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VITICULTURE NOTES ..... Vol. 28, No. 3 (October 2013)

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I. Current situation

The dramatic change in the weather in late-August has been a welcome relief as we've moved into harvest; warm, dry conditions and cool evenings have been perfect for fruit ripening. Checking a few locations around the state revealed that many locations were at or much below 25% of normal September rainfall for the month; for example, a little more than ½ inch for the entire month here in Frederick County. What a welcome relief not to have to deal with hurricanes or even tropical depressions moving into the state thus far. Even the first full week of October looks dry (and downright hot) at this point. That's not to say that the last 6 weeks have been a walk in the park. Not only do we like the flavors developing in the fruit, it seems that nearly every other creature does too. The reports – and in cases first-hand experience – with predators this year is extensive: birds (not necessarily robins, but including wild turkeys), deer, bear, squirrels, and raccoons -- especially raccoons -- have all been taking advantage of the ripening grapes. On balance though, and aside from the wildlife losses that some are experiencing, the quality of harvested fruit appears to be very high. Granted, acidity levels are running a bit higher than average, and might reflect somewhat cooler than average temperatures over the 2013 season, and over the last 30 days or so of the ripening period. As I write we are sitting on Cabernet franc and Cabernet sauvignon in research plots that's still hovering around 8 g/L titratable acidity.

We have seen a higher than usual incidence of (late-season) bunch stem necrosis (BSN) this past month, particularly in the Bordeaux red varieties. The late-season BSN becomes apparent at or around veraison and continues to intensify for a few weeks after veraison. The peculiar features of BSN include a drying of the distal portion of the cluster rachis, usually back to a branch point of the rachis, or in some cases the shoulder of a cluster. Berries remain attached to the desiccated cluster stem, but they shrivel and dry. The net effect is a loss of all or a portion of the affected cluster. The causes of late-season BSN are difficult to pin-point; indeed, there may be multiple stressors that cause the disorder. There is some evidence of specific nutrient deficiencies, but there is also evidence that excessive vine vigor, and possibly more specifically *shoot* vigor are implicated; evidence for the latter can be seen where both highly vigorous and more "normal" vigor shoots occur together on the same vine. Our Cabernet Sauvignon vineyard at Winchester had a higher incidence of BSN than in any year since planted (2006) and we recently took time to rate the incidence as a function of treatments applied. Some background on the Cab Sauvignon project, primarily funded by the

Virginia Wine Board, can be found here:
http://www.vawine.org/pdf/FY12GrapePotentialthroughRootandSoilManipulationsbyWolf.pdf

Briefly, we are looking at vineyard floor management (herbicide strip under-trellis vs. complete cover crop), rootstock, and root manipulation as means of regulating vine vegetative growth. We've talked about this work at a number of meetings, including in-field workshops. In our BSN rating, floor management had no effect on BSN levels; for non-root-manipulated vines, the average incidence of BSN was about 38% for vines grafted to 101-14 rootstock and 47% for vines grafted to riparia rootstock; vines grafted to 420-A were intermediate and the rootstock effect was statistically significant (*Pr>F=0.04*). "Incidence" is the percentage of clusters that showed any evidence of BSN, irrespective of the severity. BSN levels were far lower for vines grown in root bags, averaging 5% for vines grafted to 101-14, 2% for vines grafted to 420-A, and 9% for vines grafted to riparia. The difference in BSN incidence between the root-restricted and non-root-restricted vines was highly (*Pr> F = 0.0003*) significant. To be objective, this is entirely correlative and not explanatory of a causal effect: the lower incidence of BSN with the root-restricted vines correlates to the smaller vine size and lower "vigor" of those vines compared to the non-root-restricted vines. A similar response was reported with root-pruned vines (Pickering et al., 2005). But the root-restricted vines also tend to have somewhat lower crop levels – an average of 35% less crop per vine than non-root-restricted vines over the last 4 seasons, and 2013 is probably similar. The root-restricted vines also have much more open canopies and cluster exposure than do the non-root-restricted vines. In fact, they look pretty good – nice canopies and nice fruit – in a pretty wet year. You might ask, if it were a *vigor* effect, why would the "low vigor" riparia rootstock have a greater BSN incidence than the other two rootstocks? Two potential reasons: for one, the "lower" vigor of riparia, relative to other two stocks, has diminished since the vines were planted in 2006. The other is that relative to the two other stocks, riparia continues to have larger berries, larger clusters and, hence, higher crop levels than the other two rootstocks. Again, crop level may be positively correlated with BSN. As an aside, we installed a smaller side project in 2008, again with Virginia Wine Board funding, to explore several different sized root-containment bags for Cabernet, as we felt that the original experiment, with 12-inch diameter bags, was overly restrictive. Our recent BSN incidence rating in those vines was 5% for vines grown in 12-inch root bags, 7% for those in 14-inch bags, 12% for those in 18-inch bags, and 23% for those grown without root restriction; crop levels on these vines appear very similar. No firm conclusions can be drawn at this stage with our observations other than that the lower vine size, lower vigor (rate of shoot growth, degree of lateral shoot development, cane caliper) and somewhat lower crop level of the root-restricted vines were associated with a lower incidence of BSN.

