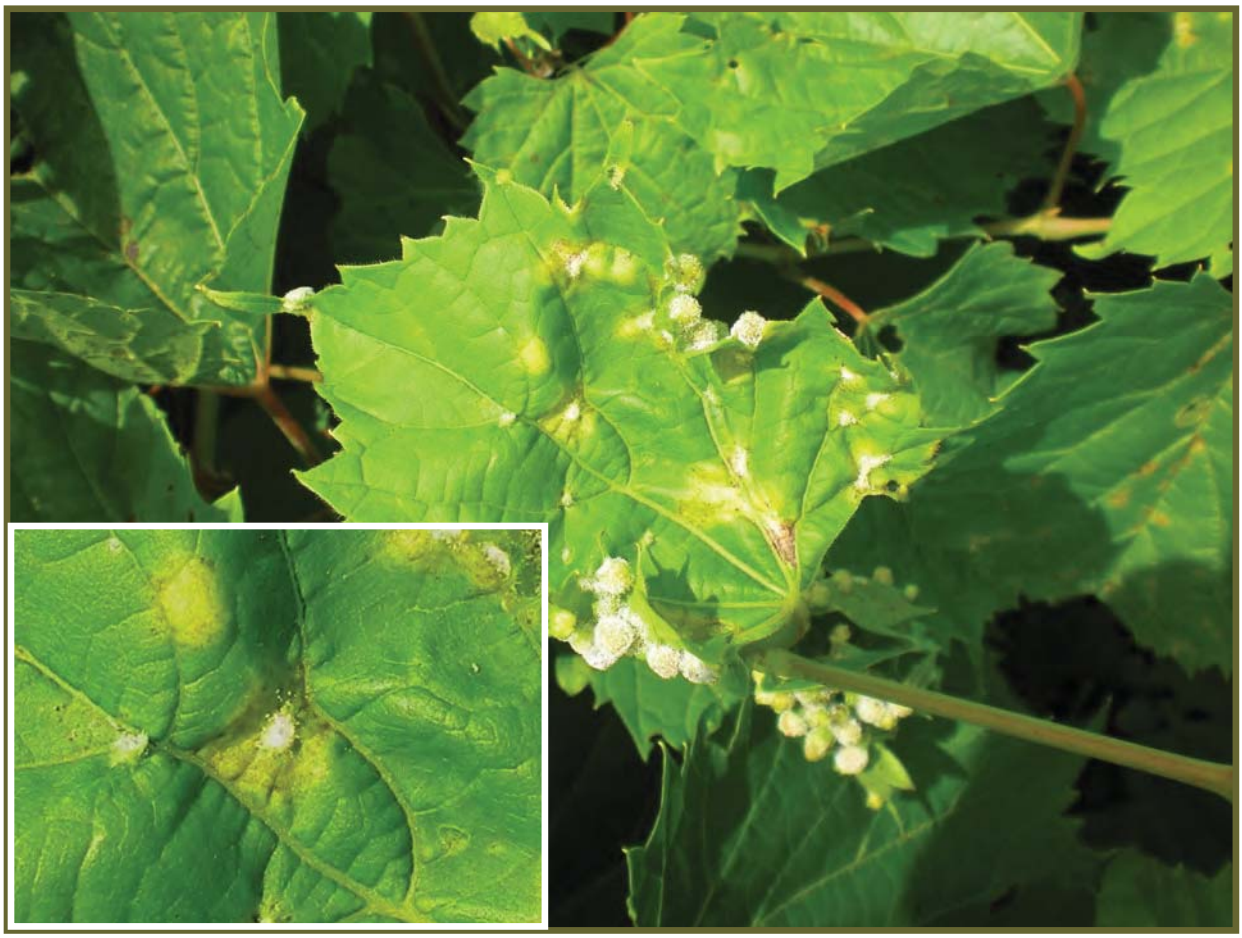
	Powdery mildew	Downy mildew
Site of infection	(A) Both sides of leaf (B) Grows on leaf surface	(A) Only infects bottom of leaf (B) Grows inside of leaf
Environmental conditions for infection	(A) High humidity but moisture such as rainfall detrimental to spores (B) Optimal (68 to 77° F) but ranges (59 to 90° F) (C) Low diffuse light conditions favor development	(A) High humidity and free moisture in the form of rainfall or dew needed for infection (B) Optimal (64 to 76° F) but ranges (54 to 86° F)
Tissue infected	(A) All green tissue (B) Berries susceptible until 3 to 4 weeks post bloom (C) Leaves and green tissue susceptible throughout season	
Spore transmission	Wind	Splashing water
Symptoms	(A) Circular spots that are not limited by leaf veins (B) Advanced infections will cover leaves with thick web of spores, leaves turn yellow and may fall off (C) Spores produced in a single chain on a single stalk	(A) Angular spots that are limited by leaf veins (B) Grey/white fuzz on undersides of leaf, top of leaf has yellow blotches that look “oily” (C) Spores produced singly on end of branched stalks
Potential problem periods	Dry periods during the growing season	Wet periods during the growing season
Highly susceptible grape varieties	Leon Millot, Seyval, Vignoles	La Crescent
Management –Cultural	(A) Reduce shading in canopy by; 1) shoot positioning and 2) leaf removal	(A) Reduce tissue wet period by: 1) site selection, 2) vine spacing, 3) control tall weeds, 4) shoot positioning, and 5) leaf removal (B) Sanitation–remove fallen leaves and fruit from vineyard
Essential Management Period	Start of bloom to 4 weeks post bloom. Use the best fungicides within your budget for immediate pre-bloom to post bloom	
Management challenges	Alternate strobilurins (Abound, Sovran, Flint) with other chemistries from spray to spray or tank mix with sulfur. Follow a similar strategy with the sterol inhibitors Endura and Quintec. Only use strobilurins two times during the season. Note: Flint has poor efficacy on downy mildew.	

