

# Virginia Cooperative Extension

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VIRGINIA POLYTECHNIC INSTITUTE  
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VIRGINIA STATE UNIVERSITY

## VITICULTURE NOTES ..... Vol. 26 No. 3, May - June, 2011

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<http://www.arec.vaes.vt.edu/olson-h-smith/grapes/viticulture/index.html>

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### I. Current situation

The 2011 season started slightly earlier but much wetter than normal, at least in northern Virginia including the northern Shenandoah Valley. Rainfall at Winchester in April – May 2011 was 12 inches, where the normal for that two-month period is 6.5 inches.

Temperatures have trended warmer than average in late-May into early-June, and bloom at Winchester was advanced about 5 days compared to our long-term average. Surprisingly, perhaps, we have had few calls/reports of rampant fungal disease. Phomopsis has been more abundant, but despite near ideal conditions for black rot and downy mildew, the number of reports of those two fungal diseases has been minor. We do see evidence of some earlier downy infections on older leaves, but the disease in those cases appears to have been arrested by fungicides, hot, dry weather, or both. If you have not done so, be sure to visit Dr. Mizuho Nita's grape disease website, including his vineyard blog:

<http://grapepathology.blogspot.com/>

a) *Fruit set*: It's a rare year that does not present some problem to growers in some

part of the state. Last year it was late (May 10<sup>th</sup>) spring frost followed by hot and dry weather. One of this year's observations is a higher than average incidence of poor fruit set. Crop yields can be reduced both by reduced fruitfulness (clusters per shoot or node) and by reduced fruit set. Reduced fruitfulness is typically due to conditions in the first year of development (e.g., 2010) and is manifest as reduced clusters per shoot and/or reduced cluster size in the second season (e.g., 2011). There are cases of that described below under bud necrosis, but the more common disorder seen this spring is reduced fruit set. Reduced fruit set can be due to a number of factors, but adverse environmental conditions immediately prior to and during bloom are commonly associated with the problem. Temperatures below 60F during this period can retard pollen tube growth and reduce the frequency of ovule (seed) fertilization. While this may occur in more northerly regions, such low temperatures are not common in Virginia during bloom. Similarly, very high temperatures can reduce fruit set, but are uncommon during bloom in Virginia. The more frequent problem that we face from year-to-year is persistent cloudy, wet weather. Rain and very humid conditions can

retard the abscission or shedding of flower caps (calyptra). Calyptrae are fused petals of the flower and are normally shed after an abscission zone forms at the base of the flower. Although there is some evidence that self-pollination can occur prior to capfall, at least in some cultivars, there is also evidence that failure of calyptra shedding can reduce fruit set, presumably by interfering with pollination of the subtending stigma. In speaking with growers and in our own observations, we noticed examples of clusters that had many flower on which the calyptrae failed to separate from the base of the flower. These clusters looked oddly brown a week or so after other clusters had set fruit, and the aborted flowers were easily shattered from the rachis leaving few if any berries on the otherwise healthy cluster stem or rachis (Figure 1).



**Figure 1.** Retained calyptrae or flower caps on Cabernet Sauvignon. Many of the unfertilized flowers have already shed.

We noticed this on a few of our own Cabernet Sauvignon vines, and we had several reports of a similar pattern with Merlot. One central Virginia grower estimated a 75% reduction in set with Merlot this year. This reduction in pollination and/or fertilization and the resultant shatter or shedding of non-fertilized flowers is termed *coulure*. Merlot, Malbec and certain other varieties are susceptible in the best of years, and hyper-susceptible in years with wet weather around bloom. In addition to the potential biophysical problems with rain and

high humidity interfering with capfall, extended periods of cloudy weather further depress the vine's overall carbon balance at a critical period. Bloom time corresponds very closely to the nadir or low point in the vine's carbohydrate status. The vine has just expended a considerable amount of energy in developing new shoots that are now 10 to 12 nodes long and are just hitting the point in their development when the shoot starts to be a net producer of carbohydrates. Flowering, pollen tube growth, pollination and fertilization are energy intensive functions for the vine, and yet flower clusters are not as strong a sink for carbohydrates as are shoot tips. Cloudy weather reduces canopy photosynthesis levels and can thus depress the energy status of the vine. Poor fruit set is a consequence.



