

# GRAPE PRESS

Winter 2022

The Quarterly Newsletter of the VIRGINIA VINEYARDS ASSOCIATION

Vol. 38 No. 4

## Wrapping Up the 2022 Season ...



Kevin Sutherland

It was harvest day for Chardonnay on Sept. 27 at Nicewonder Farm & Vineyards in Bristol. With another growing season in the books, see our Regional Reports, starting on Page 3, for observations and news from growers around Virginia.

## ... And Prepping for Winter Pruning

### *Advice on Preventing Infection and Disease When Making Your Cuts*

By Mizuho Nita

Grape Pathologist, Virginia Tech

We often discuss diseases in green tissues such as downy mildew; however, some pathogens infect woody tissues. Some examples are Botryosphaeria canker, Petri disease (aka Esca), crown gall, and Eutypa dieback. In addition, some of the other pathogens such as Phomopsis can cause disease in canes and cordons.

Since these pathogens limit the movement of

water and nutrients by infecting the xylem and phloem, typical symptoms of these diseases are the discoloration of leaves and shoots, and the decline of cordons or vines. These pathogens act like a “silent killer” to shorten the life of the vine by 5-10 years. Therefore, even if it may seem like you do not receive benefits immediately, preventative measures taken every year pay off in a more productive vineyard in the long term.

On the other hand, with younger vines (up to 5 years or so), some of these diseases can progress rapidly to cause a decline of the

infected vine within a year or two. For more on this topic, please visit our site: <http://treeandvinetrunkdiseases.org/>.

On the same site, I have an online app to help you identify various trunk-related diseases and disorders. Please check it out: <http://treeandvinetrunkdiseases.org/trunk-disease-diagnostics-app>.

**Management: Environment and cultural practice.** Since grapevines have thick bark,

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**INDUSTRY NEWS**



**GROWER'S DATEBOOK**

*Highlighting events that may be of interest to members of the Virginia wine industry. For more info as well as registration details, click on the link or event.*

**VVA Winter Technical Set for Feb. 15-17**

The VVA Winter Technical Meeting will be held Feb. 15, 16-17, 2023, at the Omni Hotel in Charlottesville. Scheduled highlights include:

■ Workshops and panel discussions on a wide range of topics, including cold weather issues, biopesticides, seasonal labor demands, the H-2A worker program, and spotted lanternfly updates;

■ An evening wine reception on Feb. 16 and a luncheon on Feb. 17;

■ Vendor exhibits.

On Feb. 15, a day before the official start of the meeting, popular workshops on Beginning Grape Production and Grape Disease Management will be offered.

Look for updated details and registration information in your email and at [virginiavineyardsassociation.org](http://virginiavineyardsassociation.org) in December.

**Free Webinar: H-2A Guest Worker Program**

Increasingly, owners and managers of vineyards large and small are turning to the H-2A guest worker program to accommodate their vineyard labor needs.

On Nov. 21, a free lunchtime webinar – “An Introduction to the H-2A Guest Worker Program” – will be held from noon to 1 p.m. Jennifer Poole, Executive Secretary of the Virginia Agricultural Growers Association, will outline requirements for hiring H-2A workers and explain the application process. There will be a question and answer period. Please register by 5 p.m. on Nov. 20. [Click here to register.](#)



The 2023 Eastern Winery Exposition and Conference will be held March 14-16 at the Lancaster County Convention Center in Lancaster, Pa.

Because the VVA is an association partner, our members are entitled to a 10% discount on a session pass. More info: [easternwineryexposition.com](http://easternwineryexposition.com).

*Information listed in Grower's Datebook is current at the time of publication, but for all events, be sure to check directly with each organizer for the latest on any changes or cancellations.*

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► **EASTERN VA.** “From what I saw in my vineyard and others, new vineyards planted without irrigation, but well managed, achieved good lignification with canopies functioning into the first week of November.”

By **Gonzalo Ortiz**  
*Rustic Vintage*

**H**ere in the beautiful Northern Neck, August was mostly dry except for one rain event that brought the balance of the month’s precipitation. After that, the area stayed dry until the second week of September, and then turned dry again until the substantial rain events during the first week of October.

Earlier maturing varieties like Chardonnay looked to do very well, while the success of later maturing varieties such as Merlot and Cabernet Franc tended to be more site specific and less universal.

