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VVA President's Corner

Market for Va. Grapes Expanded

State, VVA Pave Way for New York Wineries to Advertise for Va. Fruit

By Skip Causey

Potomac Point Vineyard & Winery

New York wineries in need of grapes now have an open invitation to advertise for free on the Virginia Vineyards Association website thanks to the combined efforts of Virginia state officials and the VVA.

The goal is to connect Virginia growers who have an excess of grapes with New York wineries dealing with significant crop losses this year.

The Virginia Department of Agriculture and Consumer Services (VDACS) has been in contact with its counterpart in New York since a spring frost event there wiped out more than 25 percent of the year's potential yield. New York, in fact, has just issued a crop loss declaration that allows its farm winery owners to source grapes or juice from outside of New York through Dec. 31, 2023, while still maintaining their New York farm winery status.

To help facilitate communication between those

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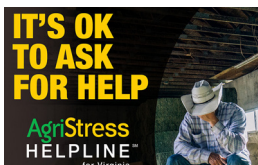
Chris Garsson

Our Summer Technical Meeting on July 19 at Blenheim Vineyards included presentations on crop estimations, vineyard floor management, bio-spray practical applications and a review of data regarding Virginia's grape supply.



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Director Kevin Rice
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Coping With Climate Change By Adapting in the Vineyard

By Bruce Zoecklein

Enology Professor Emeritus, Virginia Tech

In recent years the dramatic effect of climate change has been manifested in many forms around the world. The multitude of climatic alterations has been extensively reviewed by J. Gladstones, C. van Leeuwen, and G. Jones.^{6,23,11} Unfortunately, many climate models use nonlinear systems and different emission scenarios, resulting in a range of predictions regarding deviations in temperature and precipitation.¹¹

The challenges facing the wine industry are many and include more rapid phenological development, alterations in suitable locations for some cultivars, and a reduction in the optimum

harvest window for high-quality wines.^{11,15,28}

As such, climate adaptation strategy has become an important topic. Adaptation should include avoiding changes we can't manage and adequately managing changes we can't avoid. The following is a review of some adaptive strategies.

Shifting Vineyard Climate

It is well established that the phenology of bud burst, flowering, and véraison are largely temperature-dependent.¹⁰ The intervals between these events have decreased in some regions, resulting in shortening the ripening interval

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PRESIDENT'S CORNER

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wineries and Virginia growers, the VVA has agreed to allow the wineries to post free ads in the "Seeking Grapes" category on our popular Exchange page.

Typically, we allow VVA members to post ads for free on the Exchange but charge a fee for non-members. This year, those requirements will be waived for New York wineries looking for grapes.

In addition, because some southern states, including Georgia and North Carolina, are in need of specific grape varieties, the VVA is allowing posts from wineries in those states on a case-by-case basis, although they will have to meet normal requirements for posting.

You will find any of these out-of-state ads on the VVA Exchange page: <https://virginiavineyardsassociation.org/exchange-home>.

We'll also continue to monitor grape needs and work with neighboring states through this harvest, so keep an eye on the Exchange page since that's where we can and will get the word out quickly to everyone.

These initiatives come as we look at data regarding Virginia grapes and address the question of whether we have an oversupply of grapes.

An Engaging and Informative Meeting

The topic was discussed at the VVA's July 19 Summer Technical Meeting, which was held at Blenheim Vineyards in Charlottesville. I'd like to take a moment to recap the meeting and thank Blenheim's Kirsty Harmon for hosting us. I don't think we could have asked for a better or more beautiful venue for the meeting.

Our daylong program covered a wide range of topics, including growers discussing several examples of bio-spray or low-spray programs in their vineyards. And, as always, the regional updates from Virginia Tech were of great interest, as was the update on the advancing spotted lanternfly, or SLF.

On that subject, we also heard from Andrew Harner, currently a postdoctoral scholar at Penn State, about Pennsylvania's experience with SLF. As many of you know, Andrew has been named to the position of viticulturalist at Virginia Tech and will be based at the Winchester AREC, where he will start in January 2024. We look forward to working with him.

Many of the presentations during the meeting generated informative discussions, and speakers commented on how involved our audience was.

The liveliest exchanges came at the end of the day during an update on the Virginia wine industry and a breakdown of results from the Virginia Commercial Wine Grape Report.

Annette Boyd, director of the Virginia Wine Board Marketing Office, gave a detailed report showing a slight slowdown in Virginia wine sales with a corresponding rise in other craft beverages. It was noted that the numbers and trends are a bit skewed from 2020 and 2021 due to Covid, the current economy and rising interest rates.

Mary Beth Williams of Williams Compliance also discussed the latest legal changes in Virginia, most notably the changes to the Virginia Farm Winery licenses.

Grapes By the Numbers

In reviewing the 2022 Commercial Wine Grape Report and ad listings on the VVA Exchange, two items of note are the tons per acre by varietal type and the rise in the total tons available on the open market. I'll discuss the tons per acre first since excess fruit is the more immediate concern.

The average tons per acre gleaned from the past and recent commercial grape reports has consistently run at 2.5 tons for all varieties across the state. While this average has held true since we first started surveying vineyards for the Commercial Wine Grape Report, the most surprising finding is that vinifera grapes and hybrids are both producing the same 2.5 tons per acre. Even more surprising is that American grapes, predominantly Norton, are running at only 1.6 tons per acre.

Vinifera grapes make up 82 percent of all grapes grown in Virginia and are being sold at an average of \$1,000 per ton more than hybrids. Hybrids make up 14 percent of the vineyard plantings in Virginia but have more than 30 percent of the tonnage listed for sale on the VVA Exchange.

We have considered many possible reasons why hybrid grape production is lagging and discussed it at the Summer Technical Meeting as well. Many thoughts and ideas were thrown out, but the most plausible reasons are:

- ▶ Hybrids are not always planted in the

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Market for Va. Grapes Expanded

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best site locations.

- ▶ Hybrid spray programs are not as aggressive.
- ▶ More small producers plant hybrids and may not be as regimented.
- ▶ More hybrid grapes were sold out of state.
- ▶ More hybrids had fruit not sold but dropped and not counted.

