GRAPE PRESS

Winter 2017 | The Quarterly Newsletter of the VIRGINIA VINEYARDS ASSOCIATION | Vol. 33 No. 4

Blue Ridge Visuals/Courtesy of Loudoun Wineries Association

Virginia is producing "wines of distinction" as it evolves into a world-recognized wine region, says Neal Wavra, director of the Loudoun Wine Awards, which took note of top-quality wines in October.

Why Virginia Is On Its Way To Worldwide Recognition

Neal Wavra, director of the Loudoun Wine Awards and proprietor of Field & Main Restaurant in Marshall, Va., talks about his experiences with Virginia wine and about what he has seen work well — and not so well.

Q: What is your overall impression of Virginia wine?

Neal: I believe there is no more exciting time to be drinking Virginia wine than now. The considerable efforts taken by growers and vintners in the past 30 to 40 years are bearing fruit (pun!). The opportunity is akin to drinking Napa in the 60's and 70's. Top producers are emerging along with important vineyard sites. The results are better wines — wines of distinction. In 20 years, those of us enjoying Virginia wines now will look back and say we were there at a turning point in the evolution of a world-recognized wine region.

What were your take-aways from directing this year's Loudoun Wine Awards?

First, this past year, a requirement that all wines entered must meet the minimum requirements to be designated as Loudoun

See LOUDOUN on page 6

INSIDE

President's Corner

Planning Underway for Winter Technical

By Nate Walsh
Walsh Family Wine

As we shift our focus away from reflections on the 2017 vintage to the work that needs to be done to prepare for the upcoming 2018 vintage, the VVA has been busy compiling the program for this February's Winter Technical Meeting.

We have focused on a few broad topics which we believe are pertinent to the current concerns of Virginia grape growing, and we've developed a program which should help you kickstart the year.

First, the continued and potentially growing shortage of labor in agriculture is an ever-increasing concern for our industry.

Agriculture as a whole is struggling more and more to find suitable laborers, and as unemployment drops, this issue becomes cumulatively and

See PRESIDENT on page 2

Mark Your Calendars

The VVA's annual Winter Technical Meeting will be held Feb. 22-24 at the Charlottesville Omni Hotel. Go to the **VVA website** for more information on registration, the agenda and accommodations.

VVA BOARD 2017

President
Nate Walsh
nate@walshfamilywine.com

Vice President
Jim Benefiel
jwbenefiel@aol.com

Treasurer
Jessi Gatewood
vvatreasurer@gmail.com

Secretary
Ben Margulies
bencvm@gmail.com

At-Large Board Members
Skip Causey
scausey@dreeshomes.com

Carrington King
carringtonking@gmail.com

Advisor
Dr. Tony K. Wolf
vitis@vt.edu

Business Manager
Tracy Kirkman
vavineyardsassoc@gmail.com

Grape Press Editors/Production
Bob Garsson
rgarsson@gmail.com
Chris Garsson
cgarsson@gmail.com

VVA Mailing Address
P.O. Box 168
Waterford, Va. 20197
vavineyardsassoc@gmail.com

Special thanks to:
Paul Krop, Jim Law,
Ben Rowe, Dean Triplett,
Neal Wavra, Bruce Zoecklein

VIRGINIA VINEYARDS ASSOCIATION

PRESIDENT'S CORNER (cont.)

PRESIDENT, from page 1

more immediately concerning. I do not know anybody working in ag who is not concerned about the labor shortage.

The Virginia Vineyards Association has approached this from two perspectives. First, starting two years ago, we presented information on mechanization opportunities in vineyards with the goal of lowering the necessary "hands-on" labor that vineyards require. This equipment continues to be scaled for smaller growers, and thus more applicable in Virginia, where our average vineyard size is relatively small. This is beneficial from a labor and an economic standpoint.

NATE WALSH

This coming February we will focus on labor options, bringing representatives from the Virginia Employment Commission and the Department of Labor, as well as winery and vineyard users of temporary agricultural programs such as H-2A and J-1, to present the current requirements, processes, difficulties, advantages, and overall opinions of moving a vineyard operation toward these visa-based programs.

While these programs will not be applicable to every Virginia vineyard operation, it is helpful for all growers to understand their requirements and where their operation fits into this scale.

A second focus will be the nutritional implications of nitrogen in the vineyard. We'll explore the impact of nitrogen on overall vine health, vigor, and fruitfulness, as well as the implications of nitrogen or a lack thereof in the winery, where high or low levels can be of concern to the winemaker and potential wine quality.

An understanding of nitrogen management in the vineyard can be crucial to vine health and long-term yields. We will also be looking at this issue with an eye on the use of compost and below-vine weed management techniques.

As always, the technical meeting will include research updates, disease management and grower workshops, and Governor's Cup and Winemaker's Research Exchange tastings. We will also present not only the Grower of the Year Award but the VVA Lifetime Achievement Award, which is presented once every five years and will be announced during the VVA Banquet.

Additionally, this is a private pesticide recertification year, and the meeting content will address the recertification needs.

I hope each of you has had a successful 2017 vintage, and are gearing up for the same in 2018. I look forward to seeing you this February.

Show Off Your Vineyard!

With the guidance of the VVA board, we're in the process of revamping the VVA website so that it better serves our members and better represents Virginia growers.

To showcase the state's vineyards, we're looking for photos of your vines, your grapes or your harvest that can be displayed on a rotating basis on the website.

Here are some guidelines:

1. Include the name of your vineyard and town so they can be added to the site, and, if relevant, specify the varietal pictured (harvesting Chardonnay, etc.).

2. We'll try to work with any image; most helpful are photos with a minimum resolution of 72 pixels per inch and minimum width of 10 inches — larger is always better.

3. For each photo, identify the photographer so that we can give proper credit, and please be sure that you have the rights to have the photo published.

4. Please email photos (or any questions) to Grape Press at cgarsson@gmail.com. Thank you!

NORTHERN VA.: "Most panel members saw heavier than normal yields..."

