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Inside the November *Wine Business Monthly*

AS THIS ISSUE HEADS off to the printer, we are about halfway through what's shaping up to be a bountiful 2019 harvest. We also just wrapped up the annual Wine Industry Technology Symposium and separately, the Wine Industry Financial Symposium. Both events were well attended and informative.

Yesterday, the Trump administration announced that a 25 percent tariff will be applied to bottled table wine from France, Spain, Germany and the United Kingdom. The general reaction from the wine industry, of course, is that wine shouldn't be targeted for retaliation in trade disputes involving products other than wine. It will be interesting to see how the tariff hikes play out in the wine space.

As one article in this issue shows, tariff wars are already affecting U.S. wineries. The key challenge for U.S. wineries has involved glass prices. Tariffs levied on Chinese glass have had a ripple effect, while the retaliatory tariffs imposed on U.S. wines put the kibosh on U.S wine exports to China.

If you've been watching the news, or even if you haven't, you have probably heard there are some fairly distracting proceedings occuring in Washington, D.C., leading to questions about whether Congress and/or the President will get much business taken care of before the end of the year. One uncertainty for wineries involves whether excise tax breaks enacted under the craft beverage modernization and tax reform act in 2017 will be extended at the end of 2019. There's a lot of money at stake.

One thing that is certain: there's great information in this issue of *WBM*.

Sparkling wine sales continue to climb and the consumer's appetite for fine sparkling is growing. One result of that is more wineries are making quality estate-bottled sparklers. How are they doing it? We profile some of the service providers and consultants who have emerged to help.

Protecting wineries from phishing schemes was one of the many topics that came up during the Wine Industry Technology Symposium. The chief technology officer of one large winery described the training he's giving employees on cyber security while the CTO of another large winery described the difficulties her company encountered after an employee clicked on a tricky email, inadvertently providing system login information. This issue includes an article with steps you can take to ensure that your winery is more cyber secure.

As alluded to above, it's looking like there are plenty of grapes available this year. Results of the 2019 Vineyard Economics Survey discussed in this issue show that growers are concerned about pricing. The survey results also show, though, that growers think long term and are definitely planning ahead.

Cyril Penn – Editor

For editorial or advertising inquiries,
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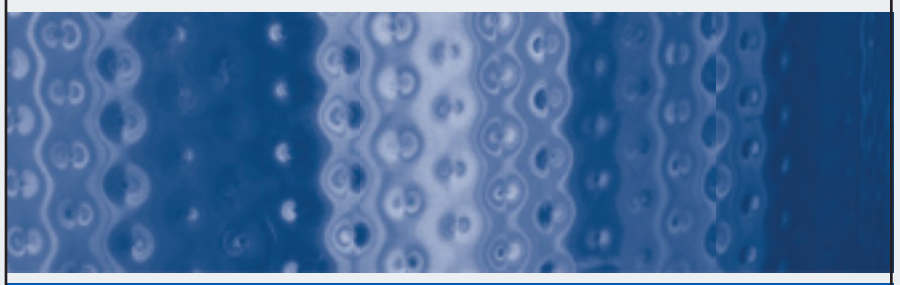
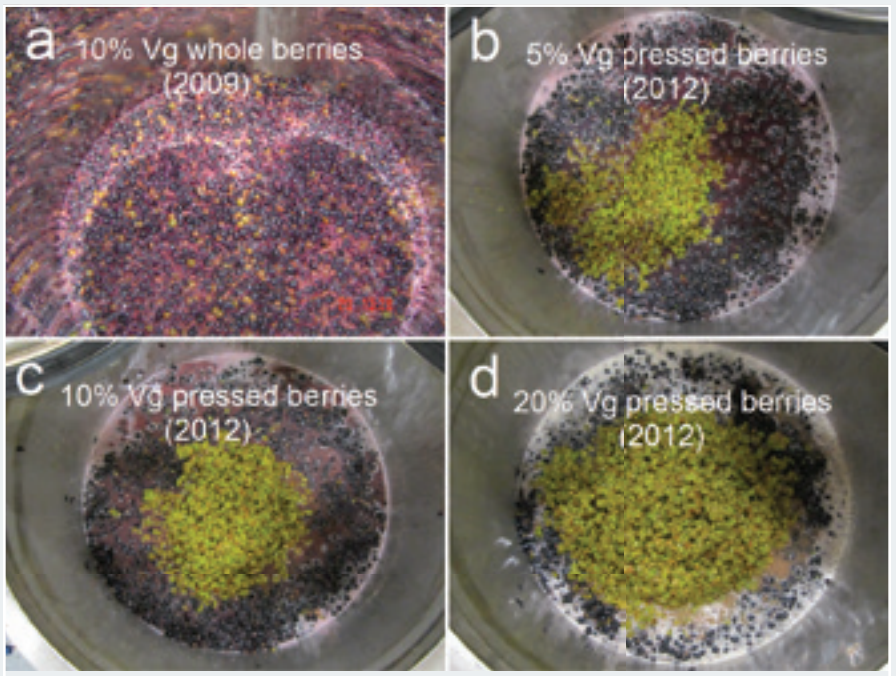
winemaking





COVER PHOTO: Keith Hock, Méthode Sparkling Wine Bottling
COVER DESIGN: Scott Summers

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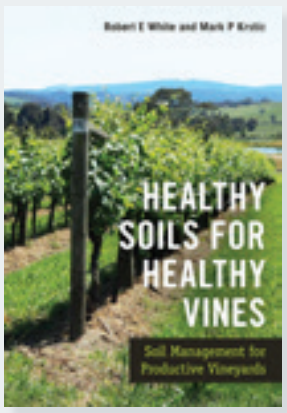

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who's talking in this issue

Keith Hock, owner, Méthode Sparkling Wine Bottling Napa Valley, "Sparkling Wine Production Goes Mobile," page 16

"Sparkling wine is really about control. Temperature, environment, movement. The wine has to be treated properly all the way and especially to be ready for disgorging."

Stephanie Honig, director of communications, sales and export, Honig Vineyard and Winery, "Wineries Adapt to Tariff Wars and Rising Transportation Prices," page 92

"When you work really hard to build something up like we did in China, and then all of a sudden you have some outside factor come in and kibosh all your work, investment, time and money, that's really frustrating."

Tim McEnery, founder and CEO, Cooper's Hawk Winery & Restaurants, "Midwest Winery Wonder," page 88

"I think the way we approach DTC has to do a lot with just the experience that goes along with it. It's stating the obvious, but their ability to taste the wine before they buy it takes away the fear factor."

Lamberto Frescobaldi, Marchesi de Frescobaldi, "Marchesi de Frescobaldi: The Historical Evolution of Montesodi," page 40

"We have become more careful in protecting the identity of the product, which means recognizability. High-quality wines do not have to please everyone. If that were not the case, they would be common wines."

Mark Greenspan, author, Advanced Viticulture, Inc., "Replanting and Mechanization," page 12

"Grape prices have been flying high in premium regions, and it wasn't until 2019 that they hit a wall (or fell off a cliff)."

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Top Stories from WINE BUSINESS.com – In Case You Missed It

Gomberg Fredrikson Reports Slowing Wines Sales During First Half of 2019

Per capita consumption of wine has been flat, according to **Gomberg Fredrikson and Associates**. Wine sales are now at 17.6 percent share of alcohol sales, down 0.3 percent over the past year. Overall, the wine market increased by 0.6 percent during the first six months of 2019. Wine case sales in Oregon grew by nearly 16 percent in volume—or 0.6 percent more—during the first six months of 2019. In California, however, wine case sales decreased by 0.1 percent in volume during the same time period.

Brokers and Growers Report Spot Grape Market Down

Growers without contracts for grapes face stiff challenges this year as wineries deal with slow wine sales and a large 2018 harvest. Brokers reported little activity on the grape and bulk markets in the late summer. **Turrentine Brokerage** stated there is an excess market for fruit throughout California, Washington and Oregon. **The Ciatti Company** and others also anticipated some grapes would be left unpicked this year. Still, Ciatti said in September there was demand for Napa Valley Merlot as well as unique varieties. There was also demand for 2017 and 2018 bulk Napa Valley Merlot and non-vintage red and white bulk wine that sells at $0.50 to $1.50 per gallon.

Robert Craig Winery Founder Dies

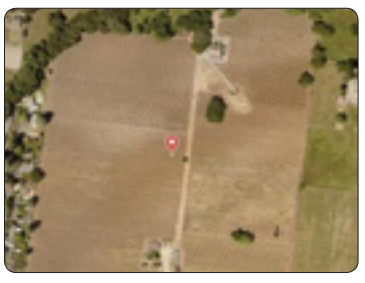
Robert "Bob" Craig died Sept. 15 in Tucson, Ariz., from complications of Parkinson's disease. He was 81. In 1990, Craig founded **Robert Craig Winery** with three friends, including two he met in business school at the University of Chicago. The winery's first vintage was released in 1992. Craig founded his eponymous winery after working for about a decade as general manager for **The Hess Collection**. During his tenure, he spearheaded the formation of the Mount Veeder and Spring Mountain District American Viticultural Areas. Craig retired in 2012. Survivors include his wife **Lynn**, son **Bryan** and daughter-in-law **Camille**.

Sonoma County Winegrowers Report 99 Percent of County's Vineyards are Sustainable

Ninety-nine percent of all vineyard acreage farmed in Sonoma County has been certified by a third party as sustainable, the **Sonoma County Winegrowers** reported in September. The voluntary program started five years ago. The next step for the group is a pilot climate adaptation certification program. The climate certification program was designed to reduce greenhouse gas emissions.

Sonoma County Wine Auction Raises Record $6.1 million for Charities

The 2019 **Sonoma County Wine Auction** raised a record $6.1 million for charity organizations dedicated to education, health and human services, arts and culture and the environment. Four hundred guests gathered at the auction on Sept. 21 at **La Crema Estate** at **Saralee's Vineyard. Christopher Jackson** and **Gina Gallo** served as honorary co-chairs. The top 2019 lot was "G.O.A.T. Sonoma County Bordeaux varietals—Past, Present & Future," which included a 378-bottle collection of Sonoma Cabernet Sauvignon and other Bordeaux varietals. It sold for a record $520,000.



Heitz Cellar Owner Buys Haynes Vineyard in Coombsville in Napa County

In September, **Gaylon Lawrence Jr.**, the owner of **Heitz Cellar**, acquired **Haynes Vineyard** in the Coombsville sub-appellation of the Napa Valley for about $12.5 million, according to public records. The sale includes 32 acres of planted vineyards, a 20,000-gallon winery, and a vineyard manager residence. The company plans to create new wines with the fruit from the vineyard. Lawrence purchased Heitz in 2018 from the Heitz family. In June, Lawrence bought 51-acre **Wildwood Vineyard** in Rutherford. WBM

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Sparkling Wine Production Goes Mobile

Service providers now help wineries make estate-bottled bubbly

Jim Gordon

Jim Gordon, editor at large for *Wine Business Monthly*, writes and edits articles on grape growing, winemaking and wine marketing. He has been covering wine and the wine business for more than 35 years, notably as the editor of *Wines & Vines* from 2006 through 2018. A role as contributing editor for *Wine Enthusiast* magazine began in 2014, in which he reviews California wines and reports on various California wine regions. He was executive director of the annual Symposium for Professional Wine Writers at Meadowood Napa Valley from 2008 to 2015. Dorling Kindersley (DK Books) of London published his first book as editor-in-chief, *Opus Vino*, in 2010, which was chosen as a finalist in the James Beard Awards. In 2002 he was co-creator and managing editor of the long-running Wine Country Living TV series for NBC station KNTV in San Jose/San Francisco.

KEITH HOCK

AS MORE AND MORE wineries begin marketing sparkling wine to accompany their still whites, reds and Rosés, consultants and service providers in the industry have sprung up to help them produce that bubbly.

More than 12 percent of U.S. wineries now produce and/or sell sparkling wine, according to **Wines Vines Analytics**. California has 511 wineries that offer sparkling wine, New York has 119, and Oregon is a close third at 107.

It's difficult to gauge the rate at which this trend has grown, but one directional indicator is the number of domestic sparkling wines reviewed by the leading consumer magazines. U.S. sparkling wine brands blind-tasted by ***Wine Enthusiast***, for example, grew to 165 in the most recent 12 months, which was a 38 percent increase from two years earlier.

A large number of those new brands are made by custom crush facilities that will take a winery's grapes or base wine, or provide the base wine, and turn it into sparkling by various methods, from inline carbonation at the bottling line to Charmat tank-carbonated wines and even Champagne-style wines that undergo secondary fermentation in individual bottles. This is also called the traditional method or, in French, *méthode traditionelle*.

It takes special equipment and expertise to make high-quality sparkling wine, particularly when the winery wants to bottle-ferment it with base wine made from grapes grown in their own vineyards. That's what a small but growing cohort of wineries is doing, helped by a variety of methods and mobile service providers newly available.

The purpose of this article is to describe the variety of services and methods offered, and highlight a few companies as examples. This report is not intended to be a comprehensive directory of service providers.

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One winery that is taking advantage of mobile, custom sparkling wine technology and expertise is Napa Valley-based **Long Meadow Ranch** (LMR), which plans to release its first two estate-grown, vineyard-designated sparkling wines from the firm's **Tanbark Mill Vineyard** in Anderson Valley, Mendocino County in early 2020. Consultant **Stéphane Vivier** is estate winemaker for LMR's Anderson Valley operations.

Vivier is making Pinot Noir in all its forms, including Pinot Noir Blanc, Rosé of Pinot Noir and Pinot Noir still wines, as well as the new Pinot Noir-based Brut and a Pinot Noir Brut Rosé—all grounded in the authenticity of estate-grown fruit.

While Vivier was in the thick of the 2019 harvest, LMR's vice president of brand development, **Jeff Meisel**, told *Wine Business Monthly* that the winery has produced a Farmstead brand sparkling wine using outside sources, but Vivier wanted to get more specific and make "single-soil series" sparkling wines from vines that were purpose-planted in the 1990s for sparkling wine production, using the Roederer 32 clone.

Vivier and LMR wanted to control the whole process, but they didn't have all the equipment they'd need nor much experience with sparkling production, so they engaged former **Schramsberg Vineyards'** winemaker **Keith Hock** as their sparkling consultant. He knew how to make top-quality sparkling wine, and his Napa Valley-based business, **Méthode Sparkling Wine Bottling Napa Valley**, could provide the specialty equipment needed for bottle-fermented bubbly.

KEITH HOCK

Hock believes he was the first such service provider in California when he started in 2015. He invested $600,000 in trucks, trailers and equipment to handle everything from *tirage*—putting the base wine and yeast into bottles for the secondary fermentation—through disgorging and perfecting the final packaging at his clients' winemaking locations.

He bought new equipment of the same types and from the same manufacturers used in Champagne, and mounted each machine or combination of machines on wheels.

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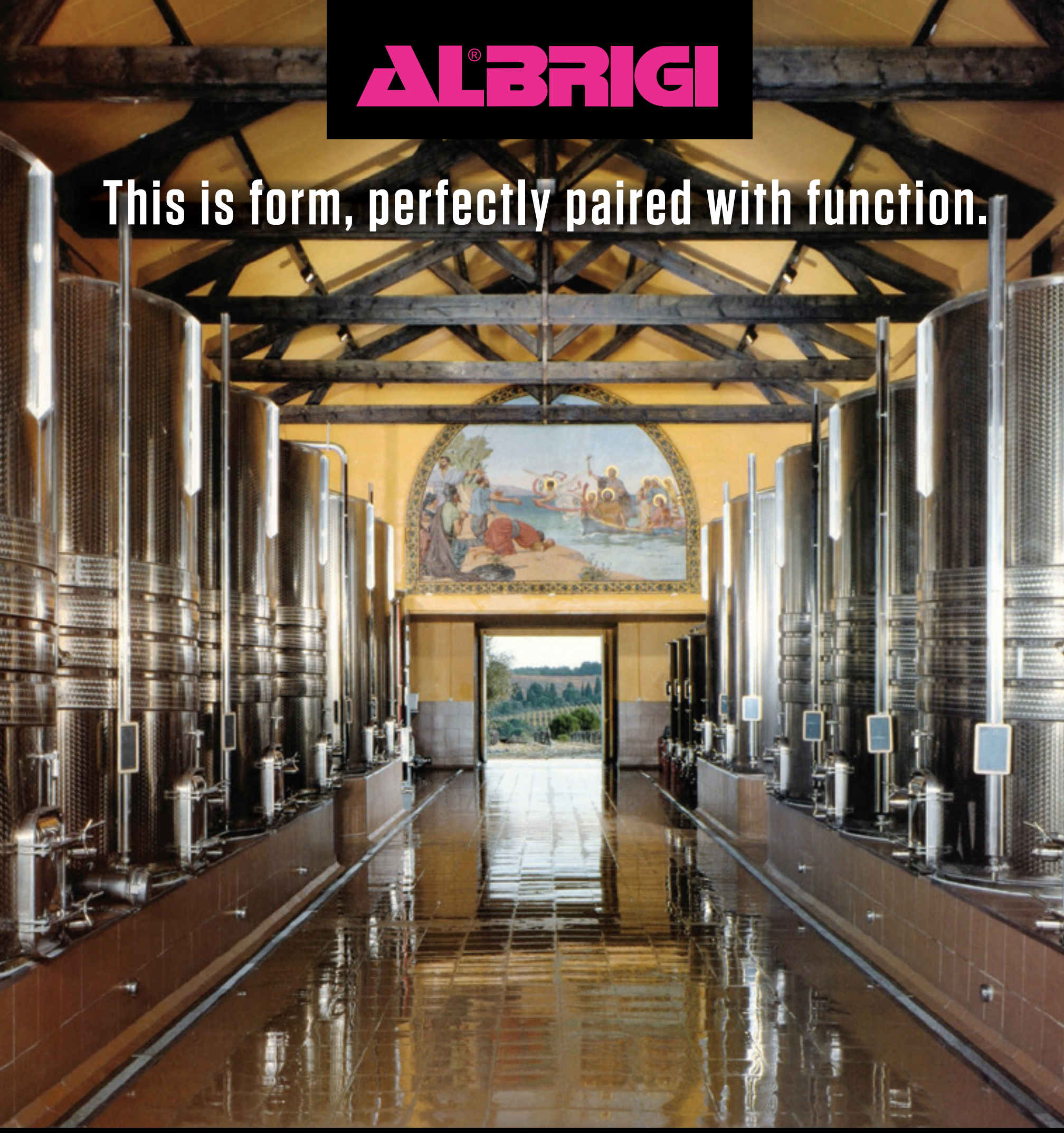

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KEITH HOCK

Keith Hock uses a combination of Costral equipment for *tirage*, and TDD Grillat's disgorging machine, corker, wine hooder and mixer.

The Four Stages of Processing Traditional Sparkling Wine

Here is a description of the four stages of traditional sparkling wine production, also known as the *methode traditionelle* or bottle fermentation method, adapted from an article by winemaker and enology lecturer **Patricia Howe** in the December 2013 issue of *Wine Business Monthly*.

Stage 1

TIRAGE BOTTLING

Most wineries can use their existing bottling lines to fill the bottles for this primary bottling but need some way to seal them. This *tirage* bottling is traditionally done in the early spring, following harvest.

Primary fermentation

- Fermentation of traditionally low alcohol, low tannin, high acid still wines, called base wines or cuvées

Base wine production

- Blending and stabilizing the base wines for sparkling wine production

Tirage bottle filling

- Mixing base wines, sugar, yeast and adjuvants (that help in later riddling)
- Transferring into special sparkling wine bottles

Biduling and crown capping

- Sealing the bottle with bidules and crown caps

Stage 2

AGING

Fermenting

- Secondary fermentation in the bottle (three to 12 weeks)

Aging

- Aging on the yeast lees (six months to more than eight years) on the bottle's side
- Typical times of 1-1/2 years for standard, three years for reserve, five years for special wines

Riddling

- Riddling the spent yeast sediment into the neck of the bottle (four to 40 days)
- Further aging on the bottle's "point"

Stage 3

DISGORGING BOTTLING

The final bottling process from "disgorging" on involves multiple steps, all done in immediate succession. This process is unique and thus requires much specialized equipment.

Disgorging

- Removal of yeast lees and crown caps/bidules

Dosing

- Addition of sweetening syrup (and SO_2 or other additives)

Fill leveling

- Adjusting liquid level/volume in the bottle

Corking

- Sealing of a bottle with traditional sparkling cork

Wiring

- Securing the cork to the bottle with wire hood

Mixing

- Agitating the sealed bottle to integrate the syrup

Stage 4

DRESSING

The process of dressing the finished wine bottle can take place immediately after disgorging or can be done as a separate process days, weeks or several months later.

Washing

- Washing the exterior of the bottle

Pleating and crimping

- Applying the traditional foil capsule

Labeling

- Labeling

For *tirage*, to bottle the wines for the sparkling fermentation, he uses a 16-head mono block filler and a biduler capper for 26 mm or 29 mm crown caps that can handle numerous bottle shapes and sizes. The manufacturer is **Costral**, based in Riquewihr, France, the Alsace region.

For disgorging, Hock's equipment includes a rotary neck freezer from **Champagel**, in Epernay, France, and a disgorging machine, corker, wire hooder (muselet), and mixer from **TDD Grillat** in Epernay. The bottle washer is by Costral.

Special equipment for the final dressing of bottles includes a capsuler and labeler from **Albagnac** in Sauzet, in the south of France.

He hauls the needed equipment for each task to a winery, off-loads it, and wheels it into the cellar or bottling area to be set up in a configuration that fits the space. The process is not like that of a typical mobile bottling line for still wine, where everything stays on the trailer.

"Why Isn't Someone Doing This?"

"When I left Schramsberg in 2015 to consult, the universal thing that my new clients wanted was to make their own sparkling wine," Hock said. "They wanted to be able to call it their own, estate-bottled, and really have ownership in the process. I began thinking, 'Why isn't someone doing this?' I knew that grower Champagnes were made this way, so I went to France, saw how they were doing it and based my idea on how they do it there."

Hock said the rationale goes far beyond an estate-bottled label verbiage that can help sales and marketing. "Sparkling wine is really about control: Temperature, environment, movement. The wine has to be treated properly all the way and especially to be ready for disgorging.

"Then if it's too warm outside, they gush too much; if there's too much sugar in the *dosage* they gush; if there's too much yeast you lose more wine; or if the bottles are filled too low, they have to be topped up to the legal 750 ml," he said.

In addition to LMR, Hock's clients include **Piper Sonoma**, **Wagner Family of Wine**'s **Emmolo** brand, **Skywalker Ranch** in Marin County, **ZD Wines**, **Joseph Phelps Vineyards** and several others.

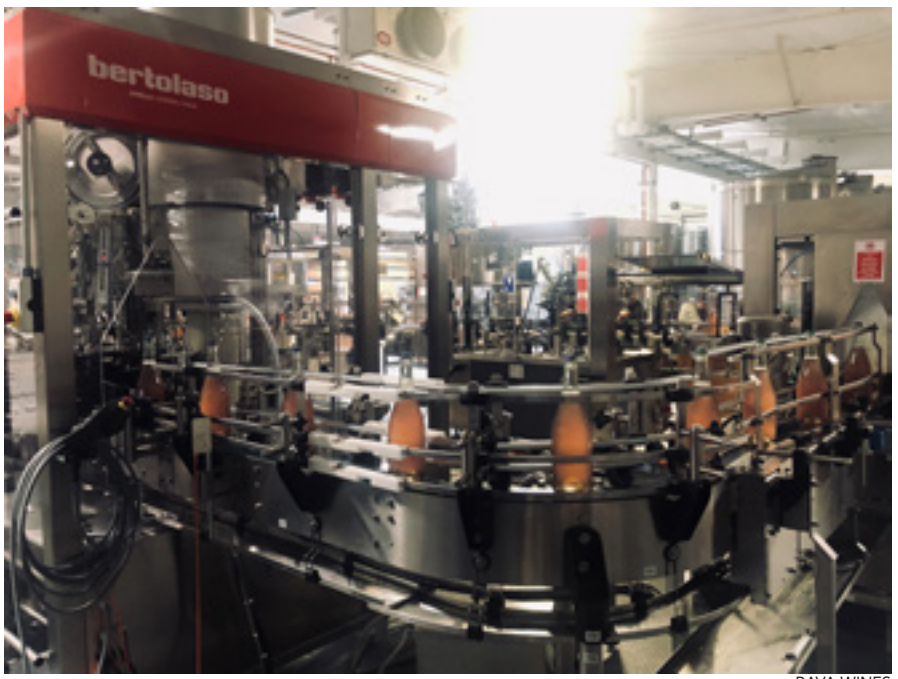
A second Napa Valley-based company launched a mobile sparkling business early this year.