The last two points bring us to the big question in the Virginia wine grape industry. Do we currently have a glut of wine grapes, or have we just hit equilibrium?

Because we vineyards report acreage by varietal but the wineries fill out a separate survey for the crush pad report, we do not account for any dropped fruit or fruit sold outside of the state. We also have a higher percentage of vineyards reporting over wineries, so more acreage is being reported than grapes processed.

This latter issue would cause the tons per acre to be lower than expected but it should affect all varietals evenly. For these two issues, we are sending out a follow-up to the 2022 survey for vineyard owners, asking for information on both dropped fruit and fruit sold outside Virginia.

We will add this data to the responses and report back on how this might change the totals and calculations.

We know that there were literally tons of unsold fruit in the 2022 season. The VVA Exchange had a 200 percent increase in postings for available fruit in the latter part of the 2022 harvest season, with hybrids making up 30 percent of the total available, even though they cover only 14 percent of the state's total vineyard acreage.

The VVA Exchange page showed early listings for available 2023 grapes and bulk wine. Most of these listings usually start in the spring or early summer, but our page was filling up in January.

Again, we are seeing a 200 percent increase in listings and tonnage available. The good news is that we are not seeing multiple listings for the same grapes except for certain varietals, mostly hybrids.

Know Your Product and Your Market

It may sound as though I'm down on hybrids, but I'm not. I have several hybrids in my winemaking program. I am, however, cautious and would advise any growers with large acreages of hybrids to contract them



Chris Garsson

Speakers at the VVA summer meeting included Viticulture Research and Extension Associate Tremain Hatch, above, and VCE Horticulturalist Beth Sastre, who provided an up-close look at tree of heaven, a host for spotted lanternfly. A wine social was a welcome way to end the day.

quickly and make sure the quality is excellent. I would also watch your market pricing and price accordingly.

As for any growers looking at new plantings, make sure you have buyers lined up, that you have done research for your site, and that you pick the fruit which will be successful and yield the best revenue per acre on a consistent basis.

Advice for varietal growers: talk to your wineries! Listen to their needs and work to that end. Have you asked for long-term contracts? We, the farmers, take most of the risks of weather, pests, and disease, but the wineries need to make quality wine that can be sold to their market.

What is the price you demand for your fruit? If it is above the average on the Commercial Grape Report, is there a good reason for it? Is your quality that good? Did you plant something at a winery's request? Do you have a unique varietal that is hard to find in Virginia? Have you been producing grapes that make award winning wines? Does your site have potential and will the fruit only get better? Are you dropping fruit to maintain a strong quality while sacrificing tons per acre? Are you working a low-spray or bio-spray program? All of these are good reasons to demand top dollar for your fruit.

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► SOUTHERN VIRGINIA

"We are anticipating veraison around the second or third week of August. Just to compare, we were already netting the Chardonnay and Viognier during the first week of August last year."

By Kevin Sutherland
Nicewonder Farm & Vineyards

There is no typical growing season anymore, you must react to the season you have. We had a cool and somewhat dry June with several nights in the mid-40s, and around 3.5 inches of rain. That really delayed the growth on all our varieties.

The heat cranked up in July, but our first 90-degree day wasn't until July 28. The first half of the month was wet, with 6.5 inches of rain, while the second half brought only 1.3 inches. And just as we were wondering where the beetles were, the heat increased, and the beetle population exploded.

In the first week of August, the Chardonnay and Viognier berries are still hard and green. We are anticipating veraison around the second or third week of August. Just to compare, we were already netting the Chardonnay and Viognier during the first week of August last year.

Now we hope the next several months will be warm and dry.

I caught up with Dave Lawson of MountainRose Vineyard in Wise, who told me that this has been an average season for his grapes. The hottest day he recorded was 88 degrees, and only a few days made it into the upper 80s.

His vineyard received 1.7 inches of rain in June and 1.5 inches in July, which made it an easy season for spraying. "This is like so many other past El Niño years," he said. "I did have some variable late frost and a cold snap over the winter which made for a lighter crop than in the past several years."

Dave said that this year's variable bud break made it more difficult to use the mechanical



Kevin Sutherland

Kevin Sutherland explains "shaking hands" in the Petit Verdot at Nicewonder: "Our Petit Verdot likes to grow every direction but up. If we try to tuck those guys before the end of June they will snap right off. So, by then they are reaching across the aisle; we call it shaking hands."

deleafers.

"Some of the larger leaf varieties do extremely well," he said, "but Riesling never cleaned up very well. It is still nice to complete leaf removal in a couple days versus a month."

Dave said that in recent years he has been backing off from removing all the leaves from the first set of catch wires in hopes of maintaining a longer period of low-80s temperature in the berries to improve fruit flavors.

With the lower rainfall, he said he has had to hedge only twice.

"Now the fight begins with birds and

raccoons and bees and SWDs!" he added.

So, we maintain the canopy, prepare to bird net, mow, clean and test winery equipment. Possibly try to catch a nap before the Crush starts. Cheers to a great harvest for all!

Editor's Note: Kevin Sutherland is secretary of the VVA Board and a regional reporter for Grape Press, covering Southern Virginia. Please contact Kevin at ksutherland1@live.com if you'd like to provide information for upcoming columns about growing conditions, new plantings or any topic that would be of interest to other growers.

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When my wife, Cindi, and I started this wine adventure almost 20 years ago, grapes were somewhat scarce, and we had to push to get quality grapes in Virginia.

After the Great Recession of 2008, large wineries pulled back and there were many super quality grapes on the market. We took advantage of this and created contracts that brought in great grapes which made great award-winning wines.

This lasted for about five years until winery openings began to significantly outpace new vineyard plantings. The wineries were opening in a little over a year or two, but of course the vineyards were taking twice that long to achieve production. The Grape Glut turned into a grape shortage which has lasted for the past 10 years.

Over the past four to five years, the number of wineries has plateaued at around 300, while the industry has been planting close to 250 acres per year in that same time frame.

Combined with shutdowns from Covid and the market changes with interest rates as well as the tightening budgets in recent years, we are seeing a market shift.

But are we in a glut?

