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Viticulture Notes

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I. January 2018 cold:

A recent question from the field about early January cold was repeated by several growers attending the pruning workshop that we recently held at Glass House Winery in Albemarle County. Reports of vineyard temperatures in early January were in the 0 to -10°F range, although most of the reports that I heard were of temperatures that remained above -6°F. We found little or no cold injury on varieties that included Cabernet Sauvignon, Merlot, and Viognier. But, as stated in a recent Viticulture Notes update, it would be well worth taking the time to do some bud checks before you finish dormant pruning. And while the immediate forecast looks favorable for mild weather, we have had damaging cold in Virginia well into February in the past. Enjoy the reprieve from the brutal cold while it lasts though.

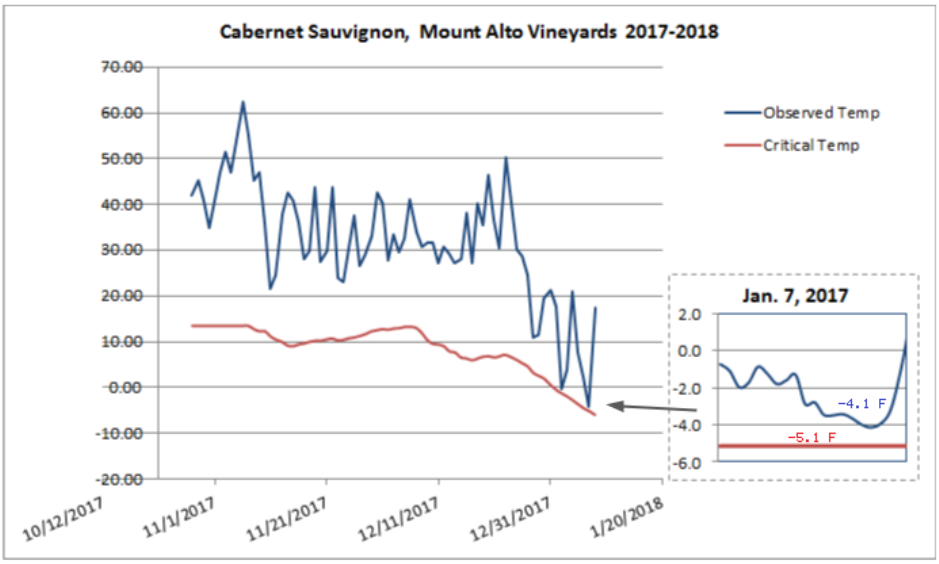
The early January cold led to an email exchange with a central Piedmont grower, Robert Burgholzer. Robert made use of a cold hardiness model developed at Washington State University to come up with a prediction of how cold hardy his Cabernet Sauvignon grape buds might be in central Virginia given the prevailing temperatures of fall and immediately before the cold temperature extremes of the period from 2 – 7 January 2018. We've used the WSU model in the past for similar purposes and have found that it does a reasonably good job of predicting acclimation and mid-winter cold hardiness, although it would require more local fine-tuning to accurately monitor deacclimation. See recent examples of the model applied to Virginia growing conditions in the February 2015 and December 2015 Viticulture Notes. For those relatively fresh to the contest of potential winter injury, the above-linked, February 2015 article on cold hardiness might be of interest to you.

Robert shared his story with me and I asked if he'd mind if I included it in this Viticulture Notes, which he graciously did, as follows:

Background: Sub-zero temperatures in early January had us a bit on edge, reminding of February 2015 when we saw temperatures down near -10°F at our vineyard in Central Virginia, and suffered widespread bud damage in a 2nd year vineyard block, with crown gall apparent in nearly 20% of the vines by year 3. When our weather station showed temperatures down near -5°F last week, we were feeling gun shy and wondering if we should be tweaking pruning strategies this winter and shoot thinning this spring. Not entirely confident in my ability to inspect buds for damage and really know what I am seeing, I decided to run a cold-hardiness model.

The Cold Hardiness Model: Washington State Viticulture and Enology program studies cold hardiness to determine the ways in which winter temperatures to date affect the grapevines' abilities to withstand extreme lows, in essence: the colder the winter, the hardier the tissues. If you have a record of mean daily temperatures since September, their model will estimate the "critical temperature" beyond which 50% bud loss is expected (for DIYers, you can request the model here: http://wine.wsu.edu/extension/weather/cold-hardiness/model/).