Downy mildew can take many forms and at times may appear more like powdery mildew as in the case with diffuse downy mildew.

Diffuse Downy Mildew.
Photo credit: Patty McManus, UW-Madison.

Typical Downy Mildew.
Photo credit: Patty McManus, UW-Madison.

Downy mildew can cause infection only where stomata are present. Grape leaves only have stomata present on the bottom surface. However, when grape leaves are galled by foliar phylloxera, this results in stomata forming on the top surface of grape leaves. This presents another avenue for downy mildew to infect grapes as the galled leaves show below.



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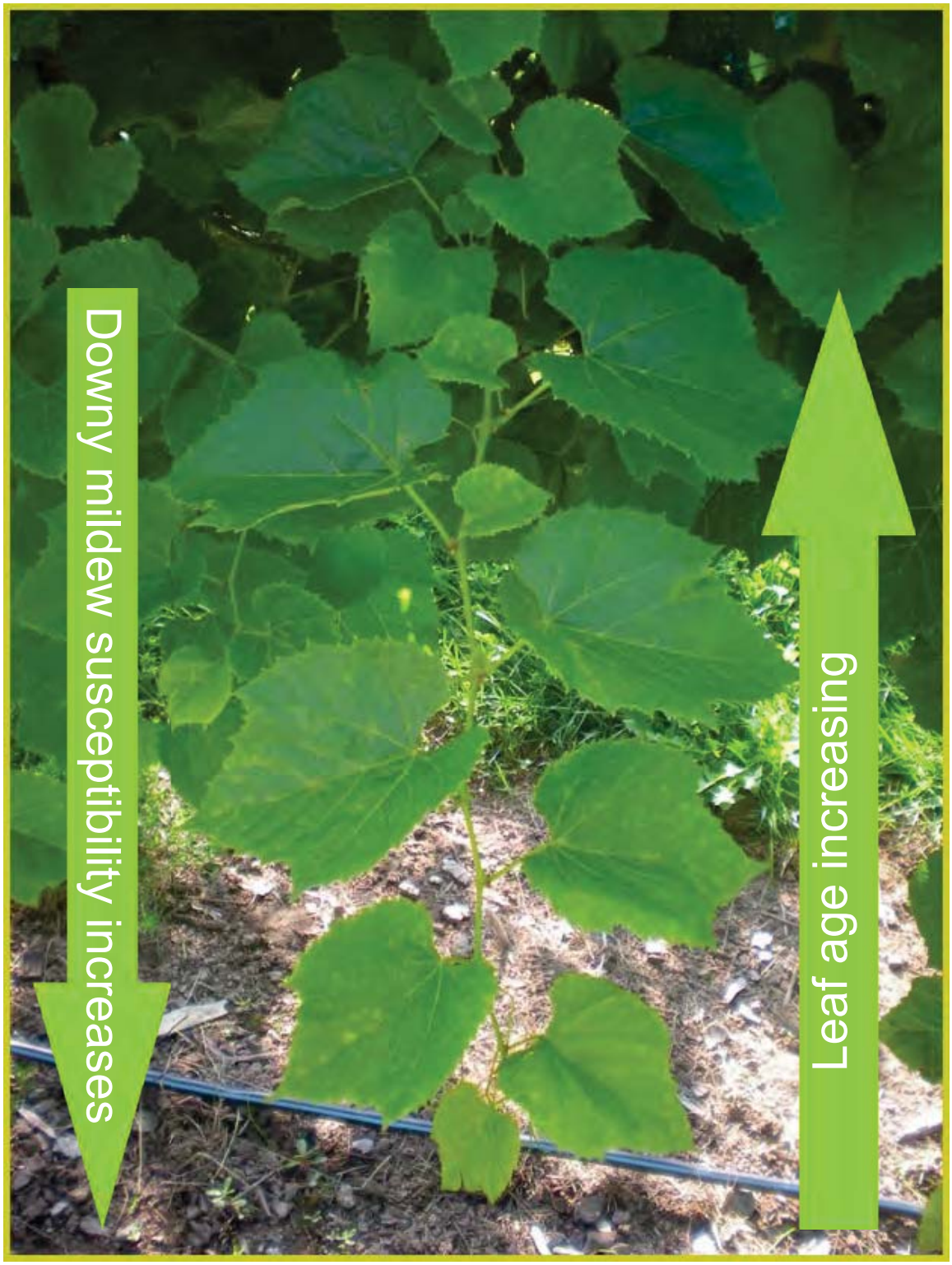
Downy Mildew

There are a number of fungicide options to protect grapes from downy mildew. See page 18 of the 2015 Small Fruit and Grape Spray Guide. Take the time to scout your