The lower number of rain events for most of August and September could have negatively affected young vines planted this year without irrigation. This is because better sites in this area dry out very quickly, do not maintain much moisture, and young vines do not have deep root systems. While the individual rain events were big, they were sufficiently few and spread out to cause noticeable stress on the young vines.

Time will tell if stress from the lack of water resulted in injury. While I did see some stress, it was not uniform. From what I saw in my vineyard and others, new vineyards planted without irrigation, but well managed, achieved good lignification with canopies functioning into the first week of November.



Veronica Ortiz

On the business side of what we do, increased costs for wooden posts and generally higher shipping costs maintained their upward trajectory through the fall. The higher volume of grapes for sale through the VVA Exchange page got my attention. I hope during our industry meetings we get some good statewide data on this year’s market.

**Gonzalo A. Ortiz, father of Rustic Vintage owner Gonzalo Ortiz, pitches in during the season by tying up first-year Petit Verdot before grow tubes are removed.**

As I write this article during the second week of November, I am getting all my supplies in order to put up my trellis next year. I am still waiting for our first hard frost, and I am looking forward to seeing how the vines will look at budburst next spring. I am very excited about the prospects for these very low organic matter sandy loam soils.

This was my first year of farming in this area and something I learned this summer was that my trick of working with a headlamp overnight in July and August to avoid the heat on the hottest days did not always work due to the humid nights.

I hope everyone had a successful year and if anyone reading this near the Northern Neck ever wants to talk shop, please feel free to reach out as I greatly enjoy discussing our craft.

*Editor’s Note: Gonzalo Ortiz is a regional reporter for Grape Press, covering Eastern Virginia. Please contact Gonzalo at [eastv growers@gmail.com](mailto:eastv growers@gmail.com) if you’d like to provide information for upcoming columns about growing conditions, new plantings or anything else you think would be of interest to other growers.*

INDUSTRY NEWS

**Nominations Open for Award, Board Seats**

**Serving on the VVA Board**

Nominees are being sought to fill three VVA Board positions for 2023-24: President, Treasurer, and one At-Large position. Board members play an important role in the direction and activities of the VVA and work directly with our industry partners to help shape the Virginia wine industry.

These positions are great opportunities for members who have a vision regarding how our industry can continue to grow and improve.

If you’re interested in learning more or know of someone who may be a good fit for the Board, please email the office.

**Grower of the Year**

Know a deserving grower? The VVA is accepting nominations for its annual Grower of the Year award, which will be presented at our 2023 Winter Technical Meeting in February.

The recipient must be an active member of the VVA with at least seven years of experience managing or operating a commercial vineyard of at least five acres.

The nominee must also be an active participant in the Virginia viticulture community with a track record of service to our industry, and the nominee must have the respect of his or her peers.

Nominations or inquiries regarding board seats or Grower of the Year can be submitted to the VVA office via letter or email (see contact info on Page 2). Nominations must include the person’s name, farm name, and your reason for nominating them. All nominations must be submitted by Dec. 14.



► **NORTHERN VA.** “Overall, I was pleased with the quality of all the fruit this year.”

By Dean Triplett  
Greenstone Vineyard

Vintage 2022 is in the past and it’s time to reflect on the season. With the prospect of hail and rainy weather spoiling the season well behind us, I’m very happy with how the year turned out.

The harvest started about one week later than last year here at my place. My Muscat Ottonel was the first to come in on Sept. 1. Each year this variety gets hammered by critters of every ilk. Even with all my efforts, this year was pretty much the same as past years. I probably lost a half ton to predation. Having said that though, the guys harvested 1.3 tons off of about a third of an acre of vines. The 1.3 tons represented about a 10 percent increase from last year’s harvest.

I was pretty happy with the quantity and

flavors, and hopefully the finished wine will be appreciated by the client I sell to. Having said that, I’m seriously considering ripping out my Muscat because of the never-ending critter issues and the small amount of fruit that is produced. Ripping out healthy, 25-year-old vines is always gut wrenching, but so is losing fruit year after year.

The rest of the harvest followed at a nice, orderly pace. Albarino was next, followed by Merlot, Petit Verdot and Cab Sauv. The weather during harvest was very pleasant with no brutally hot days. Overall, I was pleased with the quality of all the fruit this year. And as a bonus, quantities for me were up 15-20 percent in all varieties compared to last year.