Other forms of berry "shrivel" have also been observed this season. In at least one observed case the flaccidity of Viognier berries appeared to relate to brown marmorated stink bug injury to the rachis. In other cases we have seen some partial shriveling of berries with no apparent injury to the rachis, a ripening disorder that might more accurately be termed "water berry".

Reference:

Pickering, A.H., Warrington, I.J., and Woolley, D.J. 2005. Root Pruning of Cabernet Sauvignon (*Vitis vinifera* L.) Decreases Bunch stem Necrosis. Limiting factors for primary production, June, 2005, Lincoln, New Zealand. (Conference Presentation).

II. Early fall, a perfect time to check out the VVA Sustainability Guide:
http://vswag.virginiavineyardsassociation.com/login

The 2013 season won't be remembered as an easy growing season, if such every exists in Virginia. We started with a challenging frost on the 14th of May, followed by a slow, cool spring, and then, for many, a rainy summer or at least a lot of wetting periods. Many vineyards had low crop levels (frost) and unfortunate levels of disease incidence, particularly downy mildew. We cannot go back in time and redo the season, as much as we may wish to. However, while the season is fresh in mind, this is the perfect time to assess *how* you have farmed this season. The sustainable workbook may be the perfect tool to aid you in this assessment. It offers a methodical way to learn about sustainable vineyard practices and a clear way to assess your compliance with these practices.

The workbook was developed by a group from the Virginia wine industry. The Virginia Vineyards Association took the helm in 2012 and approached the Virginia Wine Board for funding. This spring the workbook was released on an electronic medium, designed by Ag^2, and is available via the Virginia Vineyards Association website: http://www.virginiavineyardsassociation.com/sustainability-guide/.

You will find over one hundred specific practices on the site, which fall into 7 categories:

- Pre-plant considerations
- Soil management, fertilization and irrigation
- Vine training and canopy management
- Groundcover and weed management
- Pest management
- Pesticide safety and management
- Grower/employee education

The assessment will give you a numerical score, for example 763/896. The score is not graded or calibrated; there is no failing or passing. The score is a useful measurement in time and you can try to better your score in coming years. The scores are also collected anonymously, so you can compare your score with an average score across your region and across the state as a whole. The assessment will also suggest high priority practices that you should consider adding to your management program. Increasing the wine quality potential of our fruit is a constant goal across our industry. This assessment is a great way to help you increase the sustainability and wine quality potential of your operation.

III. Venue (pyraflufen-ethyl) Herbicide and its Use in Grapes

Dr. Jeffrey Derr, Weed Scientist, Virginia Tech

I recently received a question about Venue herbicide and its potential uses in grape production. The active ingredient, pyraflufen-ethyl, is a rapid-acting, contact herbicide for controlling small broadleaf weeds. It ideally is applied to broadleaf weeds 1 to 4 inches tall. This herbicide is very similar in use to carfentrazone (Aim), an herbicide I already have in the Grape chapter of the Pest Management Guide for Horticultural and Forest crops (http://pubs.ext.vt.edu/456/456-017/Section-3_Grapes-3.pdf).