Courtesy of Dean Triplett/Greenstone Vineyard

With the 2017 harvest over, it's time to look back at the season; a panel of Loudoun County winegrowers saw heavier-than-normal yields and high-quality fruit.

By Dean Triplett
Greenstone Vineyard

As I write this report, the harvest of 2017 is rapidly becoming but a pleasant memory and the holidays are full blown on top of us.

On Nov. 11, we had our first serious cold snap here, with a low of 21 degrees as measured on my thermometer. That officially ended the season, although it came later this year than normal. It's now time to look back and see if there are any lessons to be learned (there usually are), and if any of our fellow growers have any comments and insights that can help us all as we move forward.

On Nov. 15, the Loudoun Wine Growers Association held a meeting at Fabbioli Cellars, Leesburg. The main event of the evening was a grower's panel discussing the year's harvest. Bill Hatch, LWGA President and owner/operator of Zephaniah Farm Vineyards, led the discussion by introducing the panel members.

They included our host Doug Fabbioli; VVA president Nate Walsh of Walsh Family Wine; Tremain Hatch, Virginia Tech viticulture extension specialist (and part of the Zephaniah Farm Vineyards family); Mitch Russ of Russ Mountain Vineyards; Gonzalo Ortiz of Breaux Vineyards; and Scott Spelbring of Bluemont Vineyard.

Nate started the discussion by giving an overview of the past season. He saw no appreciable damage in his vineyards from the previous winter. Bud break started about 12 days ahead of the spring of 2016 and growth more or less stayed ahead of last season throughout the year.

Nate saw very good fruit set during bloom, which made for a large crop overall. Berries were also larger than normal, probably due to the early season rains. These early season rains made for pretty heavy Downey Mildew pressure. He also saw a significant amount of rain in August, on the order of 6.5 inches.

The rains were protracted events, he said, not just gully washers. This, in turn, created a great environment for post-veraison Downey Mildew and late rots that required extra sprays. Fortunately, September was dry, cool and beautiful, with a 21-day dry spell before the first rain of the month.

One odd thing Nate noticed was in his Sauvignon Blanc. Randomly throughout the planting, he found about five percent of the clusters reached about 16 degrees brix near harvest, but then just stopped ripening. There was no pattern or discernible cause to what he saw. He wound up double harvesting this fruit.

Nate said he talked to a grower in the Charlottesville area who saw the same phenomenon in his Syrah. The other odd thing was that the shoots with the affected clusters didn't harden off as quickly or as well as shoots with non-affected clusters.

The other members of the panel echoed Nate's general season observations, agreeing the conditions he described were common across the region. Mitch noted that he thought he was going to have a smaller-than-normal crop at bloom, and may have over-compensated by leaving a few more shoots than he normally would throughout the summer.

At any rate, he ended up with a larger-than-normal crop at harvest, though with high quality. Part of the quality of his fruit was attributed to the use of bird netting in his vineyard. Mitch is known for the excellent stewardship of his vineyard and this, along with netting, allowed him to ripen his larger-than-normal crop. Tremain Hatch seconded the use of netting in maintaining quality fruit.

Most panel members saw heavier-than-normal yields in many varieties this year. In many cases, berries seemed to be larger than average.

Scott mentioned that he was continuing a program of removing as much old wood and dead canes from the vineyard as possible to try and decrease the amount of Mildew inoculum present.

Gonzalo said that he had a frost on May 7 that resulted in the loss of roughly 31 percent of his Vidal and 50 percent of his Seyval.

Doug said he has had to rip out about 75 percent of his Cab Franc in a low area of his vineyard due to crown gall. He's replacing these with Chambourcin, which seems to be doing quite well.

Doug also noted the need to keep up with maintenance of equipment throughout the season. A broken-down tractor or sprayer

See NORTHERN on page 4

NORTHERN VA.

NORTHERN, from page 3

can be disastrous when the vineyard is at max growth. He said Japanese Beetles were not much of an issue this year, a sentiment echoed by everyone present.

The panel got into a discussion about sprays and sprayers. Most put on more sprays than usual this year because of the early- and late-season rains. The volume of water per acre used by everyone was in the range recommended by the manufacturers of their equipment and our research experts.

Mitch said that he did apply Oxidate and Mustang Max after veraison for Spotted Wing Drosophila and late-season rots. The hope at the time was that it would help prevent sour rots at harvest and the sprays seem to have had the intended effect.

Nate said he's been using more copper formulations for Downey Mildew due to its low cost and efficacy, and he also applied magnesium to help with potassium uptake in the fruit.

Nate noted that he has hired a consultant to help source vines that are as virus-free as possible for the 2019 planting season. He feels the extra expense, about double the normal price per vine, will pay for itself in a healthier future vineyard.

He noticed that the extended growing season, due to the later-than-normal killing freeze this year, showed more Leaf Roll Virus symptoms in the vineyard than he's seen in the past.

Doug, Scott and Gonzalo all have plans to add acreage. Availability of quality vines may be a problem in the near future.

Fruit quality this year was considered very high in most varieties by the panel. The excellent weather during September was certainly a major plus, especially after the amount/frequency of rain we had throughout the growing season. Given the sometimes difficult conditions that the year presented, it's nice to hear that wine quality should likewise be high for 2017.

Winemakers are busy in the cellar doing the best they can to make us all proud. It's up to all growers to continue to learn from our researchers and peers. And by doing so, hopefully we can do our best each year to produce the best grapes we can to make our industry proud.

EASTERN VA.: "We make our to-do lists for the winter..."

By Paul Krop
Good Luck Cellars

Ah, the arrival of cooler weather when we have a moment to take a deep breath. We look back on what we did well and not so well. We completed final canopy sprays, both antifungal and nutritional, and under-row weed controls where necessary.