I feel very lucky on this count. Some nearby vineyards got hit hard by the hail event of July 12. More than one vineyard lost a significant amount of fruit. To make matters worse, in

some cases the fruit that was damaged didn’t drop off the rachis as is often the case. These damaged berries had the potential to be sources of infection throughout the remainder of the season.

I asked Tremain Hatch to give us his thoughts on this year’s harvest. Here is what he had to say:

“If you asked me in early August about the potential for the 2022 harvest, you would have gotten a pessimistic response. I anticipated this would be a hard vintage. The weather during harvest can make or break a vintage. In this case I think the weather made it.

“This was a rainy summer. In Northern Virginia we didn’t see a dry spell until the second half of August. Then in September we had 4.25 inches between the 5th and the 7th. Then, however, we were fortunate to see a

See *NORTHERN* on page 5

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## ► NORTHERN VA. (cont.)

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break of clear conditions until Hurricane Ian. Hurricane Ian produced more than 3 inches of rain over a couple of cool days. Then we were granted beautiful conditions following Ian: nice clean fruit, high sugars, and reasonable acids. A fortunate harvest given how poorly I thought the harvest would go back in early August.”

I totally agree with Tremain about the early assessment of this year’s harvest. Though I didn’t receive as much rain as other vineyards around me, it was enough to keep the crews busy hedging multiple times. And as with every year, attention to your spray program was critical.

Fortunately, most of the growers I’ve talked to do their homework, pay attention to Mizuho Nita and the folks at Tech, and know just how important this is. We’re really fortunate to have the knowledge base and resources available to us that we do. And the fact that so many of us got through a less than ideal August and had nice clean vineyards and fruit is a testament to the diligence of so many of our growers and our supporting researchers.

I was very fortunate to have a discussion with Kiernan Slater Patuský of Slater Run Vineyards east of Upperville in Fauquier County. Kiernan and her husband, Christopher, along with Kiernan’s parents, Bob and Alice Slater, opened their winery in 2010 on land that has been in the family for 300 years!

They have a beautiful 12-acre vineyard that produces truly lovely wines. Talking with Kiernan, she told me that they are very happy with the harvest of 2022. Healthy fruit, high quality and what she described as normal yields made for a great harvest.

They cane prune their vines and in some cases double-cane prune, especially their Pinot Gris. Kiernan said they had a downy mildew problem at one point during the summer but only on the leaves and were able to get on top of it before it became an issue. Other than this, the vineyard stayed clean up through harvest.

October turned out to be cooler than normal and should produce late season fruit with better than average flavors. October has seen less rain than average as well.

The first hard frost here was on the 19th. As of late October, I’ve been fortunate in that it has only gotten down to 36 degrees, so I should get good carbohydrate accumulation in my vines.

The long-range weather forecast has us

with a 40-50 percent chance of a warmer than normal winter. And the forecast is for average precipitation. It truly wouldn’t break my heart to continue our string of meager snowfalls.

In news around the region, Melanie Natoli of Cana Vineyards & Winery of Middleburg, who has been a long-time purchaser of my Albarino and Merlot, was named Winemaker of the Year by the Loudoun Wineries and Winegrowers Association. Melanie also won the Governors Cup this year. She is truly a dedicated winemaker and I feel very privileged to have her make magic with my fruit.

Mike Newland, owner of Sycamore Springs Vineyard, Ashburn, won Loudoun Winegrower of the Year. Mike, besides operating his own vineyard, is vineyard manager for Walsh Family Wine, another of my clients. It’s truly my pleasure to be associated in some small way with people of

this caliber in our industry.

So now it’s time to tidy up the barn, winterize the equipment and let the vines get a well-deserved winter’s sleep. Despite all the challenges of the year we made it through another one.

And while I get to goof off all winter, the wineries of our state will be working hard to make excellent wines that we can all be proud of.

*Editor’s Note: Dean Triplett is a regional reporter for Grape Press, covering Northern Virginia. We hope to feature more news about Northern Virginia’s vineyards and wineries in future columns. Please contact Dean at [gsvineyard13@gmail.com](mailto:gsvineyard13@gmail.com) if you’d like to provide information for upcoming columns about growing conditions, new plantings or anything else you think would be of interest to other growers.*

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## ▶ SOUTHERN VA. “Our reds came in heavier than our estimate ... but with good flavors.”

By Kevin Sutherland

Nicewonder Farm & Vineyards

This growing season was all about the rain.