Both Aim and Venue have the same mode of action and the same basic use. Since these are contact herbicides, they will not control the underground portions of established perennial weeds. They can be combined with systemic herbicides, such as glyphosate (Roundup, etc.), for improved control of perennial weeds. What is the benefit of combining one of these herbicides with a systemic such as glyphosate? One is faster control of weeds. Injury to weeds will appear within a few days of application, compared to the week or two before effects are

seen with an herbicide like glyphosate. Addition of one of these contact herbicides may improve control of certain weeds species. Annual morningglory species, for example, are often not effectively controlled by glyphosate, especially at lower application rates. Addition of a contact herbicide like Venue or Aim would assist in morningglory control. With the development of glyphosate-resistant weeds, such as horseweed, addition of Aim or Venue would assist in controlling those resistant weeds.

Where would one use applications of Aim or Venue applied alone? One place would be if a grape grower desired control of small broadleaf weeds and did not want to apply a systemic like glyphosate due to injury concerns. If Aim or Venue contacted a grape shoot, it will injure or kill that shoot but would not cause systemic injury to the rest of the vine. This leads to another use - sucker management. One could control young, succulent grape suckers with one of these herbicides.

These herbicides cause little to no injury to grasses, especially perennial grasses. So another potential use for these herbicides is selective broadleaf weed control in grass cover crops, ether within or between grape rows. Since these are contact herbicides, though, perennial weeds like dandelion will regrow from roots or rhizomes after application. Repeat applications would be needed for perennial broadleaf weed control.

One needs to keep sprays containing Venue off green or thin bark of desired plants. So avoid applications to young grape vines established less than one year unless one uses nonporous wraps or grow tubes to protect the grape bark from injury. Use rates for Venue are 1 to 4 fluid ounces per acre for broadleaf weed control, and 3 to 4 fluid ounces per acre for sucker control. One is limited to a total of 3 applications with 6.8 fluid ounces per acre total for all applications made dormant, pre-bloom, or post-harvest. One can make up to 2 applications in-season, with a maximum of 6.8 fluid ounces total. Addition of an adjuvant, such as a nonionic surfactant, may improve weed control. Since Venue does not have residual activity, one could plant grapes or a number of other crops 1 day after application. The preharvest interval is zero days, so an application will not interfere with grape harvest.

IV. Grapevine Yellows research and online Extension bulletin

In response to industry requests, Dr. Teresa Stoepler was hired as a post-doctoral associate in August 2012 to renew work on North American Grapevine Yellows (NAGY) here at the Winchester AREC. Teresa's work is focused on the ecological aspects of NAGY, including identifying primary insect vectors, understanding the importance of alternative host plants that may act as disease reservoirs near vineyards, and determining the role of other ecological factors related to NAGY incidence. We are taking a multi-faceted research approach, combining field surveys and insect collection, lab work, and greenhouse transmission experiments. A primary goal of the 2013 growing season was to begin to accurately identify the insect vectors responsible for NAGY transmission. To this end, Teresa and her assistant, Brinton Domangue, collected over 1300 individual insects (primarily leafhoppers) from several high-incidence NAGY vineyards in Virginia to test their ability to transmit phytoplasmas (the casual agents of the disease) in the lab and greenhouse. In addition, 30 vineyards in NC, VA, MD, and PA were repeatedly surveyed to start to understand the ecological factors that predict the incidence of NAGY (e.g., presence, abundance or timing of candidate vector insects, surrounding landscape composition, weather). Concurrent with Teresa's work, two projects were undertaken to resolve (1) whether insecticides can be used to reduce leafhopper populations in at-risk vineyards, and thus slow the development of NAGY; and (2) to determine whether removal of newly expressed diseased vines (or symptomatic vine parts) has a bearing on the subsequent development of

the disease. This research requires a multiyear approach, but ultimately will help direct management strategies that may include targeted insecticide and/or herbicide application, and removal of alternative host plants that may harbor phytoplasmas and that might serve as pathogen and/or vector reservoirs when they occur near vineyards. We are grateful to the Virginia Wine Board for their generous support of this research and we are equally grateful to all of the vineyard owners and operators who have participated in our visits and surveys over the 2013 season.