For anyone who has unsold fruit, the answer is "Yes"! But I would suggest that we are one frost event or fall hurricane away from this flipping back. This is what happened in New York during its spring frost event this year.

Good luck and hoping for a great harvest (and sold fruit!).

► NORTHERN VIRGINIA

“In spite of the lack of rainfall, vigor in my established vines has been strong.”

By Dean Triplett
Greenstone Vineyard

This has, so far, been a unique growing season. During May and June, we saw milder-than-average temperatures, very low humidity, and a continuing rain shortfall. We were down four-plus inches in May and June at my site, but have since crawled back out of the rain-deficit hole a bit.

We haven't had an all-day soaker for weeks, but enough thunderstorms have come through to help. In spite of the lack of rainfall, vigor in my established vines has been strong. Hedging has been required numerous times throughout June and July. Growers that planted replacement vines or totally new vineyard blocs back in April were more than a little nervous because of the lack of rain.

In a text, Ben Sedlins, vineyard manager with Walsh Family Wines, touched on a number of the issues I've seen.

“Obviously the biggest thing so far is the lack of rain. While some of the rain events have been heavier in very local areas, on average our sites have gotten about 4.5 inches of rain since June 1. We have adolescent vines (planted five to six years ago) that are showing stunted shoot growth where soils are shallow, but no signs of drought stress yet.

Above-Average Fruit Set

“Fruit set was universally above average, as a result of the dry bloom time,” he added. “Cluster counts are showing a very nice crop load, and we will drop some fruit in some red blocs. But I won't be surprised if my yield estimates are off because berry size might be quite small this year.”

I'm seeing a pretty similar picture in my vineyard. Berry size does seem down, especially in my reds. And my Merlot has quite a few shot berries, although I'm not seeing this as much in other varieties. Fortunately, because of the lack of rain/

humidity early in the season, disease control has been excellent.”

In an email, Tremain Hatch, gave me his observations of the season so far:

“This season feels different than the previous couple of years. The dry conditions have been the big change from our normal. Constant downy mildew issues are a hallmark of a Northern Virginia summer, but this year there are vineyards in which I have not yet seen downy mildew. On the other hand, I have seen powdery mildew on clusters, particularly on Chardonnay, and it was visible in the first couple of days of July.

“We have had small thunderstorms throughout July,” he added. “Relatively small areas might see more than an inch of rain while adjacent areas look parched. For the most part crop levels look good and even high. I am writing this on Aug. 1, and I am getting superstitious. Vineyards look good; however, we have a ways to go before harvest.”

Again, Tremain's observations mirror mine. And I want to pick up on the comment from Tremain and Ben about crop loads. Last year was such a large harvest across the state that many wineries are cutting back on their purchasing of fruit for this year. I know of more than one vineyard or winery that is scrambling to find a home for fruit. I'm not thrilled to say that I'm in the same boat.

In some cases, wineries are dropping fruit to lower the amount they will have to process into wine. I hope we can all find a home for our fruit, especially given that this is shaping up to be an excellent year quality-wise due to the weather conditions and excellent disease control we're seeing.

I've observed several phenomena this year, one interesting, the others not so much. The first is the wildfire smoke from Canada. While we've had only a few really bad air quality days, the smoke has had the effect of keeping our temperatures slightly lower than they might otherwise be.

Of course, the haze has occurred with the accompanying cooler Canadian air.

We had one patch of really hot air temperatures at the end of July, but so far that's been it. A nice stretch of mid-80s greeted us the first week of August, but I have no doubt that the dog days of summer are not done with us just yet.

Another observation had to do with the return of Japanese beetles, though their numbers were not terribly high. I put down one spray on a section of vines that is particularly prone to infestation, and that kept the numbers down sufficiently so that they were not a problem.

Finding Spotted Lanternflies

The last observation was the spotting, photographing, catching and killing of two early-nymph-stage spotted lanternflies. This occurred on June 13, and I fortunately had a spray planned for the next day. I added Malathion to my fungicides, and this seemed to work well for about a month and a half. In early August, however, my crew found one adult SLF.

While I'm not in full freak-out mode, I am concerned and would like to put down another Malathion spray. However, we're restricted to only two applications per year, and I like to keep one in my pocket for late-season fruit flies.

I will have to look at different insecticide formulations for SLF and come up with a strategy.

Like all growers in our area, I will be on constant alert for these unwanted guests. Then I'll wait for the newest, improved, unwanted guest to pop up and learn to deal with it as well. Ah, the joys of grape growing in the mid-Atlantic.

Editor's Note: Dean Triplett is a regional reporter for Grape Press, covering Northern Virginia. Please contact Dean at gsvineyard13@gmail.com if you'd like to provide information for upcoming columns about growing conditions, new plantings or any topic that would be of interest to other growers.

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▶ EASTERN VIRGINIA

“... We have had relatively mild temperatures with a good amount of rainfall ... so far.”

By Gonzalo Ortiz
Rustic Vintage

Here in the Eastern part of the beautiful Northern Neck of Virginia we have had relatively mild temperatures with a good amount of rainfall throughout the season so far.

May brought our area a spread-out occurrence of slightly more than five inches of rain with just one day above 80 degrees. June also brought a spread-out occurrence of slightly more than six inches of rain with half of the days topping out in the high 70s and the other half in the low- to mid-80s.

July brought another five-and-a-half inches of rain, again spread out, versus just a couple of clustered drenching rains. Our section of the Northern Neck was spared from the strong storms that brought some hail and damaging winds to other parts of the state on Aug. 7.

Strong weather events including damaging winds and hail did occur in the Eastern part of

the state in late June and early July.

On our farm we experienced damaging wind gusts on June 26 that knocked over most of our second-year plants. With some very welcome and much-appreciated help from my father, we were able to get the plants upright, although that took all of our attention and time in July and kept us from mowing between the rows. The limited airflow that resulted gave rise to some downy mildew that otherwise would have been under control.

Other growers in the Eastern part of Virginia told me that their canopies for the most part have been clean.

In the first part of August we began tying up the nine acres that we planted this spring. It took us a lot longer this year than last to get all of our grow tubes on — the end of June versus early May — but I am happy with the growth. Also, I have begun cleaning up the under-vine vegetation that we had left in place to keep first-year vine growth in check.