We also make our to-do lists for the winter months. We plan for replacement vines or expansion plantings for 18 months hence (getting our orders in before nursery stocks run out of popular varietals). We discuss the budget for repairs on older equipment or the purchase of new, but only if the investment will substantially improve quality or reduce labor needs.

We're pleased that, as of this writing, we have completed our pre-pruning, dropping the cuttings, and mulching them. This sets us up for final pruning in February and March. As we go, we're busily repairing trellis and fixing deer fence.

For the deer that do get through (over or between electrically-active, one-foot wire spacing), our 12 Walker Hound rescue dogs do the rest, keeping deer and turkeys away. Their cost in vet bills and food has been defrayed by the reduction in deer and turkey gobbling (pun intended).

At harvest end, we've removed a few Pierce's diseased plants and those succumbing to crown gall Agrobacterium vitis. And speaking of crown gall, the following is observed: On our recent planting expansion of 10 acres (never before planted in grapes or any other agricultural crop) we've experienced significant occurrences of crown gall at the graft union site.

We know this was "virgin territory" as this was part of the sand/gravel/clay donor site for the mining company here before us. Topsoil and subsoil had been stripped and sold. So, the source of our crown gall exposure came from remnants in the soil or nursery stock, often in the presence of cold injury especially in an immature graft site.

The plants exhibiting crown gall are nearly all involved at the graft union site, most are Chardonel on 3309 root stock with minimal involvement of Petit Verdot. (Note the comments on gall in Wine Grape Production Guide for Eastern North America, Ed. Tony K. Wolf, VA Tech, 2008, pages 113-114.)

Thus, the following advice:

► Inspect your newly arrived nursery specimens for graft union maturity. Manually test representative graft unions by firmly bending the graft site. Weak or immature grafts may snap and break but mature grafts should simply bend with the rootstock and scion material and not break.

► Select sites not as prone to cold injury for new plantings or install fans or wind mills for air movement on nights of expected freeze.

► Hill up with each newly planted section to cover the graft union site. We've used (and still own) a hill up/take down plow from Green Hoe, which is mid-tractor mounted and controlled by hydraulic and joy stick. We neglected to use it for the planting in question, but have used it often in the past. So, if you have not hilled up those new arrivals, get to it.

By the way, I've still got the Green Hoe device with hill up and hill down blades. Talk to me if you want to borrow it.

Happy holidays, Christmas, Hanukkah, Kwanzaa, and let's all get those wintertime projects done.

Winter Pruning With Finesse

By Jim Law
Linden Vineyards

There is a lot of information available about vine pruning. Most of it focuses on technique and philosophy. I would like to address more practical aspects by outlining how we organize the winter logistics of pruning at Hardscrabble, Linden's home vineyard.

Every operation is different in terms of labor and size. At Hardscrabble we have about 20 acres of vines. Four of us do the pruning, but we are also responsible for many other aspects of the business. Over the years, our seasonal pruning strategies have evolved in order to adapt vine needs to time constraints.

Timing

In a perfect world I would wait to do all the pruning in March and April when the sap is flowing (known as bleeding or crying, depending on where you are from). At this time there is less trunk disease pressure and one can more easily evaluate any winter damage. It's also more pleasant weather to work in.

In the real world we have to get started much earlier in order to get the job done before bud break. Additionally, Linden has a full-time staff that shows up every morning at 7 ready to work. So we compromise and start pre-pruning around Thanksgiving. I try to balance the realities of running a business while respecting the health of my vines.

With the exception of some Merlot blocks, Hardscrabble is cane-pruned. I mention this only because, in a logistical sense, it means that pre-pruning can consist only of removing the top third of the canopy, which is accomplished fairly quickly. By mid-December we are in a position where the final pruning needs to commence.

Three factors prioritize the pruning sequence:

1. Vine hardiness to winter damage and wood disease: Vidal, Riesling, Petit Manseng and Petit Verdot are first up to bat.

2. Vine age: Older vines first, non-bearing last. I see more winter damage and die-back in one- and two-year-old vines. I also worry about wood diseases when making so many cuts along the forming trunk near the base of the vine.

3. Block importance: Our best performing blocks are given top priority (pruned later in the season).

As a side note, last year I did a trial on the effects of pruning timing on bud break timing. Starting in December I pruned two different rows of Cabernet Sauvignon from a homogeneous block every three weeks. The last two rows were done in April (the vines were still dormant). There was no difference in bud break times. This confirmed my theory that late pruning delays bud break only when it is done after the distal buds have begun to show bud swell or even bud break.

Organization

We approach each block as an individual. Before we start, I walk every row and prune any non-uniform vines. This mostly consists of re-plants. I cut them back very hard, much more severely than if the same vine was part of a newly planted block. Re-plants need at least twice as many years to come into production because of competition from neighboring established vines.

It is human nature to be optimistic. My staff has been pruning these vines for years, but I would always find young replant vines struggling, burdened by excessive yields and meager shoot growth. I find that brutally aggressive pruning is the best way to address the problem. I've also found that cutting a vine back severely is not an emotionally easy task for most people. So it has become my job.

When I am making this first pruning pass I am also getting a feel (and reminder) for last year's vigor. As a group we talk about specific strategies for the block. This usually involves discussing the proclivity of renewal spurs and cane length.

Renewal spurs are a necessary evil when cane pruning. I don't like them because they tend to produce larger, more vigorous shoots that interfere with the goal of uniformity. In many cases they are essential in order to retain and maintain vine form. I find that it is human nature to leave more than is necessary, making for a crowded head area.

The only time one can evaluate a vine's growth and potential capacity is before it is pruned. The pruner is trained to evaluate last year's growth by observing the number and size of canes that grew last year. Pruning to a specific cane length is our way of communicating and adjusting for individual vine size, vigor and capacity.

A healthy, productive vine will be pruned to two full-length canes. Weaker vines are pruned to shorter canes or just renewal spurs. This system of varying cane lengths will communicate an individual vine's potential to the person doing the shoot thinning (fewer shoots remaining on shorter canes) and cluster thinning, keeping the vine in balance all season long.