Brut Bottling was created by **Antoine Dupont**, manager of **Valentin Thierion Americas**, and **Christian Troussieux**, owner of **Mobile Wine Services** and **VinPure**, a **Velcorin** dosing service. Brut Bottling manages various sparkling wine methods, including mobile disgorging for the traditional method, Charmat, pét-nat and carbonation.

Custom Services are Spreading

The range of sparkling wine services available to wineries that don't want to invest in all their own equipment is broad. Sonoma County-based **Rack & Riddle** is the best known custom winery for traditional production in California. It can create sparkling wines from a client's grapes or base wine through to the final packaging.

Similar and often smaller custom sparkling producers operate in various regions. Consulting winemaker **Michael Jones**, fermentation specialist with **Scott Laboratories**, confirms that the sparkling wine boom is big in the eastern and midwestern states, too. He said **MAWBY Vineyards and Winery** in Michigan makes bubbly for outside clients, as well as its own high-quality



RAVA WINES

wines. **Childress Vineyards** in North Carolina produces sparkling wine and has built a trailer to haul the equipment to other wineries.

Rava Wines of Paso Robles states that it is the first and only custom sparkling facility in that region. Co-owner **Lauren Rava** said she and her husband were grapegrowers before building a winery focused on events and direct sales. They quickly realized the high potential for sparkling sales at the weddings they hosted and used Rack & Riddle 275 miles away to make the first sparkling wine with a Rava base wine.

"But with the distance and the expense, we decided to begin making our own," Rava said. For the 2016 vintage, they ordered equipment from Italy and France, and did their first disgorging—the most difficult and equipment-intensive part of the process—in 2017. The winery has 11 different varieties in *tirage* now, and their brand has turned into a regional sparkling wine specialist, selling direct-to-consumer and locally direct-to-trade.

Soon other wineries asked them for help, and they built a client list for custom sparkling wine production that now numbers 25. The minimum order is 200 cases, and the price starts at $55 a case plus materials, Rava said. The business also offers sparkling wine consulting, *tirage* bottling, bin storage, riddling and disgorging.

A plus for their nearby clients is that the bottles say, "Produced and bottled in Paso Robles."

Opportunity in Oregon

A company in Oregon's Willamette Valley offers sparkling wine services that fall in the middle between full-service custom winemaking and doing everything on the winery premises. **Andrew Davis**, former winemaker at Oregon sparkling specialist **Argyle Winery**, founded **The Radiant Sparkling Wine Company** in McMinnville in 2013.

Davis trucks his mobile bottling equipment to clients' wineries for the first phase of sparkling production and eventually brings the bottles to his facility for finishing. His mobile equipment fills bottles with the base wine and adds a yeast/liqueur that he has prepared in advance with the base wine.

"I work with each and every client to work up a dose that suits them," he said. "It's still their hand in it." The bottles are sealed with crown caps, and the second, bottle fermentation soon begins, taking just a few weeks. After that point, Davis said the process is all about the length of aging on the yeast and the final disgorging mechanics. The winemaking decisions are done.

After he confirms that the second fermentation is complete, the bottles are packed into wooden *tirage* bins, originally designed for moving hazelnuts, that hold 40.5 cases each. These keep the light out and can be stacked "to the moon" in any appropriate storage facility, he said.

Most Oregonians are following the Champagne model for time on the lees, Davis said, using 18 months for non-vintage and 36 months for vintage-dated. At the end of that period the bins are shipped to the Radiant facility for disgorging, washing and final packaging.

With production now at 25,000 cases, Radiant has significantly increased Oregon's quantity of bottle-fermented bubbly. Argyle is the only significant producer at 70,000 cases, including both sparkling and still wine, according to Wines Vines Analytics.

Davis believes that the Willamette Valley has an opportunity to distinguish itself as the center of "grower Champagnes" in the United States. His clients include top Pinot Noir producers like **Adelsheim Vineyard**, **Stoller Family Estate** and **Ponzi Vineyards**, plus **Jackson Family Wines**' properties and **King Estate Winery**.

"If they're pricing them like their Pinot Noir, then they're as expensive as grower Champagnes from France. When you're doing that, you should not be hauling base wine to a different winery, pumping it back and forth, and going for homogeneity where each wine is done the same way.

"If they're pricing them like their Pinot Noir, then they're as expensive as grower Champagnes from France. When you're doing that, you should not be hauling base wine to a different winery, pumping it back and forth, and going for homogeneity where each wine is done the same way."

Andrew Davis

"We are seeing a lot of diversity in the sparkling wines here. There are warmer ferments, cooler ferments, picking earlier or later, malolactic or not. I want to keep the identity of each producer," Davis said.

It Starts with Hospitality

That same desire for individuality and ownership is driving the trend nationwide. Keith Hock of Méthode Sparkling Wine Bottling says the demand for a service like his starts with a winery's hospitality and entertaining efforts.

"At Schramsberg, we could build events around the sparkling and still wines both (using the **Davies Vineyards**' brand still wines under the same ownership), but others may be pouring someone else's wine as the first thing to give guests when they arrive," Hock said. "They'd rather be pouring their own. But if they wanted to do their own from scratch, it's very expensive, and they don't want to buy these machines and use them just two or three days out of the year." **WBM**

Tank Extras

Stuff you didn't know you needed when you bought the tank

Curtis Phillips

Curtis Phillips, an editor for *Wine Business Monthly* since 2000, is a graduate of UC Davis, and has been a winemaker since 1984 and an agricultural consultant since 1979.

SCOTT SUMMERS

"I would insulate any wine tank that is outside of a building and would at least consider doing so for tanks inside of a building as well."

WHEN WE TALK ABOUT tanks as winemakers, we often only consider the overall fit and finish of the tank and maybe the "stock" options like overall tank shape or geometry, cooling jacket coverage, racking door placement or perhaps whether it should have a steeply slanted bottom, removable top or dual-wall insulation. All of these are important considerations when shopping for tanks, but I think that most of these design decisions need to be made before one starts budgeting for the purchase. What I want to discuss here are tank features that can be considered "after-market" features—those one can be added to tanks to make them more useful.

Dedicated Pump-over

My number one tank add on is hard-piped pump-over setups for every red wine fermentor 5,000 gallons or larger. This would obviously exclude wineries using pneumatage (see below), wineries only making white wine, very small wineries and any other winery not relying on pump-overs for cap management.

The setup involves permanently dedicating a pump for each red fermentor, mounting the pump on the tank, adding piping from a racking valve to the pump and from the pump to a cap irrigator at the top of the tank, and automating the control of the pump. I've seen a fair number of large-bore flexible impeller or centrifugal pumps used in this application, but I think I've become sold on the idea of using a helicoidal impeller pump. Helicoidal pumps are a derivative design of centrifugal wine-transfer pump where the impeller is conical rather than a disk to better pass skins and pump.

Pneumatage

Pneumatage, or air mixing, is a technique developed for mixing otherwise impossible-to-mix viscous liquids, like tar and asphalt. The word was coined by **Pulsair Systems**. A similar system is available from **Parsec** (represented by **ATP Group**), but is called Air Mixing M.I.

In a nutshell, large bubbles of gas are formed under flat plates just above the floor of the tank. As the bubbles "blurp" (is there a better word?) out from under the plates, they sweep along enough liquid to give the tank a good, but very gentle, bottom-to-top stir.

As it turns out, pneumatage is a really good way to mix a tank of non-viscous liquid like juice, must or wine. The technique is a really fast way to break and cool a fermentation cap or to mix a stratified tank compared to

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conventional pump-over: It takes a 300 gpm pump 2 3/4 hours to turn over a 10,000-gallon tank once. And the large bubble size and the limited time that they are in the must means that there is minimal interaction between the bubbles compared to using a sparger or a venturi.

One can either use atmospheric air or an easily available inert gas like nitrogen. I recommend using air for active fermentations and nitrogen for wine.

As a tank add-on, a built-in pneumatage or air mixing system is designed with larger wineries in mind. Pulsair Systems does have a portable unit that may be more suitable for smaller wineries. These go over the top of the tanks, through either a racking valve or by hooking them into gas connectors at the tank. Portable units are ideal for tanks already plumbed for pneumatage but where the winery hasn't yet invested in, or plumbed for, a centralized control system.

Built-in Tank Mixers

Another winery tank add-on I like is a built-in tank mixer. These have been available as an option on non-wine process tanks for ages, and as a custom option on wine tanks for decades. In my experience, such systems are typically installed in the blending and pre-bottling tanks at very large wineries. The most typical design is the side-mount, but I have also seen some purpose-built mixing tanks where a very large impeller is bottom-mounted inside the tank and driven by a long shaft up through the tank to a top-mounted motor.

After market installations tend to be of the side mounted design. I've seen a lot of **Alfa Laval** units in European wineries. I also like the **Vinfoil Mixer** units that are available from **PolarClad**. It should be noted that there another use of the Vinfoil trademark unrelated to the PolarClad's product, specifically a packaging equipment manufacturer in the Netherlands. So be sure to go to PolarClad rather than searching for Vinfoil directly.

Another company that specializes in tank mixer installations is tank fabricator **Paul Mueller Company**. Considering that the company serves both the dairy and pharmaceutical industries in addition to the wine industry, I would think that they would be worth contacting when looking to install mixers to existing tanks in a winery.

More Sensors

One of the easier additions that one can make to an existing tank is to add more ports for additional sensors. An additional port for a temperature probe is likely to be one of the more cost-effective ways to upgrade a tank. Even small tanks can see a significant stratification in temperature if they are not stirred. Stirring, of course, is precisely what one does not want to do if one is settling lees. For the most part, a thermally stratified tank isn't a big deal as long as the warmest part of the tank is at or below (or *above*) in the case of malolactic fermentation) the desired tank temperature. Any temperature gradient should ensure a certain amount of mixing, but it isn't always enough.

During a red fermentation, the temperature in the cap can easily outstrip that of the rest of the must. It seems sensible that when the thermometers are read electronically instead of by eye, we should be able to track the temperature of the cap by installing thermometers in the top third of a fermentor, as well as the more common placement down at eye-level. We could even use the temperature difference between the two as a way to trigger alerts or automate pump-overs. This latter case should reduce the number of fermentations that "stick" because the temperature in the cap gets high enough to kill the yeast.

Another sensor that I'm pretty interested in is the Brix Probe which is available from **TankNET**. They are calling it the TankNET® BP-7826 and pair it with their TankNET® TC-1 Controller. The idea is that one can use it to monitor the Brix in a fermenting must in real-time. This should provide the winemaker with a better idea about the overall progress and health of the fermentation. It could also be automated to alert the winemaker if the fermentation begins to turn sluggish and is threatening to stick.

I really like the idea of being able to monitor Brix directly during fermentation. Unfortunately, I am not in a position to give a user testimonial for the sensor being sold by TankNET. Even though it has been available for a while, I just haven't had the opportunity to use one at all, much less through multiple harvests. As I noted, I really like the idea and would certainly consider them installing on the fermentors of in any winery.

Gas Connections

Gas fittings at the top of the tank are the add-on that no one seems to appreciate. I like to use them for gassing a tank headspace. One can obviously opened the top door, but I am fairly convinced that the opening and shutting of a tank top manway pretty much ensures that any gas one uses gets so mixed with the gas in the headspace that it becomes ineffective as a blanketing gas. (Except possibly argon, and then only if one is exceedingly careful.)

The system often used for positive-pressure, nitrogen-atmosphere, bottling tanks is probably overkill, but is probably the correct approach. For bottling tanks the nitrogen inflow needs to be fairly constant so the gas inflow is normally regulated by a spring-actuated manifold (valve).

Insulation

One can buy double-walled, insulated tanks when one makes the original tank purchase. The additional cost does tend to result that these tanks are not used by most wineries. I do see them once in a while in some pretty high-end facilities in Napa but almost never elsewhere. What I do see are a lot of big wine tanks that are insulated either by a "spray foam" closed cell polyurethane, sometime with a rigid acrylic outer coating, or tanks insulated with polystyrene clad in aluminum or stainless steel. The former system is available from many companies and used for many applications beyond the wine industry. PolarClad has more or less defined the latter category in the U.S.

I would insulate any wine tank that is outside of a building and would at least consider doing so for tanks inside of a building as well. I've made wine at several wineries where the outside tanks were uninsulated, and in these days of rising energy cost, it just doesn't make any sense to let any cooling escape by having uninsulated tanks outside.

SO THAT WOULD BE my list of tank upgrades to consider. A winery would probably see the most value in insulating their tanks, but with the scarcity and high cost of cellar labor, that might be a wash with automating pump-overs or installing pneumatage or air-mixing systems. I personally want the most information from each tank of wine in the winery, despite the occasional difficulty in processing and internalizing all that data, so I tend to lean toward installing as many sensors as I can. **WBM**

Select Tank Suppliers

AAA Metal Fabrication, Inc.	Stainless Steel	Beaverton, OR	503-601-3212	*www.aaametal.com*
Ager Tank & Equipment Co. **see page 30**	Stainless Steel We stock tanks that range in size from 150 gallon to 6,500 gallon. We also accept custom orders for larger tanks. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Portland, OR	503-222-7079	*www.agertank.com*
Algor	Stainless Steel	Beverly Hills, CA	323-702-0824	*www.algorgroup.com*
Archon Industries, Inc.	Stainless Steel	Suffern, NY	845-368-3600	*www.shoparchonind.com*
Artisan Barrels & Tanks, Inc.	Concrete/ Stainless Steel	Oakland, CA	510-339-0170	*www.artisanbarrels.com*
The Belli Corp. dba **Westec Tank & Equipment Co.** **see page 29**	Stainless Steel Our tanks are custom ordered. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Healdsburg, CA	707-431-9342	*www.westectank.com*
Black Forest Container Systems	Stainless Steel	Greenville, SC	864-282-2301	*www.blackforestmktg.com*
Bonar Plastics/Snyder Industries	Plastic	Lincoln, NE	800-768-6246	*www.bonarwineproducts.com*
Bouchard Cooperages	Concrete	Napa, CA	707-257-3582	*www.bouchardcooperages.com*
Carolina Wine Supply	Stainless Steel	Yadkinville, NC	336-677-6831	*www.carolinawinesupply.com*
CFP Winemakers	Stainless Steel	Pittsburgh, PA	412-232-4507	*www.cfpwinemakers.com*
ColloPack Solutions **see page 19**	Stainless Steel Custom tanks with stock porta tanks available. 486 gal forkliftable, jacketed **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Napa, CA	707-258-3940	*www.collopack.com*
ContainerLogic SRP	Stainless Steel	Indianapolis, IN	425-484-0261	*www.containerlogicsrp.com*
Containerpal	Plastic	St. Petersburg, FL	727-319-2300	*www.containerpal.com*
Cornerstone Stainless Containers **see page 30**	Stainless Steel	Redmond, WA		*www.cornerstonestainlesscontainers.com*

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Criveller Group **see page 33**	Stainless Steel	Healdsburg, CA	707-431-2211	*www.criveller.com* Our tanks are custom ordered, plus we stock 1,000 gal. to 3,000 gal. tanks **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes
Custom Metalcraft	Plastic/ Stainless Steel	Springfield, MO	417-862-0707	*www.custom-metalcraft.com*
Della Toffola USA, Ltd. **see page 17**	Stainless Steel	Santa Rosa, CA	707-544-5300	*www.dellatoffola.us*
Euro-Machines, Inc. **see page 31**	Stainless Steel	Fairfield, CA	707-864-5800	*www.euromachinesusa.com*

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Flextank	Plastic	Vancouver, WA	877-407-3348	*www.flextankusa.com*
Glacier Tanks	Stainless Steel	Vancouver, WA	360-953-8453	*www.glaciertanks.com*
GW Kent, Inc.	Stainless Steel	Ypsilanti, MI	734-572-1300	*www.gwkent.com*
ICC Northwest	Stainless Steel	Canby, OR	503-263-2858	*www.icc-inc.net*
La Garde **see page 4-5**	Stainless Steel Our tanks are custom ordered. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Quebec City, Canada	800-263-5170	*www.lagardeinox.com* LA GARDE
Machinery & Equipment Co.	Stainless Steel	San Francisco, CA	800-227-4544	*www.machineryandequipment.com*
Minox SRL	Stainless Steel	Minervino Murge BT, Italy	+39 (0)883-69-43-04	*www.minoxsrl.it*
Mio Vigneto Products	Stainless Steel	San Ramon, CA	415-531-6450	*www.miovigneto.com*

Select Tank Suppliers

Napa Fermentation Supplies see page 33	Stainless Steel	Napa, CA	707-255-6372	*www.napafermentation.com* NAPA FERMENTATION SUPPLIES
Omega Thermo Products, LLC	Stainless Steel	Stratford, WI	800-470-1126	*www.laser-plate.com*
P&L Specialties	Stainless Steel	Santa Rosa, CA	707-573-3141	*www.pnlspecialties.com*
Pasco Poly, Inc.	Plastic/ Stainless Steel	Weiser, ID	208-549-1861	*www.pascopoly.com*
Paul Mueller Co.	Stainless Steel	Springfield, MO	800-683-5537	*www.paulmueller.com*
Pickering Winery Supply	Stainless Steel	San Francisco, CA	415-474-1588	*www.winerystuff.com*
Prospero Equipment Corp. see page 18	Stainless Steel	Pleasantville, NY	914-769-6252	*www.prosperoequipment.com* PROSPERO
	Prospero offers stainless wine and sparkling wine tanks. Variable capacity, fixed capacity, stackable, rectangular, or square tanks. Tanks can be equipped with CIP, automatic punch down, and seed removal as well. We provide both stock and customized tanks. A wide range of stock sizes from 50 gallon up to 2,000 gallon sizes. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes			
Quality Stainless Tanks	Stainless Steel	Windsor, CA	707-837-2721	*www.qualitystainless.com*

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Raynox 2000, Inc.	Stainless Steel	Rougemont, QC, Canada	450-469-4219	*www.raynoxinc.com*
Revolution Equipment Sales	Stainless Steel	Santa Rosa, CA	707-573-3154	*www.revolutionequipmentsales.com*
Sacmi USA De Franceschi	Stainless Steel	Des Moines, IA	515-276-2052	*www.sacmiusa.com*
Sanitary Stainless Welding **see page 27**	Stainless Steel Our tanks are custom ordered. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Fresno, CA	559-233-7116	*www.sanitarystainless.com*
Santa Rosa Stainless Steel	Stainless Steel	Santa Rosa, CA	707-544-7777	*www.srss.com*
Silver State Stainless	Stainless Steel	Mound House, NV	775-246-1180	*www.silverstatestainless.com*
Sonoma Cast Stone	Concrete	Petaluma, CA	877-283-2400	*www.concretewinetanks.com*
Spec Trellising	Stainless Steel	Ivyland, PA	800-237-4594	*www.spectrellising.com*
Spokane Industries **see page 21**	Stainless Steel Our tanks are custom ordered. Tailorable 550 gal. (2 ton) and 825 gal. (3 ton) portable open top totes are stocked. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Spokane, WA	509-241-4116	*www.spokaneindustries.com*

Select Tank Suppliers

St. Patrick's of Texas **see page 32**	Stainless Steel We carry stock sizes ranging from 300 Liter – 15,000 Liter. **Offer Forklift Skids:** Yes **Offer variable capacity:** Yes	Taylor, TX	210-402-7326	*www.stpats.com*
Stout Tanks and Kettles	Stainless Steel	Portland, OR	503-372-9580	*www.conical-fermenter.com*
Tanks for Wine	Plastic/ Stainless Steel	American Canyon, CA	916-730-5485	*www.tanksforwine.com*
TranPak, Inc.	Plastic	Fresno, CA	800-827-2474	*www.tranpak.com*
Transition Equipment Co.	Stainless Steel	Napa, CA	707-537-7787	*www.transitionequipment.com*
Vance Metal Fabricators	Stainless Steel	Geneva, NY	315-759-2131	*www.vancemetal.com*
The Vintner Vault	Stainless Steel	Paso Robles, CA	805-226-8100	*www.thevintnervault.com*
WinerySeals	Stainless Steel	Hayward, CA	510-732-7010	*www.wineryseals.com*
Wine Filter City	Stainless Steel	Monmouth Junction, NJ	732-329-2500	*www.winefiltercity.com*

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Drip-Irrigated Cork Plantation Expedites Tree Growth and Closure Production

Corticeira Amorim purchases its first cork oak forest property: What this means for the efficiency and sustainability of the natural cork closure industry

Stacy Briscoe

AMORIM

THOUGH ARGUABLY ONE OF the most sustainable natural resources, there are very few man-made cork plantations. But with the current demand for cork stoppers reaching nearly 12.5 billion units per year, according to experts at **Corticeira Amorim**, that is exactly what the company is investing in.

This year the company, whose history in cork production dates back more than 150 years, is planting its first cork plantation in a forest property named **Herdade da Baliza**, located in Castelo Branco, Portugal. Amorim purchased 2,866 hectares (7,082.04 acres) for €5.5 million (about $6.1 million), according to the material disclosure.

In conjunction with the **University of Évora** in Alentejo, Amorim's research and development team has proven that cork plantations, when irrigated properly, are a more efficient and sustainable way to grow *Quercus suber* (cork oak) trees.

"The company is not about to change itself from an industrial to a forestry company, not at all. This is the first time in 150 years the company has ever owned land," said **Carlos de Jesus**, marketing director of Amorim, in an interview with ***Wine Business Monthly***. Coming from a more industrial understanding of cork closures, de Jesus said one of the company's main goals of this project is to understand the cork tree from a forestry point of view. But he also pointed out that given the expected growth rate of cork closure demand—for wine, beer, spirits and non-alcoholic beverages—there is currently not enough quality cork being produced to support that growth.

Stacy Briscoe is the assistant editor of *Wine Business Monthly*. She has been writing about wine professionally since 2015, freelancing for multiple publications including The *San Francisco Chronicle*, *Edible Communities* and *Napa Sonoma Magazine*, among others. She also maintains her own website, *BriscoeBites.com*, dedicated to wine reviews and tasting notes. Outside of wine writing, she also contributes as a freelance editor for the independent publisher She Writes Press. Stacy has a Bachelor of Arts degree in English-language literature from the University of California, Santa Cruz.

"We're not going to sit around and wait for that to happen. This is how you can sustain that growth; and if no one else is going to do it, then we'll do it ourselves," he said.

According to de Jesus, each year there are approximately 19.5 billion bottles of wine filled and stoppered. About 12.5 billion of those bottles use natural cork closures, with Amorim accounting for about 5.4 billion of them, according to the company. "Obviously, from 5.4 to 19.5 billion, that's a lot of territory to grow, but that's our market. If you want to be able to grow as much as we hope to within the next few decades, you have to start planning now because—like grapevines—oaks, in general, take a long time to produce a successful harvest," he said.

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Hurry Up and Wait

The consumer marketplace continues to show an increase in sales value in the ultra-premium and above wine segments. In fact, according to the latest ***Wine Analytics Report***, the greatest increase in average bottle price was seen in the super-luxury tiered wines (those priced $25 and above), which rose 3 percent to $39.77. Studies continue to prove that consumers still associate natural cork closures with higher value wines. (See "Studies Measure Consumer Preferences for Wine Closures" in the April 2019 issue of *Wine Business Monthly*.)