While expecting to have over 80 days until first fall frost on our site the goal will

be to have the one-year vine canopies clean and functioning up to the end. I see good lignification on both first- and second-year vines.

At this writing, it is still too early to be sure, but it does look as though the vast majority of our first-year Cabernet Franc vines will have sufficiently good growth and diameter to begin establishing trunks this winter. About half of the Merlot vines are in similar condition.

If the other half of the Merlot does not even out in the next three months, I will just cut all the Merlot back to a couple buds this winter to ensure even growth throughout that block next year.

Editor's Note: Gonzalo Ortiz is a regional reporter for Grape Press, covering Eastern Virginia. Please contact Gonzalo at eastvagrowers@gmail.com if you'd like to provide information for upcoming columns about growing conditions, new plantings or any topic that would be of interest to other growers.

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SLF Updates

What to Know as Spotted Lanternflies Emerge This Year

(Editor's Note: The following are excerpts and a map from Virginia Tech Fruit Entomologist Doug Pfeiffer's July 23rd post on his Virginia Fruit Insect Updates blog: <https://virginiafruitinsectupdates.blogspot.com>)

This week, spotted lanternfly (SLF) adults began their appearance. There was an appearance of an adult in a vineyard in Bedford County on July 19. There is a possible appearance a day or so earlier that is being followed up on.

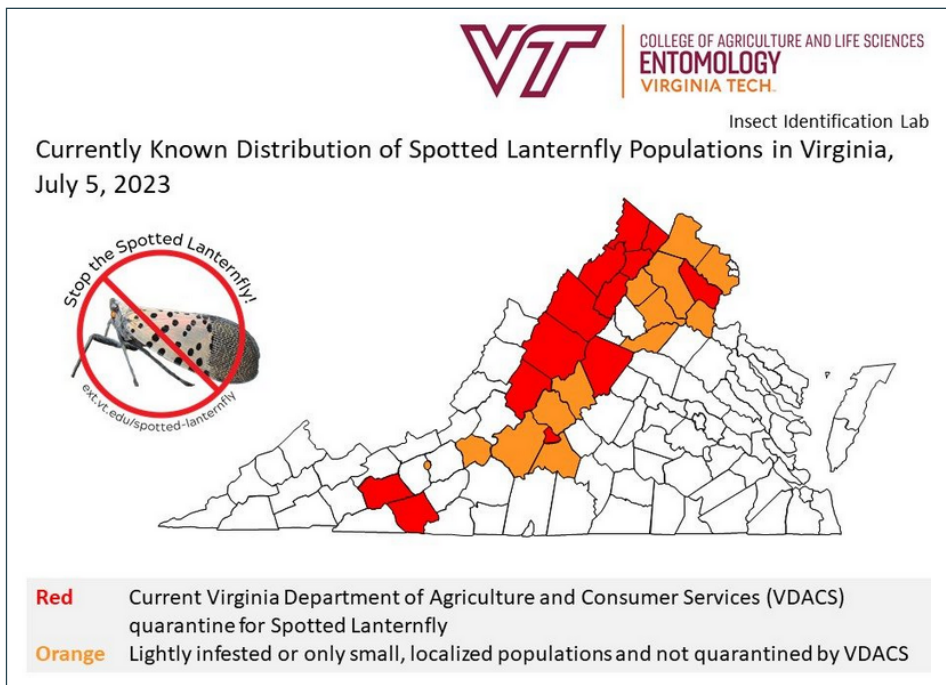
The adult stage poses the greatest risk of immigration into vineyards, because of its mobility and attraction to grapevines.

If adults are just showing up in an area, there is no need to overreact. In areas where SLF has been present in an area for a season or two, the pest pressure is likely to be higher.

In the coming weeks, pay close attention, looking for adults on cordons and canes. A provisional action threshold in vineyards is 5-10 adults per vine. I emphasize the term provisional. This may go up or down as we gain further experience with this insect in our vineyards.

There is often a strong edge effect with this insect, and border sprays may be able to handle the problem, without spraying the whole block.

The Pest Management Guide chapters for Commercial Vineyards, Small Fruits and Hops can be found at <https://www.pubs.ext.vt.edu/456/456-017/456-017.html>. There are several materials listed for this time of the season, when adults are the



The map includes updates in geographic spread of SLF in Virginia, generated in the Insect Identification Lab in the Department of Entomology. Red counties are included in the VDACS quarantine; counties in orange have established populations but are not yet in quarantine.

target.

Once sprays start, reassess frequently. Pay close attention to the maximum applications or amounts applied per season, and watch preharvest intervals.

I would very much like to hear more about this as it unfolds at your sites.

Here is a link to my SLF page ([https://](https://www.virginiafruit.ento.vt.edu/SLF.html)

www.virginiafruit.ento.vt.edu/SLF.html).

There is a table linked there listing SLF materials, with PHI and seasonal max levels. There are fact sheets for SLF for general information, management in vineyards and in residential areas.

Let me know if you would like to discuss SLF at your location: dgpfeiff@vt.edu.



Growers Encouraged to Help Track SLF Through Survey

The Penn State Extension Grape and Wine Team is calling on those who own, operate, or manage a farm, vineyard, or winery in the Mid-Atlantic region to participate in a survey that aims to track the spread and severity of nymph and adult spotted lanternfly populations during the 2023 season.

Results will appear on the SLF Map 2023 of the Eastern U.S.

► **LEARN MORE AND, IF YOU'RE OBSERVING SLF, TAKE THE SURVEY**

Adapting to Climate Change May Be Key to Future Success

ADAPTIVE STRATEGIES, from page 1

among different cultivars, thus compressing the overall harvest. We know that climatic conditions of the vintage have the strongest effect on most vineyard and fruit variables followed by soil type and cultivar.^{6,19,23,24}

For example, heat stress events, which are becoming more common, can impact leaf physiology and fruit composition including pH, titratable acidity, malic acid, tartaric acid, Botrytis, and anthocyanin concentration.¹⁷ An average increase of 1 degree C can be expected to increase the degree days by 240. Collecting and integrating geospatial measures for real-time monitoring of plant temperature, and growth, canopy health, plant and soil water, nutrient status, and pest and diseases will become common practice.