July brought over 12 inches of rain, with 7 inches of it coming during the last week of the month. We tried our best to spray between the rains, but we still had some downy mildew in the top of the canopy. Fortunately, it was all manageable. As we came into mid-August the weather finally turned dry, and the fruit ripening really took off.

We started our harvest on Sept. 18 with the Viognier, then harvested weekly for the next four weeks. The quality was good across the board.

We decided not to pick the Merlot or Petit Verdot ahead of Hurricane Ian. We ended up with 1.5 inches of rain and were fortunate.

Our reds came in heavier than our estimate, a little light in color, but with good flavors. So, the tank dance started early. We would have liked to let our Petit Verdot hang one more week, but with an impending freeze, we harvested on Oct. 16. We had our leaf killing freeze on Oct. 19.

One odd thing that I observed had to do with yellow jackets. Where were they? We saw hardly any in the vineyard as harvest started, and they didn't show up on the crush pad until Oct. 20.

Now, we'll finish fermenting the reds and take a deep breath before starting fall and winter activities in the vineyard.

I caught up with Dave Lawson, owner, vineyard manager and winemaker of MountainRose Vineyards in Wise, who also had an interesting season of challenges with rain and pests.

“After 18 inches of rain in July, I was just hoping to have something to harvest,” he told me. “Near the end of August it dried up and some hope was restored, although berry samples I took the following week had me worried. There were very high acids and moderate sugars and just no favor at all on any variety. So, I waited. And waited.

“It was a comfort to see the Sentinel vineyard data and learn that, at least on paper, my grapes were following within the mean. I think the average crop load of



Kevin Sutherland

Nicewonder Farm & Vineyards began its 2022 harvest by bringing in Viognier on Sept. 18.

**“As we came into mid-August the weather finally turned dry, and the fruit ripening really took off.”**

about 1.5 pounds or less per row foot helped my fruit ripen with the godsend of several weeks of dry weather.

“I finished harvest with some Chambourcin on Oct. 14, just in time for a frost several days later that burnt the tops of all the vines.

“All the rain during the season left a lot of shoots not fully mature, so I know I will be looking at some winter damage during spring pruning.

“Wines are better than I expected, never

as good as I want! For every warm day I dream of having fruit still hanging, but I always remember the phrase: pick or perish.

“At the end of the season, I saw the dry spell coming and took advantage of it. I thought it would be a good year for dessert wine, and so I let some of my Vidal hang for late-season harvesting.

“I also used the dry weather to get out some much-needed lime and fall cover crops. Now, all of the woes of the past season are fading, giving way to dreams of next year. I am already making plans for new plantings and looking forward to working with fruit from new varieties planted this year.”

**Editor's Note:** Kevin Sutherland is secretary of the Virginia Vineyards Association Board and a regional reporter for Grape Press, covering Southern Virginia. Please contact Kevin at [ksutherland1@live.com](mailto:ksutherland1@live.com) if you'd like to provide information for upcoming columns about growing conditions, new plantings or anything else you think would be of interest to other growers.

# Following Good Pruning Practices Now Can Help Avoid Infection Later

*PRUNING, from page 1*

there will be a low probability of these pathogens infecting healthy bark tissues, invading through the cortex, phloem, cambium, and xylem tissues. Instead, they are more likely to start an infection from exposed woody tissue, such as injury on the trunk or, as you might have guessed, through pruning wounds.

The fungi and bacteria that cause diseases on grapes require a certain temperature range and, more importantly, a wet surface. Thus, if the pruning wound is dry, there will be fewer chances for the pathogens to infect the tissue. The rain will also help the pathogens disperse, so, it is especially important to avoid making wounds before the rain. Please check the weather forecast before pruning and make sure it calls for sunny days to ensure the wounds will be dried out in a few hours, and there will be enough time for the wound to heal.

If you can afford it, please pay attention to the timing of pruning. In California, they recommend waiting as late as possible because, under cool weather, pruning wounds take more time to heal. It may take up to two weeks under the low-temperature range (40s), and about one week in mild temperature (50s). The same principles apply to us. We have much colder winters than in California, and I would not expect pathogens to be active in the snow. However, it will take longer for wounds to heal.

Pruning surface shape and orientation are also important, especially when you make a big cut. If you make it flat and level, it can hold water. Thus, it is recommended to create a slanted surface so that rainwater will run off.