This data indicates that the demand for cork is, indeed, on the rise. Amorim is attempting to anticipate this demand by increasing the speed at which cork bark can be harvested.

Traditionally, it takes 25 years for the bark of a cork tree to be ready for its first harvest. Even then, that first harvest does not yield material hardy enough to produce the high-quality cork closures needed by, and expected from, the wine industry. In fact, according to de Jesus, it's not until the third harvest that the bark can be used for wine closures—but the length of time between harvests is nine years.

"That nine years between harvests, that's the law. But there's no law about when that first harvest needs to take place," de Jesus said. What the law does require is that the *Quercus suber* reach 70 cm in diameter and 130 cm in height before the bark can be stripped, which usually takes 25 years. But what Amorim has found through their research is that, by using a very precise micro-drip irrigation method, they can reduce the time a cork tree needs to develop the proper diameter and height from 25 to 10 years. Once it has reached those measurements and the first harvest has taken place, drip irrigation can stop, and the regular nine-year growth cycle can continue as usual.

Besides speeding up the growth process, the micro-drip irrigation will also allow for a more densely packed cork plantation. While most forests grow approximately 50 trees per hectare, Amorim plans to plant about 250 to 300 trees per hectare in their Portugal plantation. This, according to de Jesus, will increase Portugal's cork production by about 30 percent.

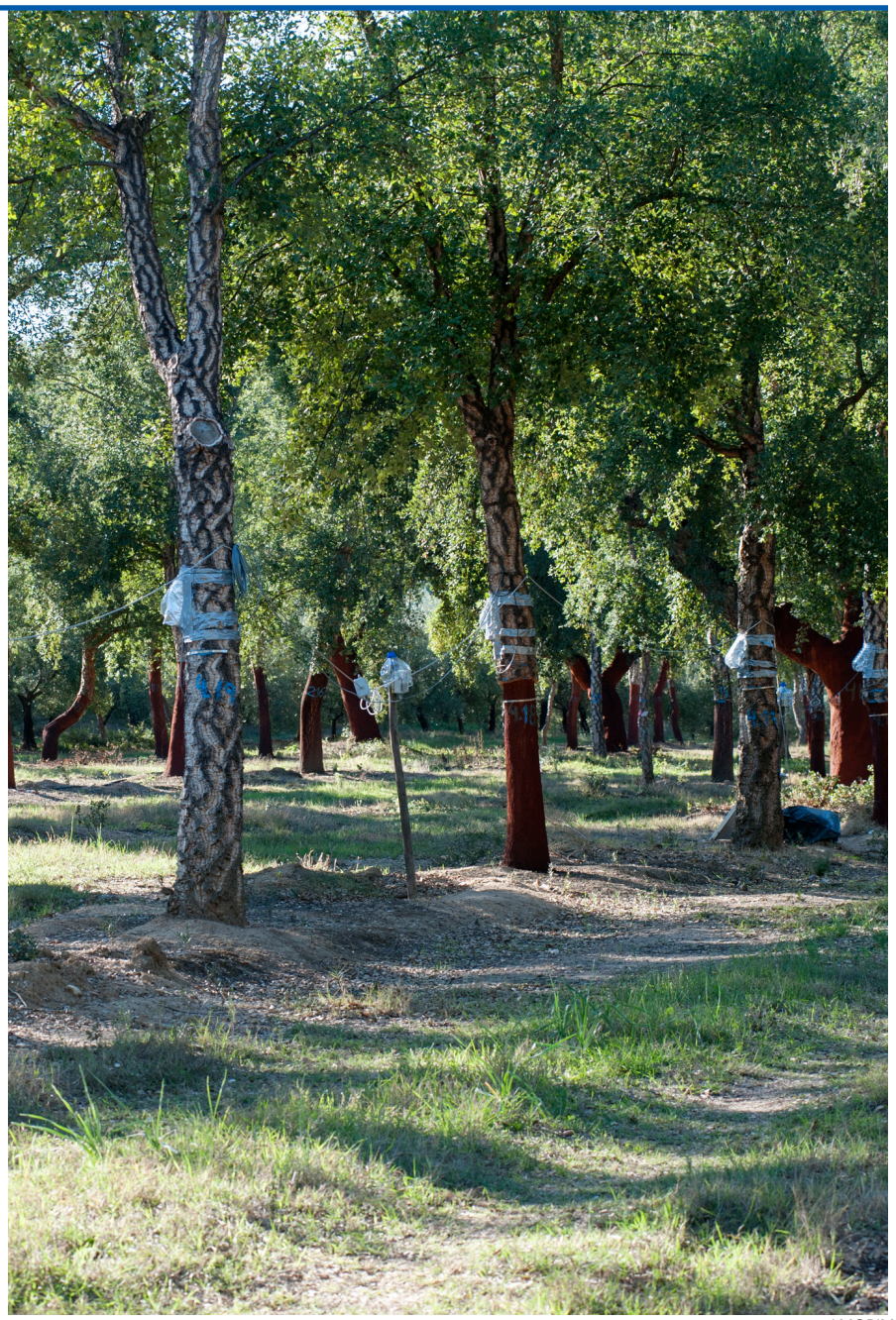
Glass Closures, Too

The planting of its own cork tree forest isn't the only closure investment Amorim has made. Earlier this year, Amorim announced that it acquired a 50 percent stake in **Vinolok**, a manufacturer of technical glass and crystal stoppers.

Vinolok, which is a part of the Czech Republic-based **Preciosa Group**, currently conducts about €16 million of glass closure sales per year, according to the company.

When asked about the deviation away from cork, de Jesus said it wasn't a deviation at all, calling the glass closures a complement to Amorim's product portfolio. "It's convenient, provides a beautiful design, and the look and feel fit with the premium and ultra-premium wine tiers," he said.

Further, de Jesus noted that this business decision is a 50-50 partnership and not a full-on acquisition. "The idea is to develop Vinolok further, make it grow and provide what are clearly beautiful closure finishes on top of a bottle," he said.



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Sustainability Factor

When asked about what this means for Amorim's business—how many more cork closures the company plans to produce as a result of these farming methods—de Jesus said that is not their main concern or goal with this project. "We're not so much worried with what comes out of the property as we are in achieving that global output," he said. "How we get there is once that yield curve changes, then more people will be looking into this crop, investing in it, either from scratch or as current property owners."

One of the biggest advantages cork trees have over other crops is that they can grow in areas that many farmers may find undesirable—those with poor soils and little water supply. "If you have very rich soils with a lot of water and a lot of nutrients, you won't plant cork oaks. You are going to plant things that will give a crop every year," de Jesus said. "There aren't many who would want to invest in a business with a turnaround time of 25 to 30 years."

But Amorim has found a way to make cork forestry a more economically interesting, and stable, option for foresters and cork producers in Portugal as the micro-irrigation method can be used for both new plantings and to renew the supply of existing cork forests.

"And if, as we suspect, the yield curve becomes greater and sustainability becomes stronger, then we've set a good example that will be multiplied in this country and others," de Jesus said. **WBM**

Marchesi de Frescobaldi: The Historical Evolution of Montesodi

An iconic wine, a pure Sangiovese, and its changed relationship with wood

Carlo Flamini, Il Corriere Vinicolo

"It is a very significant return to the origins, because today the identity of the wine must be enhanced in terms of its intimate connection with the territory from which it comes."

- Lamberto Frescobaldi

EDITOR'S NOTE: This year, ***Wine Business Monthly*** partnered with **SIMEI** and news organizations around the world to conduct and share interviews with winemakers at some of the most iconic wineries about their barrel philosophies and regimens. In the U.S., **Jim Gordon** interviewed **Genevieve Janssens** at **Robert Mondavi Winery** (*WBM*, September 2019) and **Matt Crafton** at **Chateau Montelena** (*WBM*, October 2019). The following article was written by **Carlo Flamini** of ***Il Corriere Vinicolo*** in Italy and features the evolution of oak usage at Marchesi de Frescobaldi. It has been translated from Italian.

All articles will be presented at SIMEI later this month, as well as in each of the magazines across the globe, to provide a look at how oak is used—or not used—around the world.

"IN OUR GROUP, EVERY estate has its own history. From Montalcino to Maremma, from Chianti to Friuli, by way of Bolgheri, all have their own stories about the developments in the relationship between the wines produced and wood. But I believe that Montesodi, as the descendant of Sangiovese, has had the most remarkable evolutionary path. Initially, it aged in large, chestnut barrels. Then, following the corporate restructuring in the '90s (which also involved the vineyard), we switched to barrique, with gradual changes to less and less toasted woods, ending with the recent return to the 30-hectoliter oak barrels. A return to the origins, but with the experience gained over all these years, which enables Montesodi to be a perfect expression of Sangiovese." This is how **Lamberto Frescobaldi** explains the choice of Nipozzano Cru to tell the stylistic evolution that has accompanied the company over the last 30 years.

Corriere Vinicolo: *The history of Montesodi seems to embody that of quality Italian wine...*

Lamberto Frescobaldi: Yes, we have moved from a pioneering phase, let's say, to one where the so-called "Parkerization" phenomenon has overturned established customs and habits.

CV: *And today we have gone back in time. But what is the difference compared to the past?*

LF: Today, wood is in all respects a technological tool. In the '90s, it was used to modify the wine—the time in the cellar could also distort the product that came from the pressing of the grapes. Today, instead, we try to be as faithful as possible to the idea of the terroir where the wine is born. It would also be a contradiction to invest so much money to acquire land in the most suitable areas and then make all the same wines. So, a return to the origins—that is, the use of big barrels rather than barriques—is in tune with this production philosophy that makes respect for the land its *raison d'être*. But I believe that if it had not been for Parkerization we would not have come to this new evolution.

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Jean-Claude Mas, Winegrower and owner of Domaines Paul Mas.

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The guardian of aromas

CV: *In what sense?*

LF: It was an obligatory step, and we could also say interesting in terms of the research and attention that it led us to pay to the relationship with wood. Today, it all seems so natural, the presence of the neat rows of barrels and barriques in the wineries, something that has always been there. But here in Tuscany, until the ’70s and ’80s, we used chestnut, a typical wood from the Chianti woods, some used cherry, while oak barrels were a prerogative of the French. And even the great Chateaux, up until the ’80s, had more or less 30 percent new barrels because barriques were mainly used for transport. The use of wood as the technological completion of the production process and the whole study in the exchange between wood, oxygen and wine were actually encouraged by the advent of the Parker style. Then all this has had its consequences: we got to the point that Napa, Australia and Bordeaux wines all seemed the same thing. Today we can finally devote ourselves to producing great local wines, making use of the know-how in wood gained from the ’90s onward.

CV: *So, today’s Montesodi has nothing to do with that of the ’80s and then ’90s?*

LF: Every wine is the product of its soil, the climate, years. It comes from the grapes and vines. Montesodi is 100 percent Sangiovese, offspring of the territory of Nipozzano and, therefore, Chianti Rufina. As such, it was, and is, an expression of this particular terroir. Its relationship with wood has always been very complex because Sangiovese is not keen on external intrusions. So, in all these years we have made very slight changes to the technique; we have really moved on tiptoes, balancing the expression of the vines and the vineyards of one particular year with the work in the cellar. We often forget what a consumer of high-quality wines wants, indeed, demands, is to recognize the diversity between the various vintages. If in all these years we had striven to make the same Montesodi, we would have betrayed our customers, as well as our job as winemakers.

In short, we have become more careful in protecting the identity of the product, which means recognizability. High-quality wines do not have to please everyone. If that were not the case, they would be common wines. This is why the Montesodi that is drunk in Italy is the same that can be drunk in the USA or Japan.

CV: *In your opinion, who dictated this return to the typicity and identity of wine? The specialized press again?*

LF: I think it was a two-sided job: The producers at some point rediscovered a bit of healthy pride, but even the critics felt that consumers were starting to look for something new, different from the usual vanilla-flavored Merlot. In the end, the guru is not an alien but someone who, by tasting a lot, has a global vision and can interpret the different sensations with which he comes into contact. In the end, he cannot write only about what he likes, but above all, he has to satisfy his readers.

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Lamberto Frescobaldi

Niccolò D'Afflitto

Winemaker Niccolò d'Afflitto: Wood? It Must Give and Then Disappear

"I started in Nipozzano in 1995, where I found Montesodi in old chestnut barrels, the ones used in Tuscany at the time. Chestnut, like cherry, has an unpleasant oxidizing power, which becomes a problem with Sangiovese. After a couple of years, Lamberto and I started a project of complete corporate restructuring, which started from the vineyard and went right down to the cellar, where the first thing I did was to replace the barrels with oak barriques."

Niccolò D'Afflitto, the historic winemaker of Marchesi Frescobaldi, makes the story of the Montesodi-wood relationship strikingly vivid, evocative. "I remember those large chestnut barrels. When we tore them to pieces, they had layers of tartrate, a finger thick, which made the wood inert. We say that it had become good in the sense that it was no longer bad..."

CV: *But did you switch to new oak from one year to the next?*

ND: Virtually yes, but before it received the Montesodi, the aromatic exuberance of the barrique was smoothed by the passage of other wine for two to three months and by thorough washes, as Sangiovese does not accept the dominance of wood. It must also be said that at the beginning, having replanted the vines, renewed the planting systems, rootstocks and clones, the young vines had greater need of wood tannins, whereas now they are 25 to 30 years old and need less. Consequently, the use of wood is totally different.

CV: *So, should wood be used according to the vineyard parameters?*

ND: If a producer asked me: How long should I leave this wine in wood, I would ask him to show me the vineyard first, tell me how old the plants are, the altitude, what exposure they have. The wood should be dosed exclusively according to the parameters of the vineyard and a general plan—if you want to make a wine that is an expression of that exact terroir. Going back to the Montesodi of the '90s, considering that the vines were young, we performed not only thinning in the vineyard but also "bleeding," which needed barriques to soften in order to obtain structured and tannic wines.

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MARCHESI DE FRESCOBALDI

Today, the oenological objectives have changed: man's intervention is much less invasive. What must emerge is the identity of the wine, understood as a precise correspondence with the territory from which it is born. This is why we went back to big barrels five to six years ago, but still in oak. So, the size has changed, but the essence has remained.

CV: *Where are your suppliers?*

ND: Some in France and some in Austria, from *Quercus Peduncolata* and *Sessilis*. I am fresh from a trip to France, in the forests of the Allier, where I was able to visit the places where barrel oak is produced, which are different from those of barrique oak.

In fact, a barrique cooper is different from a barrel cooper, as the dimensions, the aging of the wood and the production techniques are different. It is an extraordinary experience that enables you to understand the level of professionalism in this industry at the service of the wine sector: everything is traced, certified by lots, types of plants and ages. We really are at the crossroads of art and science. Foresters are true experts; they know the forests like the back of their hands. For a company that wants to structure its barrel cellar according to specific oenological objectives, the identification of the right type of wood is fundamental.

CV: *And what are the advantages for today's Montesodi?*

ND: Today, I believe that high-quality wines must have uniqueness as a distinctive mark, given by the territory where the grapes are grown. What is done in the cellar is meticulous work to enhance this uniqueness. Large oak barrels are the most complete tool to achieve this goal. In the first two or three years, they gradually and completely yield their aromatic potential and then become neutral containers that favor just small exchanges of oxygen with the outside, allowing the correct evolution of the wine to endow it with the right complexity. After a few years of use (the average age of our barrels today is about four to five years), even the exchange of oxygen is reduced. So maybe we need to carry out decanting operations. I always say that for Montesodi the return to big barrels is not the closing of the circle, but it has been a sort of spiral path, which we would not have undertaken had we not taken the previous path.

CV: In a nutshell, what should wood give to today's wine?

ND: Respect. That is, it must give and disappear as if it had never been in it. **WBM**

Recent Research:

How Does Pressing Prior to Cofermentation Affect Color and Phenolics During Winemaking and Bottle Aging?

L. Federico Casassa, Landon S. Keirsey, Andrew L. Schultz, Richard C. Larsen and James F. Harbertson

Federico Casassa teaches at the Wine and Viticulture Department at California Polytechnic State University; **Landon Keirsey**, **Andrew Schultz**, **Richard Larsen** and **James Harbertson** all teach at the Viticulture and Enology Program, School of Food Science at Washington State University. Corresponding author Federico Casassa can be reached at 805-756-2751 or *lcasassa@calpoly.edu*.

COFERMENTATION ENTAILS COMBINING DIFFERENT grape cultivars when the grapes are being crushed as opposed to the blending of the finished wines. Cofermentation has its origins in the Côte Rôtie appellation of the Rhône Valley (France), where Syrah is sometimes blended with small amounts of Viognier. The technique is applied with the expectation that cofermented wines will display higher and more stable color as compared with an unblended control. This color enhancement has been attributed to the white grape's contribution of skin flavonols, which are planar molecules that can engage in copigmentation reactions with anthocyanins (**Boulton**, 2001). The net effect of copigmentation is a hyperchromic shift (i.e., enhancement of the color intensity of the wine) and a bathochromic shift (i.e., shift of wine color towards a more bluish hue). Cofermentation is also practiced to enhance acidity, as well as floral and fruity notes, due to the contribution of the white variety (**Etaio** et al., 2008).

During cofermentation, Viognier grapes can be added following pressing protocols that range from whole berries to lightly pressed through fully pressed berries. Adding fully pressed berries may counteract a potential dilution effect that occurs when whole or lightly pressed berries are added, but it is unknown if there is a detrimental effect (e.g., dilution) when adding whole berries. It is also unclear at what blending percentages the color is affected and, if so, to what extent.

In this study, a control wine (made with 100 percent Syrah grapes), and three Syrah cofermented blends (consisting of additions by weight of 5, 10 and 20 percent Viognier grapes during crushing) were made over two vintages. In the first experiment (2009 vintage), whole (i.e., without pressing) Viognier grapes were added after destemming (Casassa et al. 2012); in a subsequent experiment (2012 vintage), Viognier grapes were added after pressing (grape solids without pulp, i.e., skins and seeds). The motivation for these studies was to assess the effect of cofermentation on the phenolic chemistry and color stability of the resulting wines.

Key Points:

- Research was conducted to understand how pressing regimens affect the color and phenolics of cofermented grapes.
- Regardless of the pressing protocol followed for Viognier grapes, Viognier additions equal to or less than 10 percent decreased most chromatic parameters.
- Addition of Viognier to Syrah grapes do not result in an increase in color stability and/or saturation.
- The addition of pressed Viognier grapes to Syrah seems to avoid the dilution effect on the phenolic composition when whole berries are added.

Grapes and Winemaking Protocol

Syrah (clone Joseph Phelps) and Viognier (clone R1) grapes from the Columbia Valley AVA in Washington state were manually harvested into 1-ton capacity bins. Four treatments were prepared: 100 percent Syrah (control) and additions by weight (± 0.25 kg) of 5, 10 and 20 percent of destemmed (in the 2009 season) and lightly pressed (~2 bars, in the 2012 season) Viognier to Syrah at crushing. After the fruit was crushed, 35 mg/L of sulfur dioxide (SO_2) was added. Fermentations were carried out in triplicate in stainless steel fermenters. Musts were inoculated after crushing with selected dry yeast (2009: Zymaflore FX-10, **Laffort**, France; 2012: EC-1118, **Lallemand**, Canada). Malolactic bacteria (SB3 Instant, Laffort, France) were added three days after crush. Diammonium phosphate was added to raise the yeast assimilable nitrogen to 225 mg/L prior to fermentation. Maceration occurred at a temperature between 24° C to 26° C and lasted seven days. Cap management consisted of a half-volume tank pump-over followed by a 5 minute punch-down two times per day. Pressing occurred at 5° Brix by racking the free run wines into 20 L glass carboys fitted with airlocks. Alcoholic fermentation was completed after 12 to 17 days. The end of malolactic fermentation (MLF) was confirmed (< 0.1 g/L malic acid) by enzymatic determination of L-malic acid. The wines were racked two times, adjusted to 35 mg/L free SO_2 and bottled in 750 mL bottles under screwcap.

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Fruit and Wine Analysis

Syrah and Viognier berry samples were evaluated for skin and seed tannins (**Harbertson** et al. 2003). Protein precipitable tannins, large polymeric pigments (LPP) and small polymeric pigments (SPP) were measured as detailed (Harbertson, **Picciotto** and **Adams**, 2003). Total polymeric pigments (TPP) were calculated as LPP + SPP. The CIELab coordinates were calculated using the MSCV software (**Grupo de Color de La Rioja**, Logroño, Spain). Anthocyanins and flavonols were determined using by HPLC-DAD-ESI-MSn.

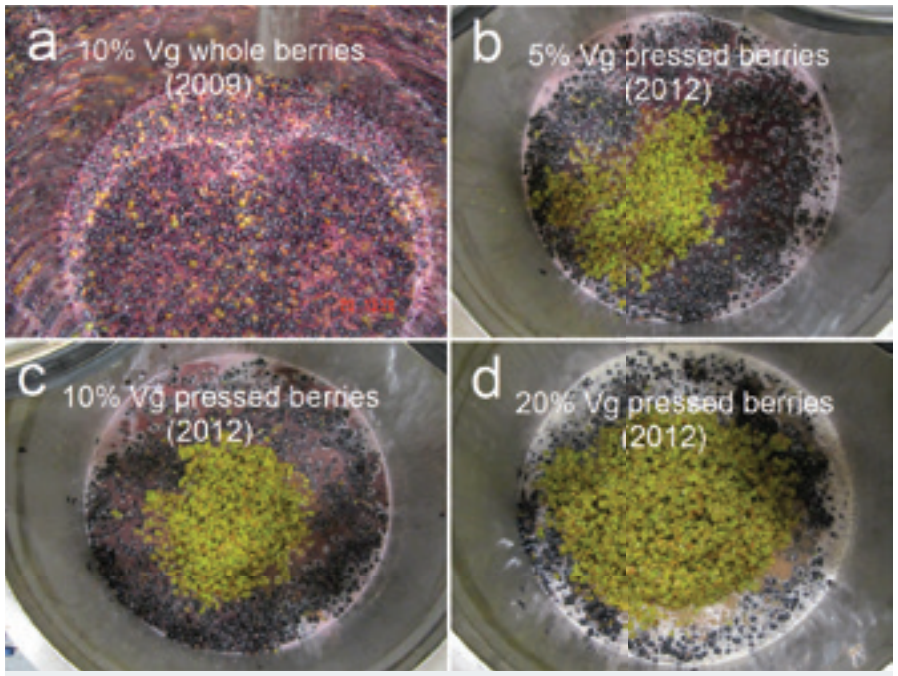

FIGURE 1 Detail of the fermenters just after crushing in 2009 and 2012. Only one treatment (10 percent Viognier whole berries) from the 2009 experiment is shown.