A.K. Parker et al demonstrated that grapevine flowering-*véraison* (GFV) and grapevine sugar ripeness (GSR) models can be implemented as a means of monitoring changes and testing the suitability of alternative cultivars as an adaptation strategy to climate vicissitudes.¹⁴

Traditional viticulture regions such as Bordeaux are exploring planting new varieties. While there are thousands of wine grape varieties grown around the world, most districts grow fewer than 30. Indeed, many regions are dominated by about twelve cultivars often referred to as ‘international’ varieties. Will these be best suited for a particular locality in the future?

The number of cultivars and rootstocks available provide a wide range of genetic diversity in disease resistance (and spray materials needed), cold hardiness, drought and salt tolerance, and ripening phenology.²⁵

Most *vinifera* require a high carbon footprint. Is that what we want for the future? Should we change out some *Vitis vinifera* for hybrids?

It is conceivable that GMOs could possibly solve mildews, leafroll virus, Pierce’s disease, drought, and cold hardiness problems. Perhaps plant genetics, both breeding, and selection, will aid us as we look for new varieties that are climate suitable, hold acidity, limit sugar production and provide disease resistance.

One current adaptive strategy has been to move to higher elevations. On average a 1 degree C increase is offset by each 150 meter

“An important barometer of a warming climate has been the increase in atmospheric CO₂ concentration (currently at an all-time high of 421 ppm⁶), which has increased 20 percent in just the last 20 years.¹¹ Continued elevated CO₂ may produce an accelerated accumulation of Brix, and what some refer to as ‘decoupling’ between sugar concentrations and grape aroma/flavor and phenol elements.”

increase in elevation.

Another possible effect of a changing climate has been a decrease in the diurnal temperature range. A large diurnal range during ripening has been considered by some to be a quality-enhancing factor, although scientific evidence for this is contradictory and likely confounded by many variables, including cultivar, temperature extremes, etc.

Increased levels of atmospheric carbon dioxide increase the rate of photosynthesis and plant growth. We know that maximum photosynthesis occurs around 25 degrees C (77 degrees F), while anthocyanin and aroma/flavor production is optimal between 17 to 26 degrees C (63 to 79 degrees F).

For most red cultivars, optimum anthocyanin concentration occurs at a relatively small percentage of direct solar exposure.¹² Northwest-southeast row spacing, optimizing in-row spacing to provide optimal fruit shade, and timing and quantity of irrigation during heat events can help to reduce load. Generally, enough light is transmitted through one leaf layer so as not to inhibit color production while helping to reduce fruit temperature while retaining acidity.

Optimum leaf removal strategies and cluster radiation protection are useful practices for vineyard adaptation to rising temperatures. Some are using shade cloth and/or kaolin (Chinese clay) sprays as a means of reducing heat load while others

have shifted either away from VSP training systems to reduce solar exposure or are using off-set cross arms.

Canopy strategies to delay the development cycle of the grapevine include late spur-pruning, increasing vine trunk height, trimming shoots, removing enough leaves to impact the leaf area to fruit weight ratio, increasing the crop load, and the use of antitranspirants. With increased ultraviolet radiation resulting from climate change, optimum canopy management and regulating solar exposure will become an issue of even greater importance.

Chill days, or the accumulation of cold temperatures above freezing, are needed for plant development. In some regions, a loss of chill hours is occurring, resulting in a decline in winter hardiness. In addition to warm growing season temperatures, M. Battany suggested that the use of wind machines may become necessary for fall frost protection in places like California’s central coast region due to climate change.¹

Plant Metabolites

Plant hormones govern growth and development. As such, there is increased interest in using these to help adapt to change by impacting fruit components and/or the rate of maturation.

For example, as noted, fruit anthocyanin

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and aroma/ flavor production are optimal between 17 to 26 degrees C (63 degrees to 79 degrees F). Warming fruit temperatures may exceed this range. As such, some are using commercial preparations, including natural products such as ABA (abscisic acid) and ethylene stimulators to help boost anthocyanin production.^{16,27,28}

Auxin treatment (1-naphthaleneacetic acid) of bunches prior to véraison is being explored to counteract adverse changes by delaying berry maturation. Auxin treatments have been shown to reduce berry shrivel and increase ripening synchronicity with little effect on berry and wine composition.

Ideally, we will continue to develop grower-friendly barometers to measure plant stress. We know that plants subject to water stress display changes in metabolism often leading to the production of specific chemical markers. Some research indicates that increased moisture stress increases fruit proline concentrations, although further study is warranted.

'When the well is dry, we learn the worth of water' – Benjamin Franklin

An important aspect of soil with regard to terroir manifestation is water-holding capacity.^{20,22,23,26} For this reason, calcareous soils are favored by some, as are soil amendments such as biochar and proprietary formulations such as Blu Vite for non-irrigated vineyards.

Terroir representation is depressed, if not eliminated, by a high level of soil moisture.⁶ There are those that believe that true expression can only be achieved through dry farming and that irrigation destroys the concept of terroir. Many New World vigneron consider that the production of high-quality wines requires at least moderate water deficit stress in at least part of the season.^{8,9,22}

Heat spikes in the last 40 to 50 days to harvest are increasing in some regions and changing the plant water balance causing moisture stress. Vapor pressure deficit (VPD) measures the difference between the amount of moisture in the air and how much it can hold at saturation. This site and cultivar-specific index is being used more frequently to help determine irrigation programs to help minimize heat wave effects on plant stress. VPD can be used as a site climate index by categorizing the number of days with a VPD of greater than 3.5 to 4 kilopascals (Kp), a unit of pressure often used to measure atmospheric pressure as well as gases and fluids.