vineyard at a minimum of once per week. Grape plant tissues are most susceptible to infection when the tissue has extended wetting periods. However infection periods are also temperature dependent and an infection can occur when leaf wetness periods are as short as 2 hours at 77° F.

Powdery Mildew

Similar to downy mildew there are many fungicide options to control powdery mildew. These can be found on page 17 and 18 of the Spray Guide. Consider using Potassium salts if powdery mildew colonies have formed to “burn” out the colonies. It is important to follow-up with an application of protectant fungicide since potassium salts have no protectant activity.



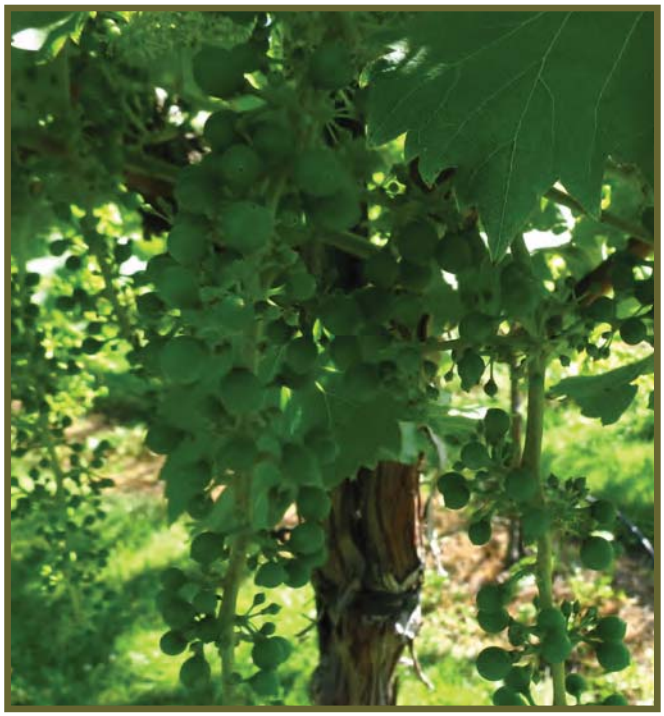
Young leaves are more susceptible to downy mildew than fully expanded mature leaves. Photo credit: Dean Volenberg

From the Mailbag: What growers are seeing in the vineyard.