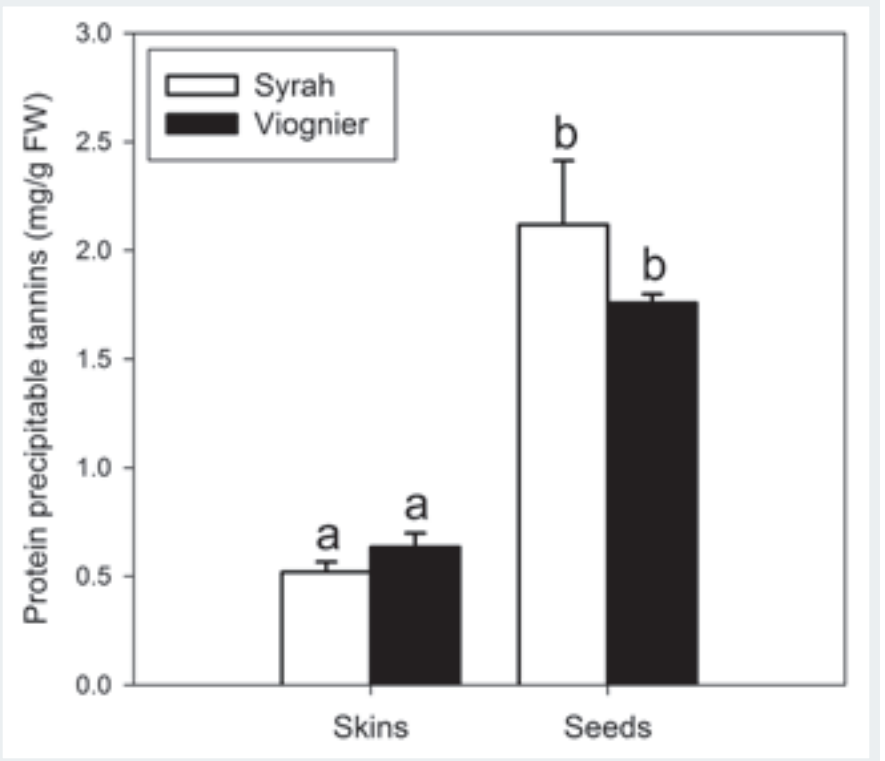

FIGURE 2 Tannins concentration expressed on a fresh weight (FW) basis in the seed and skins of Syrah and Viognier grapes at harvest in the 2009 vintage. Different letters indicate significant differences for Tukey's HSD at $p < 0.05$

Results and Discussion

In the 2009 experiment, Syrah was cofermented with Viognier grapes added as whole berries after destemming (FIGURE 1A), whereas in 2012, pressed Viognier grapes were added to the fermentation tanks at crushing (FIGURE 1B, C and D). In the 2009 experiment, fruit tannins were evaluated to uncover a potential tannin contribution by the added Viognier seeds or skins. Viognier and Syrah fruit had equivalent concentrations of both skin and seed tannins, thus ruling out a possible contribution of seed and skin tannins by the added Viognier (FIGURE 2). In addition to initial differences in Brix between Syrah and Viognier grapes in 2009, overall sugar levels were higher in the fruit from the 2012 season (TABLE 1). However, no differences were observed for the final ethanol levels, pH and TA of the wines at bottling for both the 2009 and 2012 experiments.

TABLE 1 Initial Brix (soluble solids), pH and titratable acidity (TA) at crushing for the different treatments (± standard error) of Syrah and Viognier grapes at harvest.

Vintage/AVA	Cultivar	Initial Brix	pH	TA (g/L tartaric acid)
2009 Columbia Valley	Syrah	21.40 ± 0.21 c	3.59 ± 0.03 b	6.2 ± 0.05 a
	Viognier	23.90 ± 0.30 b	3.52 ± 0.04 c	6.9 ± 0.03 a
2012 Red Mountain	Syrah	24.70 ± 0.45 a	3.73 ± 0.07 a	5.4 ± 0.20 b
	Viognier	24.60 ± 0.11 a	3.28 ± 0.05 d	6.1 ± 0.22 a

Different letters within a column indicate significant differences for Tukey's HSD at $p < 0.05$.

PHENOLICS

In the 2009 experiment, selected phenolics were followed from crushing through bottle aging, spanning a period of 580 days. Cofermentation is thought to enhance long-term color stability, and so to be able to assess this long-term stability is important from a practical standpoint. FIGURE 3 shows the evolution of anthocyanins, tannins, flavonols, and iron-reactive phenolics at key points during the winemaking process in the 2009 wines. Anthocyanins are largely responsible for the color of young wines and they typically engage during winemaking with other wine components via non-covalent and covalent reactions to create anthocyanin-derived pigments (Casassa & Harbertson, 2014). A total of 14 different anthocyanins were identified by HPLC-DAD-ESI-MSn of which malvidin-3-O-glucoside was the most abundant.

Anthocyanins were initially lower in 20 percent Viognier and at day 580; 20 percent Viognier still showed lower concentrations of anthocyanins relative to the control wines (FIGURE 3A). This suggests a dilution effect as a result of adding the whole Viognier fruit. Tannins (FIGURE 3B) peaked at pressing, with no differences among treatments; but after about three months of bottle aging, a drop equating to a 46 to 52 percent loss was observed in all treatments. FIGURE 3C shows the evolution of flavonols during winemaking and bottle aging. Flavonols are phenolic compounds that, while only displaying a peak of absorbance at 350 nm (thus being mostly colorless or lightly yellowish), are good copigmentation factors due to their planar

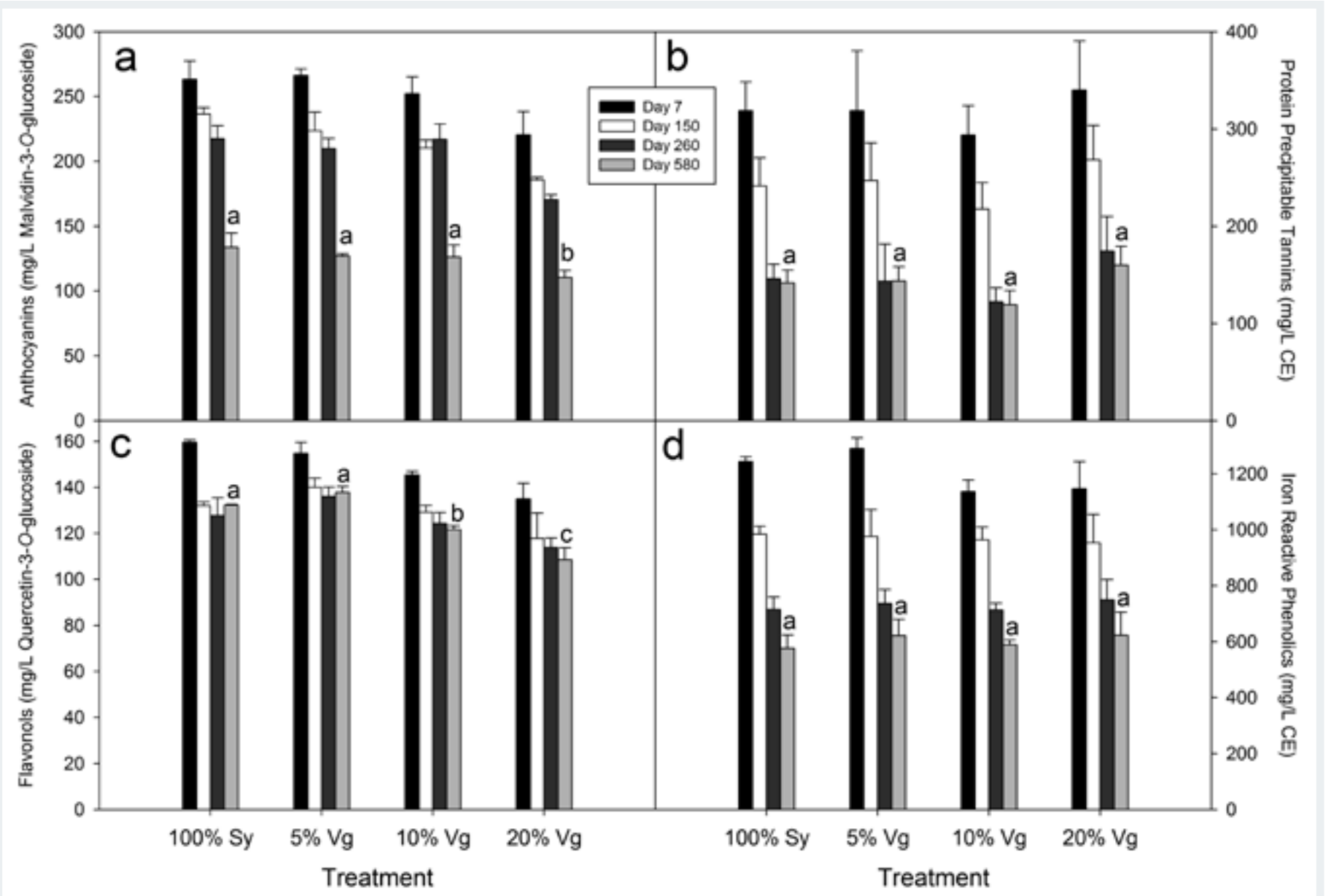

FIGURE 3 Extraction and evolution of (a) anthocyanins, (b) protein precipitable tannins, (c) flavanols, and (d) iron reactive phenolics at days 7 (pressing), 150 (bottling), 260 (~3 months of bottle aging) and 580 (~1.25 years of bottle aging) in the 2009 vintage. Different letters at day 580 indicate significant differences for Tukey's HSD at $p < 0.05$. CE: catechin equivalents.

molecular structure (Boulton, 2001). In fact, the practice of cofermentation is thought to add, by way of the added white grape, an extra pool of flavonols to the maceration process. A total of six flavonols were identified by HPLC-DAD-ESI-MSn, of which quercetin-3-O-glucoside was quantitatively the most relevant. Flavonols peaked at pressing, with lower levels on 10 percent Viognier and 20 percent Viognier that remained comparatively lower during winemaking and bottle aging.

Therefore, counter to the anecdotal belief that white cultivars provide an extra pool of flavonols, lower concentrations of these compounds were, in actuality, observed at Viognier additions of 10 and 20 percent. This, once again, suggests a dilution effect by the added Viognier grapes. Iron-reactive phenolics (IRP) followed the same trend as tannins, and at day 580 no differences among treatments were observed.

COLOR

The evolution of two key CIELab parameters is shown in **FIGURE 4**. Lightness (L^*) and saturation (C^*) were measured to evaluate a possible hyperchromic shift potentially resulting from the cofermentation treatment. The L^* values were higher in 20 percent Viognier (**FIGURE 4A**), indicating lighter colored wines relative to the other treatments. This finding suggests, again, a dilution effect caused by the added Viognier must although this effect was not observed for all Viognier additions. For example, at day 580, 5 percent Viognier had significantly lower L^* values (i.e., more opaque wine) than 20 percent Viognier although no differences were found between the 5 percent Viognier treatment and the 100 percent Syrah and 10 percent Viognier treatments. Saturation or C^* (**FIGURE 4B**) summarizes the contribution of red ($a^* > 1$), blue ($b^* < 0$) and yellow ($b^* > 1$) components to overall color. From pressing to bottling, evident but variable decreases in saturation were observed among treatments. However, at day 580 only 5 and 20 percent Viognier showed differences in C^*, with 5 percent Viognier displaying a 19 percent increase but only relative to 20 percent Viognier. Without necessarily implying causality, the lack of hyperchromic shift in the cofermented wines (measured in our study as wine saturation), may be due to the decrease, rather than the expected increase, in anthocyanins, because of the noted dilution effect.

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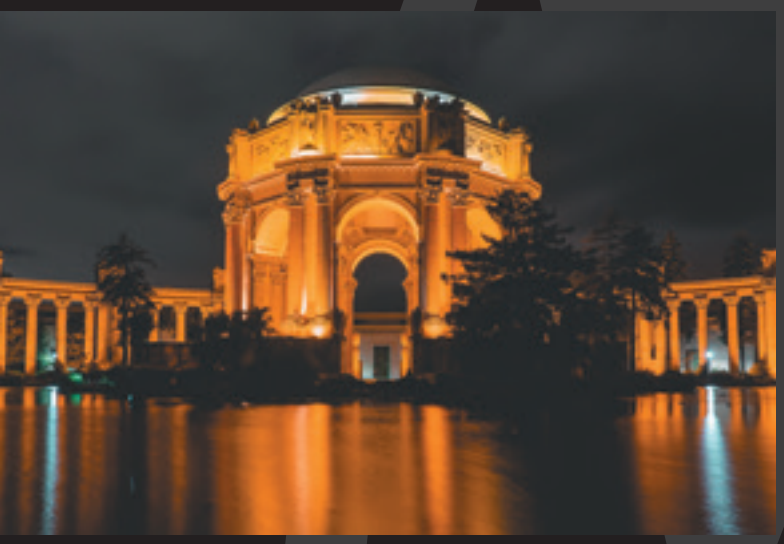

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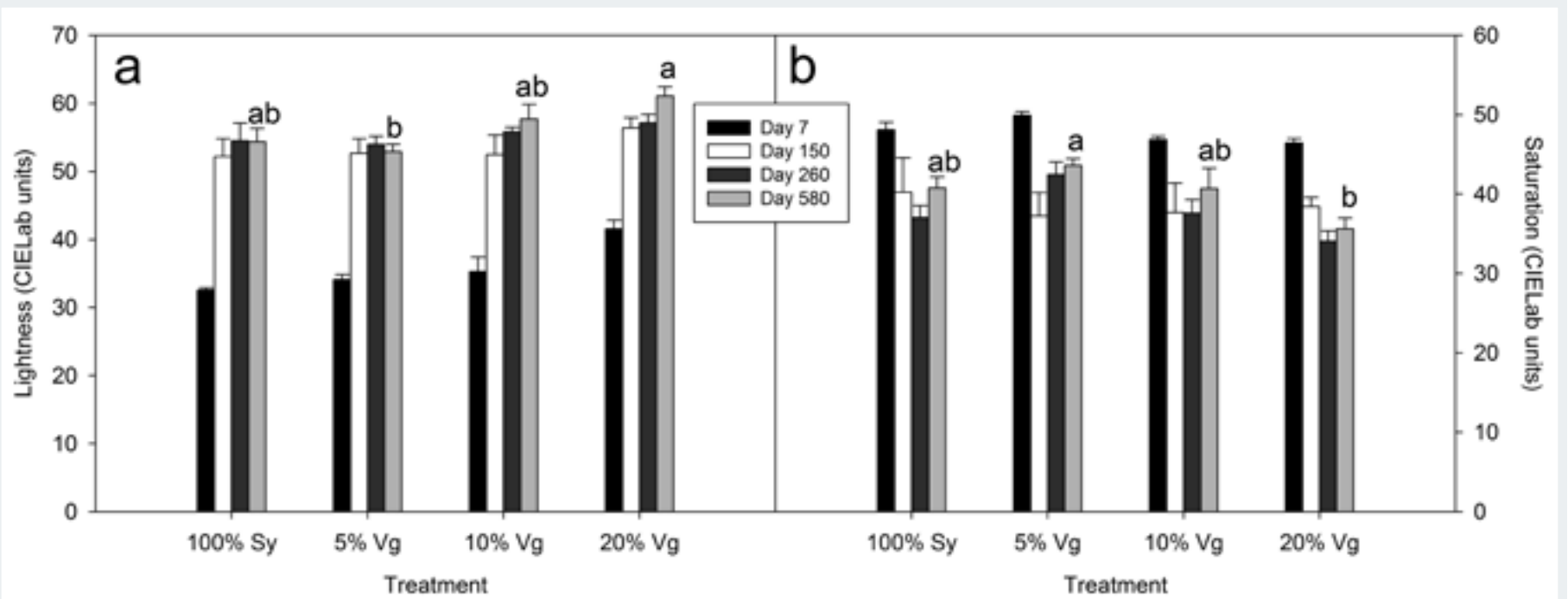

FIGURE 4 Evolution of the CIELab parameters (a) Lightness and (b) Saturation or Chroma at days 7 (pressing), 150 (bottling), 260 (~ 3 months of bottle aging) and 580 (~1.25 years of bottle aging) in the 2009 vintage. Different letters at day 580 indicate significant differences for Tukey's HSD at $p < 0.05$.

FIGURES 5A, B and **C** show the evolution of the SPP, LPP and total polymeric pigments (TPP), respectively, at pressing and at day 580. Polymeric pigments are winemaking artifacts formed via covalent reactions between anthocyanins and small molecules, such as acetaldehyde or pyruvic acid (in the case of SPP), or between anthocyanins and tannins (as in the case of LPP) (Adams et al., 2004). Polymeric pigments provide stable color and have positive effects on mouthfeel modification (Casassa & Harbertson, 2014). From pressing to day 580, the TPP content increased in all treatments. During this period, no change was observed in LPP, but SPP increased, indicating that SPP formation was primarily responsible for the increase in TPP. For the most part the increase in polymeric pigments was consistent with the observed decline in anthocyanins (**FIGURE 3A**). However, the faster rate of SPP formation in 10 percent Viognier and 20 percent Viognier did not translate into more color intensity as evidenced by the L* and C* values (**FIGURE 4**).

Counter to the anecdotal belief that white cultivars provide an extra pool of flavonols, lower concentrations of these compounds were, in actuality, observed at Viognier additions of 10 and 20 percent. This, once again, suggests a dilution effect by the added Viognier grapes.

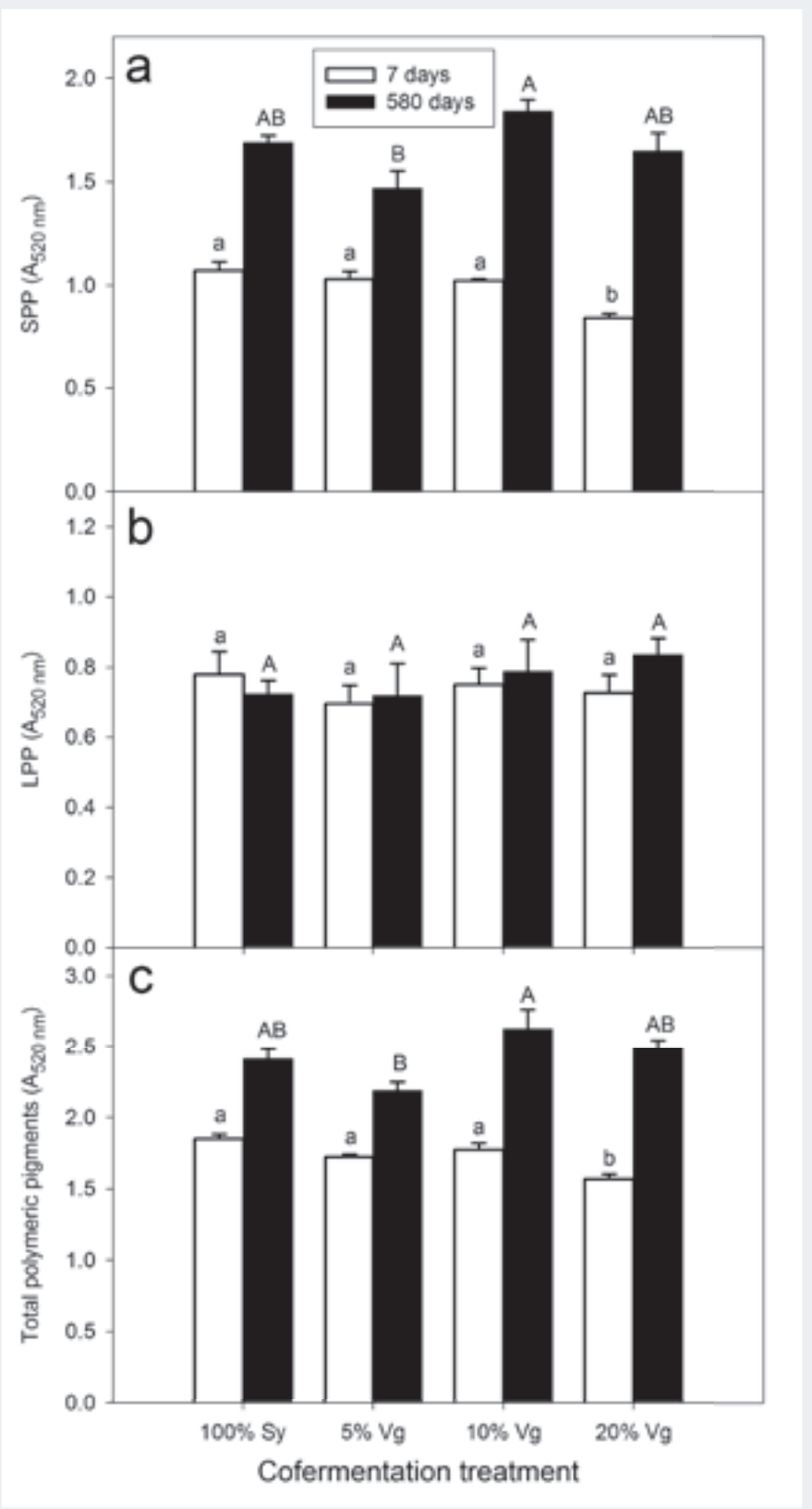

FIGURE 5 Evolution of (a) small polymeric pigments (SPP), (b) large polymeric pigments (LPP), and (c) total polymeric pigments (TPP) at days 7 (pressing) and 540 (~1.25 years of bottle aging) in the 2009 vintage. Different letters at each time point indicate significant differences for Tukey's HSD at $p < 0.05$.

Regardless of the pressing protocol, Viognier additions above 10 percent lowered most chromatic parameters in the final wines, indicating no hyperchromic or bathochromic shift.

Modifying the Experiment Based on 2009 Results

In the 2012 experiment, pressed Viognier grapes (~2 bars) were added to counteract the dilution effect observed in the 2009 experiment and selected phenolic classes were assessed in the wines after bottling. Total anthocyanins (grouped by the main five anthocyanin derivatives, FIGURE 6A) were, once again, significantly lower in the 5 and 10 percent Viognier treatments although no difference was found between the control and the 20 percent Viognier treatment. In trying to understand this lowering effect of Viognier solids on anthocyanins and ruling out a dilution effect, it is thus possible that some anthocyanins may have been adsorbed into some of the extra fermentation solids from the added Viognier skins and seeds (**Somers** & **Evans**, 1977). In fact, it was noted that the originally white Viognier skins showed a reddish coloration at pressing, confirming this hypothesis. Tannins, total polymeric pigments (SPP + LPP) and flavonols showed no difference among treatments, suggesting that, unlike in the 2009 experiment, the dilution did not occur.

Conclusions

In this study, which covered two vintages, the phenolic and chromatic composition of wines made by cofermentation of Syrah with additions by weight of 5, 10 and 20 percent whole and pressed Viognier was followed during key points of the winemaking process and bottle aging. Regardless of the pressing protocol, Viognier additions above 10 percent lowered most chromatic parameters in the final wines, indicating no hyperchromic or bathochromic shift. No differences were observed for tannins and iron reactive phenolics either at pressing or after 580 days of bottle aging. In 2009, additions of Viognier at a rate of 20 percent led to a lower concentration of anthocyanins and flavonols, suggesting dilution of these compounds. However, in 2012, adsorption of anthocyanins into the extra fermentation solids supplied by the added Viognier resulted in lower anthocyanin concentration in the 5 and 10 percent Viognier addition treatments. Moreover, formation of polymeric pigments was unaffected irrespective of the treatment and

Without necessarily implying causality, the lack of hyperchromic shift in the cofermented wines (measured in our study as wine saturation), may be due to the decrease, rather than the expected increase, in anthocyanins, because of the noted dilution effect.