Teresa organized an eight-page extension bulletin on North American Grapevine Yellows which is available online at:
http://pubs.ext.vt.edu/AREC/AREC-48/AREC-48.html
The bulletin explains what is known about the disease, including common symptoms used in field identification, varietal susceptibility, and where research is needed to further our understanding of potential management strategies.

V. Reflections from Bordeaux: Winter 2012-2013
Tremain Hatch, Viticulture Research/Extension Associate

Two groups of Virginia winegrowers traveled to Bordeaux, France last winter to experience the world's most famous wine production area. The timing of these study tours was apt; the eve of the Virginia Vineyards Association trip departure was 21 February 2012 – the awards ceremony for the Virginia Governor's Cup. Eleven of the 12 wines that made the Governor's Case were Bordeaux styled reds. Virginia is making exceptional wines, and many of these wines are made with varieties and techniques similar to those used in Bordeaux. Virginia grape growers made a good decision to learn more about this highly regarded grape growing area.

The numbers:

	Virginia	Bordeaux
Approximate Vineyard Acreage	3,000 acres	300,000 acres
Annual Average Temperature	57.0 °F	55.5°F
Annual Precipitation	48.8 inches	33.5 inches

*Remember there is much more that describes a place than averaged numbers, you know how variable Virginia can be year to year and location to location.

Virginia has rain during the growing season; Bordeaux has rain during the growing season. They have wetter seasons and dryer seasons, and we have similar seasonal variability. These comparisons can be made at length, but the encompassing comparison is made with wine. Virginia wines can be similar to those of Bordeaux.

Challenges similar to those in Virginia are dealt with in Bordeaux. Harvest decisions are sometimes made due to compromised fruit integrity, similar to Virginia. There is not the infinite hang time as oft seen with the West Coast. Harvest is performed with an impending wall of the fruit "falling apart."

In Bordeaux, we find a wine growing area capable of ripening Cabernet Sauvignon…., but only *just* ripening that variety. Jean-Philippe Roby, professor of viticulture explained that the wines made from grapes that "just" achieve full maturity in the season are those that have typicity or uniqueness so revered. Grapevines that experience water deficit, primarily post-veraison are more capable of producing fruit with high wine quality potential in Bordeaux.

Vine density was the first feature of the Bordeaux vineyards that struck the Virginia travelers. It is not uncommon to see 1x1 meter (4047 vines per acre) plantings or 1x2 meter (2023 vines per acre) plantings (Figure 1). However, the shoot density we saw was quite low; in many cases, 1-3 shoots per foot of canopy (Figure 2). The image that came to my mind was similar to lyre-trained vines, grown with a low cordon. It begs the question- what is more important: the canopy parameters or the vine density? Many viticulturists, led by such thinkers as Dr. Richard Smart (*Sunlight into Wine*), focus on the canopy density as the important feature allowing for high quality wine production rather than vine planting density *per se*. For growers in Bordeaux to create their canopy density, they plant their vines at high density – elsewhere, with different conditions, different planting densities are used to develop the same canopy density. Growers in Bordeaux use planting density and cover crops to manage vigor and vine size; the goal is to have consistent canopies within management blocks.

Vineyard management blocks are an important factor in fine winemaking. Vines grow differently in different conditions; this is primarily driven by the vine's access to soil moisture. Vineyard management blocks are zones of uniform vine growth. Vineyard management blocks simplify vineyard management as decisions can be made for each block versus having to have different management/sampling zones within the same vineyard field. The vineyard blocks we saw in Bordeaux were laid out to maximize vine growth uniformity within blocks, and to facilitate vineyard activities including harvest (Figure 3).