It is thought that irregular patterns of

moisture stress will certainly have an impact in the future.⁶ For example, R. Scott suggested that the effects of dry winters in California may add to the problem of restricted spring growth syndrome (RSG) causing poor fruit set, etc.¹⁸

Many premium producers are measuring, and managing where possible, either plant moisture and/or soil moisture, directly or indirectly, to help optimize fruit quality. Climate extremes will make these efforts more challenging. Water uptake can impact vine nutrition, including nitrogen uptake, and therefore influence terroir expression.^{5,10,12}

Ripeness Assessment

Intervals between the main phenological events have exhibited significant trends toward shorter time spans.¹¹ This has resulted in earlier berry development and compressed harvests causing modifications to grape

“Prolonged droughts and warmer summer temperatures, including heat spikes, have increased the incidence of fruit sunburn and shrivel in some regions impacting, among other things, reductive strength.”

and wine composition. Therefore, climatic shifts may be evidenced through more out-of-balance ripening profiles.¹¹ B. Zoecklein and B. Gump have extensively reviewed the methods for the evaluation of grape maturity under changing climatic conditions.²⁹

An important barometer of a warming climate has been the increase in atmospheric CO₂ concentration (currently at an all-time high of 421 ppm⁶), which has increased 20 percent in just the last 20 years.¹¹ Continued elevated CO₂ may produce an accelerated accumulation of Brix, and what some refer to

as ‘decoupling’ between sugar concentrations and grape aroma/ flavor and phenol elements.

There is a positive correlation between anthocyanin concentration and red wine quality. Because of this relationship, and despite high potential alcohols, some winemakers use anthocyanin “plateau” (the maximum concentration on a per berry basis) as a harvest gauge.

As such, generally, the more anthocyanins in the fruit relative to tannins, the shorter the resulting polymers and the “finer” the tannins. Smaller polymers lead to smaller colloids that can have a softer mouthfeel and provide aromatic integration.^{4,21}

Conversely, it is believed that excessive hang time (presumably beyond the anthocyanin plateau level) can lead to a loss of anthocyanin stability as a function referred to as field oxidation.²¹

Winery Management

Buddhist and Daoist philosophy reminds us of the mereological nature of things, that is, everything in the universe is connected. It seems logical that conservation and sustainable practices are keys to fighting climate change.

Water, waste, and energy management will likely become even more important in the winery. During red wine fermentation, phenol extraction occurs from two primary grape sources: the seeds and skins which contain both tannins and anthocyanins. These two sources contain different types of phenols, extraction dynamics, and sensory features. It is likely that focused fermentation modeling, more advanced alcohol management, and sustainability practices including carbon capture will become even more important tools in the future.

Indeed, it may be that we think of CO₂ harvest as well as grape harvest.

Microbial Ecology

In the past few years, the concept of microbial terroir has emerged. Many vigneron attempt to increase wine complexity by using a variety of *Saccharomyces*, non-*Saccharomyces* yeast species, and/ or non-inoculated fermentations and selected non-*Saccharomyces* as bioprotectants. Ultraviolet radiation is increasing as a function of a shifting climate and may impact both the dominant species and the titer of native microbes on the fruit. This can impact both uninoculated and inoculated fermentations.

Even with the addition of sulfur dioxide and cultured yeasts, a portion of the fermentation can be conducted by other, native organisms,

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ADAPTIVE STRATEGIES, from page 9

suggesting the importance of microbial ecology to terroir expression.²

Watering down is commonly practiced for alcohol adjustment. With elevated Brix levels, this may be done to a greater degree in the future. Because of the relationships between ethanol and the perception of other volatile and non-volatile components, this may become a greater area of concern. Monitoring Brix changes via pressure transducers and measurement of redox potential during fermentation will continue to help support yeast growth, fermentation success, and sulfide management.

Minimizing Oxidative Degradation

Controlling the rate of oxidative degradation is important to optimizing wine quality and complexity. This becomes a more challenging issue in a changing, variable climate.

Prolonged droughts and warmer summer temperatures, including heat spikes, have increased the incidence of fruit sunburn and shrivel in some regions impacting, among other things, reductive strength.

The reductive strength or antioxidative vigor of a wine is influenced by the phenol composition, particularly in red wines, addition products, lees, and the mineral content of white wines.

Questions remain regarding the impact of watering down on oxidative buffering and wine longevity. With climate variation, the importance of oxidative buffering capacity may be enhanced. For example, excessive fruit maturity can lower the reductive strength by a significant factor.²¹

Oxygen management, minimalistic processing, and the use of selective yeast lees with high antioxidant properties, or lees products, may become even more important tools for increasing wine complexity and minimizing oxidative degradation. Additionally, judicious use of bioprotectants and exogenous antioxidants including ascorbic acid may become more common adaptive tools.

What Does All This Mean?

The impacts of climate alterations on viticulture and winemaking will likely continue to be inconsistent across geographic regions and cultivars. S. Ostojica reported that the U.S. Department of Agriculture has regional hubs for monitoring climate variables across the U.S.¹³

Additionally, the IWCA (International Wineries for Climate Action) provides information and shares strategies. While models are limited, measuring, modeling,

and managing viticulture and winemaking variables may allow vignerons to continue to reach their stylistic and quality goals.

It is certain that there will be an increase in programmable systems that continuously monitor. Universal questions include:

- What is the cost of increased use of new technologies to understand and better deal with changing climate variables?

- Is it worth it?

- What are the ROIs?

- What are the limits to adaptation?

Perhaps the only way of discovering the limits to adaptation is to venture beyond them into what now may seem impossible.

As J. Cheney suggested, adaptive change is difficult and involves a succession of awareness, desire, knowledge, and ability to implement.³ Changes in some vineyard management practices, locations, cultivars, rootstocks, harvest evaluations, and winemaking protocols may be necessary. Perhaps it is wise to follow Newton's logic in developing the calculus, that is when a problem seems too large to deal with, reduce it to small, simpler components and tackle those.

Humans are often limited in their grasp of reality. This would include understanding the full impacts of climate change. The only lasting truth is change. Be the change.

Editor's Note: Bruce Zoecklein is an Emeritus Professor of Enology, co-author of Wine Analysis and Production, and editor of Winery Planning and Design. His Enology Notes are posted at www.vtwines.info.