Figure 1 shows the results for our vineyard; we were within 1° of the critical temperature twice during the first week of 2018, bottoming out at -4.1° on the 7th. This suggests that we were still in the safe zone, but to be sure we headed outdoors anyhow.



Sampling and Modeling: Thankfully, a sample of 30 buds and several canes from various spots in our vineyard showed no obvious cold damage. But we might ask, if we can just sample the buds, why bother running a model? I think that models can be useful to:

1. Save time - sampling/analyzing buds takes time, and the larger the farm, the more work.
2. Fill in the gaps - if you're unsure of your ability to interpret what you get out in the field, or don't have time to sample everywhere, models can help you interpret what you see.
3. Alert us to situations we might not otherwise recognize -- for example, this winter has been a cold one, but what did that warm spell during mid-December do to the vines?

Robert Burgholzer is part of the team at Mount Alto Vineyards in Albemarle County and assists Dr. Mizuho Nita with the grapeipm.org website when he's not busy running water supply, drought and aquatic biology models for the state of Virginia.

2. Spotted Lanternfly notes

Appreciation to Ms. Dana Melby, agricultural research technician at the AHS Jr. AREC who took notes on this keynote address at the recent Cumberland-Shenandoah Fruit Workers Conference in Winchester, VA, 30 November 2017. The address was presented by Sven-Erik Spichiger, entomology program manager, Pennsylvania Department of Agriculture. Coincidentally, I had the opportunity on Friday, 19 January to visit a stone and block company site in Winchester where staff from the Virginia Department of Agriculture and Consumer Services had found Spotted Lanternfly egg masses in early January. In addition to the egg masses, which were observed on Tree of Heaven trunks, we saw a (dead) adult spotted lanternfly as well. Thus, in addition to the original site of infestation in Pennsylvania, and the more recent occurrence in Delaware and New York, the Spotted Lanternfly is also now in Virginia. We've been aware of this invasive pest for the last two years and have anxiously watched as Pennsylvania's Department of Agriculture and others have studied the insect and attempted to keep it quarantined to the original detection site in eastern Pennsylvania. It is apparent at this point that like brown marmorated stink bugs and emerald ash borers, we have a new invasive insect pest threatening forestry and agriculture in Virginia. I've asked Dr. Doug Pfeiffer, fruit entomologist with Virginia Tech, to provide an update on Spotted Lanternfly at the upcoming VVA winter technical meeting (23-24 February 2018).

Spotted Lanternfly (*Lycorma delicatula*) is native to Southeast Asia, but gained attention in the US when it was discovered as an invasive pest in Berks County Pennsylvania. The insect is a planthopper (Hemiptera, family Fulgoridae). It was introduced into South Korea in 2006 and by 2009 was found throughout the southern Korean Peninsula where it had become a major pest of grape and peach. First identified in Pennsylvania in 2014 on a damaged Tree of Heaven (*Ailanthus altissima*), its range in Pennsylvania is expanding and it has now been identified in Delaware and New York. A quarantine is in place for affected areas in Pennsylvania and eradication attempts are currently underway. Its preferred host is Tree of Heaven but it feeds on over 70 other plant species. Agricultural crops that are most likely to be impacted are hops, grapes, peaches, and apples; however, there are damage reports from it feeding on basil, cucumber, horseradish, and blueberry as well. These planthoppers are phloem feeders and the feeding can weaken and ultimately kill host trees and grapevines. In addition, the heavy feeding produces a massive amount of honeydew which the insects excrete on a daily basis. The honeydew causes sooty mold to develop on affected surfaces, including fruit, trunks, and ground cover.

Spotted lanternfly adults on grape in Berks County, PA in October 2017. Photo: Erica Smyers, Penn State

Pennsylvania's hardwood exports are also being negatively affected. Spotted Lanternflies are heavily feeding on walnut, oak, maple, and hickory, which is causing flagging of shoots and tree dieback. It has also been found on alfalfa, corn, and soybeans, but does not appear to cause as much damage on these agronomic crops.

