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Viticulture Notes

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I. Current situation:

Each Spring I watch the sunrise advance north along the Massanutten Mountain from my vantage in Shenandoah County until reaching a point just beyond Signal Knob. It is now slowly but inexorably starting back to the south. The solstice heralds the end of sweet cherries and strawberries, but the start of early peaches. In the vineyard, the summer solstice generally marks “cluster closure” for us in the northern Shenandoah Valley, the advent of Japanese beetles, and the second generation of grape berry moth. Much to watch for. We also move into a more typical “summer” pattern of weather in which warm/hot, humid days can spawn pop-up thundershowers that locally drench some areas and completely miss others. It’s been awhile since I could say this, but we’re actually seeing the grass starting to brown here at the AREC. We had an inch of rain in April, about 2 inches in May, and less than a half-inch thus far in June – northern Shenandoah Valley living up to its record of one of the driest areas of the state. Much of the moisture appears to be wrung out of the atmosphere in the Midwest and Ohio Valley before reaching us. This has made our disease management efforts far easier than what we experienced last year. Aside from the previously mentioned issues with winter cold damage, we’ve fielded several calls about poor fruit set on Traminette, especially where the vines are vigorously growing (just about anywhere Traminette is planted). And again, Japanese beetles are making their annual appearance and we’re starting to see the second generation of grape berry moths in traps.

II. Crop estimation:

With canopy management hopefully caught-up, we are turning attention to crop estimation in bearing vineyards. The following is a very brief reminder/summary of crop estimation that is covered as an entire chapter in the Wine Grape Production Guide for Eastern North America. I’ll hit the major points here. If you’re new to crop estimation, you might ask Why do it? Presumably you plan to use the 2019 crop in your winery, or you plan to sell the crop to someone else. Either way, it will be decidedly helpful to have a reasonably accurate assessment of how much crop to anticipate at harvest. Now that fruit set has occurred, crop estimation can be done by using some data collected this summer and some historical cluster weight data that you’ve hopefully been collecting over time if your vines are mature. Otherwise, you’ll need to

make an educated guess as to what the anticipated cluster weights will average for your variety(ties) [we can give you some guidance]. Another reason to gauge crop level in late-June or July is to know how much crop reduction should be implemented if you know that the crop potential exceeds your goals for fruit/wine quality potential. For example, targeting 1.0 to 2.0 pounds of crop per foot of canopy is a generally acceptable, albeit somewhat broad benchmark for "acceptable" crop levels across many varieties. Yes, that might be higher or lower than what you aim for, but that's why you should do the cluster counts, set the crop level of your choosing, and evaluate the results.

The basic requirements for estimating crop are as follows:

- a record of average cluster weights from previous harvests and lag-phase cluster weights if using that parameter to refine your estimate (see below)
- an accurate count of sampling unit per acre (or missing units per acre). "Units" might be bearing vines per acre or panels of canopy per acre if vine space is non-uniform. *A "panel" is the row distance between two consecutive line posts*
- an accurate count of clusters per sampling unit (again, most often by vine or by panel).

Crop yield is a summation of components of yield including berry weight, berries per cluster, cluster weight, clusters per shoot, shoots per vine, etc. These components of yield can be partitioned into two major pools:

- Components set in previous year/or at dormant pruning which determine clusters per acre, including vines per acre, nodes retained per vine, shoots per node, clusters per shoot (fruitfulness)
- Components determined in current season, which will determine average cluster weight, including flowers per cluster, berries per flower (set), and berry weight.

Each of the above components is associated with some degree of variability, which collectively reduce the accuracy of our crop estimation. For example:

Vines per acre: Attrition due to disease, winter injury, or other factors can reduce the number of vines from those originally planted. A first step would be accurate assessment of bearing units per acre. Calculate the percent missing "units" (eg., vine- or panel-basis) and deduct this percentage from estimate of crop assuming 100% vine stand or trellis-fill.

Nodes retained per vine: Will vary depending on uniformity and severity of pruning. Will vary from variety-to-variety depending upon crop expectation.

Shoots per node: Some variety and pruning differences. Winter injury can lead to < 1 shoot per node. GDC training has led to >1 shoot per node (due to enhanced light environment). Spur-pruning also often leads to > 1 shoot per retained node.

Clusters per shoot: Varietal differences, cane vs. spur-pruning, light and temperature regime of developing buds in previous season, bud necrosis, and previous season's crop level will all affect this variable.