My own pruning priorities focus mostly on young vines that are entering their third, fourth and fifth years. This is the stage where the foundation of the vine's structure will be determined for the life of the vine. As I have become more experienced I have seen the advantage of pruning back fairly severely in this stage.

Pruning was my first vineyard job back in 1979. I still vividly remember standing in snow with a cold wind howling and loving every minute of it. I knew immediately that I was to become a winegrower for life. My enthusiasm for pruning has only grown. The satisfaction and creativity of shaping and renewing a vine never wanes.

Brush Up on Pruning Skills at Extension Workshop

A 2018 Dormant Pruning Vineyard Workshop, sponsored by Virginia Cooperative Extension, will be held Jan. 17 from 1 p.m. to 4 p.m. at **Glass House Winery**, 5898 Free Union Road, Free Union, Va. 22940.

Dormant pruning of grapevines will be discussed, followed by guided practice pruning hybrids, vinifera and young vines.

This workshop will have both indoor and outdoor components. Dress appropriately to go outside, and bring pruning shears. This is a two-part meeting that will include carpooling to a second site.

The workshop is free, but please register **(click here)** to ensure there are enough handouts and to receive any future communications regarding meeting details.

This will be the only VCE pruning workshop in central Virginia; a pruning workshop is scheduled for March 16 in Northern Virginia.

Questions? Contact Tremain Hatch at thatch@vt.edu.

If you are a person with a disability and desire any assistive devices, services or other accommodations to participate in this activity, please contact Tremain, AHS Jr. AREC at (540) 232-6032 between 9 a.m. and 5 p.m. to discuss accommodations 10 days prior to the event.

How Loudoun and Va. are getting it right

LOUDOUN, from page 1

County resulted in an overall increase in scores for the wines submitted relative to the year before when the fruit only had to be sourced in Virginia. With greater site specificity, the judges found the wines to have higher quality.

Another takeaway was that balance, finesse and elegance led the way. Wines that displayed heavy doses of oak, more extraction and higher alcohols were not as well received. This is not to say that those styles do not have a place in the market, just that those styles were not as effectively produced in Loudoun County — better examples exist in other regions that are typically also known for producing such styles.

Finally, Loudoun County can produce world-class wines. There were examples of Cabernet Franc and Viognier that stood out as among the top tier of wines in the world made with those grapes.

What varietals are particularly promising or interesting?

As mentioned above, Cabernet Franc and Viognier are made very well here and there are a number of other varietals that are either interesting, or promising and interesting.

Cabernet Franc can (and in my opinion should) showcase a lighter more delicate side. Think more Pinot Noir-like than Cabernet Sauvignon. Styles that showcase ripe, fresh fruit characteristics with moderate alcohol, bright acidity and smooth texture are more appealing than counterparts from either California or the Loire Valley in France.

NEAL WAVRA

For Viognier, excellent examples here often benefit from precise picking to maintain freshness and/or the addition of a small amount of Petit Manseng to maintain acidity. Virginia versions that display freshness still tend to be juicier than French counterparts and not as laden as California examples.

Petit Manseng does very well in the Old Dominion in terms of production. Late harvest versions done here rival any in the world. The challenge of this grape is that it maintains its acidity as it ripens and as such can make a very alcoholic wine when made dry. Off-dry and sweet wines do not have a large market. As a result, this is a very interesting grape. I find blends made with it to be where the most promise lies.

Chardonnay is the most widely planted grape in Virginia and is made in a full spectrum of styles. Where I find it most interesting is with neutral oak and less malolactic acid, which generally makes a less expensive, easy drinking wine that compliments food at the table.

Petit Verdot is interesting. Initially, I found wines from this grape to be monolithic and one-dimensional. However, in more recent years, they have been made with more complexity, and that is welcome. Petit Verdot ripens well here and provides an option for the often sought-after power that big-red drinkers desire, especially since Cabernet Sauvignon does not deliver in all areas of the state.

Blends are both interesting and promising. Red blends continually are the highest-scoring wines in the Governor's Cup competition. They are the wines that show the most complexity and intrigue.

Traditional Bordeaux blends that are Merlot dominant (Right Bank) or Cabernet Sauvignon dominant (Left Bank) are possible here depending on the region. These blends are definitely interesting. Promise lies in the blends that may involve Petit Verdot in a larger percentage with Merlot, Cabernet Franc, Cabernet Sauvignon and/or Tannat.

See LOUDOUN on page 7

LOUDOUN, from page 6

There are a number of other varietals that are interesting but that do not yet represent promise. Albarino and Vermentino jump to mind.

Is there a market for native and hybrid grapes?

Absolutely! Hybrid grapes present options for Virginia wines that vinifera generally cannot provide. First and foremost, they are cheaper and tend to have higher yields. This allows for affordable wines that are well suited to parties, barbeques, and daily drinkers. When blended with a percentage of vinifera grapes, the resulting wines are very quaffable and enjoyable and work very well for potential by-the-glass pours for restaurants.

At Field & Main, our house wines, which we make with Ben Jordan at Early Mountain Vineyards, blend Chambourcin with Cabernet Franc for the red and Vidal with Petit Manseng and Chardonnay for the white. The results are quaffable wines that hit an attractive price point.

In addition, grapes like Chambourcin and Vidal make compelling dessert wines. I would like to note that price and quality are important here. For hybrids to be of interest, more attention should be paid to their production. High yields often bring off aromas. For hybrids to work, more effort must be paid to their production, but prices will need to remain lower relative to vinifera.

What are the next steps in building the Virginia wine culture?

There is an established Virginia wine culture at the wineries and in the tasting rooms. Virginia wine tourism is strong and contributes substantially to the state's economy. This is, of course, positive, but also is a hindrance to the expansion of Virginia as a globally recognized quality wine region.