**Double-pruning.** The idea is to do pruning in two passes. The first pass, rough pruning, is made in winter or early spring, and the second pass, or final pruning, follows in late spring.

This approach has several advantages. First, you do not need to spend a long time in frigid winter weather perfecting your pruning. Second, final pruning takes less time because you do not have to move long shoots from the wires in the second run. Finally, even if the first pruning wounds take time to heal and are infected, the second pruning will get rid of infected tissues.

**Sanitation.** We also recommend keeping

the vineyard clean of debris. Many wood canker pathogens can survive on dead tissues, especially that of Bot canker. Thus, it is ideal to remove pruned wood from your vineyard to be composted or to be burned. The other option is to bring pruned wood to the row middles and run them over with a bush hog or a mower. Hopefully, it will speed up the rate of decomposition.

If you make a big cut, say re-training a cordon, it would be best to remove the old cordon from your vineyard. There is no benefit in keeping the larger deadwood in or near your vineyard. Also, if you had an outbreak of black rot, which is, unfortunately, one of the common diseases in 2022, make sure to remove infected clusters from the vineyard. Dropping them off on the ground won't help since their spores can be airborne.

**Pruning equipment.** It is not practical to clean your shears all the time, but you can do it after pruning heavily infected vines and/or after several rows or a section. Your old trunk may be infected with the pathogens, and they may have already produced spores that can be transferred from one vine to another.

It will be very time-consuming, but what you can do is get 70 percent alcohol (rubbing alcohol) and spray it onto the pruners. Alternatively, you can make a 10 percent Clorox solution (10:90 Clorox: water solution) in a bucket and dip your equipment for 1-2 minutes.

**Chemical management strategies.** Pruning wound treatment has been discussed in various places and in different contexts. In California, where Eutypa dieback is a big issue, they tested a wound paste that contained boron. They used Biopaste, which was not available in the U.S., but we have a product called B-Lock (Nutrient Technologies, Calif.). Although it is not available locally, you can order it from Farm Supply Company in California (<http://farmsupplycompany.com/cm/Home.html>).

Also, there is a product called VitiSeal, which contains essential oils. These pastes protect wounds from infection by Eutypa and Esca. However, Eutypa is only a minor problem in Virginia. The survey of wood canker diseases by Dr. Phillippe Rolshausen in 2008 did not find a positive Eutypa case from

Virginia samples.

In addition to the pastes, two fungicide treatments have been registered. One is Topsin-M, and the other is Rally. These will be applied as paint-on or as a spray. Please see the labels for detailed rates and application information. One of the potential advantages of Topsin-M is that it works well against *Botryosphaeria*, which is very common in Virginia.

If you choose to use these materials, you will need to obtain the latest labels. Please visit my blog (<http://ext.grapepathology.org>) and search for pruning wound treatments. It should take you to a post with recent labels for Topsin-M and Rally. Please note that Topsin-M has a 2-day REI. One tip is that the label of Topsin-M for pruning wound protection is for both paint and spray, thus, you can mix B-lock and Topsin-M, too. Based on our preliminary research results, we found both Topsin-M and B-lock to be effective (but not Rally). However, the efficacy was not consistent, so more research is needed.

Other regular wound paints, such as latex paints, are also commonly used, but the general consensus among growers, not only of grapes but also other crops, is that the paints are not effective. In addition, there was a study done with trees that showed that it may have a negative impact due to the trapping of moisture underneath the paint.

Last, but not least, I would like to mention Phomopsis cane and leaf spot. The pathogen of this disease infects canes and produces spores on them during the following growing seasons. Thus, if you have infected canes near new shoots, it will be easier for the pathogen to infect it. That's especially the case when the new shoot is originating from beneath the old, infected cane because spores drip down from the old wound with rain.

So, please pay attention to the relative orientation and distance between the infected wood and new shoots. This is another reason not to keep old dead canes on your vines.

There is an option to apply a dormant application of fungicide (Lime sulfur at 10 percent or Sulforix at 1 percent) against Phomopsis. Unfortunately, this treatment alone is not strong enough, thus, you still need the early-season mancozeb applications to protect new shoots starting when shoots are about 1-inch long.



# Database Offers Insights Into Va. Fruit and Wine Trends

A newly organized Winemakers Research Exchange database contains 856 unique entries from experiments conducted from 2014 to 2021. The tables and graphs on pages 8-10 represent the type of comparisons that are possible. A more complete presentation of the data can be found on the WRE website: [winemakersresearchexchange.com](http://winemakersresearchexchange.com).