**Figure 2.** Poor fruit set or *coulure* in Cabernet Sauvignon. Note shed flowers in lower part of photo.

It's tempting to think that drought stress in 2010 could have further contributed to the fruit set problems seen this spring; however, the greatest effect of drought on subsequent season's crop yield occurs when the drought stress occurs during the early part of the first season (as early as bloom), as clusters are just beginning to be formed in the developing buds. Research with Concord vines in New York State showed that late-season (post-veraison) drought stress, combined with heavy cropping, did not affect fruit set in the subsequent season. I would therefore surmise that most of the fruit set problems

observed in 2011 were therefore due to weather conditions pre-bloom through bloom of the current season. That said, I should point out that in our own research with under-trellis cover cropping to manage vine size and vigor, we have reduced fruit set to some extent, and this has no direct relationship to weather during bloom. We can speculate on causes, which may well be combinations of reduced nitrogen reserves, depressed carbohydrate status, and possibly altered hormone synthesis in roots of vines grown in direct competition with under-trellis cover crops. All of these stressors could be expected to reduce set. My point with this is to suggest that you consider the range of possible reasons why fruit set may be off target in your vineyard – particularly if you're seeing it year after year.

Another form of reduced fruit set that we see and that was reported in some vineyards over the past 2 weeks is referred to as inflorescence necrosis (IN). This is a bit different from *coulure* in that whole portions of the flower cluster wither and fall. Varieties that are particularly susceptible to IN include Traminette, Riesling and Gewurztraminer. There is some evidence of altered nitrogen metabolism being responsible for IN, including a toxic accumulation of ammonium nitrogen in the affected tissues. This could relate to environmental conditions such as shade, nutrition, or possibly to altered nitrogen substrate metabolism that leads to the accumulation of ammonium by-products.

Excess vigor and shade appear to increase fruit set problems in many, but not all cases. Shoot tipping immediately prior to bloom has been reported by some to increase fruit set. We have noticed that the problems with Traminette fruit set are increased when flower clusters develop in shaded canopy interiors. Establishing appropriate shoot density early in canopy development, and choosing management systems that do not further stimulate Traminette vegetative development are recommended.

*Dealing with poor fruit set:* Many varieties will express some level of reduced fruit set

during springs with poor weather, even if overall vine management is good. Other than reassessing yield potential and perhaps adjusting canopy management to compensate for the potentially stimulated vigor due to light crop, vine management is not affected. Chronic problems with fruit set warrant more active intervention. As previously mentioned, certain varieties – and some clones – are more susceptible to poor fruit set than are others. I know of growers who have removed Traminette because of poor fruit set, and both Merlot and Malbec have above-average problems. Be careful with nitrogen fertilization. If needed, apply small amounts of N after fruit set, and not in the period between budbreak and bloom. Although some growers have complained about added labor associated with Geneva Double Curtain (GDC), we found that GDC training decreased shoot vigor and increased crop per unit length of canopy compared to either Smart-Dyson or vertical shoot positioning. Short-term management of blocks that express poor fruit set will also need to include a revision of expected or historical average cluster weights. If your Merlot clusters typically weigh 0.34 lbs at harvest (for example), they may only weigh 0.22 lbs each, or less (for example) due to poor set. If you have collected “lag-phase” cluster weight data, which is done about 40 days after bloom, simply repeat the lag-phase collection this year in order to revise down the anticipated harvest cluster weight. Use of lag-phase cluster weights to refine harvest cluster weights is explained in some detail in our Wine Grape Production Guide (see page 138 of the Guide). Another means of estimating final cluster weights is to sample clusters and obtain average cluster weights when veraison is nearly complete – when most berries are showing color change, for example. At this point, clusters will normally represent about 80% of their final weight (assuming that post-veraison dehydration is not significantly affected by drought stress). There is considerable cluster-to-cluster variability in fruit set and in cluster weight, but estimates made either at lag-phase or at the tail-end of veraison may help improve the precision of

estimating harvest cluster weight and, ultimately, crop per acre.