Most of the wine produced here is consumed here. Efforts are underway to expand the reach of wine made in Virginia, but for these efforts to gain traction, a number of producers will have to shift part of their production from retail sales in their tasting rooms to wholesale in distribution. Virginia wine needs to be consumed in restaurants in the region and beyond.

One major challenge in this respect is the production levels of grapes. More quality production is needed.

In addition, the exchange of ideas in viticulture and viniculture needs to continue. Growers and producers benefit themselves and the whole of the industry when they share both best practices and failures. Competing in the marketplace is necessary in business, but the belief that one's neighbor is the competition is shortsighted.

Blue Ridge Visuals/Courtesy of Loudoun Wineries Association

The 2017 Loudoun Wine Awards, held in October, highlighted the achievements of a region that is producing high-quality wines.

The competition is global. To be recognized as a quality wine region that can command a premium, vineyards must be planted with the right grapes that are tended intentionally, which in turn produce wines of distinction, character and quality.

What do you look for when buying Virginia wine for your restaurant?

Story, distinction, and appeal.

Price and value, while associated, are two different concepts. Virginia wine is more expensive than some other wines in the world.

This is a point that often comes up when talking about Virginia wine. It is usually underpinned by the assumption that the quality and thus the value is not present to justify paying a higher price for a Virginia wine.

While this perspective had grounding a decade ago (and does still, in so far as it does for any wine region — none produce all winners), today quality wines are found all over the Commonwealth.

So, I look for wines that are well made without faults. I look for wines that reflect an understanding (or are in pursuit of an understanding) of a sense of place. I look for wines that result from the efforts of farmers.

After these criteria are met, I look at price. For wholesale pricing, wines that are under $14 per bottle are options for a by-the-glass pour, which will result in more exposure and more orders.

Generally speaking, white wines made from unoaked Chardonnay and other vinifera like Viognier, Sauvignon Blanc, Albarino, Vermentino, etc. will sell if they are around $18 per bottle or less.

I have had success with single varietal reds like Cabernet Franc, Petit Verdot and Tannat in the range of $16 to $26 wholesale per bottle. As an average, Bordeaux blends sell in the $18 to $30 range.

Neal also provides wine- and food-related consulting services through his company, FABLE Hospitality. He has been the sommelier or manager at a number of restaurants, including The Ashby Inn in Paris, Va. Neal is the recipient of the Commanderie de Bordeaux Wine Scholarship and the Kopf Foundation Wine Excellence Scholarship.

What to Know About Climate Change

From Tannins to Nitrogen: A Look at the Variables For Wine Grape Growers

By Dr. Bruce Zoecklein
Enology Professor Emeritus, Virginia Tech

The Intergovernmental Panel on Climate Change (IPCC 2014) estimates temperatures will increase from 2.0 to 2.5 degrees C by the end of the century, with the worst case being an increase of 3-3.5 C (Catena 2016). Despite the worldwide rise in temperatures, many agricultural products will continue to be cultivated without any noticeable difference or change discerned by consumers. This is not the case with our industry, where wine quality may be impacted.

Indeed, according to Miguel Torres (2016), "Climate change is the greatest threat for the wine business in general and for winegrowers in particular." The reality of climate change and man's influence is admitted by the vast majority of scientists, vignerons, and the general population.

My first glimpse of the impact of climate change occurred during a USAID-sponsored trip to Romania in the early 1990s. One day, I found myself traveling on one of Romania's state-of-the-art medieval roads to meet one of the country's more renowned winegrowers. Unfortunately, his lack of English competency was eclipsed only by my lack of Romanian. Through an interpreter, I attempted a conversation by asking the vapidly pedestrian question: What is your most important constraint to operating your vineyard?

His reply was rather torrid. To my simple question about viticulture constraints, he replied, "My favorite time of year is mid-way between the flood and the drought," what I would later term, the Universal Grape-growers Mantra.

As it turns out, it may not be the change in the climate that is the greatest concern, but rather the unpredictability of the weather.

Climate and Vine Physiology

Among environmental factors, climate has a greater impact on vine development and fruit composition than either soil or variety (van Leeuwen et al. 2004). Each of the main wine-producing regions of the world can be characterized by mean climatic conditions which are drivers of wine typicity for that region.

However, those drivers are changing. Gladstones (2011) and Roehrdanz and Hannah (2016) summarized some of the overall effects of a changing climate:

- Increased temperature during the growing season.
- Increase in growing degree days.
- Increase in mean temperature during fruit maturation.
- Increase in mean temperature of the warmest month of the growing season.
- Increase in mean temperature of the coldest month of the growing season.
- Increase in length of growing season (frost-free days).
- Occurrence of extreme winter minimum temperatures.
- Increases in precipitation from July through October.
- Increase in precipitation seasonality.
- Change in the Aridity Index (annual precipitation/potential evapotranspiration).

The primary climate vectors impacting viticulture include temperature, moisture stress and radiation (Jones et al. 2012). It is well established that the phenology of bud break, flowering, and véraison are temperature dependent. In some regions, the intervals between these events has decreased (Bock et al. 2011, Lageder 2016) as a result of climate change.