By Joy Ting

Research Enologist,  
Winemakers Research Exchange

In its six years of operation, the Virginia Winemakers Research Exchange has gathered data on grapes and wine as part of evaluating more than 300 practical vineyard and winery experiments completed throughout the Commonwealth of Virginia. In a project funded by the Virginia Wine Board, these data have now been organized into a single searchable database that allows us to report summary statistics for routine measurements such as Brix, pH, TA, and acetic acid.

New data will be added at the end of each year of WRE experiments.

Most wineries, including those in Virginia, rely on basic metrics for grapes and wine to guide decision making. It is the responsibility of the grape grower and winemaker to interpret the results of tests such as Brix,

pH, and TA to make actionable decisions. Interpretation of test results is based on the producer's own background and experience with a given grape variety, vineyard, or region.

Good decision making, however, is sometimes hindered by the lack of appropriate benchmarks for Virginia fruit. Winemakers and grape growers may rely on textbooks or other publications for expected ranges of these metrics, but none are fine tuned to Virginia.

The availability of benchmarks taken from data about Virginia fruit gathered over time might be used by grape growers and winemakers for a number of purposes: to define quality parameters for grape pricing, evaluate vineyard performance, or quantify vintage variation.

They might also be used to negotiate harvest decisions between growers and wineries, evaluate winemaking techniques, generate questions for further study, and

evaluate Virginia wines in relation to benchmarks from other regions.

Before looking at any results, several cautions must also be kept in mind.

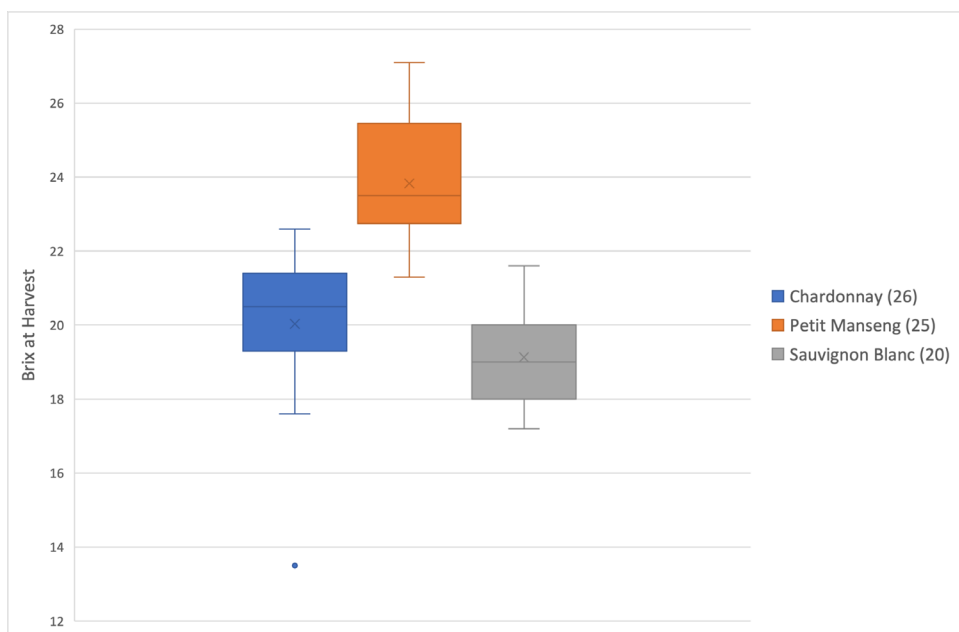
- These data were taken by different labs, including many different winery laboratories and several service labs. Some variation in values is expected due to differences in operators, equipment, and protocols.

- All of the data reported are from previous WRE experiments. Despite efforts to include vineyards and wineries from around the state, experiments are not necessarily a representative sample of the industry as a whole.

- The dataset is still very small relative to the number of variables involved in how the data were generated. Some differences or trends may be due to chance. Correlation does not equal causation. Any interesting trends hinted at by these data should be followed by rigorous testing prior to any firm conclusions.

## Figure 1

A comparison of Brix values for white grape varieties shows that Sauvignon Blanc was harvested at the lowest Brix on average, while Petit Manseng had the highest Brix. The number of samples used for each analysis is listed in the figure's legend. For example, Chardonnay (26) indicates there were 26 values for Chardonnay Brix at harvest.