*b) Bud necrosis:* Bud necrosis (BN) is a distinct physiological disorder that can affect fruitfulness in susceptible varieties (see Wine Grape Production Guide, page 106). Briefly, Riesling, Syrah, Viognier and Tempranillo are particularly susceptible to BN. Several factors are known to increase the incidence of BN but effective management is still elusive. The manifestation of BN is the presence of shoots that lack flower clusters or bearing only one small flower cluster, with occasionally multiple shoots originating from a single node. We have seen some vineyards affected by BN this spring and if this is a new phenomenon for you, it might be worthwhile to track the incidence. We notice vineyard-to-vineyard variation in BN frequency such that vineyards that have a high incidence tend to express that high incidence from year to year. In our own research, spur-pruning tended to retain more healthy buds than did cane pruning, and this may be one means of compensating somewhat for necrotic buds.



**Figure 3.** Primary bud necrosis in Viognier dormant bud. Here the primary bud (arrow) aborted early in the first year of development, resulting in an enlarged 3rd order bud. The original secondary bud appears healthy at the 3:00 o'clock position.

*c) Apparent winter injury (contributed by Tremain Hatch):* We had several cases

where vineyardists from around the state commented on delayed bud break and/or poor shoot development from the vine. Closely inspecting affected vines in a one such vineyard revealed evidence of what appeared to be cold injury to the vascular tissues of the vine (Figure 4).



**Figure 4.** Apparent cold injury to xylem and phloem tissues of Cabernet franc spur (left), compared with apparent healthy spur (right).

Symptoms of winter injury are surprising because we did not record temperatures below about 9°F this past winter, well above the temperature at which we would predict cold injury to occur. Symptoms observed in the one vineyard that we examined included:

- Apparent cold injury – stunted shoot growth, blank spaces in the cordon with apparently dead spurs, and a dull brown color in vascular tissue apparent when a cross sectional cut is made in cordons, trunks or canes (Figure 4).
- Canker disease-like symptoms – a combination of wedge-shaped cankers visible in cross sectional cuts, and elliptical necrotic zones around wounds on cordons and trunks.
- Damaged vines were located in a close proximity to each other, and in *higher* rather than *lower* sections of the vineyard. Now, that sounds counter-intuitive based on cold air drainage/settling, but the higher portions of the vineyard also had the lowest



water-holding capacity of the soil (read on).

While the canker-like problems may very well be due to *Botryosphaeria* or other vascular, fungal pathogens, there was strong evidence of cold injury causing some of the symptoms – either directly or indirectly. Although the 2010/2011 winter was not that cold, there were some stressors present in some of the affected vineyards, in particular the vineyard that we surveyed.

- *Drought during the 2010 growing season:* drought conditions were present across much of the state in mid-summer 2010. Vines that experienced drought stress could be expected to exhibit reduced cold hardiness due to depressed carbohydrate production and reserves. Good carbohydrate reserves do not guarantee cold hardiness, but there is ample evidence that *depressed* reserves can contribute to increased cold injury. An interesting feature in one vineyard is that the affected vines were more or less confined to relatively droughty soil – the vineyard is situated on transitional soils that go from clay loams to shale loam; the latter soil has very low water holding capacity.
- *High crop load in 2010 (aggravated by drought stress):* High crop levels, combined with drought, could further depress carbohydrate reserves. High crop levels might have been a contributing factor in at least one of the affected vineyards.
- *Stress to vines caused by wood canker diseases:* Trunk canker diseases such as *Botryosphaeria* (bot canker) will cause further stress to vine; again, potentially reducing the vine's cold hardiness.