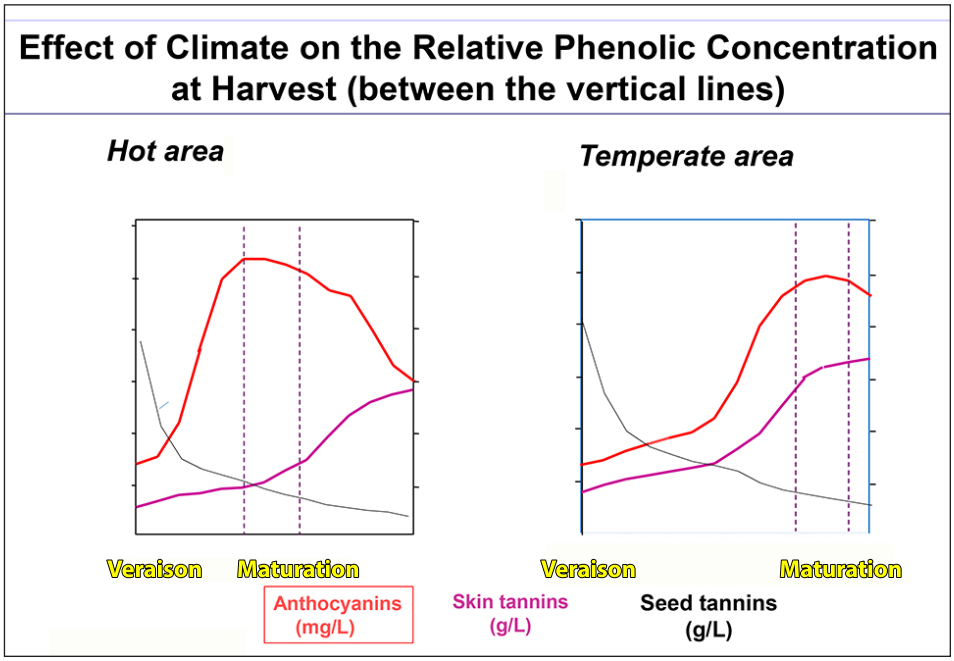
Temperature affects the rate of fruit ripening. Sugar concentration increases with temperature, although secondary metabolites such as aroma, flavor, and phenol compounds are generally negatively affected by high temperatures (Kliewer and Torres 1972).

Vine water status depends on soil texture, percentage of stones, rooting depth, rainfall, evapotranspiration and leaf area (van Leeuwen and Darriet (2016). Water deficiency affects photosynthesis and shoot growth, and can increase both tannin and anthocyanin content (Duteau et al. 1981), while excess stress can lead to leaf damage and severally impair fruit ripening. The proper cover crop may help assure ground shading and contribute to humus formation while helping to buffer the very dry and very wet periods.

Many Europeans equate limited soil moisture with their terroir expression and remain reluctant to irrigate. It should be noted, however, that many of these vineyards are on abundant aquifers. In many other regions of the world, aquifers are very deep and/or below impenetrable rock and thus the water is unavailable to vines (Catena 2016). Climate variability may necessitate even more careful monitoring and, perhaps, more irrigation.

Ripening is dependent on a constant supply of hormones. Optimum hormone balance is dependent on a continuous and moderate moisture stress and favorable soil temperatures.

See CLIMATE on page 9



Source: Lallemande/Courtesy of Bruce Zoecklein

Comparing red fruit during the last month of a warm vs. a cool season. For more information, see page 10.

CLIMATE, from page 8

Therefore, irregular patterns of moisture stress and increased rainfall will certainly have an impact (Gladstones 2011).

Another possible effect of climate change is diurnal temperature range (the difference between day and night), which will decrease as carbon dioxide levels increase (Bindi et al. 2010, Gladstones 2011). Such changes can influence fruit secondary metabolites, such as aroma, flavor, and phenolic compounds. According to Gladstones (2011), large differences in clouds, humidity and diurnal range, particularly in mid-latitudes and continental interiors, will continue to occur with a changing climate.

Winemaking Issues

Processing changes may need to be considered for both red and white cultivars. The following are a few winemaking issues that are impacted by climate change:

- Vintage-to-vintage variation.
- Ripeness assessment.
- Tannin and color.
- Longevity/reductive strength.
- Grape nitrogen.
- Grape and must temperature.
- Alcohol adjustments.
- Need for flexibility in practices.

Vintage-to-Vintage Variation

Climate change may result in minimal impact on terroir expression, due to the multitude of influences of geography, topography, soil, and underlying geology (Catena 2016). However, some varieties are more impacted than others regarding warmer temperatures and seasonal variations. Tight-clustered grapes are much more prone to fungal diseases, as are varieties with thin versus thick skins. Varieties such as Viognier, Petit Manseng and Tannat have proven to do well in the warm, humid environment of Virginia.

Vintage-to-vintage variations are likely to become much greater as seen throughout the world. It is not climate change, per se, that will affect some, but the erratic nature of the unpredictable weather that may be a greater problem. Increased seasonal variations may influence fruit set and will affect maturity and maturity evaluations. We can expect that the dis-synchrony among primary (e.g., Brix) and secondary (aroma/flavor/phenols) metabolites will likely increase.

Additionally, as a function of changing environmental conditions during fruit set, fruit variation within otherwise uniform blocks may increase.

Even in the most uniform vineyard, the variation for various components at best is broad: Brix 4-5 percent, TA 10-12 percent, berry weight 6-20 percent, and color 13-18 percent. These ranges will certainly increase in some areas and will require great sampling precision.

Ripeness Assessment

Champy (2016) reports that harvest dates

See CLIMATE on page 10

CLIMATE, from page 9

for his Pinot Noir at Louis Latour, Beaune, France, have moved from mid-October to approximately Sept. 20. Frank (2016) reports that his New York vineyard has experienced an increase in GDD (growing degree days) of 10 percent in the last 10 years. One obvious contribution of global climate change is the tendency in some regions to pick grapes at a slightly early ripeness. Optimally, this should occur following the loss of green tannins in the fruit.

Nature and plants have moved to higher elevations and more northerly climates to adjust to warmer temperatures. It is likely that viticulture will need to follow a similar pattern in the future (Catena 2016). Some have chosen to plant fruit at higher altitudes to find cooler ripening climates. This can impact heat and, likely, UV interception.

Tannin & Color

Red wine cap management strategies and skin contact time must be reviewed in the context of the changes in seasonal variability and fruit chemistry.

The graphic on page 8 compares red fruit during the last month of a warm vs. cool season. Differences in phenols are both qualitative and quantitative. The major quantitative differences due to climate lie in the ratio of anthocyanin to skin tannins. This ratio is important due to the influences on color, color stability, mouthfeel, and aroma integration.