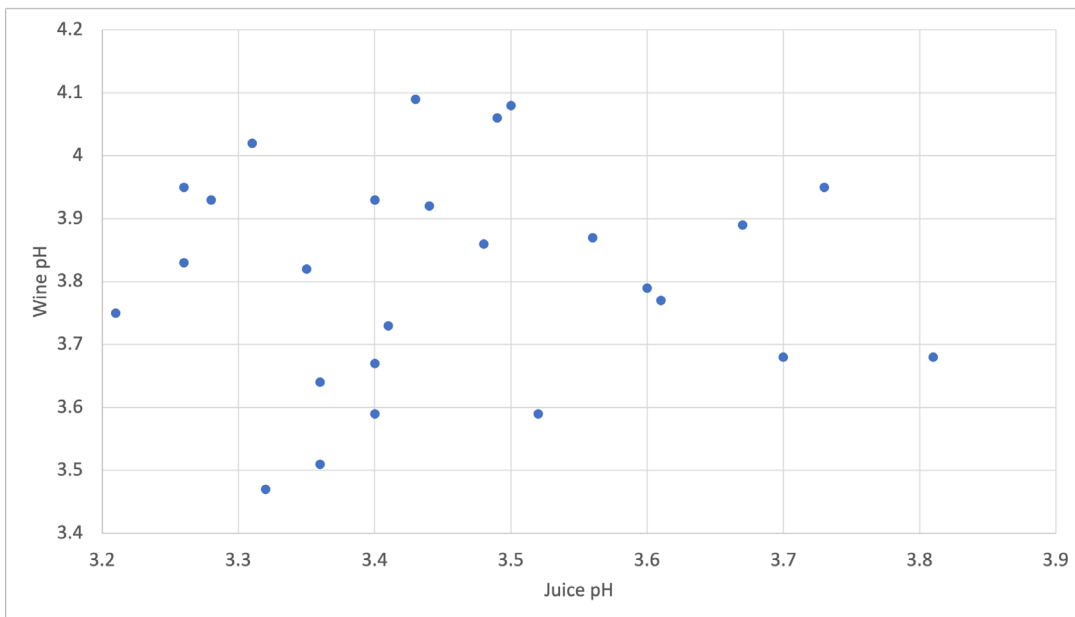


# Va. Research Database Organized (cont.)

**Table 1**

Summary statistics for harvest metrics of three red grape varieties. Red grape varieties showed a wide range of Brix at harvest within varieties, with very similar mean values between varieties. The table shows the mean value, the standard deviation, the range of values and the number of observations.

	°Brix			
	Mean	St Dev	Range	Number
Cabernet Franc	22.3	2.01	17.9 - 26.7	79
Merlot	22.1	1.59	19.0 - 25.0	60
Petit Verdot	22.4	2.02	16.9 - 27.8	35
	pH			
	Mean	St Dev	Range	Number
Cabernet Franc	3.77	0.20	3.46 - 4.36	79
Merlot	3.74	0.22	3.26 - 4.13	59
Petit Verdot	3.44	0.16	3.13 - 3.81	33
	TA (g/L)			
	Mean	St Dev	Range	Number
Cabernet Franc	4.5	1.02	2.6 - 7.2	70
Merlot	4.2	0.96	2.3 - 6.6	48
Petit Verdot	7.2	1.76	4.2-11.6	24