There is one generation per year, without a winter diapause. There would likely be a lack of defined generations in more southerly regions. Females lay egg masses

containing 30-50 eggs starting in September with peak egg laying in October. Females are capable of laying multiple egg masses. Both sexes are capable of mating multiple times. The egg masses look similar to a mud splash and it is not easy to gauge the number of egg masses because they are often hidden under bark and in cracks. The adults die off after the hard frosts of fall. The egg masses overwinter and begin hatching in April. The immature insects go through four instars before becoming adults in July. The adults feed on a number of plants, but require a period of feeding on Tree of Heaven around the time they begin mating.

The pregnant females are most likely to "hitch hike". This is of particular concern because of the number of tree of heaven lining railroad tracks and the propensity of females to lay eggs on wood and rusted metal. Egg masses have been found inside apple bins, which may limit the transport of apples out of quarantined areas. They also demonstrate swarming behavior and can hide in clothing and vehicles.

Scraping egg masses can be helpful in keeping numbers down, however the masses are often hidden and may go unnoticed. The immature life stages go up and down tree trunks every day. Applying a sticky band around the trunk can be an effective trap, albeit laborious to apply to many trees. Also employing a technique of selectively leaving a few male tree of heaven trees in a woodlot that has been cleared of tree of heaven to be trap trees and then applying insecticide around mating time has shown promise. Eradicating tree of heaven appears to disrupt the Spotted Lanternfly life cycle. There has been no known transmission of disease with Spotted Lanternfly to-date; however, feeding damage can leave trees/vines more vulnerable to disease.

Virginia Cooperative Extension has a recently posted factsheet on Spotted Lanternfly, available here: https://pubs.ext.vt.edu/ENTO/ENTO-180/ENTO-180.html

It's worth looking at some of the Web-based resources that include photos of the egg masses, nymphs and adults of Spotted Lanternfly.

https://extension.psu.edu/spotted-lanternfly-on-grapes-and-tree-fruit

http://www.readingeagle.com/news/article/spotted-lanternfly-moves-from-pest-to-plague

3. Revised soil liming recommendations

With the advent of 2018 the Wine Grape Production Guide for Eastern North America marks its 10th year since publication. While the bulk of the information contained within the guide remains relevant and accurate, there are some things that have changed over the 10 years since its release. For example, in 2016 we modified our potassium fertilization recommendations at least for Virginia, given our greater appreciation for the potassium availability of most of our soils. Virginia Cooperative Extension soil report recommendations now limit the recommendation for added potash to vineyard soil reports that test low (low+ to low-) for potassium; soils that test at the moderate or above level of potassium do not have an added potassium fertilizer recommendation. Additionally, it has recently come to my attention that the lime recommendation table (Table 8.3, page 153) in the nutrition chapter is understating the amount of lime needed to correct acidic soil. Former graduate student David Sheldon brought this to my attention this past fall when he noticed that the current Virginia Cooperative Extension (VCE) Soil Test recommendation for lime was greater than what was recommended based on the matrix in Table 8.3, which generates a lime

recommendation based on the starting pH as well as soil Cation Exchange Capacity (CEC). Table 8.3 was included from recommendations originally published by A&L labs (now Waypoint Analytical). The methodology used today by Waypoint Analytical for lime recommendations is somewhat different from that used 10-15 years ago (basis for Table 8.3). To further complicate matters, the methodology used by Waypoint is also different from that used by the Virginia Cooperative Extension lab. While it's instinctive to ask, "Which is the correct method?" there is not an easy answer. Both labs calculate both soil pH and soil *buffer* pH. Soil pH is a measure of the soil solution active acidity and is based on the concentration of hydrogen ions in the soil solution. A pH of 7.0 is neutral, less than 7.0 is acidic, and greater than 7.0 is alkaline. As acidity increases, soil pH decreases. The buffer pH is an index of the soil's ability to resist a change in pH and is measured by mixing the soil sample with a buffer solution. The VCE lab uses a Mehlich buffer while the Waypoint lab uses the SMP (Shoemaker, McLean, Pratt) buffer. The SMP buffer tends to yield a slightly greater (higher) buffer pH value than does the Mehlich buffer and this contributes in part to the differences in lime recommendation between the two labs, with the Waypoint recommendations being slightly lower. The VCE lime recommendation also incorporates a multiplier (1.25%) which automatically results in a 25% increase in the tons of lime/acre recommendation. The reason for this adjustment is that the analytical results of the lab are based on pure (reagent grade) calcium carbonate. Ag lime, however, is not pure $CaCO_3$, but is closer to 25% less reactive than pure calcium carbonate, hence the upward adjustment of lime recommendation. The VCE recommendations further refine the lime rate specific for either dolomitic lime vs. calcitic lime depending on the analysis of soil's magnesium and calcium content; if neither element is particularly low, the recommendation defaults to "ag lime".