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Q&A With AREC Director Kevin Rice

Center Continues Focus On Research, Education To Protect Fruit Crops

In August 2022, entomologist Kevin Rice became director of the Alson H. Smith Jr. Agricultural Research and Extension Center in Winchester, which serves Virginia’s horticultural fruit industries. Kevin sat down in July via Zoom with Grape Press Editor Bob Garsson to discuss his first year on the job, his goals for AREC, the challenges ahead, and how drums and katydids helped launch his career in entomology.

Q. Your post-doc research at Penn State focused on economic damage from invasive herbivores. Aside from the spotted lanternfly, are there other herbivores on the horizon that particularly concern you?

A. With grapes, the primary pest is still spotted lanternfly. And then we also have the normal complex of our native insects that are continually a problem. I don’t foresee any new insects on the horizon right now. That doesn’t mean they are not

out there. Invasive insects are arriving at accelerating rates, and that’s because of our global trade. We have airlines transporting people and goods all over the world and insects often hitchhike on these trips without being noticed. Their specialist natural enemies such as parasitoids did not make the same trip, so in the new habitat they have unregulated population growth without natural enemies.

It is a continual problem, not just for

“We are looking at climate models and what spring and winter temperatures are predicted to be 10 and 20 years from now. We are starting to base some of our research on those models, and hopefully we will have some management options.”

grape growers, but for all agricultural commodities and natural systems.

Are there things growers should be doing before spotted lanternflies arrive in their vineyard?

Some research suggests that removing their primary or favorable host plants, like Tree of Heaven, might reduce infestations in nearby vineyards. Tree of Heaven is an invasive tree, so removing this species does not severely affect native species. But it’s a weedy species, so if you chop it down, it creates new growth sprouts. So, it is a continual management issue.

What research underway at AREC are you most excited about?

There is a lot of research here investigating agricultural problems for Virginia grape and tree-fruit growers. One of the really cool things happening right now in grapes is in [Virginia Tech grape pathologist Mizuho Nita’s] lab. His team has been training dogs to detect spotted lanternfly eggs in vineyards during the early stages of infestation. The dogs now are about 95 percent accurate in detecting eggs at low levels. And they are better scouts than humans.

Those eggs are really cryptic, really hard to see, and at low populations, it is very hard to see the nymphs. So that is a really groundbreaking method for

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Courtesy of Kevin Rice

Kevin Rice, an entomologist and director of the Agricultural Research and Extension Center at Winchester since last year, inspects for insects in an apple orchard.

A Focus on Protecting Fruit Crops

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detecting that insect.

Also, you are well aware of the problems we are having with climate change. We are having milder winters and warmer springs and summers. In fruit crops, flowering is occurring earlier in the season, and when freezing temperatures occur after flowering, growers experience severe fruit losses.

Dr. Sherif Sherif's lab is examining plant growth regulators that can keep plants dormant and delay flowering. This will hopefully prevent flowers from being exposed to those spring frosts. So that is pretty exciting.

What else is on the horizon at AREC?

This is a long-term vision, but one of the things we are discussing is increasing our greenhouse space at AREC and possibly building biosafety greenhouses, which would allow us to work with different pathogens including grape pathogens in a controlled environment. That's something that we as a faculty have been discussing, how we would obtain funding for that project.

We're also discussing funding options for environmental chambers we could use to elevate CO2 and temperature. This would allow us to investigate how fruit plants respond to pathogens and insects and horticultural practices under varying environmental conditions and how we might be able to mitigate yield losses associated with climate change.

How much of AREC's work is focused on wine grapes, and how much is focused on other fruit crops?

Our main focus here is apples, peaches and grapes. If you just look at faculty splits and investment, a little less than half of our work is devoted to the grape industry. We have a plant pathologist who focuses on grapes, we have a new viticulturist arriving in January. So, it is a pretty large investment for the Virginia grape industry.

How much research do you have underway on climate change, and how optimistic — or pessimistic — are you that we can address it in a meaningful way?

A large proportion of our research deals with climate change. Climate change

affects all research questions. It affects everything. Not only does it affect when buds burst, but it affects the prevalence and abundance of insect pest and diseases. So, it is a substantial part of our research right now — looking at disease and insect management and varieties that might do better under future environmental conditions.

We are looking at climate models and what spring and winter temperatures are predicted to be 10 and 20 years from

ten years?

The first goal is to continue to be the primary resource for the Virginia fruit industry. Another issue that we're starting to look at is housing for graduate students. Winchester is a very expensive place to live, especially on a graduate student stipend. And they are required to move back and forth between Blacksburg to take classes during the semester.

So, one of the things we're currently looking at is getting funding for student



“It's a competitive world but we've got a good track record of obtaining funding for our research.”

now. We are starting to base some of our research on those models, and hopefully we will have some management options. So, we are being proactive with our research on climate change.

How much time will you spend in the field as opposed to being behind the desk managing AREC?

Unfortunately, I do much more desk work than I used to. I do get out of the office to attend our extension meetings. Our faculty travel to several regions throughout Virginia during the winter updating growers and industry stakeholders on new pests or emerging agricultural issues and provide updated management options. We also have farm extension meetings throughout the state during the growing season to discuss current issues and provide management recommendations.

I unfortunately don't get to go into the field to collect data like I used to. Our graduate students and the post docs handle most of that.

What are your goals for the next five or

housing to ease the pressure on graduate students. That's a priority.

Additionally, our facility is about 30 years old. So, we're consistently in the process of upgrading our labs and research plots so it will produce high-level science for the next 30 years.

Winegrape growers are a significant constituency of AREC. How do growers get in touch with AREC to let people know what research they're interested in, what problems they're looking to see addressed, that kind of thing?

The best way would be to attend those fruit extension meetings. In addition to providing that newer research that hasn't been published yet, you have faculty arriving in different parts of the state to meet with growers and with industry to get feedback. Those personal interactions, those one-on-one conversations, are opportunities for growers to ask questions and provide feedback.

Additionally, we have extension blogs located on our website with

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Crisis Hotline for Ag Workers

If you or someone you know is struggling, call or text 833-897-2474

The AgriStress Helpline, a free and confidential crisis and support line that you can call or text 24/7, is available to agricultural, forestry and fishing workers and their families.