**Figure 2**

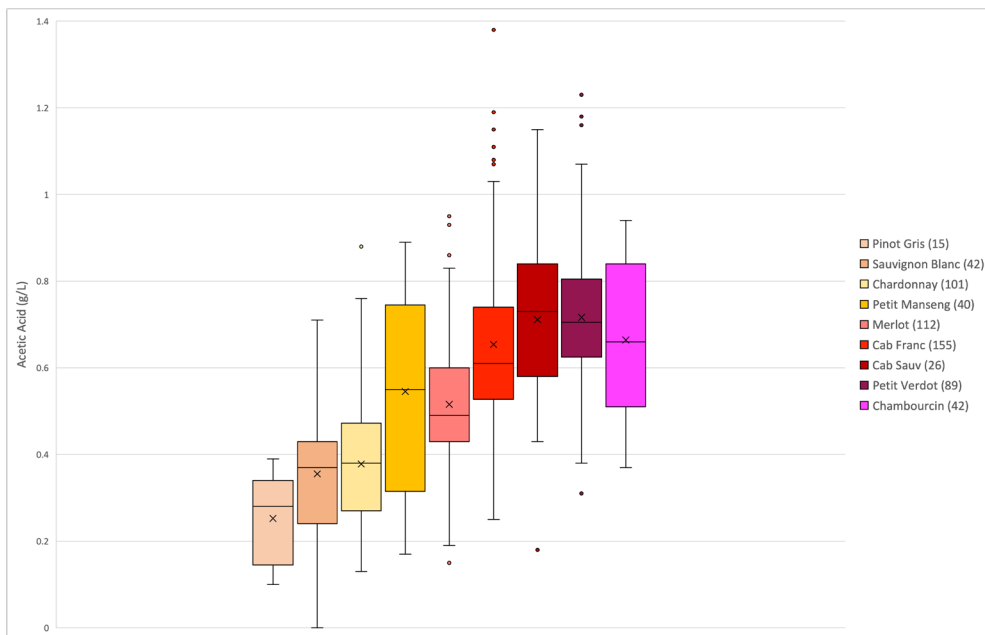
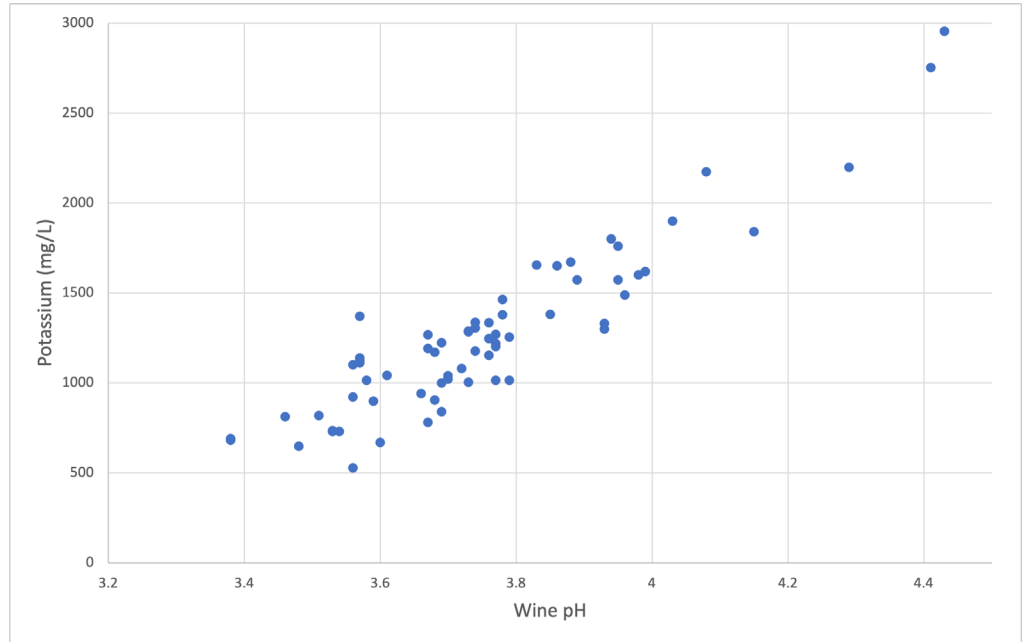
Comparison of the pH at harvest vs. pH of finished wine in Petit Verdot. Though Petit Verdot was harvested with overall lower pH and higher titratable acidity than other red varieties (Table 1), there was no correlation between the juice pH and pH of the finished wine, indicating juice pH does not predict wine pH within normal ranges.

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(cont.)

**Figure 3**

There is a strong correlation of wine pH and wine potassium ( $R^2=0.845$ ). Potassium comes from the skins of the grapes, but measurement at the juice/must stage is difficult, leading to challenges in managing acid additions at harvest. Several WRE experiments in 2020 and 2021 examined approaches to acid additions that included consideration of potassium.



**Figure 4**

Acetic acid levels of finished wine by variety. On average, white wines complete fermentation with lower acetic acid than red wines, though more than 50 percent of the Petit Manseng wines used in WRE experiments completed fermentation with acetic acid above 0.5 g/L. The limit of detection for acetic acid in red wines is considered to be near 0.7 g/L. The average values for all of the reds except Merlot are at or near this threshold.