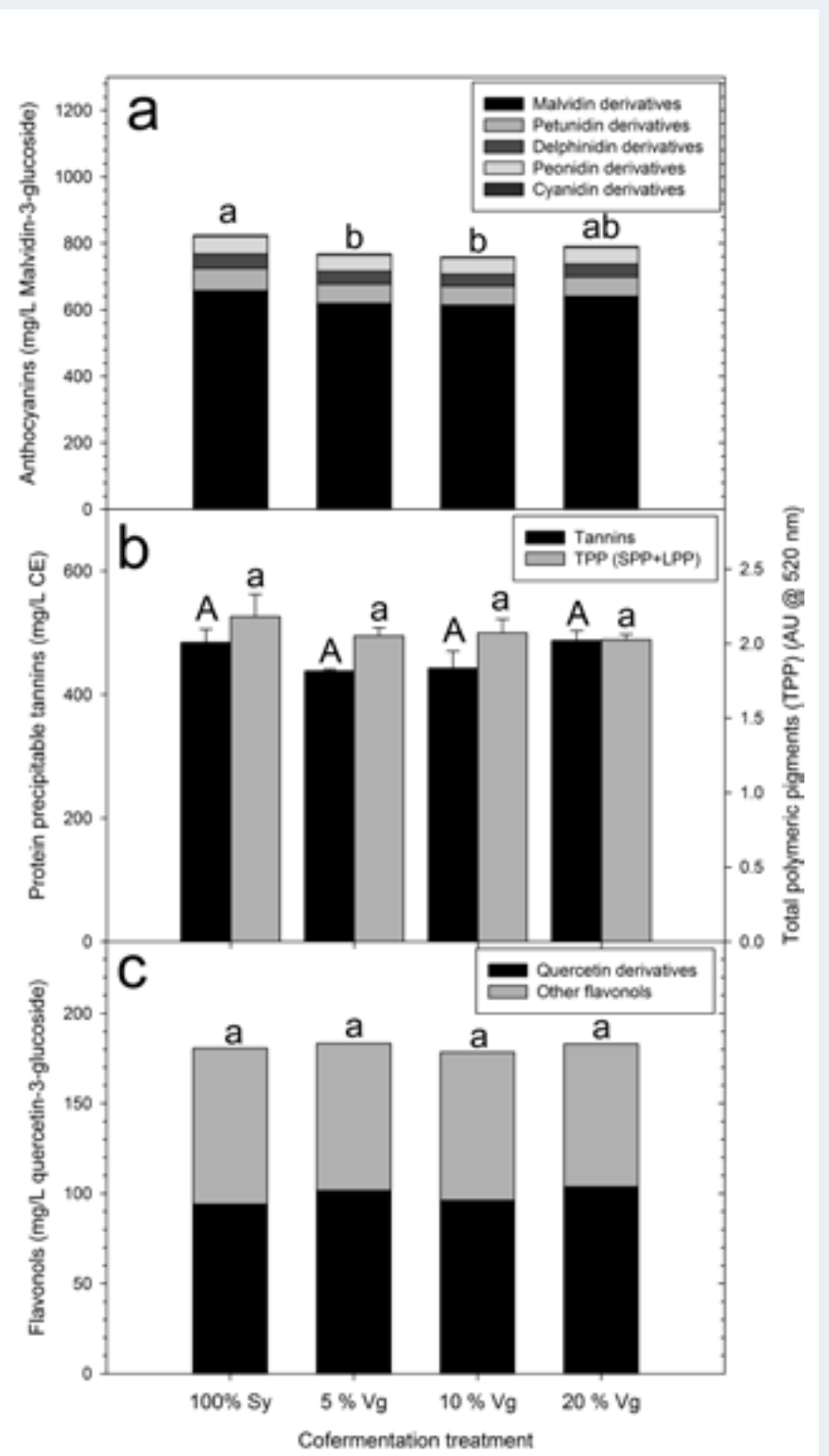

FIGURE 6 Concentration at bottling of (a) anthocyanins grouped as a function of the aglycones, (b) tannins and total polymeric pigments (TPP), and (c) total flavonols in the 2012 vintage. Different letters at each time point indicate significant differences for Tukey's HSD at $p < 0.05$.

pressing protocol. Overall, these results suggest that additions of Viognier grapes to Syrah grapes at the rates studied here do not result in an enhancement of the chromatic and phenolic composition of the final wines, and at high rates, these additions may be detrimental for wine color. However, adding pressed (as opposed to whole) Viognier grapes does not result in a dilution effect, and it would be a more advisable practice to follow from the perspective of phenolics and color. Lastly, effects of cofermentation on other chemical and sensory aspects of the wines, including aroma, taste (acidity) and mouthfeel modification, appear also as a possible outcome and should be further explored, not only in the pair for Syrah/Viognier, but also for other pairs or even the so-called "field blends." **WBM**

Acknowledgments:

Rhône Rangers, the **Fulbright Commission** and the **Walter Clore** scholarship are thanked for financial support. We also thank **Lonesome Springs Ranch** vineyards and **Klipsun Vineyards** for providing the grapes.

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Winemaker Trial

Comparison of Phenolic Extraction in a GOfermentor Versus a Tank

After five years developing the GOfermentor, Dr. Vijay Singh sent the new machine to Enzo Cagnasso of the University of Torino, Italy to compare the high-tech fermentation technique to the more traditional pump-over method.

Stacy Briscoe

VIJAY SINGH PH.D., is a biotech scientist who specializes in fermentation. He has an M.S. from the **University of Pennsylvania** and a Ph.D. in biochemical engineering from **Rutgers**. He was with **Schering-Plough** from 1982 to 1997 and developed one of the first recombinant drugs—interferon alpha. In 1999, he founded **Wave Biotech** (sold to **GE** in 2007), inventing, manufacturing and marketing a disposable cell culture device known as the **Wave Bioreactor**. In 2012, he applied his knowledge of fermentation and disposable device design to improve winemaking technology, creating **GOfermentor**. In 2014, he and his wife set up a commercial winery—**Sky Acres Winery** to test and demonstrate the GOfermentor. The winery has won numerous awards over the last five years.

Why were you interested in working with the GOfermentor and comparing that technology to traditional winemaking methods? What were the traditional winemaking methods you used in comparison?

Singh: We have been developing the GOfermentor since 2014 and found that the unique punching mechanism extracts more color and tannins. It is similar to old-school foot stomping in that the must is gently crushed many times a day. This is done by inflating a flexible chamber that squeezes the grapes during the fermentation. This is done automatically every two to four hours.

We wanted to compare this technique versus the traditional tank pump-over method used in most commercial wineries. Detailed assays were performed on the same lot of grapes run side-by-side in our system versus a conventional tank. Sensory analysis was performed at six months post-fermentation and 18 months by a trained panel.

Stacy Briscoe is the assistant editor of *Wine Business Monthly*. She has been writing about wine professionally since 2015, freelancing for multiple publications including The *San Francisco Chronicle*, *Edible Communities* and *Napa Sonoma Magazine*, among others. She also maintains her own website, *BriscoeBites.com*, dedicated to wine reviews and tasting notes. Outside of wine writing, she also contributes as a freelance editor for the independent publisher She Writes Press. Stacy has a Bachelor of Arts degree in English-language literature from the University of California, Santa Cruz.

Why did you choose to use Barbera and Nebbiolo specifically for this experiment?

Singh: We engaged professor **Enzo Cagnasso** of the **University of Torino** to lead the trial as he is a world-renowned expert in phenolic extraction. His lab is well equipped to run the complex assays to quantify phenolic extraction. We chose to do the trial in Italy so that he and his staff could closely monitor the fermentation. They used Barbera and Nebbiolo because these varietals present different problems in terms of extraction of tannins and color.

Were there any winemaking issues or problems you were looking to solve or specific goals you were hoping to achieve in conducting this experiment?

Singh: We were hoping to show that we can make a better wine in terms of color and mouthfeel using our unique GOfermentor equipment than wine made in the conventional way.

Can you briefly describe how you set up this trial?

Singh: The **Castello di Neive** in Piedmont, Italy agreed to perform the trials and provide the grapes and tanks for side-by-side comparison. In return, they would use the wine (if satisfactory) in their commercial wine production. We agreed to ship two GOfermentors and associated disposables from the U.S. to Italy. Professor Cagnasso and his staff were given a contract by us to conduct the actual trials and analyze the results.

I developed the punch schedules and other operating protocols for the GOfermentor. The head winemaker at Castello de Neive chose a proprietary yeast and fermentation parameters.

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Did you come across any complications or difficulties during the course of the trial? If so, how did you overcome those issues?

Singh: We expected difficulty in setting up the equipment due to the remote location and language issues, but the local winery workers set everything up without assistance. The only problem was an issue with temperature control due to higher than expected environmental and coolant temperatures. In retrospect, we should have used two coolers per GOfermentor rather than the usual single one used.

Did your team or colleagues have any input or opinions about this trial?

Singh: We were involved in the experimental design of the trial. Measurements were sent to us by email during the runs, and any changes to the design were discussed. An interim report was published six months after the fermentations and then a final report 18 months after the runs. These also studied the effects of typical bottle aging prior to release.

What was the conclusion of your trial? Were the results as you predicted or did something unexpected occur?

Singh: The results of the trial exceeded our expectations. We would have been quite happy to make a wine of equal quality to the control which, after all, has been optimized by decades of experience. The GOfermentor is a new and unique method with only four to five years of operational experience. In all cases, the wines in the GOfermentor during this trial were, in the judgment of the sensory panel, as good as the control, but some characteristics (such as color and mouthfeel) were judged to be better. This is the result that we had hoped for based on our work in Australia, Spain and the U.S.

What were some of the winemaking lessons you learned after conducting the trial? Do you plan to adjust your current winemaking methods as a result?

Singh: As mentioned, we need to add additional cooling capabilities for full loads (>700Kg), especially in hot environments.

What were some of the comments from your team or colleagues? Did they have a preference between the wines tested?

Singh: The tasting at six months and 18 months by the sensory panel showed that the wine made in the GOfermentor had better color stability, smoother mouthfeel and fresher, fruitier notes than the controls. Samples of the wine and controls were shipped to us, and our findings were similar. The samples of GOfermentor wine and the corresponding controls were also presented to the public for tasting at the IQ trial 2019.

Do you plan to conduct a follow-up trial to re-test these results? Would you or will you conduct the same experiment with different grape varieties?

Singh: We plan to conduct a similar experiment in France with typical, local varieties. **WBM**

2019 Vineyard Survey Report

Replanting and Mechanization

Mark Greenspan

I KNOW YOU'VE BEEN waiting all year for this. No, not harvest or crush or the company Christmas party. The 2019 **WBM Vineyard Survey** results! This year's survey netted 192 respondents: 60 percent of whom were growers, 35 percent were wineries with vineyards and the other 5 percent were wineries without vineyards, and some other small operations. Sixty-five percent of respondents had vineyards in California's North Coast growing regions, 17 percent in California's Central Coast growing regions, 18 percent in other California regions, 15 percent in Oregon, 9 percent in Washington and 8 percent outside of the West Coast states. As some respondents had vineyards in multiple locations, the regional percentages listed total to more than 100 percent. Two-thirds of the respondents have vineyards of 50 acres or less, with about one quarter of the respondents having 10 acres or less. Only one-quarter of respondents have more than 100 acres of vineyards and just under 10 percent have more than 500 acres of grapes. Keep this in mind when considering the survey results. The results are definitely skewed toward small-scale growers, though your typical 10-acre Napa Vineyard has economies that are hardly small-scale. That said, the demographics of vineyard size are very much in line with those from 2018, so there is consistency to the type of growers that respond to this survey.

Planting and Replanting

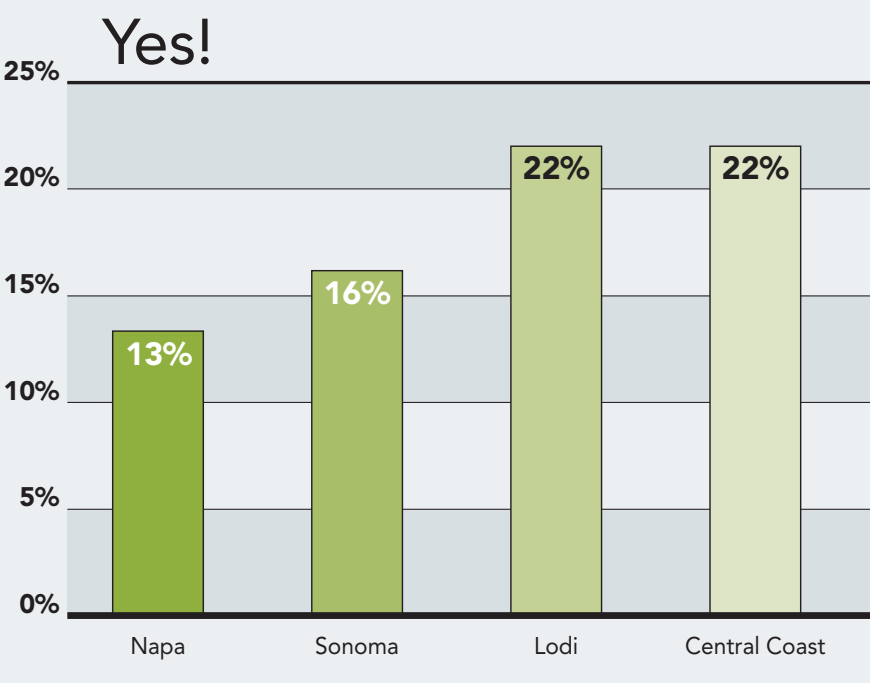
The subject of replanting is especially germane to today's grower because of what should be obvious reasons: rampant virus and other diseases, combined with a down market. In down markets, of which the current cycle only started this year, growers are tempted to tear out under-performing blocks and replace them with healthy blocks that will be in full production when the grape market becomes a seller's market once again. But, it's not always that easy to face the cashflow loss that goes with tearing out a producing vineyard, even when prices and demand are down.

The survey indicated that overall only 23 percent of growers will be planting new vineyards. That is actually a rather large number, and I wonder how many people were not thinking that the question was asking about currently unplanted ground. It surprises me that a full 23 percent of growers would be developing new vineyards (**FIGURE 1**), especially in an uncertain market. If this is accurate, then there is more optimism than is apparent as growers are currently unable to sell uncontracted fruit at a decent price—or sometimes at all. The optimism, or more likely available ground, is higher outside of Napa/Sonoma. While 13 percent of Napa and 16 percent of Sonoma growers indicated their intent to plant new acreage, 22 percent of Lodi and Central Coast growers indicated they would be doing so.

Replanting vineyards seems a bit timelier, a reflection of our current vineyard health and economic conditions. Thirty-five percent of respondents indicated that they would be replanting some of their vineyards this year, which is a fairly high, but not unexpected, number (**FIGURE 2**). Reasons given for replanting vineyards stressed sick and tired vines for the most part, along with the desire to change varieties grown. While it is less costly to graft vines to change varieties, one cannot, or at least should not, graft vines that have virus diseases since the newly-grafted scion will have the virus just like the old scion. So, perhaps even the varietal change is linked to diseased vines. Based on my interpretation of these results, I'll chalk up diseased vines as the major impetus for replanting a vineyard.

Dr. Mark Greenspan has more than a quarter-century of scientific viticulture research and viticultural field experience. He specializes in irrigation and nutrition management, yield and canopy management, vineyard climate and microclimate, vineyard design and vineyard technology. He is the founder of Advanced Viticulture, Inc. based in Windsor, California (*www.advancedvit.com*), providing consulting, technology, vineyard management and vineyard development for wineries, winemakers and wine growers devoted to producing premium wines. Please direct queries to *mark@advancedvit.com* or 707-838-3805.

FIGURE 1 *Will you be planting new acreage this year?* By Region



Source: 2019 WBM Vineyard Survey

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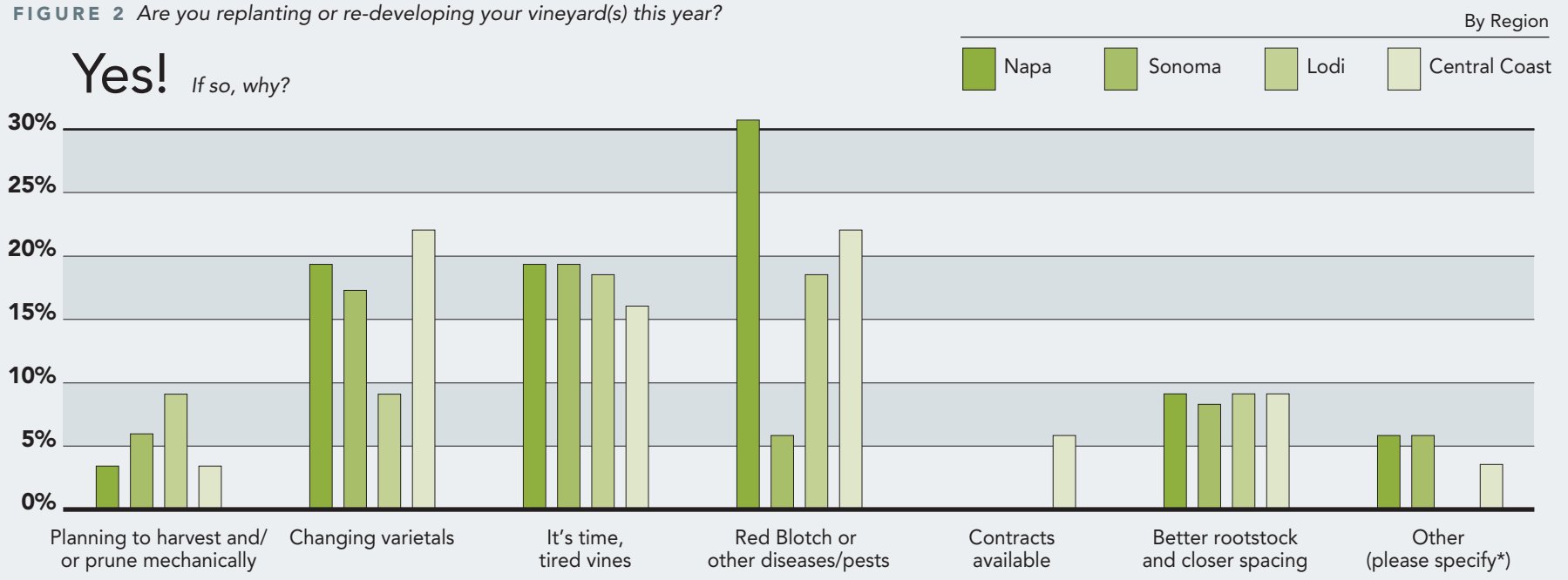
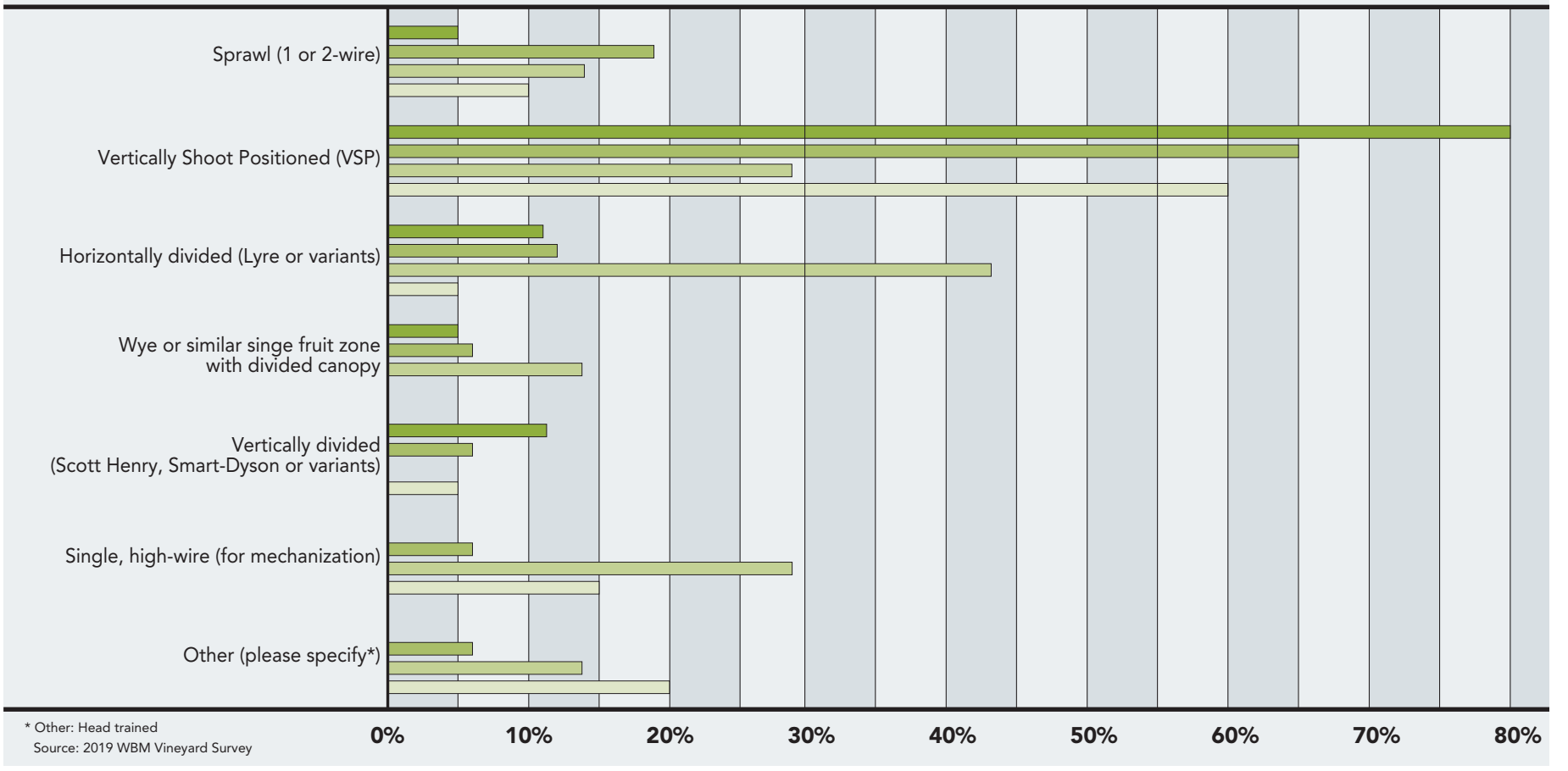
FIGURE 2 *Are you replanting or re-developing your vineyard(s) this year?*



Source: 2019 WBM Vineyard Survey

* Other: A few interplant replacements only; adding varietals; Have just completed re-planting of half our cabernet; No vineyards, we source out all of our grapes from local growers; Planting hazel nuts; replacing lost vines, same varietals; Replanting 9 acres; Replanting next year leaving field fallow for a year; Switch to dry farm

FIGURE 3 *If you are planting or replanting, what trellising system are you deploying?* By Region



* Other: Head trained
Source: 2019 WBM Vineyard Survey

That said, other reasons would be changing rootstocks or spacing, as well as conversion to mechanized systems. An economic reason was not stated, but this survey went out before the market began its change from a seller's to a buyer's grape market. Note that this year's responses were very much in line with those from last year. Bringing in the question about grape market conditions may reveal another reason why people are replanting now.

Another reason for replanting a vineyard is to update infrastructure, including the trellis system. Not surprisingly, most respondents who are replanting stated that they will be putting their new vineyard on a VSP trellis (**FIGURE 3**), which has become the standard trellis for the coastal regions. And why not? It's easy to work with, opens the canopy up and is mechanizable for the most part. Note that the Lodi region did not state this as their go-to trellis; rather, they seem to be going to horizontally divided systems, such as Lyre. This surprises me since, although divided systems can be used to balance out very vigorous site conditions, they are much more difficult to mechanize than a single-curtain trellis system. Indeed, Lodi also indicated moving toward the single high-wire trellis system. The high-wire is the quintessential mechanizable system. We're not seeing much interest in the high-wire system in the North Coast vineyards, according to this survey, though a fair number of Sonoma respondents indicated that they are going to a sprawl system. I think that a sprawl, if contained with a T-top type of trellis, can be a good alternative to VSP for vineyards farmed for other than high-end wines, though I've seen some hybrid VSP/T-top trellises that create seemingly ideal conditions for fruit under an umbrella of foliage.

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Grower Concerns

It's always good to hear what concerns growers, as it provides a possible glimpse into the future because, as we all know, concerns and worries drive decisions. Opportunities do too, but hey, we're talking about farmers here. Worry is just part of the package.

Growers were asked to list their top three concerns in response to this question. As it was last year, the top response was labor shortages and cost (FIGURE 4). Even talking about it seems mundane and commonplace. We all know that labor is in short supply, and for those remaining available field workers, they are asking for higher pay for their services. Unlike the grape market, the labor market is not cyclical. It trends only one way, and that is not in a good way. Immigration policy in the U.S. is dismal, and immigrants are finding other sources for employment besides agriculture which, let's face it, is a difficult way to make a living. So, mechanization trends will continue to grow in our business, and it won't be a revolution. Indeed, we've seen mechanization increase rapidly in high-production regions and slowly, but surely, in premium growing regions. The only thing slowing us down is acceptance of mechanical practices by wineries and adaptability of existing vineyards to mechanization.