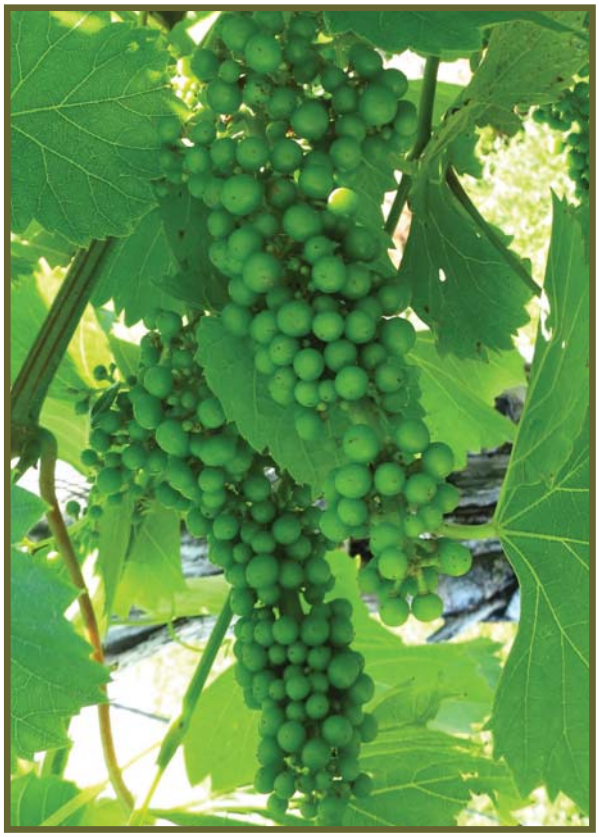
The Norton leaf pictured is showing symptomology of magnesium deficiency. The leaves of Norton typically will have interveinal chlorosis starting at the leaf margins. Often magnesium deficiency is the result of potassium and magnesium being out of balance. In the soil solution a competition for uptake exists between the cations; potassium, calcium, and magnesium. An application or two of magnesium sulfate (Epsom salt) should remedy the situation. Also recommend petiole sampling and soil sampling at veraison to determine nutrient status.

The leaves pictured above are showing symptomology that I believe is from herbicide drift. The symptoms are interveinal and appear to mimic a nutrient deficiency. However, nutrient deficiencies do not cause bleaching. The symptomology is likely from some type of carotenoid inhibiting herbicide that results in the destruction of the chlorophyll. There are number of carotenoid inhibiting herbicides, one example would be Callisto that contains the active ingredient mesotrione.

Phenology from Gasconade County



Chambourcin 50 inch shoots and buckshot to pea –sized berries on June 8, 2015. Gasconade County



Vignoles 50 inch shoots and approaching bunch closure on June 8, 2015. Gasconade County

Cumulative Growing Degree Days for the Seven Grape Growing Regions of Missouri from April 1 to June 8, 2015.

Region	Location by County	Growing Degree Days[1]		
		2015	2014	30 Year Average
Augusta	St. Charles	956	962	895
Hermann	Gasconade	879	896	852
Ozark Highland	Phelps	987	1001	915
Ozark Mountain	Lawrence	952	1000	897
Southeast	Ste. Genevieve	986	1014	932
Central	Boone	894	890	854
Western	Ray	840	898	819

[1]Growing degree days at base 50 from April 1 to June 8, 2015. 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, click this link Search for GDD at your location using 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

A quick note on Grape Berry Moth

Presently we have accumulated between 445 GDD (Gentry County) and 540 GDD (Cape Girardeau County) at a base temperature of 47 since May 15. May 15 was selected as the biofix date based on the blooming of wild grape. A total of 810 GDD at base 47 are needed to complete a generation of GBM according to MSU entomologist Rufus Isaacs. I will keep you updated as we near the second generation which will occur at 810 GDD at base 47.

If anyone has phenology data on when wild grape bloomed in their area, please send the information in an email to me.