Phenol binding or polymerization occurs during fermentation and in young wine development. Polymerization of tannins continues until a terminal end reacts with an anthocyanin molecule, stopping the process. Thus, anthocyanins act as bookends, limiting chain elongation. As such, the more anthocyanins there are relative to tannins, the shorter the resulting polymers and the 'finer' the tannins. Thus, seasonal variations illustrated in Fig. 1 can impact the resultant polymer length. Tannin-anthocyanin polymers help stabilize color. Small polymers have relatively fewer protein binding sites, thus producing less astringency.

These small colloids provide a surface area which allows for the integration of aroma components. Additionally, climate change can impact the concentration and type of color cofactors.

Longevity/Reductive Strength

Small pigmented polymers help provide red wine reductive strength. Reductive strength is essentially a measure of the uptake of oxygen, providing longevity, or the ability of a wine to age. This is an important quality attribute, analogous to a wine's chi (qi) or life force. Reductive strength is impacted by both climate and fruit maturity. Problems with under-ripe fruit include the following (Smith 2010):

- Insufficient pigments.
- Limited extraction.
- Limited desirable flavors, which limits tannin capacity.

The problems with over-ripe fruit or wide variations in fruit maturity include the following:

See CLIMATE on page 11

CLIMATE, from page 10

- Loss of color.
- High alcohol capacity, which can destabilize color-tannin complexes.
- Significant loss of reductive strength.

The change in the phenolic content, as a function of excessive fruit maturity, can lower the reductive strength by a factor of 10. In some regions, the use of hyperoxygenation for some white cultivars may become more important in helping to provide longevity (See Enology Notes #160 at **www.vtwines.info**).

Grape Nitrogen

Both YAN (yeast assimilable nitrogen) and micronutrients are essential for fermentation. Nitrogen (N) availability can be considered a terroir factor, being correlated to both red and white wine quality, particularly where soil moisture is not limiting.

Fruit N may change notably in some regions as a result of increases in temperature and precipitation extremes. As such, it may be even more important in the future to monitor each block, each season, for N status. This monitoring should be done in concert with the understanding of differences in optimum YAN in red versus white grapes, cultivar differences, and the difference between native plant-derived nitrogen and fermentation adjuncts.

Grape/Must Temperature

The importance of energy management should be highlighted as a result of climate change. Many regions around the world have sustainability programs to help winegrowers understand the importance of sustainably practices, including thermal control. These programs will become even more important to the industry in the future.

Winemakers and winery owner should understand that energy is a variable not a fixed cost. Each producer — larger or small — interested in saving money should answer the following questions:

- What is the relationship between energy cost and your bottom line?
- How is energy used at your facility, and where?
- What are the ways to reduce energy consumption?
- Are you benchmarking or measuring your energy use?

The advantage of benchmarking or determining your energy use lies in the ability to answer these questions by measuring, contrasting, and charting progress. It is like the old saying: If you don't know where you are going — any road will take you there!

Alcohol

Many regions have experienced sugar concentration increases, resulting in potential alcohol elevations of 1 to 2 percent. However, others have noted that the average sugar levels at harvest have not significantly changed over the years, suggesting that grape sugar levels are not only dependent upon weather, but are also influenced by a multitude of other factors including yield. Research on additional methods for alcohol removal, and the selection and creation of yeasts that produce less alcohol, will certainly continue.

Industry Strategies, Flexibility

There is an old expression that suggests that advice is free unless it is followed. Below are recommendations for adjusting to the ever-changing reality of climate change:

- Be flexible, not formulaic, with vineyard/wine processing regimens.
- Use and share scientific information.
- Be out in the vineyard.
- Invest in wine and grape research.

There may not be a better example illustrating the need for research investment than smoke taint that has occurred in the west this vintage. Climate change and the way forest land has been managed has resulted in an increase in the incidence of forest fires (Diamond, 2005). These fires have added a relatively new term to the winegrowers lexicon — smoke taint.

Smoke residue contains high concentrations of volatile phenols, such as guaiacol and eugenol. The glycosylated forms of these phenols tend to accumulate in the grape skin and pulp. These compounds are released during fermentation, causing wines to become unpleasantly 'pharmaceutical,' 'dirty,' 'ash tray,' 'medicinal,' 'campfire,' or 'burnt,' and reduces the perception of fruit aroma intensity.

Climate Change Dilemma and Science Skepticism

Given the stakes, not just for viticulture, but for humanity as a whole, it is disheartening to see that some people, including a number of government officials, simply deny that the climate is changing, and that it is changing because of human activity.

Directly and conclusively linking climate change to weather has admittedly been difficult, a fact the heretics point out on a regular basis. But asking for direct scientific evidence in this case is like attempting to prove that poor eye sight or arthritis are caused by old age. They are not, but are certainly related.

I believe the argument for and against man-made climate change is reminiscent of Pascal's Logic of the Wager. Blaise Pascal was a French feudalistic philosopher who proposed a wager to his colleagues who did not believe in God. The wager, and you have to bet, was his way of demonstrating the importance of seeing the world the way you would like it to be.

Pascal wrote: You can wager there is no God. If you are right, what do you gain? Absolutely nothing. What do you lose? Infinitively everything.

You can bet there is a God and if you are wrong, what do you lose? Absolutely nothing. But if you are right, what do you gain? Infinitely everything including eternal salvation. Faced with the choice of no detriment and such a gain, who would not want there to be a God? The analogy seems appropriate. What do you (and the rest of us) lose if you bet against man-made climate change and are wrong?

Everything, including a livable planet!

References

Bindi, M., Fibbi, L. and Miglietta, F. (2001). Free Air CO2 Enrichment (FACE) of grapevine (Vitis vinifera L.): II. Growth and quality of grape and wine in response to elevated CO2 concentrations. European Journal of Agronomy, 14, 145-155.