Although the past winter was generally “mild”, we believe that we are seeing some evidence of “winter injury” in a few vineyards. The yield will be reduced in affected vineyards, and, unfortunately, things will probably get worse for vines that show the symptoms of winter injury already – it is typical that those shoots that do emerge will “collapse” when the transpirational needs of the shoot increase beyond the capacity of the damaged vascular tissue.

*What could have been done?* Many vineyards across the state have bot canker damage – but still produce high quality fruit. For management tips for canker disease see [Viticulture Notes: Volume 18 Number 6](#).

However, the combined stress of canker diseases, drought stress and overcropping could explain the observed “winter injury” symptoms. Two practices could have been used to alleviate drought stress on vines during the last growing season:

- Irrigate vines – supplemental water could be applied if the vineyardist is willing to invest in either a temporary means of supplying water to the vines, or by installing a solid-set irrigation system.
- Remove crop – if a stressed vine is not producing enough carbohydrates to ripen fruit and properly acclimate to cold temperatures then some crop reduction may be necessary to alleviate some of the stress, particularly in the absence of supplemental water.

*What to do if you see this damage:* Vines displaying these symptoms should be treated like vines recovering from winter injury. *Do not remove sucker shoots which emerge low on the trunk of vines displaying symptoms of winter injury.* These sucker shoots might well be necessary for successful retraining of trunks and cordons. Trunks and cordons should be retrained from sucker shoots emerging from just above the graft union. Retraining of trunks and cordons is also a tactic to reduce the impact

of *Botryosphaeria* and the other trunk canker diseases. Be sure to removed damaged or dead trunks from the vineyard and burn them or bury them to minimize their threat as a potential inoculum source.

d) *Cane vs. spur pruning*: The question comes up from time to time and was addressed in Viticulture Notes Vol 23(3), November-December 2008. Here's a recap with an added observation or two. Cordon-training and spur-pruning is commonly used and has both advantages and some disadvantages to cane-pruning.

Advantages of cordons and spurs over cane-pruning include:

- Elimination of labor involved with tying canes to trellis wire.
- Ability to achieve more uniform shoot growth along a longer vine space distance (see additional discussion, below). A cane laid out 3 or 4 feet often exhibits non-uniform shoot growth – vigorous shoots near the head region and towards the distal end of the cane, but relatively poor shoot growth in the mid-cane region. This non-uniformity is not as obvious with cordon-training.
- Greater ability to achieve desired shoot density with vines that have extremely long internodes (admittedly, this can be mitigated by laying two canes).
- Ability to use double-pruning of spurs as a means of suppressing basal shoot development on the spurs and buying a few days of frost injury avoidance.
- Probably easier to “rough prune” vines using unskilled labor.

By contrast, the advantages of head-training and cane-pruning include:

- Fewer pruning cuts per vine
- Better node fertility with varieties that have low fruitfulness of basal buds (e.g., Sauvignon blanc and Nebbiolo).

- Less shoot thinning required with varieties that have propensity to push a lot of non-count or base buds (e.g., Cabernet Sauvignon).
- Less pest pressure in some cases. For example, older wood of cordons and spurs can harbor phomopsis cane and leaf spot inoculum, mealybugs, and European red mites.
- In high-vigor situations, the minimization of perennial wood is thought by some to be a management tool to help reduce vegetative growth of big vines.
- Ability to avoid, and more easily compensate for, wood-rotting fungi such as *Eutypa* and *Botryosphaeria* canker.