Winemakers mentioned again and again the importance of fruit sorting. Sorting gives absolute control over what fruit makes it into the fermenter. In cases, very high cull rates – up to 30% or more – wine with excellent quality could be made in a difficult vintage. One bio-dynamic producer we visited reported processing a yield of 1 ton per acre after sorting. New oak is also a standard with wine making; heavy use of first and second fill barrels seems to be the norm. New oak was even used when using aromatic grape varieties such as Sauvignon blanc and Semillon (White Bordeaux). Wines, even the whites, were not too oaky though.

Bordeaux has had centuries of practice to build their wine growing techniques. Artifacts show that Celtic tribes were growing wine grapes in the Bordeaux area as early as the 3rd century BC. Changes in varieties, production techniques and infrastructure have occurred since that early beginning, but the rudimentary process of growing grapes and making wine has occurred for ages. Experience in a place is important for innovation and improvements to production techniques; farming grapes in the same place for over 2000 years vets production techniques quite well. With less than half a century of experience in this phase of the Virginia wine industry, we have made leaps and bounds worth of progress in production and quality.

In total, the group had a fantastic learning experience with the French producers. In speaking with our Virginia producers, an optimistic feeling was present. We have seen a snapshot of how

Bordeaux makes amazing wine, and there is no magic to it. They have had plenty of time to match production techniques to the land they farm. This kind of quality is feasible in Virginia's future- it just will take experience, innovation and research in Virginia to get us there.

A scholarship, provided by the Case Foundation and secured by the Virginia Vineyards Association, supported my expenses for this trip and is gratefully acknowledged.

Figure 1: Low trellis with high planting density (or… I am a giant)

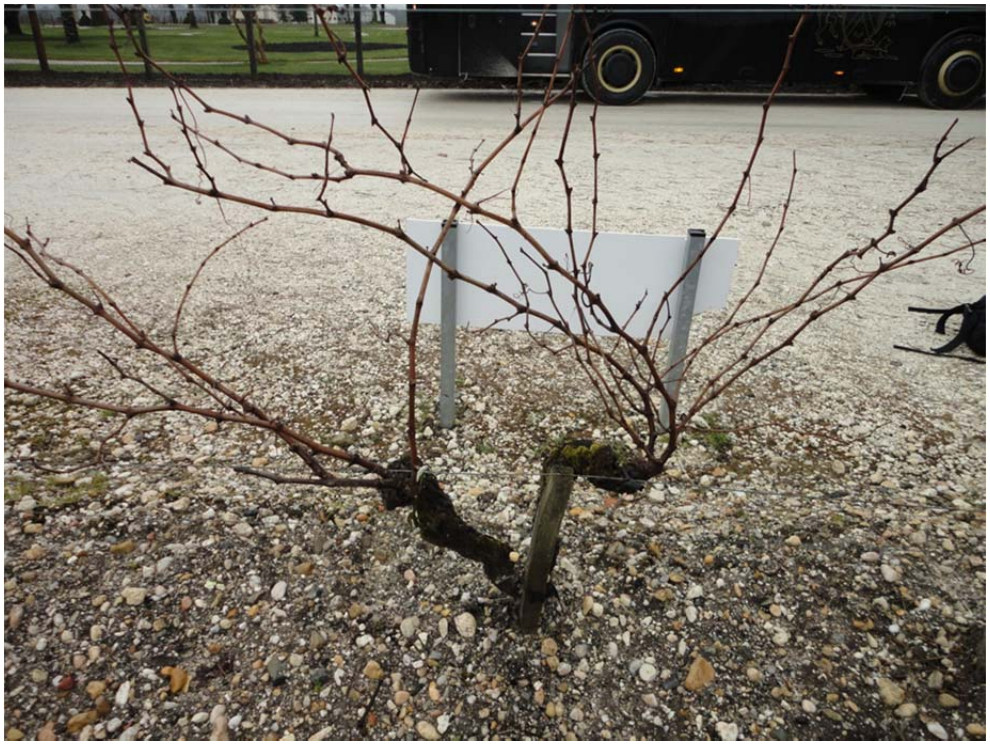

Figure 2: Low shoot density

Figure 3: Management blocks with access roads

References:

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