Bock, A, Sparks, T., Estrella, N. and Menzel, A. (2011). Changes in the phenology and composition of wine from Franconia, Germany. Climate Research, 50, 69-81.

Catena, L. (2016). Climate change field reports. J. Wine Econ. Vol.11, No 1.

Champy, B ,(2016). Climate change field reports. J. Wine Econ. Vol.11, No 1.

Diamond, J. (2005). Collapse-How societies choose to succeed. Penguin Publishing, New York, NY.

Duteau J., Guilloux, M., and Seguin G., (1981). Influence des facteurs naturels sur la maturation du rasin,en 1979, a Pomerol et Saint-Emilion. Connaissances de la Vigner et du Vin. Vol 15. No 3. 1-27

Frank, D.F. (2016) Climate change field reports. J. Wine Econ. Vol.11,No 1.

Gladstones J. (2011). Wine, terroir and climate change. Wakefield Press, Kent Town, South Australia. pp.279.

Jones, G.V., Reid, R. and Vilks, A. (2012). Climate, grapes, and wine: structure and suitability in a variable and changing climate. In: Dougherty, P.H. (ed.), The Geography of Wine: Regions, Terroir and Techniques. Springer: New York and Berlin. 109-133.

Kliewer and Torres, (1972). Effect of controlled day and night temperatures on grape coloration. Am. J. Enol. Vitic. Vol 23, no. 2.pp71-77.

Lageder 2016. Climate change field reports. J. Wine Econ. Vol.11, No 1.

Torres, M. (2016). Climate change field reports. J. Wine Econ. Vol.11, No 1.

IPCC (International Panel on Climate Change). (2014). Climate chage 2014. Impacts, adaption and vulnerability. http://ipcc-wg2.gov/AR5/report/final-drafts

Roehrdanz and Hannah (2016). Climate change, California wine and wildlife habitat. J. Wine Econ. Vol. 11.no 1, 69-87.

Smith, C. (2010). Red wine structure. Goal and strategies. Presentation of the 2010 Wineries Unlimited, Richmond, Virginia.

van Leeuwen, C., Fraint, P., Chone, X., Tregoat, O., Koundouras, S., and Dubourdieu, D., (2004) Influence of climate, soil and cultivar on terroir. Am. J. Enol. Vitic. Vol 55, no.3, 207-217.

van Leeuwen, C., and Darriet, P., (2016). The impact of climate change on viticulture and wine quality. J. Wine Econ. Vol.11, No 1, pp. 150-167.

Va. Legislature Gears Up for 2018

By Ben Rowe
Virginia Wine Council

This summer, all wineries, cideries and vineyards received a copy of the wine industry study from either the Office of the Secretary of Agriculture and Forestry, the Virginia Wineries Association, or the Virginia Wine Council. As you may recall from our report during the Council's most recent industry-wide conference call, the study focused on noise and traffic from winery events.

In addition to identifying issues, it asked for solutions. The information obtained from this survey was incorporated into the study's recommendations.

In addition to the wine industry, input was solicited from a wide range of concerned parties, including local government, neighbors of wineries, law enforcement, and tourism, among others. However, the vast majority of responses came from the wine industry.

The study results have been released, and they were very favorable to our industry. In line with the recommendations from the stakeholder panel, the Secretary of Agriculture and Forestry will not propose legislation as a result.

Instead, the report concludes that the impact of events, noise, and traffic can be addressed through the existing authorities. Both the wine industry and local governments were asked to develop best practices and improve education of their members on best practices on how to conduct events.

The full report can be found on the Legislative Information System as **House Document (HD) 16**.

Special thanks to David King, Mitzi Batterson, Nate Walsh, Annette Boyd, and James Turpin for their work on this project.

Impact of the 2017 Elections

The results of November's elections mean that Democrats will continue to hold the offices of Governor, Lieutenant Governor, and Attorney General, but the margins of victory for Ralph Northam, Justin Fairfax and Mark Herring far surpassed that of four years ago.

Republicans currently hold onto their majority in the Virginia House by a 51-49 margin, down from the 66-34 member majority they held going into the Nov. 7 elections.

However, three races are still being contested, and Democrats would take control for the first time since 2000 if they prevail in two of those races. If they change the outcome in one race, the House would be evenly split, and the two parties would have to negotiate a power-sharing agreement.

What does this mean for the Virginia wine industry? We are fortunate in that our issues are typically nonpartisan, and we have largely avoided highly charged social or economic issues where votes are divided strictly by party. Rather, the biggest part of our job will be to educate our many new House members on the industry and the laws, regulations, and issues that impact our operations.

With that in mind, we are working to create a Wine Caucus of members of both the House of Delegates and State Senate who have wineries in their districts or are just interested in our issues. The goal of this effort is to provide the industry with a base of support in the General Assembly to promote the industry's interests.

Thanks to Delegate-elect Emily Brewer (R-Isle of Wight) for her interest and leadership on this issue.

Legislative Issues

The 2018 General Assembly session convenes on Jan. 10 and runs until March 10. During that time, we are likely to face a number of issues — some new and others heard previously.

The most significant of these is the application of building codes to rural retail structures such as tasting rooms. Currently, at least 10 counties are considering such actions on the local level.

The industry is working with its agribusiness allies to develop a process to address this issue in a way that is fair and obtainable. Tactically. this means we are trying to buy time to find a workable, statewide solution rather than opening the floodgates for multiple localities to develop recommendations independently.

Whether dogs should be allowed in tasting rooms is another question that is likely to come before the General Assembly. The industry is split on this emotional issue.

Finally, the industry will be involved in the continued evolution of the Virginia ABC from a commission to an authority. This structural change will mean numerous changes in how ABC functions and regulates the wine industry.

The creation of the Virginia Alcoholic Beverage Control Authority will free ABC from public procurement and personnel laws, as well change the way in which ABC appoints its directors.

As always, our greatest strength lies in our membership and the willingness of our members to contact legislators when the need arises.

We look forward to the challenges and opportunities ahead.