There has been one marked change from 2018 in this category, and that is grape prices. Thirty-six percent of growers listed this as a concern in 2018, but 48 percent of growers did in 2019. As I said, grape prices have been flying high in premium regions, and it wasn't until 2019 that they hit a wall (or fell off a cliff). Certainly, if this survey was conducted now (at harvest), the concern would be even higher than it was in this survey set. I suspect to see it even higher next year.

Other concerns are repeatable from last year, and they include compliance with increasing regulations, vine diseases and water availability. The concern about consolidation of companies remained the same as last year, but I'm wondering if it's hitting a point where growers will start to feel the pinch of consolidation as bigger companies exert leverage to push grape prices downward.

FIGURE 4 *What are your* ***top concerns*** *of the current year?* (choose 3)

By Year	2019	2018
Labor shortage and costs	71%	76%
Grape prices	48%	36%
More laws and regulations	41%	40%
Pierce's Disease/Leafroll/Red Blotch, etc	32%	33%
Water availability	21%	23%
Big getting bigger/Winery consolidation	15%	15%
Succession planning	14%	9%
Higher vineyard prices	14%	8%
Tax increases	13%	7%
Other (please specify*)	7%	9%
Negative national or international event	6%	5%
Imports	2%	3%

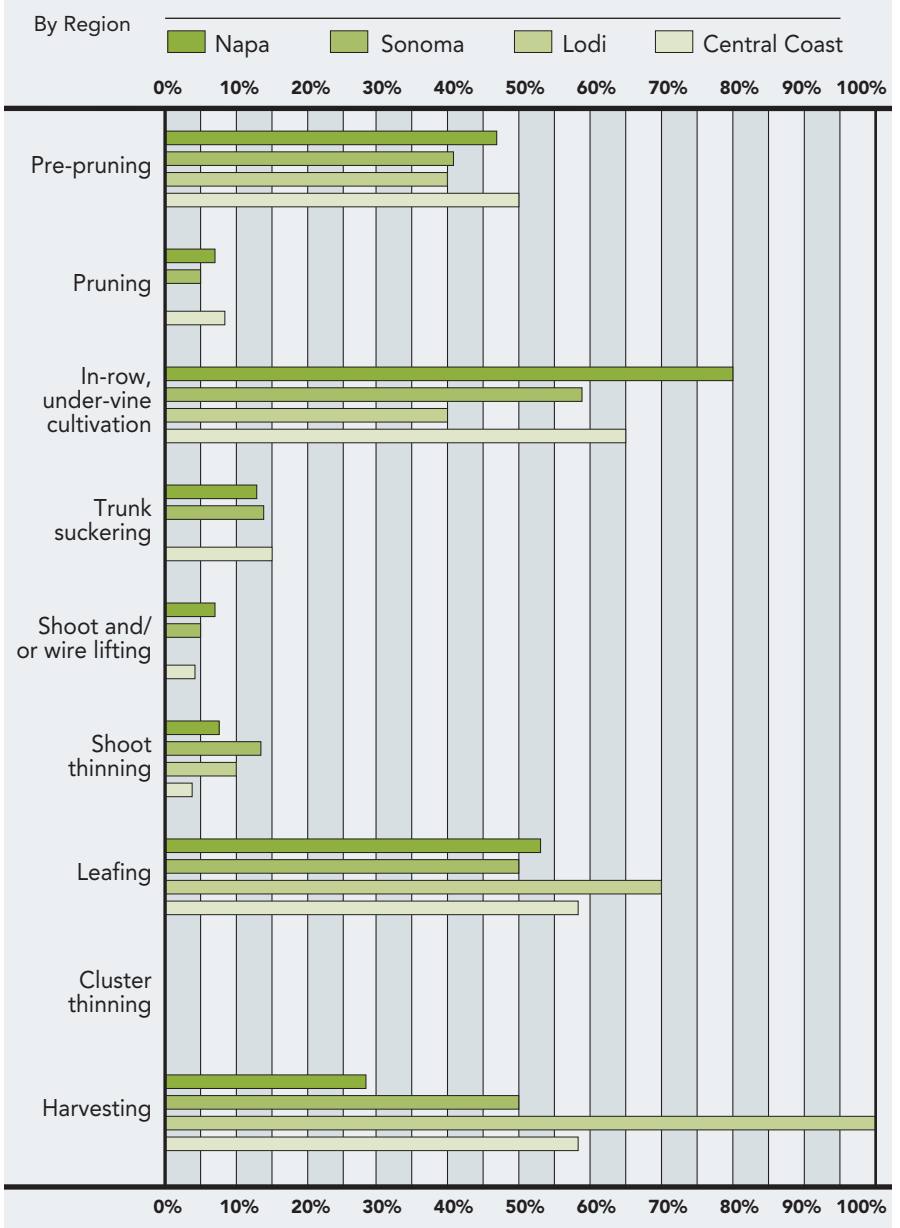
*Other: Abundant past harvests have lowered demand and price; Being able to sell my grapes higher than my costs; contracts/selling my grapes; Crop failure/rejection; increased tonnage; Labor price should; Over planting in area; Oversupply of pinot noir; Pinot noir gluth; Proliferation of wineries. Quadrupled around us. We're all sharing the same customer flow.; Recession in the near future; Renewing contract; Selling fruit; Slowing progress on sustainability in wine industry

Source: 2019 WBM Vineyard Survey

Mechanization, Technology and Automation: What Are Growers Changing?

As I mentioned above (and have been writing for a long time), as labor costs trend upward, mechanization is trending upward as a result. Fortunately, necessity is the mother of invention; and as demand increases for mechanizing vineyard operations, machines get better and sometimes less expensive—the blessings of competition.

FIGURE 5 *What have you mechanized in the vineyards?* (Choose all that apply)



Source: 2019 WBM Vineyard Survey

Interestingly enough, harvesting was not indicated as the primary operation being mechanized. That honor went to under-vine cultivation, with 57 percent of respondents stating that they're using under-vine tillage for weed control (FIGURE 5). This is a big shift from last year, where only 46 percent said they were using under-vine tillage. Perhaps this is a reaction to the, possibly unfair, public reaction to the use of glyphosate as an herbicide. Fewer growers are using that product, at least, in part, due to wineries demanding that they not use it any longer. I've stated before in my column that I feel that herbicides do cause harm to the soil in one way or another, and that reduction or elimination of them would be a benefit to vineyard soil health. Under-vine tillage is slow, and the machines require careful operation and adjustment to use without causing damage to vines. But they have gotten better, and there is seemingly a big uptick in their use in vineyards.

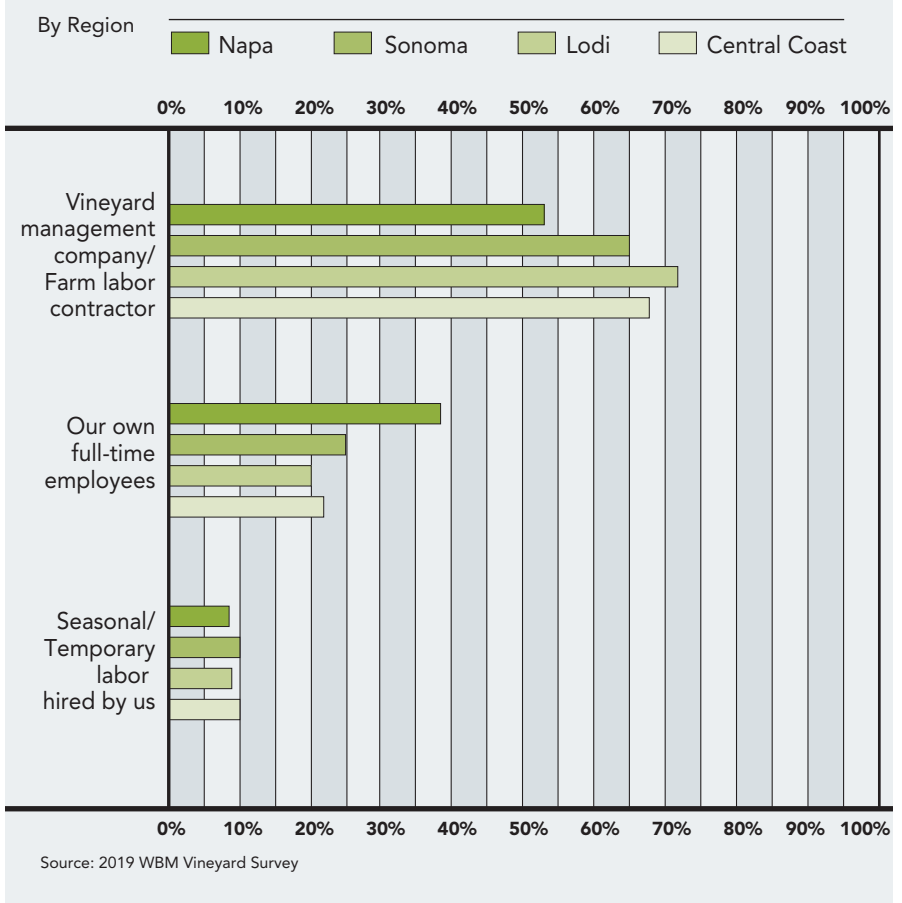
Harvest used to be the big mama of mechanization, and it still is, but perhaps its adoption has plateaued for the time being. I doubt that is true, but machine-harvesting has not really changed from last year's survey, with 48 percent of respondents saying that they use it. All of the Lodi respondents, however, indicated that they use machines for harvest. Napa, why do you lag so? With only 27 percent of respondents stating that they harvest by machine, Napa appears slow to adopt it for their vineyards. I believe that Cabernet Sauvignon is ideally suited for machine harvest, and it may very well be that machine harvest is beneficial to wine quality. It's just a mental apprehension, so it seems.

Leaf removal and pre-pruning are apparently also commonplace, with about half of respondents indicating that they remove leaves mechanically and about 40 percent indicating that they pre-prune vines mechanically. I'm a bit surprised, frankly, that the pre-pruning value is so high, simply because I don't see a lot of it around the North Coast. Yet, the survey indicates that the North Coast conducts pre-pruning by machine, and it makes perfect sense to do so, as long as it can be done when the ground is still firm.

Of the other practices, I expect to see trunk-suckering increase in popularity and usage going forward. As it is, a relatively small number of growers are doing it, but it is an operation that does not require a skilled worker to perform so why not brush them off with a machine? More skilled operations, like shoot-thinning and pruning, and specialized operations, like shoot-positioning/wire lifting, are still slow in their adoption of mechanization by growers.

On the manual labor side, growers who responded to this survey indicated that most vineyard labor comes from vineyard management companies or

FIGURE 6 *What percentage of the labor you use in your vineyard comes from the following sources?*

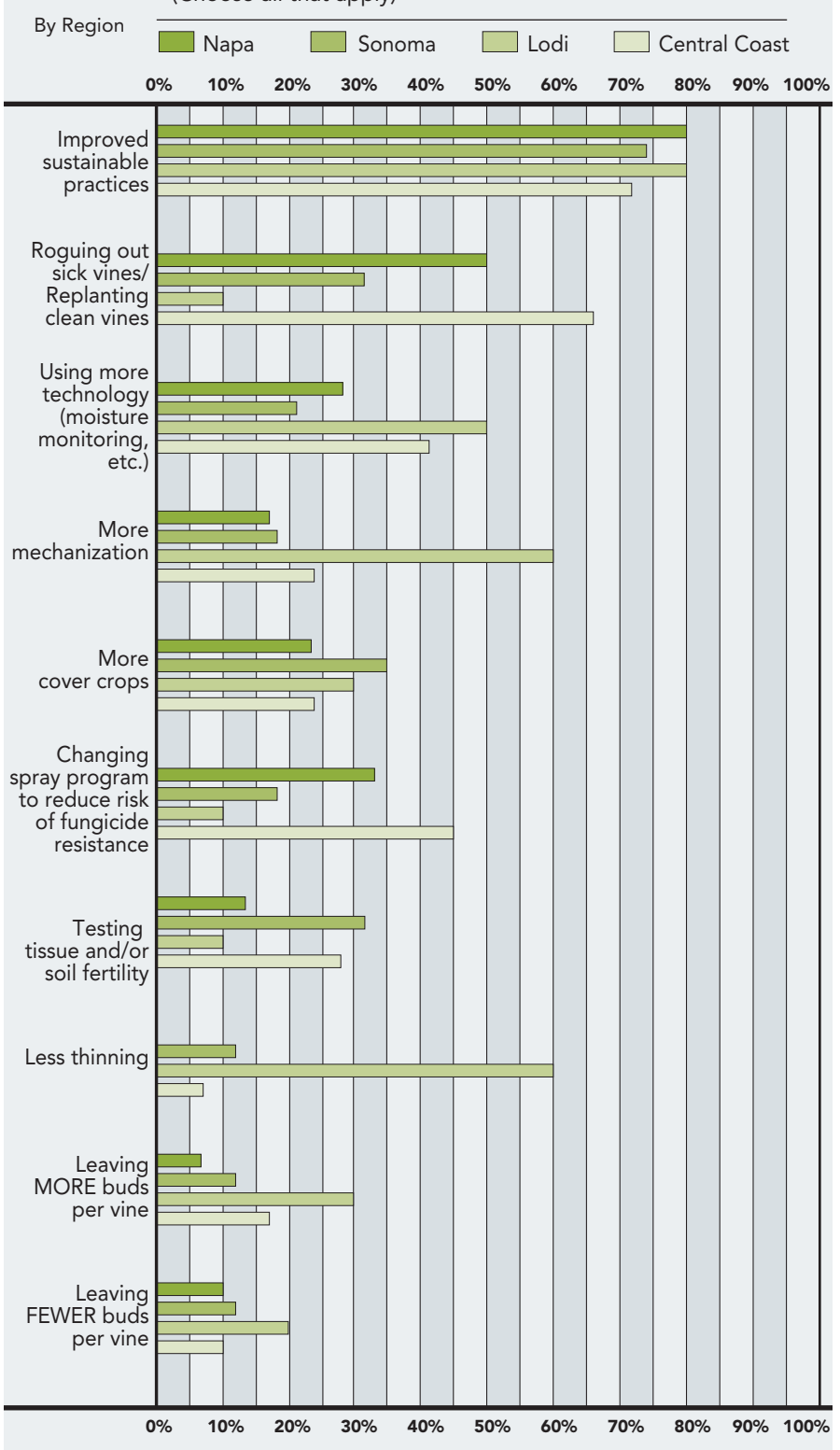


Source: 2019 WBM Vineyard Survey

farm labor contractors and far less from their own vineyard employees. Napa seems to use more in-house labor than other regions but still relies mostly on outside labor for their operations (FIGURE 6). Other regions showed less balance than Napa, with more outside sources of labor and less in-house labor. I think that some vineyards do not have enough work year-round to keep a labor force; and because of that, it is more cost-effective and potentially less volatile to hire outside labor.

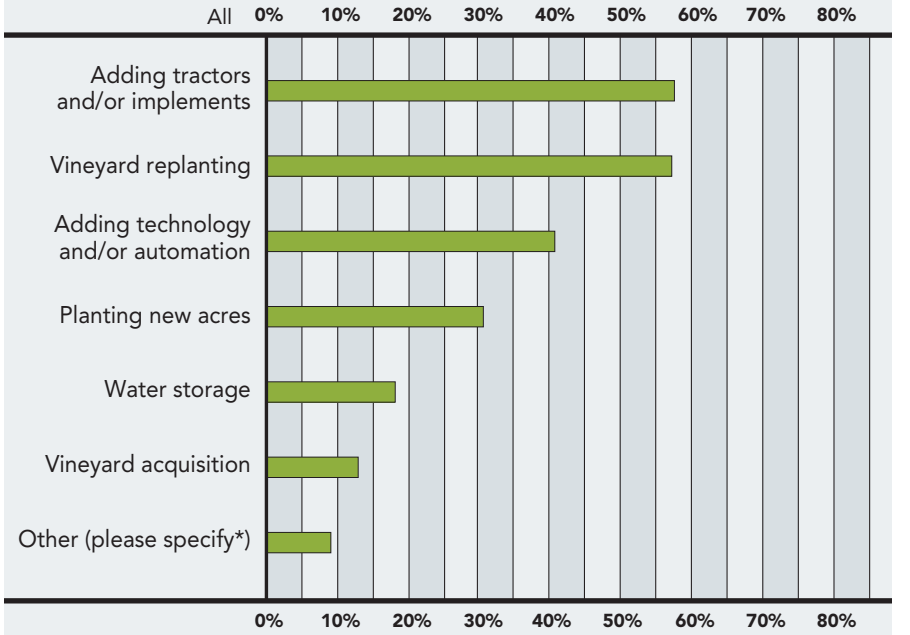
Growers were asked to indicate all of the things they are doing differently from 2018, and it appears that all growers are becoming more sustainable (FIGURE 7). Across all of the major growing regions, the most common response was improving their sustainable practices. Sustainability covers a wide swath of practices, so it is unclear what growers are actually doing to become more sustainable. Hopefully, they are real improvements and not just paper improvements. At least growers are thinking about it, and I hope no one wants to be the last to be on board with sustainable practices in all aspects of farming.

FIGURE 7 *What are you doing different from 2018 in the vineyard?* (Choose all that apply)



Source: 2019 WBM Vineyard Survey

FIGURE 8 *Which areas of your vineyard business will require capital over the next three years?*



*Other: Bird control; Cost of water; Grafting; Interplanting different varietal/clone; Labor shortage; No plans; None; None, we have a sweet spot with winery production, all needs met, thankful; Paying increased wages and benefits; Removal of vineyard, solar powered well pumping; Tasting room-hospitality center; Trellis repair/replacement; Unknown

Source: 2019 WBM Vineyard Survey

Removing suckers and diseased vines and replacing them with clean plants is something I discussed above, and it seems to be a common theme for most of the respondents in the coastal regions. Using more technology, such as moisture monitoring and, I presume, automation, seems to be something that growers are gravitating towards, and Lodi and Central Coast growers seem to be the most interested. Lodi also seems to be leading the pack with increasing their use of mechanization and, I presume a reaction to grape prices, seems to be intending to crop their vines more heavily, both at pruning time and at thinning time. That goes contrary to the direction of coastal growers, who seem to be less interested in higher yields, perhaps because they need to be competitive in the market by producing fruit of higher quality.

Lastly, growers are willing to spend money on their business, or at least 82 percent of respondents indicated that they are planning on investing some capital in their vineyards. Adding machines, tractors or implements, as well as replanting of vineyards, appears to be where most of their money will be poured (FIGURE 8). Fifty-seven percent of respondents, who indicated capital investment, pointed to machines and replanting as their focus. Adding technology or automation was in third place, but 41 percent of respondents will be improving their vineyard tech. Just under one-third of capital will be flowing into new acreage.

In summary, worries about grape pricing seem to be showing, but I think growers and wineries are still looking long-term, which is healthy for an industry that experiences ups and downs on a somewhat regular basis. I think our industry is heading for short-term struggles, though most growers will ride out the short-term market challenges, and the smart ones will use this opportunity to reset, improve and be ready for the next up-cycle. WBM

Pests & Diseases:

Spotted Wing Drosophila Expand Their Territory

Researchers and growers in Minnesota are fighting back

Nan Bailly and Dana D'Amico

Nan Bailly has been the winemaker at Alexis Bailly Vineyard for 30 years. She serves on the advisory board of the Minnesota Invasive Terrestrial Plants & Pests Center at the University of Minnesota.

Dana D'Amico is communications specialist for the Minnesota Invasive Terrestrial Plants & Pests Center, which drives discoveries to protect Minnesota's natural and agricultural resources from harm by invasive species.

SPOTTED WING DROSOPHILA (*Drosophila suzukii*) was first detected in Minnesota in 2012. As populations continue to thrive nearly a decade later, it's clear that spotted wing drosophila (SWD) is not going anywhere soon; and as a consequence, the region's winegrape growers are looking for creative ways to reduce the pest's impact. New research from the **University of Minnesota** is helping to chart a path forward.

Dr. Bill Hutchison, professor and extension entomologist at the University of Minnesota, and **Eric Burkness**, researcher and assistant Integrated Pest Management (IPM) coordinator at the **Minnesota Extension IPM Program**, have been leading the development of IPM best practices for cold-hardy winegrape growers. Their team collects field data from **Alexis Bailly Vineyard**, owned by winemaker **Nan Bailly**.

The **Minnesota Invasive Terrestrial Plants & Pests Center** (MITPPC), which funds some of the University of Minnesota's most promising applied research on invasive species, ranks SWD among the top 15 most pressing invasive insect threats to the state. MITPPC has invested nearly $1 million to date towards the creation of better forecasting, control and decision-making tools for berry and grapegrowers battling this pest. The center's work is supported through the **Minnesota Environment and Natural Resources Trust Fund** and the **Minnesota State Legislature**.

C. GUEDOT, UNIVERSITY OF WISCONSIN-EXTENSION

Spotted wing drosophila are the same size as other fruit flies. This magnified image shows a female SWD on the left. The female's saw-like reproductive organs are shown in an insert to the lower right of the female. The male SWD on the right has the typical black spot on its wings.

Key Points

- Invasive species research center and extension specialists at the University of Minnesota are developing better spotted wing drosophila management and forecasting tools for Minnesota winegrape growers. More information about their work is available online at: *http://z.umn.edu/swd-forecast*.
- Integrated pest management begins with trap monitoring and a solid foundation in spotted wing drosophila identification. It also includes responsible cultural practices, like canopy pruning, good vineyard sanitation and the use of protective netting, along with any rotational insecticide applications. Go to the FruitEdge website (*www.fruitedge.umn.edu*) for more information.

Effects on Berry and Wine Quality

SWD first appeared in West Coast vineyards around 2009. Today, it is a multi-million-dollar problem for fruit growers across the country.

Male flies can be identified by a characteristic dark spot at the edge of each wing. Females have unique, saw-like reproductive organs that allow them to pierce the skin of ripe fruit and lay eggs. They prefer thin-skinned berry crops, like raspberries, blackberries, blueberries, strawberries and grapes. As larvae develop and feed, the fruit decomposes into slush.

Grapes become susceptible to SWD infestation as the berries begin to turn color during *véraison*. If the fruit skin breaks, egg-lay can happen more easily. Fruit injury can be caused by many things: birds, insects like grape berry moths or wasps, disease, even the physical impact of hail. Heavy rainfall can also cause splitting, especially on tight-cluster varieties. Minnesota has

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Spotted wing drosophila larvae on Léon Millot grapes

experienced bouts of heavy rainfall that have exacerbated the SWD problem for many vineyards, in large part because of fruit splitting.

SWD's movement of acetic acid bacteria near harvest is also a major problem for winemakers. Contamination, during the juice or fermentation stages of processing, can increase levels of volatile acidity, the primary cause of vinegar taint. Researchers measured significantly higher levels of volatile acidity in the juice of several popular winegrape varieties, including Frontenac, after exposure to 20 SWD adults for 10 to 14 days prior to harvest.

Integrated Pest Management (IPM) Recommendations

SWD infestations can often be alleviated by smarter management practices. If a vineyard's irrigation system is well-optimized, for example, it will reduce the risk of physiological damage, like berry splitting, closer to harvest.

Since 2012, Hutchison and the Minnesota Extension IPM Program have conducted trials at Alexis Bailly Vineyard in Hastings, Minn. The location hosts one site of the popular SWD trapping network, which reports weekly trap counts for berry and winegrape growers around the Midwest.

This collaboration has helped to strengthen IPM recommendations for winegrape growers in cool- to cold-climate growing regions that have not previously had a problem with SWD. Recommendations from Hutchison and Bailly include the following:

Trapping and Identification: SWD management begins with knowing how to identify both males and females, as well as knowing how to tell them apart from other fruit flies in a trap. Males are easier to identify because of the characteristic dark spots on the wings. To identify a female, a grower can use a hand lens and look for the ovipositor—the serrated protrusion on the hind end.