The fact that both cordon training and head training are found in Virginia vineyards suggests that either can work, but the specifics of vineyard design should consider up-front which direction you want to go. Wide in-row vine spacing (e.g., greater than about 5 feet) pretty much demands cordon-training (and spur-pruning) systems. It is possible to bi-laterally lay out canes 3 or more feet, but the non-uniformity of shoot development on those long canes can be very disappointing. If you wish to cane-prune vines (now or in the future), you'd be well advised to keep the in-row spacing “narrow” such as 4 feet (which would require only 2-foot long canes (±) for fruiting units. My comments on in-row vine spacing in a recent VA Vineyards Association Grape Press were:

4 to 6 feet is a good working range for most varieties. Four feet might be more appropriate with predictably low “vigor” situations (steep slopes, shallow soil, size-limiting rootstocks, etc. etc.) and for head-training and cane-pruning. Six feet might be more appropriate with deeper, richer soils and where cordon-training will be used.

I still get anxious seeing growers crowd vines into narrow spacing (less than 5') on deep, fertile soils with high water-holding capacity, so I'll continue to recommend

cordon training in those wider-spaced designs.

## **II. Invitation to participate in an industry survey to benchmark knowledge and practices:**

As you might be aware, a team of eastern US grape and wine researchers and extension personnel were successful in obtaining a major grant from the USDA's National Institute of Food and Agriculture in 2010 to conduct research and provide educational programs to address some of the cultural and market constraints to expansion of the eastern US wine and grape industry. The five-year project is led by Tony Wolf at Virginia Tech, but there are over 20 investigators from seven land-grant colleges and experiment stations involved with the project. You might have participated in one of the preliminary stakeholder meetings involved with the proposal preparation in the fall of 2009. The project has four basic objectives: (i) research and adoption of vineyard management practices to achieve optimal vine balance under variable conditions; (ii) viticultural and enological evaluation of novel wine grape cultivars and development of a GIS-based approach to vineyard site evaluation; (iii) market analysis of consumer perception of eastern US wines; and (iv) dissemination of study findings to users. Teams have been formed around each objective.

An overview of the project can be found at the following web-site:

<http://www.arec.vaes.vt.edu/alson-h-smith/grapes/viticulture/research/scr-index.html>

Part of our proposal included a mechanism by which we could document impact of our effort. This requires us to first document or benchmark the current industry level of understanding and practice with some of the areas that our project has proposed researching. A web-based survey document has been developed and will be conducted by team members at North Carolina State

University and Virginia Tech's Center for Survey Research. The Virginia Tech Institutional Review Board provided approval for this survey (IRB 11-570) in order to help ensure the protection of the research subjects involved with the study. Invitations will be sent electronically to over 1,200 wine and grape industry members in the eastern US within the coming weeks. If you receive the survey invitation, please take the time to complete the survey. Although your participation is entirely voluntary, we hope you'll participate and share your thoughts. The project research and the extension and outreach components are designed to enhance the quality, sustainability and consumer appreciation of eastern US wines and wine grapes. Any survey responses you choose to provide will remain entirely confidential and will never be released in a way that can identify you. The survey would take approximately 15 minutes to complete. Our plans are to repeat essentially the same survey in 4 years to determine where changes in knowledge and practice have occurred as a result of our educational efforts.

My message here is simply to alert you to the possibility that you may receive the survey invitation via a separate email. I do hope you'll respond to it if you are a recipient.

## **III. Vineyard visits:**

We've used the occasion of the spring and early summer vineyard Extension meetings as a means to discuss current vineyard and vine development, pest pressures and general vine management. We appreciate the hosting of such meetings from Campbell County in the south through Nelson, Orange, Madison, and Warren Counties. In addition to those scheduled meetings, we are available for on-site vineyard consultation to review or troubleshoot issues that might affect your operation. Unusual observations or problems can sometimes be explained and resolved by phone conversation and emailed photos. If necessary, we can also visit on-site. Feel free to contact us, report

unusual vineyard observations/problems, and/or request a site visit. While your local Cooperative Extension Educator may be able to help with some issues, there are many counties that do not have a horticultural Ag and Natural Resources educator. Let us know if we can help. Please work with Tremain Hatch here at Winchester ([thatch@vt.edu](mailto:thatch@vt.edu), 540-869-2560 x11) or Tony Wolf ([vitis@vt.edu](mailto:vitis@vt.edu)) for general viticultural issues, or Mizuho Nita ([nita24@vt.edu](mailto:nita24@vt.edu), x33) for grape disease issues.