In practice, we count clusters per vine to estimate crop, rather than the last three items. Let's fast-forward here. We're going to use our average cluster count per vine (our unit of measure for this discussion), and multiply that by an average cluster weight to generate an average crop weight per vine. We'd like to minimize the variation in our estimate of clusters per vine and this will require sampling a number of vines.

Use a grid-pattern in vineyard block, based on 10 to 15 vines per block. For example, we might count the clusters on every 20th vine in every 10th row. The more vines (or other units) counted, the closer our estimate of the mean will be to the true population mean. Count any cluster that you would anticipate being harvested.

Some factors that affect cluster counts are:
- winter injury, crown gall, canker rots, spring frost, climbing cutworms…. The more variability that you see with cluster counts, the more sampling might be needed.
- bud necrosis (e.g., Viognier)
- bud shading during previous season
- variety and clone

The inherent variation in average cluster weight is the chief contributing factor to deviation of our estimate of crop from the actual crop. Both fruit set (berries per cluster) and berry weight will vary from year to year. Fruit set is affected by carbohydrate status of the vine, weather conditions during bloom/fruit set period, as well as biotic and abiotic factors that impact vine health. Berry weight is governed by overall crop status and environmental factors, most important of which would be moisture conditions.

Working equation: At its simplest, here is a working equation to estimate crop yield using the data collected:

$$\frac{Tons}{acre} = \frac{1}{2000lbs} x \frac{Vines}{acre} \text{ x } \frac{Clusters}{Vine} \text{ x Average cluster weights from previous harvests (lbs)}$$

Average cluster weight can vary significantly, and will likely be major source of variation or error in accurately predicting yield. One means of collecting average cluster weights is to count and weigh all clusters per vine for a representative number of vines per sampling block. This might be 10 or 15 vines total – similar to the sampling you've done for cluster counts. Collect this data at harvest – ideally the day before harvest or early on the day of harvest, before the chaos of harvest commences.

As the following example illustrates, a 15% difference in cluster weight can translate into more than a ton/acre difference in crop, all other factors remaining constant. In this case, an historical average cluster weight of 0.49 lbs, which was based on clusters weighed at harvest over a 5-year period, was increased to 0.58 lbs (average data collected from a different vineyard). The 1.2 ton/acre difference is appreciable, especially when multiplied by the number of acres of a given variety.

Vines/acre	Clusters/vine (2013-2017)	Ave. cluster wt. (lb.)	Tons/acre
691 (9' x 7')	29 – 48 (avg = 38)	0.49	6.43
691 (9' x 7')	29 – 48 (avg = 38)	0.58 (~15% greater)	7.61

Improving the working equation:

Crop prediction model can be improved by using an **historical average lag-phase cluster weight**, plus the **current season's lag-phase cluster weight** to adjust the predicted harvest cluster weight:

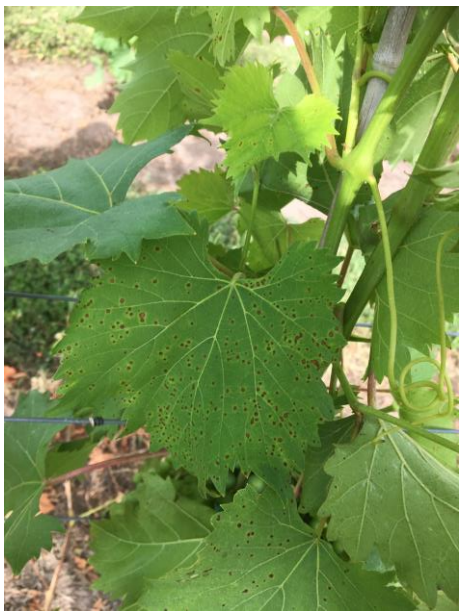
$$\text{Predicted yield} = \left(\frac{Vines}{acre}\right) \text{X} \left(\frac{Clusters}{Vine}\right) \text{X} \left(\frac{S}{A} \; X \; \text{H}\right)$$

Where: S = lag-phase cluster weight for current season
A = historical, average lag-phase cluster weight (several years' data)
H = historical, average harvest cluster weight (several years' data)

Here, in addition to the historical average weight of clusters at harvest, we need the average weight of clusters at the so-called "lag-phase" of their growth curve. There are several ways to estimate the lag-phase. One can time it for about 30 to 40 days post-bloom, or benchmark it at around 1200 growing degree days (base of 50F) from 1 April [Note, we were at 1196 GDD at the AREC as of 24 June]. See Wine Grape Production Guide for more detail on using mid-season or "lag-phase" cluster weights as a modifier of harvest cluster weights. The average lag-phase cluster weights can be arrived by randomly collecting ~ 300 clusters per block, or by a destructive harvest of all clusters per vine from 10 – 15 vines per block. While most of the variation in cluster weight is attained by lag-phase, subsequent extremes of precipitation can still affect anticipated harvest cluster weights.