The Virginia Tech lime recommendations are pretty straight-forward, and will replace those given in the table of the Wine Grape Production Guide using the following formula which is specific for a target pH of 6.5. The rates assume that the lime is intended to neutralize acidity within a 6- to 8-inch depth of soil (more lime would be needed if the lime is incorporated more deeply than this). More details of this can be found in the VCE soil test recommendations for Virginia.

Lime recommendation (tons/acre rounded to nearest 0.5 ton) = (71.74 – (11.18*buffer_pH)*0.5)*1.25

The soil pH is used to determine if a lime application is needed; no lime is applied until the soil pH is 0.3 or more units below the target soil pH. Thus, if we use 6.5 as the benchmark soil pH, lime would not be recommended if the soil pH is at or above pH 6.3. The *amount* of lime is determined by the buffer pH. If we had a soil sample with a pH of 5.6 and a buffer pH of 6.19, the VCE lab would recommend 1.5 tons of lime as follows:

Lime rate (tons/acre) = (71.74 – (11.18*buffer_pH)*0.5)*1.25
= (71.74 – (11.18*6.19) *0.05)*1.25
= (71.74- 69.20) * 0.5) * 1.25
= 1.5 (rounded from 1.59)

Again, Waypoint Analytical uses a somewhat different approach to lime rate recommendations but the recommendations come reasonably close to the VCE soil lab recommendations, albeit somewhat lower because the adjustment for calcium carbonate equivalency (CCE) is not used.

My take-away from this reassessment of Table 8.3 of the Wine Grape Production Guide is as follows:

- Two different soils labs may very well produce two different soil lime application recommendations using the same soil sample, although the differences should not be significantly different where up to 3 tons of lime/acre are recommended.
- the differences in lime recommendation might, however, become much greater as the lime recommendation increases (>3 tons/acre). Note, more than 2.0 tons of lime per acre, in one application, is rarely recommended with established vineyards. To do so may induce potassium deficiency symptoms.
- The lime recommendations shown in Table 8.3 of the WGPG are definitely lower than would be recommended with current lab methodologies and particularly with the inclusion of a CCE correction (e.g., 1.25% increase in recommended lime rate); don't use this table to formulate lime application rates for Virginia vineyards.
- The soils lab that you choose to use will provide a calculation of the recommended rate of lime. You needn't perform the calculations yourself, but the detail for the VCE lab is shown here should you wish to use other target pH values, or you know that the purity of the limestone (ag lime) is greater than 75% calcium carbonate.
- Other aspects of liming are covered in more detail in the Wine Grape Production Guide.

4. Review of upcoming VVA meeting

The annual Virginia Vineyards Association's winter technical meeting is just around the corner and there's something in the program that should be of interest to any wine grower in Virginia. This is an "on" year for private pesticide applicator's recertification so in addition to the pest management updates, there will be some obligatory safety and legal issues as part of the program. Several major themes are labor issues, nitrogen issues in the vineyard and winery, and a review of some of the Winemaker's Research Exchange work. The full agenda and registration information is available on the Virginia Vineyards Association website: http://www.virginiavineyardsassociation.com/?

The half-day program on Thursday, 22 February offers three tracks, one of which is simply called "Viticulture 201". The purpose of the Viticulture 201 series is to provide advanced course content to wine grape growers and to provide a forum for questions and answers of the audience and the instructional team. Hence, we are calling the lecture series "Viticulture 201" to denote the more advanced content. Our intended audience is experienced producers and vineyard mid-management employees who seek a deeper level of knowledge about topics that are only superficially covered in our more basic, beginning grape growing seminars (which we've conducted in each of the last several years). These might be producers who have several years of production experience, or those seeking a contemporary refreshment of concepts once learned. Similarly, the content is not intended to take the place of current or "cutting edge" research topics that might form the basis of the subsequent annual technical meeting. The 2018 presentation topics will include the following:

- Contemporary vineyard design
- Advanced canopy management
- Crop estimation and crop level/quality relationships
- Advanced vine nutrition
- Advanced disease management strategies

Feel you have a good understanding of these topics already? That's great. I'd suggest the Governor's Case wine discussions as an alternative track. But if you're relatively new to wine growing and these areas are a bit murky yet, you might want to spend some time with us.