Every vineyard should have at least one trap and two in vineyards larger than 2 acres. Some growers may prefer to build their own traps or **Scentry**™ or **Trece**™ traps can be purchased from **Great Lakes IPM** (*www.greatlakesipm.com*). Traps should be checked once or more per week, and growers should keep records of the SWD captures. Trap instructions are linked at the UMN FruitEdge website: *www.fruitedge.umn.edu*. This site also has information on the SWD trapping network for Minnesota.

Hutchison considers one female fly trapped per week the threshold for potential damage because of SWD's high rate of reproduction.

Exclusion Netting: Netting has been used in viticulture for many years to protect berries from bird damage, and it is more important than ever to keep fruit wound-free now that SWD have moved into the upper Midwest.

In addition to bird netting, winegrape growers can also find special, ultrafine 80-gram exclusion netting on today's market. While exclusion netting is largely successful in filtering out SWD, there is a high initial capital investment between $5,000 and $6,000 per acre. However, because the material holds up well against heavy rain and hail, the product can last between eight and 10 years. On a long-term basis, the annual cost is more reasonable (and is being adopted for other fruit crops, such as blueberries and raspberries). **Dominique Ebbenga** of the MN Extension IPM Program, Dept. of Entomology, University of Minnesota, and Burkness recently completed a two-year study in the Hutchison lab that showed 98 to 100 percent control of SWD via exclusion netting, without any use of insecticides. So far, Bailly reserves it for her most split-susceptible, tight-cluster varieties.

Good Sanitation: Sanitation is a simple but vital step all vineyards can take to lower infestation levels. Growers should not leave fruit on the ground and should also properly dispose of all organic material during crush. Bailly burns stems and covers pomace until after frost, when she can spread and till it back into the vineyard soil.

Harvest Timing: Several years ago, Bailly lost nearly 3,000 pounds of grapes—roughly half the yield in one of her vineyard blocks—to an SWD infestation following poor weather conditions. When her area received 6 inches of rain in a single September day last year, Bailly made the decision to harvest early to stave off another infestation. The entire crop was picked in eight days, and Bailly believes it prevented another major yield loss.

Canopy Pruning: Pruning for a more open canopy allows air circulation, which reduces moisture on the fruit and allows spray treatments to penetrate. SWD prefers moderate temperatures versus the heat of full sun, so discouraging shade will help manage populations. Hutchison and other researchers in the Midwest have found that SWD will move to nearby forest edges during the summer months, likely to find cooler temperature conditions.

D. EBBENGA, UNIVERSITY OF MINNESOTA

A Scentry™ trap for SWD is visible through the netting that covers the vines.

Insecticide Applications: Average insecticide use in Minnesota winegrape vineyards currently consists of two sprays, typically at 10 to 14 days and at two to three days before harvest. Rotating different modes of action will minimize the risk of resistance. Popular chemistries include **Mustang Maxx** (pyrethroid), **Malathion** (organophosphate) and **Delegate** (spinosyn), and organic products **Entrust**, **Pyganic** and **Grandevo**. It should be noted that Mustang Maxx insecticide is a Restricted Use Pesticide and growers should always use and follow label directions. Mustang Maxx insecticide is not registered for sale or use in California.

In summary, the "label is the law" and is the final word on safe pesticide use, so it must be reviewed carefully to ensure proper compliance. The timing of the last spray before harvest or the pre-harvest interval (PHI) varies from one to seven days for most insecticides approved for winegrapes and must be strictly implemented.

Organic growers face greater challenges in managing resistance, with fewer registered and effective products for SWD. For all growers, conventional and organic, insecticide use should be matched by cultural control as part of a larger IPM program.

Research Brings Hope of Better Tools, Forecasting for Growers

One of the major roadblocks to developing management recommendations for an invasive pest like SWD is a lack of knowledge about the insect's biology and behaviors in its new environment. It is not likely that SWD can survive Minnesota's extreme winters, for example, where average seasonal lows clock in at just 5° F in the warmest parts of the state. But no one is sure what the insects are doing during that time.

They could be seeking shelter in warm spaces, like grower greenhouses, heated high-tunnels, vineyard buildings and other protected structures. They may be avoiding the problem altogether by migrating to Minnesota at the start of each season from warmer states. The final answer could be a combination of the two.

To find out, the MITPPC is funding the work of **Anh Tran**, a Ph.D. student in the Department of Entomology at the University of Minnesota. Tran will place traps near possible overwintering shelter spots to see how first capture dates align with flies' developmental timelines. This information should shed light on whether the SWD have arrived locally or via long-distance migration. In cooperation with the UMN aerospace and engineering department, she will also fly a drone equipped to catch SWD that may be migrating at altitudes of up to 300 feet.

Along with information about how the flies move at a more local level between fields, Tran's migration research will be used to develop population forecasting tools for both raspberry and grape growers. Her project is just one portion of a larger MITPPC-funded venture focused on SWD's impact on the Minnesota raspberry industry, led by Drs. **Mary Rogers**, **Gigi DiGiacomo**, and Hutchison. Rogers has been testing the success of exclusion netting and organic biopesticides in the field while DiGiacomo has been analyzing the

D. EBBENGA, UNIVERSITY OF MINNESOTA

A Scentry™ trap hanging on a trellis wire in a research vineyard

economic impact of SWD on the raspberry industry and will be developing an economic decision-making tool for berry growers managing SWD.

MITPPC is also funding promising work in the genetic control of this pest, where researchers have interfered with the pest's ability to reproduce. By preventing new generations from developing, such technology has the potential to drastically reduce Minnesota's SWD populations.

More information about the MITPPC project on SWD sites for overwintering and on their migration patterns is available online at the website *https://z.umn.edu/swd-forecast*.

The Big Picture

It is probable that researchers and growers will not be able to eradicate SWD in Minnesota or anywhere else in the country. But for northern winegrape growers, invasive species research and extension work at the University of Minnesota are opening up new knowledge, new tools and new possibilities for integrated management. **WBM**

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Pests & Diseases:

Trunk Diseases and Winter Injury In North America: How Are They Related?

Richard Smart, Évelyne Barriault, Paul Read and Dean Volenberg

Richard Smart is the principal of Smart Viticulture, and based in Cornwall.

Évelyne Barriault serves as an advisor in pomology and viticulture, Ministry of Agriculture, Fisheries and Food in Saint-Jean-sur-Richelieu, Québec.

Dr. **Paul Read** is a professor of horticulture/viticulture at the University of Nebraska, Lincoln.

Dr. **Dean Volenberg** is the viticulture extension specialist at the University of Missouri Grape and Wine Institute in Columbia, Missouri.

THE SENIOR AUTHOR BECAME involved with modern trunk disease (TD) around 2010 with its discovery and diagnosis in a young English vineyard with dying vines. Subsequently, he learned about trunk disease fungi and their range of symptoms from the literature and by attending trunk disease scientific meetings; he was aware of *Eutypa* in Australia and *Esca* in Europe but not of other contributing fungi.

Interest in a possible relationship between trunk disease and winter injury was first raised during a visit to Russia in 2012. There he observed many vines purported to be affected by winter injury, which corresponded in external symptomology to vines with trunk disease. Furthermore, cutting open spurs, cordons and trunks showed the characteristic staining due to trunk disease organisms. A Russian scientist had confirmed the presence of trunk diseases, locally called "black cancer," especially due to *Botryosphaeria* species. This observation of local confusion regarding winter injury symptoms and those of trunk disease was subsequently repeated for **Richard Smart** in Ontario, Canada, northern Japan and central and eastern China.

Smart's visit to the American Midwest in June 2018, including vineyards in Iowa, Nebraska and Minnesota, raised the same issue: once again, the local diagnosis was of "winter kill" for vines, which he considered showed both external and internal symptoms of trunk disease. His colleague, during these visits, was **Mike White**, former viticulture extension specialist in Iowa, who submitted samples for lab testing, and a range of trunk disease fungi was identified (see Smart and White, 2019). Grower interest around trunk disease was high, so Smart arranged a second tour during June 2019, which also included the Finger Lakes of upstate New York, several regions in Québec, northern and southern Michigan, eastern Iowa, Nebraska, Kansas and Missouri. Seminars and field visits were held in each region, discussing trunk diseases and their control, and demonstrating field symptoms.

The aim of this article is to review the occurrence of trunk disease symptoms in the regions visited, and to relate these to winter injury. We also review some other recent surveys of TD made in the region. **Évelyne Barriault** of Québec and **Dean Volenberg** of Missouri collected vine samples for TD lab identification during Smart's visit. This article discusses the emerging wine regions of the locations visited, and also includes recent observations made by Dr. **Paul Read** and colleagues in Nebraska of TD symptoms in a range of local cultivars. Further, it will indicate that the situation in Missouri may be different from other regions visited.

New Wine Regions of the Midwest and Northeast

Of the regions visited, New York has the largest acreage although Missouri vineyards are older and, interestingly, were developed before those of California. The Missouri wine industry was destroyed by Prohibition and now, despite the presence of a few very old wineries and vines, resembles other Midwest vineyards with new vineyards and businesses. There are many features in common among the regions visited. The wine industries are generally small, and most businesses are new, with growers typically in the first generation, and many were of small acreage. For many of the seminar participants, this is a second career, so they are inexperienced in viticulture and winemaking but very enthusiastic. Wineries and vineyards are typically isolated, scattered among other forms of agriculture, often corn and soybeans, especially in the Midwest.

There are climate similarities as well for the regions visited. The regions have severe winters with temperatures well below freezing (see **FIGURE 1**), which shows long-term average monthly maximum and minimum temperatures for the centers visited. Granby, Québec has the lowest mean monthly minimum in January of 6° F and Columbia, Missouri the highest of 21° F. In some regions in some years, the presence of snow can offer protection against low air temperature. Snow is highest in Traverse City, Mich., and Granby, Quebec: on average over 100 inches pa. Geneva averaged 54 inches pa while other centers were below 30 inches. A second problem is high summer rainfall with important implications for fungal diseases, varying between 30 and 40 inches pa.

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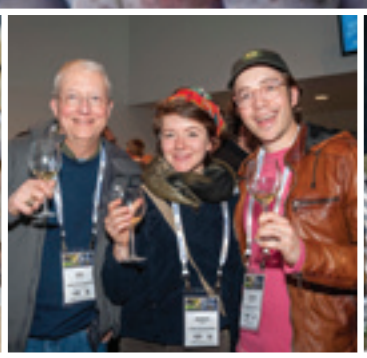



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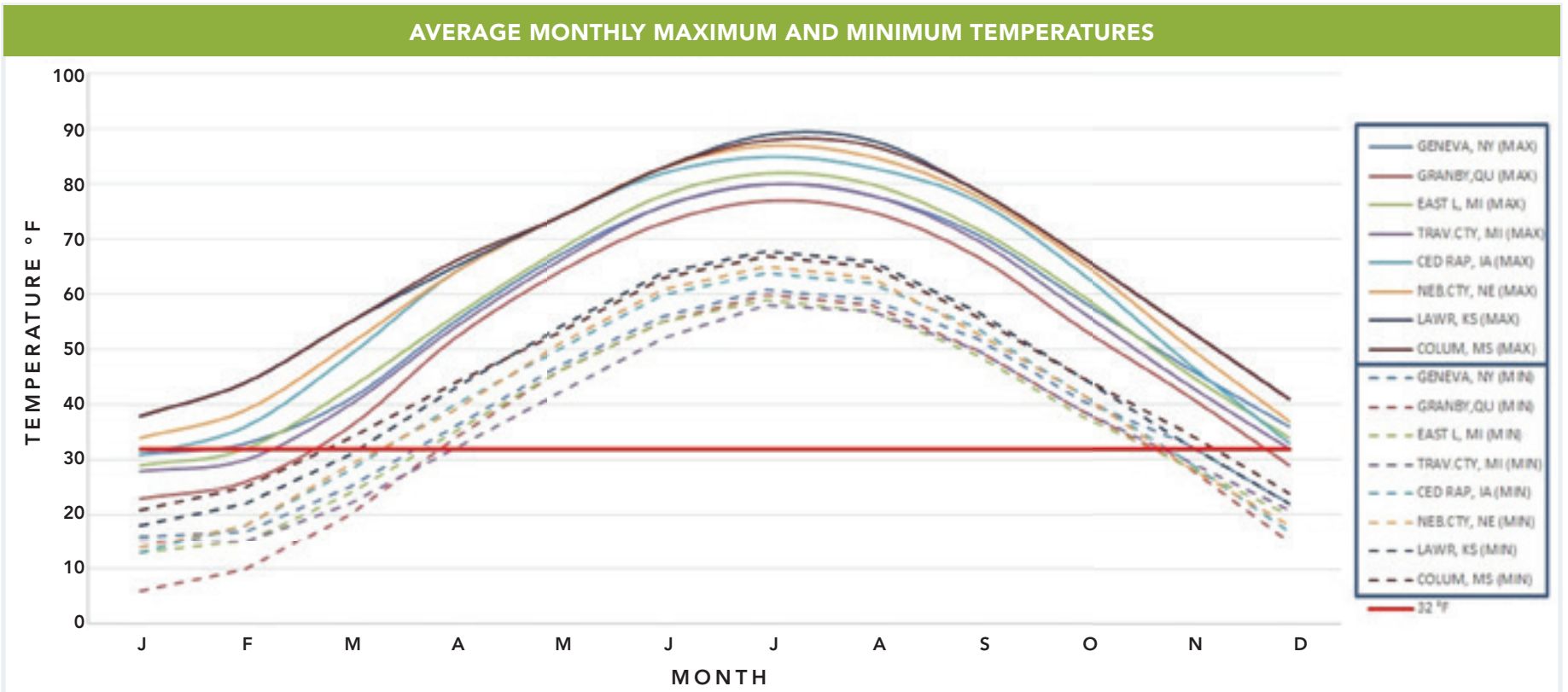

FIGURE 1

Average maximum and minimum temperatures for centers visited, June 2019

Because of the climate challenge, it is difficult to grow *Vitis vinifera,* as is done in the West, although some growers persevere, even in Québec, where growers have developed unique solutions to problems with freezing temperatures. The regions often grow locally bred cultivars from the program at the **University of Minnesota**, based on the local wild grape *Vitis riparia,* as well as other hybrid cultivars. The small nature of the wine industry often means that it is more difficult to attract state government attention; the same also applies to local universities with their research and extension emphasis often on other forms of agriculture. However, **Cornell University** in upstate New York has an active education, research and extension program in viticulture and enology, and other programs should develop gradually in other regions.

As difficult as viticulture is in these regions, there are some advantages. Some vineyards are located relatively close to large population centers, and wine tourism can be a main revenue stream.

Nebraska Trunk Disease Project

Declining yields in Nebraska vineyards and in the Midwest, in general, have been variously attributed to aging of the vine, winter injury or other environmental factors. Only recently have trunk diseases become suspect, largely because of the concerns raised by Smart in a June 2018 visit with White. An opportunity arose for the **University of Nebraska Viticulture Program** (UNVP) to investigate trunk disease symptoms when a 20-year-old cultivar research planting was terminated in August 2018. This planting was on a commercial vineyard in Nebraska City that contained 36 cultivars, with the oldest vines planted in 1999.

UNVP personnel led by Dr. Read "destructively harvested" above the ground and evaluated for grapevine trunk disease symptoms a minimum of two replicates of 21 cultivars of hybrid grapevines, most of which had been in the ground for nearly 20 years. All were trained to a high-wire double cordon system. Evaluations were based upon observations of both visible staining and dead wood symptoms found in cross-sections at five locations: 15cm from the distal end of the cordon, at mid-cordon, at the juncture of the cordon and the trunk (crown) and two locations on the trunk at 90 cm and 10cm above the ground. All of the cultivars evaluated exhibited recognizable symptoms of TD, and some cross-sections also exhibited textbook symptoms of *Eutypa* and/or *Botryosphaeria* wedge-shape cankers. Severity of cross-section symptoms was rated on a scale of 1 (no visible symptoms) to 10 (cross-section completely stained or dead), using visual assessment.

FIGURE 2

Cross sections of cordons and trunks showing staining and necrosis associated with trunk disease fungi symptoms. The symptoms were rated visually and include staining and necrosis. They are presented in sequence of increasing symptom rating.

In general, the severity of symptoms progressed from low ratings at position 1 (distal end of cordon) to the greatest severity at position 5 (10 cm above the ground) for 16 of the cultivars examined. However, two cultivars ('Norton' and 'Brianna') showed a discernible decrease in severity from position 1 to position 5. In addition to these two cultivars, 'Petite Pearl', 'Frontenac Gris', 'Frontenac Blanc' and 'Sabrevois' ratings showed on average lower visible symptom rating than the 18 cultivars that exhibited the progression of severity from position 1 to Position 5.

TABLE 1

Symptom rating of cordon and trunk cross sections of 21 cultivars in the Nebraska study

CULTIVAR	Symptom Rating						
	Cut 1	Cut 2	Cut 3	Cut 4	Cut 5	Mean	No. of Reps
Petite Pearl	2.8	2.8	2.3	2.5	3.5	2.8	4
Sabrevois	3.5	4	2.5	2.5	3	3.1	2
Brianna	5	4.5	3	1.5	2.5	3.3	2
Frontenac Blanc	3	3.3	3.5	3.8	3.8	3.5	4
Frontenac Gris	1.5	2.5	3.5	6.5	3.5	3.5	2
Norton	3.6	3.8	3.9	4.1	2.8	3.6	20
La Crescent	3.5	3.5	3.5	4	5.5	4	2
Aromella	0	2	7	5.5	6	4.1	2
Chambourcin	2	3.8	5	6	7.6	4.9	5
Cayuga White	1.6	2.4	4	7.6	9.2	5	5
St. Croix	4.4	5.3	6.1	5.7	6.7	5.6	12
Chardonel	4	4.3	5	5.7	9.7	5.7	3
Vidal Blanc	1.8	4.5	5.8	7.8	9	5.8	4
Lacrosse	3.9	4.5	5.2	7.1	8.1	5.8	10
Grafted Chambourcin	4.3	4.3	4.8	8.5	9.3	6.2	4
Frontenac	4.1	5.6	7.2	6.8	8.1	6.3	12
Niagara	5	6.3	6.3	7.3	7	6.4	3
Edelweiss	4.8	4.6	6	7.9	8.6	6.4	11
Leon Millot	4	5.7	6.6	8.1	8.9	6.7	7
Vignoles	4.1	4.6	6.6	8.6	10	6.8	8
Traminette	5.8	7.2	8.4	9.2	10	8.1	12

The trunk and cordon cross-section symptoms that were observed (**FIGURE 2**) were similar to those reported in other states and for which laboratory diagnoses of TD fungi presence were confirmed.

It is tempting to speculate that the apparent tolerance as indicated by relative freedom of symptoms of 'Norton' may have been conferred by its part *Vitis aestivalis* ancestry (Robinson, et al, 2012). Furthermore, 'Sabrevois' [ES 283 (Minn 78 x Seibel 1000) x ES 193 (Minn 78 x Seneca)] had far less TD than its sibling 'St. Croix' (also ES 283 x ES193) while 'Brianna' exhibited differing traits than otherwise similar cultivars, retaining green

leaves well after other cultivars' leaves had turned brown and fallen. We postulate that genetic relationships may well play a part in understanding the tolerance of some cultivars to TD and should be studied further, especially for local conditions.

There is a general negative linear correlation between the symptom rating and decline in yield, expressed as relative to initial yield (FIGURE 3). There are yield data available for only 13 cultivars. The R2 value is low at 0.40 due to some cultivars with lower yield reduction than might be expected. These include Frontenac Gris, Petite Pearl and La Crescent, all of which have low symptom ratings, and also Edelweiss and Frontenac Blanc, both of which have low cordon symptom ratings in cuts 1 through 3. When these five cultivars are removed from the calculation, R2 improves to 0.87. The data suggest that there may be differences between cultivars in TD effects on cordons and trunks.

RELATIONSHIP OF SYMPTOM RATING AT BASE OF TRUNK AND PERCENT YIELD REDUCTION

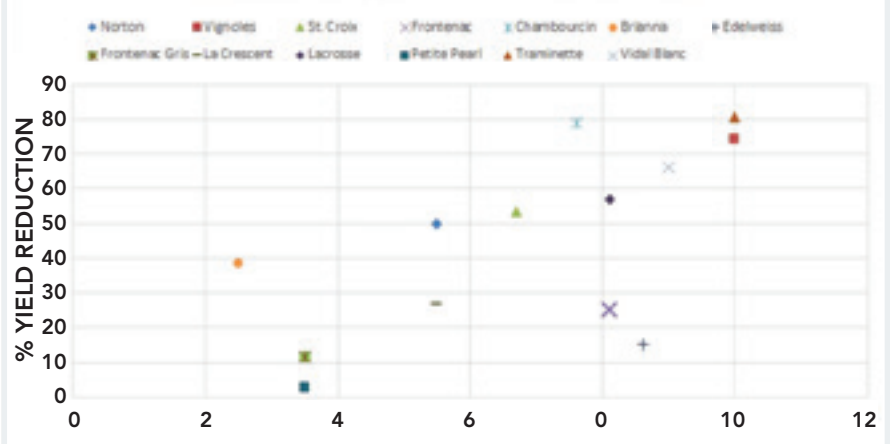

FIGURE 3
Relationship of percent yield reduction to symptom rating at the base of the trunk, cut 5; Nebraska Cultivar study

Recent Trunk Disease Studies in the Region Toured

TABLE 2 lists some recent trunk disease studies in the regions of interest. The list does not pretend to be exhaustive but rather to reflect the range of trunk disease fungi found in recent surveys. It is interesting to note that one of the earliest trunk disease studies was published in 1909 and 1914 by **Reddick** of Geneva Experiment station, Cornell University, in upstate New York, regarding trunk disease caused by *Phomopsis viticola*. Reddick named this disease "dead arm" and noted that it was likely present in most vineyards of Eastern USA, that it was "insidious" in nature and caused poor vine health and death, and that it could be controlled by training "replacement trunks" from below staining in the trunk, the same as today's advice.

Five sources of data are summarized in TABLE 2. The first is a survey of trunk disease in Arkansas and Missouri by **Urbez-Torres** et al. (2012) that contain excellent symptom photographs, and the second a study by **Baumgartner** et al. (2013) of *Diaporthe spp* in eastern North America vineyards of USA and Canada. Other trunk disease fungi present in vineyards in this study were identified to the genus level and are so presented in TABLE 2.

There is little doubt that trunk disease fungi are well established in the regions visited, and they have been isolated from symptomatic vine parts. There were 16 different genera recorded in these five samples. The most frequent occurrences were *Botryosphaeria dothidea*, *Diatrypella sp*, *Diplodia seriata*, *Eutypa lata*, *Lasiodiploda sp*., *Neofusicoccum sp*., *Phaeoacremonium sp*., *Phaeomoniella sp*. and *Phomopsis sp*. These fungi variously contribute to major grapevine trunk diseases, namely *Botryosphaeria dieback* (or canker), *Eutypa* Dieback, *Esca* or *Petri* disease, and *Phomopsis* dieback.

During visits to the regions, the described shoot symptoms of *Botryosphaeria* dieback were commonly seen but less frequently were those of *Eutypa* dieback. None of the very distinctive *Esca* foliar symptoms were seen during the visit, as are common in Europe, but they are commonly seen in Missouri later in the season and especially in association with drought. In many regions, staining and necrotic tissue were seen in longitudinal sections around the unions of dormant bench grafts supplied by local and interstate nurseries; such symptoms were seen especially at the rootstock base, around the graft union and in the scion tissue above the graft. Many hybrid cultivars are ungrafted. However, testing in Missouri showed only one vine, a two-year-old Norton infected with *Diaporthe ampelina* and *Pestalotiopsis/Neopestalotiopsis*. Staining in the other four samples was due to saprophytic fungi, commonly including *Penicillium*.