AgriStress crisis specialists have received training on factors that impact people working in agriculture and have access to a state-specific curated database of agricultural and health resources. **More helpline info here ...**

Digital and print promotional materials for the helpline are available by contacting the VVA office: info@virginiavineyardsassociation.org.

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updated current information about growing conditions. Faculty email addresses are provided if growers have concerns or questions related to tree fruit and grape production.

Do you have the funding you need to continue critical research at AREC?

Our faculty has been very successful at getting federal and local research grants from the USDA, the National Science Foundation and commodity boards and Virginia Tech campus. It's a competitive world but we've got a good track record of obtaining funding for our research.

There were some retirements and some staff turnover just preceding your arrival. How are you doing in filling those positions?

We've filled all open positions. There were a couple of recent retirements. Tony Wolf retired after 36 years of service as the viticulturalist and AREC director, Chris Bergh retired as the entomologist after 20 years, and it's unfortunate to lose such powerful, great scientists with such good track records.

But it's also exciting, because it does create an opportunity for new researchers with different skill sets to work together. We filled the viticulturalist position and the entomology position. So, all faculty positions are currently filled at the AREC.

You took quite an unusual route, starting with playing drums with bands in Ireland, to get to your current position. Could you tell me about that?

My parents are immigrants from Northern

Ireland. I was born in the U.S. and my father was a professional musician. In fact, my entire family in Ireland is made up of professional musicians. I decided I was going to be a professional musician, and I attended the School of Music in Ireland for a few years and played drums.

We came back here, and I joined some rock bands and played on the East and West coasts, but after a few years, I realized that maybe I wasn't going to be the next Bono and that I needed a bit more economic stability to feed myself. I went to a community college, and then to the University of North Carolina at Asheville.

That's a really small liberal arts university. The professor for the first class I took was an entomologist who studied katydid bioacoustics. He was very interested to find out that I was a drummer and that I had some background in musical studio recording. We were able to analyze the songs of those katydids looking at the temporal patterns that were very much like drumming. I looked at these patterns on the computer, and we basically observed that these insects had different songs even though they were morphologically identical. And because they have different songs, they speak a different language, so they don't mate. That means they are a different species, even though they look the same.

That got me interested in insects. And then, that professor dragged me out in the field in in the Smoky Mountains to do some cage trials with unmated female katydids to see what males would respond, and that's when I fell in love with entomology.

I'd start asking him questions and he would respond, "Well, we don't know the answer to that. How would you design an experiment to answer that question?" And I

was amazed. I knew I didn't know a lot, but I thought it was very interesting that I could think of a question that nobody else had answered yet. I kind of stumbled my way into figuring out a behavioral way to answer those questions, and that was it, that's when I knew that's what I wanted to do.

I can't imagine that you had any idea back when you first were playing drums that it would somehow morph into entomology?

No, and in fact, I still do play a little bit with some of my older musician friends, and they are very confused about how the guy who used to play drums in a band with them came into this position.

Prior to joining AREC, Kevin Rice was Assistant Professor of Entomology in the Department of Plant Sciences at the University of Missouri.

He formerly served as a postdoctoral researcher at the Appalachian Fruit Research Station with USDA-ARS, examining the foraging and visual ecology of invasive species in small fruit production. He also served as a postdoctoral scholar at Penn State University in the Department of Entomology, and was an Extension Agent at the University of Arizona.

He completed his PhD degree at The Ohio State University, his M.S. at Auburn University, and his B.S. at the University of North Carolina at Asheville.



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. For more happenings, check out the VVA website.

Have You Returned the Vineyard Survey?

If you're a wine grape grower in Virginia, please be sure to complete the survey for the 2023 Virginia Commercial Grape Report as soon as possible. Participation helps obtain a more complete picture of our wine industry. The survey for the crush pad report is expected to be sent to wineries in November.

VCE to Hold Sept. Viticulture Meeting

► **Virginia Cooperative Extension** will continue its free Virtual Viticulture Meeting series with a session at 1 p.m. on Sept. 14. Registration is required at <https://forms.gle/4w8ztKKXk7923VbZ7>.

State Schedules Pesticide Collections

► **Virginia's Pesticide Collection Program**, which assists with the proper disposal of unwanted pesticides, including those stored by agricultural producers, rotates the regions of the state it will serve each year. This fall, it will hold collections for the following counties: Amelia, Amherst, Appomattox, Bedford, Brunswick, Buckingham, Campbell, Charlotte, Cumberland, Franklin, Halifax, Henry, Lunenburg, Nottoway, Mecklenburg, Patrick, Pittsylvania, and Prince Edward and the cities of Bedford, Danville, Lynchburg, Martinsville, and South Boston. Click for locations, dates and times.

Save the Date for the 2023 VVA Winter Meeting!

► **The VVA 2024 Winter Technical Meeting** will be held Feb. 21-22, 2024, at the Omni Hotel in Charlottesville. This is a pesticide recertification year. Details and registration information will be available in December through email and on our website.

Technical Study Tour in Sicily Planned

► **Bruce Zoecklein, Professor Emeritus**, Virginia Tech, and Professor Pascal Durand, University of Burgundy, will lead a technical study tour of Sicily Dec. 2-9 for commercial grape growers and winemakers.

"For such a small island Sicily produces a remarkable diversity of wines," Bruce said. "There are an astounding 70 different grape varieties grown, many ancient and rare, apparently well adapted to global climate change."

The study tour begins and ends in Rome and will be limited to 16 participants. The cost is \$4,920 for a single person in one room and \$4,470 per person for a shared room. To reserve, send a non-refundable, \$200 deposit per person to: Dr. Bruce Zoecklein, Department of Food Science and Technology, FST Building, Virginia Tech, Blacksburg, VA 24060. For more information, contact Bruce at bzoeckle@vt.edu.

Consider Serving On the VVA Board

► **It isn't too early to consider** running for a seat on the VVA Board or volunteering for one of our committees. Board elections for president, vice president, secretary and an at-large member will be held at the end of this year. Terms begin in 2024. If you have questions about how you can serve the VVA and Virginia's wine grape growing community (or if you know of a deserving candidate), please contact a VVA board member (**emails are on Page 2 of this issue**).

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.