5. *Vineyard Advisor* mobile app

A free, mobile iPhone and Android application for vineyard managers is available. *The Vineyard Advisor* provides recommendations for managing some 350 problems afflicting grapes nationwide, from diseases, insects, mites, nematodes and wildlife, to environmental stress, physiological disorders and weeds.

The Vineyard Advisor began as a project funded by the American Vineyard Foundation in 2014, which produced a working prototype. Subsequent funding from the State of Texas supported development of the fully functional mobile app.

Ed Hellman, Professor of Viticulture at Texas Tech University, led development of *The Vineyard Advisor* while holding a joint appointment as Viticulture Extension Specialist with Texas A&M AgriLife Extension. Dr. Hellman is now full-time with Texas Tech, based in Fredericksburg where he is leading expansion of viticulture and enology teaching and research programs in the Texas Hill Country.

Two search options are available to the user: search *The Vineyard Advisor* database for grape problems, or search for pesticides labeled for use on grapes. The pesticide search can be done by product name or active ingredient. Customized links are provided to the user's state agricultural extension service and pesticide regulatory agency based on the user's location. *The Vineyard Advisor* is available at the App Store for iPhone and Google Play for Android users.

6. Other upcoming meetings: (details will follow)

16 March 2018
Pruning workshop at Breaux Vineyards (Northern Virginia)

10 April 2018
Vineyard IPM workshop at Early mountain Vineyards (Central Virginia)

6 June 2018
"Beginner's" Grape Growing workshop
Virginia Tech's AHS Jr. Agricultural Research and Extension Center, Winchester VA

7. Viticulture internship available

Note: I'm happy to post announcements of internships that are available here in Virginia and elsewhere. With Virginia Tech's Food and Beverage Fermentation option in Food Science and Technology, and the Viticulture minor in Horticulture, vp[we have an increased interest in undergraduate student placement in both vineyard and winery internships. If your vineyard/winery has internships available, please share the details with me (TKW).

ABACELA VITICULTURE-ENOLOGY INTERNSHIP

Timeframe- June 15th - November 15th, 2018 (5 months)

Abacela is a 76 acre Oregon estate winery (www.abacela.com) that pioneered the production of Tempranillo and Albariño as varietal wines in America. We specialize in grapes and wine styles indigenous to the Iberian Peninsula. The vines are sustainably managed with limited inputs and are hand-harvested. This internship is an opportunity learn and experience the science and art of grape growing in a family owned vineyard and winery that grows and harvests about 200 plus tons of fifteen different grape varieties for the annual production of 12,000 cases of wine.

ESSENTIAL DUTIES AND RESPONSIBILITIES:

- Soil moisture reading downloads, entered in computer and discussed with vineyard manager
- Leaf Water Potential (Pressure bomb) data entered in computer and discussed with vineyard manager
- Assist with vineyard scouting, monitoring and data collection
- Cluster counts, weights and crop load estimates
- Harvest sampling computer data input and analysis
- Harvest crew support to include picking, delivery of fruit to on premise winery, machine application and removal of bird netting
- Other duties may be assigned

QUALIFICATIONS:

- Viticulture majors preferred but please note this in an integrated viticulture/winemaking internship
- Must be able to work mid-June to mid-November
- Tractor driving experience is good and experience operating large equipment a bonus
- Must have a valid driver's license and clean DMV record
- Must be a team player, have a strong work ethic, and skills in spoken and written English
- Students whose primary language is not English must have at least conversational English
- Must be able to work long hours, up to 6 days a week, in different kinds of weather, etc

PHYSICAL DEMANDS:

- Ability to listen, follow directions and carry out the project accurately to completion
- Ability to walk distances, including steep hillsides
- Ability to lift 50 pounds
- Non-smoker

Stipend is $2000/month. Housing is not provided. Assistance provided to international students to locate housing. If interested, contact Earl Jones of Abacela Vineyards and Winery:

earl@abacela.com
Mobile (541) 430-1733
www.abacela.com