Alternatively, one can use a multiplier pre-harvest to predict harvest cluster weight:
Start of lag-phase: use multiplier of "2" (50% of final wt.)
50% veraison: use multiplier of "1.25" (80% of final wt.)

Crop estimation provides a means of targeting how much crop you'll potentially be harvesting. Knowing this now, well in advance of harvest, provides an opportunity to reduce crop if vines are carrying more than can be satisfactorily ripened. It also allows the grower time to make arrangements for sale of the potential crop. For those just starting, the lack of historical cluster weight data will be a limitation. You can contact us (vitis@vt.edu) if you want some idea of a variety's potential cluster weight. Our numbers won't be as accurate as your own data, but it can give you a start in this cumulative process.



Question from the field: I have noticed some of our young, two-year-old Chambourcin vines (on 3309 rootstock) are showing these spots on the leaves. I thought of phomopsis but I haven't seen anything on the shoots, rachis, etc. Could this be herbicide drift? We recently used a combination of glyphosate and Surflan. I also noticed they are a lighter shade of green but would guess it's just lack of nitrogen.

A: This is "Rupestris leaf spot" or "Rupestris speckle", a generally inconsequential disorder that is apparent on hybrids with *Vitis rupestris* in their lineage. The disorder is common on Chambourcin. In our experience, the spots/speckle is more pronounced with low nitrogen status of the vines, and this might be why your observation of "lack of nitrogen" corresponds to a more obvious appearance of the disorder. It could be helpful to do a petiole test of the vines close to veraison to determine N status.

III. Meeting reminders:

Vineyard Field Trip: Maryland Edition

24 July 2019

Visit Maryland vineyards with other wine growers. This is your opportunity to see these vineyards in person. The field trip will have a point-to-point format. Participants will meet at Big Cork Vineyards, and then head east to Boordy Vineyards, Black Ankle Vineyards and Windridge Farm. We will spend about an hour at each site, walking the site with those who farm there. We have timed this field trip just before veraison, so participants can see crop levels, vine size and vine training systems. Registration is required, and lunch will be provided. Carpooling to the field trip is encouraged, we will have passenger vans leaving from Winchester and Purcellville. Rain or shine program.
Registration required by 17 July.

Contact Tremain Hatch with any questions thatch@vt.edu

44th Annual meeting of the American Society for Enology and Viticulture-Eastern Section (ASEV/ES)

16-18 July 2019
Hobart and William Smith Colleges
Geneva, NY

The 2019 ASEV-ES conference will be held at the Hobart and William Smith Colleges in Geneva, NY July 16-18, 2019. The **ASEV-ES conference** will begin with technical/research presentations on Tuesday, July 16 and include the awards/lunch and Oenolympics with Wines of the East Reception. On Wednesday, July 17 there will be a **New York Digital Viticulture Tour and Equipment Demonstrations** in vineyards on Keuka and Seneca Lakes. The **Nelson J. Shaulis Symposium** on Thursday, July 18 will feature invited speakers to discuss "Digital Viticulture: New Tools for Precision Management of Vineyards". Click here for more information about the tour and symposium. Visit our website http://asev-es.org/ for more information.

There are several options for hotel and room accommodations for the ASEV-ES Conference and Nelson J. Shaulis Symposium. Click here to download the conference registration information.

IV. Request for research assistance:

Soil scientists from Virginia Tech's School of Plant & Environmental Sciences are currently looking for vineyard blocks that vary with respect to topsoil thickness. PhD student Jaclyn Fiola is interested in the influence of topsoil (soil nutrition and hydrology) on grape ripeness components and potential wine quality attributes. She is specifically looking for a few more research settings that have the following attributes:

- Single vineyard blocks with different topsoil thicknesses - either natural or due to land leveling activities
- Vines of the same cultivar (clone), age, rootstock, and management
- Ideally, red *Vitis vinifera* cultivars

If your vineyard fits these criteria and you are interested in collaborating, please contact Jaclyn Fiola at jcfiola@vt.edu or at (301) 883-1009 or Tony Wolf at vitis@vt.edu.