#### IV. Upcoming meetings

##### **July 11-14: American Society for Enology and Viticulture Eastern Section Annual Meeting**

*Sheraton Baltimore North, Towson, MD*

Join us next month for the 2011 ASEV-ES Conference, held at the Sheraton Baltimore North in Towson, Maryland July 11-14th. After a tour of Maryland wineries on Monday, July 11, the conference will feature an IPM symposium on Tuesday, followed by student and research presentations during the two-day annual meeting. This year will also feature the debut of the first annual Oenolympics, a student competition designed to test the practical and esoteric knowledge of our viticulture and enology students. Wednesday's award banquet will feature recipients of the best student papers awards and the ASEV-ES student scholarship, made possible by generous donations at the Wineries Unlimited auctions.

Tuesday's symposium, "Pest Management: Impacts in the Vineyard and Winery", will focus on new and potentially emerging pests in eastern grape growing regions of the U.S. and Canada, information on management strategies, and the potential impacts of pest management decisions on both vineyard and winery production. The focus of the Symposium is on providing growers and winemakers with up-to-date, practical knowledge that they can use in their operations.

More detailed information on the Symposium

and Conference programs, the pre-conference tour, and registration is available at <http://www.asev-es.org>.

##### **August 3: Vine balance: what does it mean, how is it measured, and does it matter?**

**AHS Jr. AREC (directions below)**

**10:00 am – 3:30 pm**

AHS Jr. Agricultural Research and Extension Center (AREC)

595 Laurel Grove Rd., Winchester VA 22602

<http://www.arec.vaes.vt.edu/alson-h-smith/index.html>

This meeting is the final regular vineyard field meeting planned for the 2011 season (but please note that it starts an hour earlier than the previous meetings of the season). We will use the platform of a long-term study of Cabernet Sauvignon to explore practical means of affecting vine size and vine balance. This workshop will start with a combination of classroom theory on defining, measuring and relating vine "balance" to fruit composition and wine quality potential. Following lunch, we will provide a hands-on session in canopy assessment and a demonstration of various techniques to modify vine size, vine vigor and assess vine balance using an existing range of vine capacities in the experimental setting. Time will also be devoted to reviewing some of the current grape disease management efforts underway at the AREC. The program is free but we do request that you "register" for the meeting prior to 29 July by contacting Tremain Hatch at (540-869-2560 x11 or [thatch@vt.edu](mailto:thatch@vt.edu) by email. **NOTE:** You may bring your own lunch or you can order a box lunch (by 29 July) by sending a \$10.00 check (payable Virginia Tech Foundation) to Tremain Hatch, 595 Laurel Grove Rd., Winchester, VA 22602. We must receive your check by 29 July to guarantee you a lunch.

*Directions:* (Frederick County). From Interstate 81, take the Stephens City exit on the south side of Winchester. Go west into Stephens City (200 yards off of I-81) and



proceed straight through traffic light onto Rt. 631. Continue west on Rt. 631 approximately 3.5 miles. Turn right (north) onto Rt. 628 at the "T" intersection. Go 1.5 miles north on Rt. 628 and turn left (west) onto Rt. 629. Go 0.8 miles. The center is on the left side of the road.

**Contact to register:** Tremain Hatch, Virginia Tech ([thatch@vt.edu](mailto:thatch@vt.edu)) or (540) 869-2560 x11

**August 10:** VVA Summer Technical Meeting

*Location:* Rappahannock Cellars in Huntly, Virginia

**Theme:** Pre-harvest considerations.

Program is still in development but will include invited speaker on late-season disease management, post-veraison canopy and crop management, discussion about sustainable vineyard management workbook project, pre-harvest insect management (stink bugs and bees in particular), and more. Stay tuned for details which should be resolved around the first of July.

<http://www.virginiavineyardsassociation.com/events.php>