We noted above that Missouri has the mildest winters of the regions visited but is, however drought-prone, and drought conditions have occurred in nine of the last 10 years. It is not uncommon to see drip irrigation in Missouri vineyards. Dean Volenberg suggests that the *Esca* and *Petri* diseases fungi *Phaeoachremonium* and *Phaeomoniella*, respecitively, are increasing in occurrence in Missouri vineyards as evidenced by the recent survey, occurring in five of the 14 samples. Also, there is increasing frequency of characteristic *Esca* foliar symptoms, especially on Vignoles and Norton, although frequently only one shoot per vine is symptomatic, and it may subsequently develop apoplexy with shrivelling of leaves and fruit.

Petit et al. (2011) surveyed Black Foot disease in the Northeastern U.S. and southeast Canada; this is a common form of trunk disease caused by the soilborne fungus *Cylindrocarpon*, now *Ilyonectra sp*, causing injury and death to young vines. The disease was found in Canada and was probably associated with winter burial of grapevines as a form of winter protection.

Of noteworthy occurrence was the finding of trunk disease symptoms in wild *Vitis riparia* vines in Missouri, in woods adjacent to vineyards and from some miles away. Harvesting of wild *Vitis riparia* is shown in FIGURE 4, with Dean Volenberg taking samples from forests in Missouri. Six samples were taken, and each of them showed TD fungi, mostly *Phaeomoniella* (in five of six cases) also *Phaeoachremonium* (three of six cases) *Botryosphaeri* (one of six cases). Smart and White (2019) also reported *V. riparia* wild vines from Iowa as containing *Phaeomoniella minima*, *Phaeoachremonium chlamydospora* and *Botryosphaeria dothidea*.

TABLE 2

This table includes lists of TD fungi found in the regions, visited for five sources of data

Authors/ Collectors	**Urbez-Torres** et al, 2012	**Baumgartner** et al, 2013	**Smart and White**	**Barriault**	**Volenberg**	**Frequency** ex 5
Locations	Arkansas, Missouri 2006, 2009	NE America 2008, 2009	Iowa 2018	Quebec June 2019	Missouri June 2019	
	Botryosphaeria dothidea	*Botryosphaeria sp.*	*Botryosphaeria dothidea*		*Botryosphaeria dothidea*	4
		Cadophora sp.				1
				Cylindrocarpon sp.		1
					Colletotrichum acutatum	1
			Cytospora viticola			1
	Diaporthe sp. (Phomopsis)			*Diaporthe sp.*		2
					Diaporthe ampelina	1
		Diaporthe eres			*Diaporthe eres*	2
					Diaporthe neoviticola	1
	Diatrypella sp.	*Diatrypella sp.*	*Diatrypella sp.*		*Diatrypella sp.*	4
					Diatrypella verruciformis	1
	Diplodia seriata	*Diplodia sp.*		*Diplodia seriata*		3
	Dothiorella americana					1
	Eutypa lata	*Eutypa sp.*	*Eutypa lata*	*Eutypa lata*		4
	Eutypella vitis	*Eutypella sp.*				2
				Fusarium oxysporum	*Fusarium sp*	2
	Lasidiplodia missoiriana	*Lasiodiplodia sp.*			*Lasiodiplodia theobromae*	3
	Lasiodiplodia viticola					1
	Neofusicoccum ribis	*Neofusicoccum sp.*		*Neofusicoccum parvum*		3
	Neofusicoccum vitusiforme					1
					Neopestalopsis sp.	1
	Pestalotiopsis sp.		*Pestalotiopsis sp.*			2
	Pestalotiopsis uvicola					1
		Phaeoacremonium sp.	*Phaeoacremonium chlamydospora*	*Phaeoacremonium chlamydospora*	*Phaeoacremonium sp.*	4
	Phaeomoniella chlamydospora	*Phaeomoniella sp.*	*Phaeomoniella minima*		*Phaeomoniella sp.*	4
	Phomopsis viticola		*Phomopsis sp.*			2
	Phomopsis fukushii					1
			Seimatosporium			1
	Schyzophyllum commune					1
	Togninia minima					1

The Implications of Trunk Disease Presence

While there have been previous reports of trunk disease presence in the regions visited, because of the confusion with winter injury the grape-growers in the regions were unaware of the infections and symptoms. The confusion with winter injury was widespread.

The important question remains: "So what?" It remains to be shown how TD might interact with winter injury; perhaps it makes the vines more susceptible to cold damage. There are two reasons to suspect this. The first is that in the absence of winter injury, TD can have devastating effects on vine health, often causing deaths in regions with no cold winter stresses, as is happening world-wide. Further, the TD symptoms shown are the same in regions with and without low winter temperatures.

The second reason is the distribution of winter injury/TD symptoms in the vineyards of the region. These are similar to those seen in vineyards where there are no winter cold stresses, often occasional vines down the row, sometimes in patches that extend across rows but not in a uniform pattern as one sees for frost, winter injury and drought stress. This non-uniform pattern reflects the somewhat random TD infection pattern as is seen elsewhere in the world. Also, TD may affect carbohydrate storage in the vine, which is known to be an important issue for promoting survival in low winter temperatures.

To prove whether TD affects winter injury susceptibility will require careful experimental design and execution, but it is an important question to be researched. One approach will be to combat TD with established procedures (see following) to see if winter kill is reduced.

Management Opportunities for Trunk Diseases

This subject is well researched, a testimony to the damage being caused by TD around the world. This impact is so grave and widespread that there has been substantial research effort (see, for example, the website of the **International Council for Grapevine Trunk Diseases** (*https://icgtd.ucr.edu/*).

There are two present approaches. The first is to avoid spread of infection, primarily achieved by protecting winter pruning wounds with fungicides sometimes mixed with a barrier substance. The U.S. has a wide range of chemicals approved and available, especially in the western states, although state-by-state registration is required for their use elsewhere. Unfortunately,

FIGURE 4
Dean Volenberg harvesting wild *V. riparia* trunks in the forests of MO, and a cross section showing substantial staining. This tissue tested positive for *Phaeoachremonium sp.* and *Phaeomoniella sp.*

none is approved for use in Canada for the moment. These products may be applied by hand with a brush or spray bottle, or by tractor-drawn sprayers, and ideally should be applied as soon as possible after the pruning injury. This may present special challenges in below-freezing temperatures. In some locations there may be a benefit in avoiding pruning at certain times, or double-pruning to reduce infection.

The second approach is well known in vineyard regions with freezing winter temperature, as it has been the traditional management of winter injury. Sometimes known as "spare parts viticulture," this involves creating "replacement trunks," and trunks may be renewed as frequently as every five years. This process was known for control of *Phomopsis* Dieback in New York, dating back before 1909, and was subsequently proven for control of *Eutypa* dieback in Australia; it is now suggested to control TD, by training suckers (watershoots) from the base of the trunk below conspicuous symptoms. It is now recommended world-wide as a means of "rejuvenation" of infected vines.

It remains to be seen how these two procedures might be incorporated into vineyard management for the regions considered. Certainly there is a considerable need for more supporting local research and extension.

Conclusion

This article has shown that grapevine trunk disease is of widespread occurrence in the regional vineyards under study. We can also report that this situation has largely escaped the notice of growers and professionals alike, generally because of confusion with purported symptoms of winter kill but which are often, in fact, symptoms of TD. We also report TD infections of wild vines of *Vitis riparia*, and there are intriguing questions about the role of vines imported from America for rootstock use as a possible source of trunk disease fungi. Additionally, there are interesting studies to be made

of TD fungi infection in other wild vine species, from locations adjacent to and far removed from existing plantings.

Data presented here support earlier studies that confirmed TD presence in these regions. In Missouri, with warmer winter temperatures, drought appears to be an important environmental stress, and anecdotally, the *Esca* and *Petri* disease form of TD appears to be increasing.

The Nebraska studies showed significant differences between local cultivars in susceptibility to TD in terms of symptom expression and effects on yield. Knowledge from such studies will be of benefit to breeders to produce new cultivars with higher degrees of resistance to TD.

We hope that the outcome from our study and this article will be a greater awareness of grapevine trunk diseases in the region. Local research should indicate how treating TD might help improve the longevity and productivity of vineyards, and so contribute to further development of the local grape and wine industry. **WBM**

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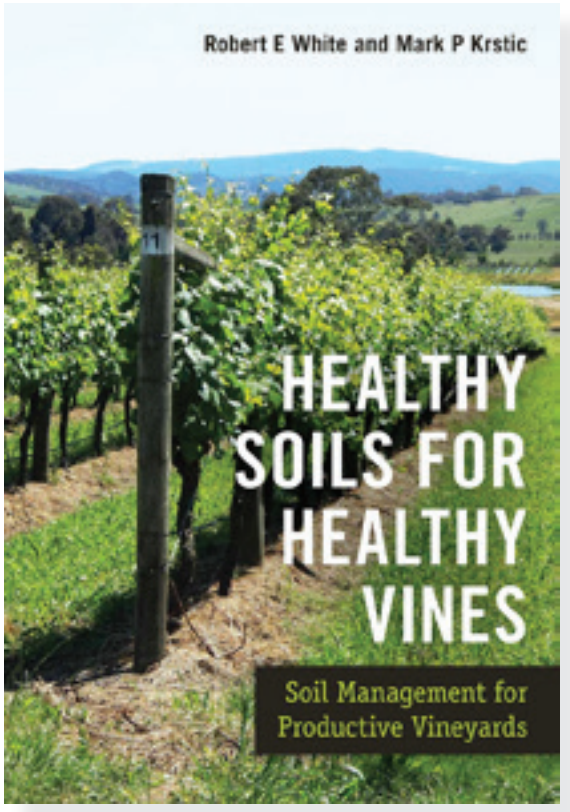

Robert White is emeritus professor at the University of Melbourne, author of "Understanding Vineyard Soils," "Soils for Fine Wines" and "Principles and Practice of Soil Science," consultant in soils to the Australian wine industry, honorary life member of Soil Science Australia and honorary member, International Union of Soil Sciences.

Mark Krstic is general manager of business development at the Australian Wine Research Institute, author of "Growing Quality Grapes to Winery Specifications," past president of the Australian Society of Viticulture & Oenology. Krstic has 24 years of experience in wine industry-related research, development and extension and is a graduate of the Winemakers' Federation of Australia Wine Industry Future Leaders Program.

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Chapter 3
Dynamic Factors of Soil Health

CARBON CYCLING

Tracing the fate of carbon in soil is fundamental to understanding dynamic biological properties. The origin of SOM was discussed previously under "Soil Organic Matter." Here, some diverse pathways for carbon are discussed in terms of the end products of decomposition, interrelationships between soil organisms that depend on SOM, the connection between carbon cycling and transformations of other nutrients and the consequences for vine growth.

MICROBIAL BIOMASS, MICROBIAL ECOLOGY AND PATHWAYS FOR CARBON

Soil organisms are collectively called the soil biomass. Within the biomass we recognize the microbial biomass, encompassing the microorganisms—also collectively called the soil microbiome—which has been described as "the eye of the needle" through which all organic matter must pass in soil. Implicitly, this concept recognizes the importance of the composition of the microbial population and microbial processes in determining the nature of SOM. Overall, the microbial biomass may be only 2 percent to 4 percent of the total SOM, but its activity is crucial to soil function.

The term "microbial ecology" is used as a generic descriptor of the interrelationships between all soil organisms that depend on carbon substrates, directly or indirectly. This concept is formalized as the soil food web, for which the first trophic (feeding) level is organic residues—plant litter, dead roots, animal waste—on which the higher-level organisms progressively feed (FIGURE 3.10). For a soil to be healthy, carbon should flow through the web of organisms without constraint, a process referred to as carbon turnover.

As organisms grow, excrete, are consumed by other organisms and die, a complex mix of organic molecules is synthesized, and under aerobic conditions, CO_2 is produced. The more recalcitrant microbial molecules together with resistant plant molecules, such as lignin, account for the longevity of SOM. (This component of SOM used to be called "humus" but is now referred to as "stabilized organic matter.") Other more labile molecules, such as sugars, proteins and nucleic acids, are decomposed rapidly, influencing the turnover of elements, such as N, P and S. Some complex synthesized molecules may have growth-promoting effects on vines and cover crops.

Within the soil biomass, we distinguish between:

- "the reducers," which are macro-invertebrates that break down organic matter into smaller pieces but have little digestive capability, and
- "the decomposers," which are microorganisms that produce extracellular enzymes to attack small organic fragments and are also able to absorb soluble carbon compounds.

The decomposers—comprising mainly bacteria, archaea, fungi, actinomycetes, heterotrophic algae and protozoa—fit into the second trophic level while the reducers fit into the third and fourth levels, which include arthropods (adults and larvae) and nematodes. For completeness, we should add earthworms and enchytraeid worms to the third level of FIGURE 3.10: these are important reducers under favorable conditions of temperature and moisture.

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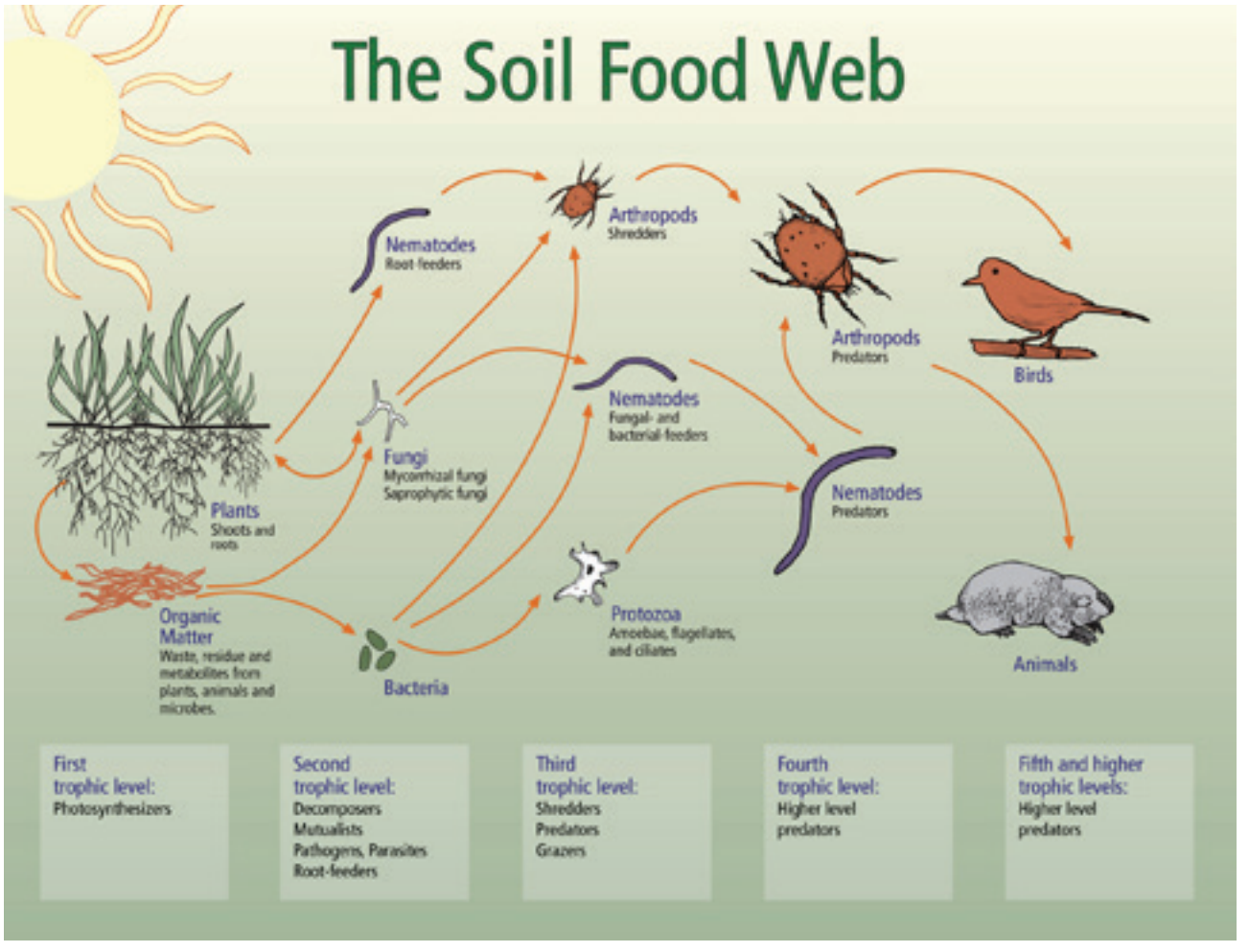
FIGURE 3.10



THE BALANCE OF ORGANISMS

A properly functioning food web has a balance of organisms within and among the different levels. One symptom of imbalance is when earthworms are inhibited, and plant litter is not incorporated into the soil but accumulates in a layer on the soil surface. Earthworms are inhibited at a soil pH less than 5.0, or where the topsoil is kept dry or is regularly disturbed by cultivation.

Fungi should comprise about 50 percent of the microbial biomass, so another symptom of imbalance is when the bacterial biomass exceeds the fungal biomass. This can occur in soils that are cultivated regularly because the disturbance breaks up the fungal mycelium, and the faster-growing bacteria take advantage of the reduced competition. Fungi are also more effective in decomposing lignified material (as in wood, grass and cereal residues) so that when these inputs are small, bacteria tend to outnumber fungi.

However, fungi have an advantage over bacteria in dry soils because their filamentous growth enables them to bridge gaps among moist microenvironments. This allows them to attack organic matter not accessible to water-bound bacteria. Although there may be no direct effect of a low fungi:bacteria ratio on a soil's function for vine growth, the predisposing conditions (excessive cultivation, types of residues returned) are often associated with deteriorating soil structure, with adverse consequences for available water and air-filled porosity.

However, there are other examples of the microbial community structure directly affecting the functioning of a soil in plant growth (see next section).

MICROBIAL COMMUNITY STRUCTURE, BIOLOGICAL DIVERSITY AND FUNCTION

Microbial community structure comprises the identified organisms, their genetic relationships and their relative abundances. Modern genomic techniques of gene sequencing are used to identify organisms. The result of this genetic profiling is a very large number of groups, perhaps species, called "operational taxonomic units" (OTUs), which are a measure of microbial diversity. Because of this diversity, establishing links between particular OTUs and a soil process affecting plant growth is still in its infancy. Nevertheless, symbiotic relationships provide two specific examples of the important link between microorganism and plants.

First, Rhizobium bacteria, which are widespread in soils, form a symbiotic association with legumes through nodule formation on the roots. Within the nodules, the bacteria convert N_2 gas to amino acids (a process of N_2 "fixation") that are available to the host, and they use carbohydrates supplied by the host to obtain energy for this reduction process.

Second, certain species of fungi live symbiotically with plants. The most common are the endomycorrhizal fungi whose hyphae grow mainly inside the root and form arbuscules (feeding structures) within the root cells—hence the name arbuscular mycorrhizal fungi (AMF). The fungus receives organic compounds from the host while supplying it with nutrients, particularly P, absorbed from the rhizosphere soil by the external hyphae. Grapevine roots are commonly infected with AMF. Note that both the rhizobial and AMF symbioses function best in soils poor in nutrients, and their efficacy is reduced when the availability of mineral forms of N and P is high.

NITROGEN TRANSFORMATIONS

Nitrogen and carbon are intimately bound together through C–N bonds in proteins, purines and pyrimidines in living cells. When plant litter and other organic matter are decomposed by microorganisms, some of the organic carbon is converted to CO_2 and some of the organic N to the ammonium ion, NH_4^+. This is called mineralization. The reverse process whereby mineral N is converted to organic N is called immobilization. The balance between these opposing processes is determined primarily by the C:N ratio of the organic substrate being decomposed, the C:N ratio of the microbes involved and their growth efficiency (i.e., the proportion of C in the substrate that gets converted into microbial tissue). The critical substrate C:N below which net mineralization is expected is about 20 (gram per gram).

C:N ratios vary for the same material, according to its source and also among materials. Legumes, such as clovers, vetches and medics, fix atmospheric N_2 gas into proteins and so have consistently low C:N ratios; straw is consistently high, and grapevine leaves are intermediate. Given a critical C:N ratio ≈20, we expect legume residues to provide immediate net mineralization. For straw, we expect net immobilization, with the microorganisms drawing on existing soil mineral N to top up their N requirement. As N is repeatedly cycled through the microbial biomass and carbon is released as CO_2, the average C:N ratio of the residual carbon substrates (largely microbial products and residues) decreases, and eventually net mineralization occurs. In the end, we find the C:N ratio of stabilized SOM in a healthy soil lies between 10 and 15, but the rate of release of mineral N from this organic matter is slow. **WBM**

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Michael S. Lasky is the former editor of *AppellationAmerica.com* and is the author of hundreds of articles for national magazines and newspapers.

HOW DOES A WINERY recruit nearly 400,000 wine club members, each with an impressive, average retention of more than two years?

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The Beginning

Started in 2005 with one location in Orland Park, Ill., by founder **Tim McEnery**, **Cooper's Hawk Winery & Restaurants** is driven by a hybrid concept: A Napa-style tasting room combined with a brew pub-like restaurant.

It was established on the "if you build it, they will come" philosophy and has worked well for McEnery. By providing a dining experience fueled by a reputation for quality and trustworthiness, he's been able to raise the bar in terms of the types of wine his consumers will enjoy.

Wine club memberships originate in the tasting rooms and the restaurants. While the winery does sell its wine online and consumers can sign up for the wine club there, McEnery reports that 99 percent of members join while they are at a Cooper's Hawk location, enjoying the food and wine experience.

The typical experience at each location works like this: Visitors enter through a large front tasting and sales room and make their way to the host stand and restaurant. Once seated, they select from a variety of American comfort food choices, like steaks, bourbon-glazed pork chops, burgers, salads and various pastas. Each food item on the menu is accompanied by a suggested wine pairing. Wines on the wine list are arranged by number, making it easier for guests to order a wine with a hard-to-pronounce name.

"The average wine consumer in the Midwest is much more sophisticated than they were 14 years ago when we started the company. They're much more willing to experiment with new varieties and new blends," he said. "When we started the company, one of our first wines of the month was Malbec. Today Malbec is a common variety that everybody enjoys, but back then, nobody had heard of it, and we were excited to introduce it to the masses."

Tim McEnery

McEnery was the original winemaker for his establishment; the first wine he made himself was a Viognier. Two years later, he hired **Rob Warren** as winemaker. ("Thankfully, I'm not the winemaker anymore, so the wines are much better," McEnery joked.) Warren sources grapes from around the world, but processes the fruit in the state-of-the-art, 25,000 square-foot winery he helped to bring to fruition in Woodridge, Ill. Wines are sold exclusively in Cooper's Hawk restaurants and adjoining tasting rooms. There is zero distribution beyond this, other than the company's website.

Over the years, the wine club evolved to meet the changing needs of its members. What started out as a very "traditional" wine club that sent out a unique bottle each month along with discounts on purchases became one that incorporates a travel program associated with a loyalty program, as well as points for members to redeem for unique experiences, including celebrity chef and winemaker events and even free meals. "It has evolved tremendously over the years, which helps to explain our high retention rates," said McEnery.

Today there are about 2,000 shipping-only members, but most people will come to a restaurant location to pick up their wines to both save money and have a meal. "I think the way we approach DTC has to do a lot with just the experience that goes along with it. It's stating the obvious, but their ability to taste the wine before they buy it takes away the fear factor," McEnery said. "We've got a great educated staff that helps them find what they're looking for. We design our wines to be very approachable and very high quality for the price that they pay. We think of the club as not just a wine-of-the-month club: we think of it more like joining a membership club or joining a country club."

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Sweet Success: Catering to Midwestern Consumers

According to McEnery, Cooper's Hawk Winery's most popular wine is a sweet red. "It's a Concord grape-based wine. Number two is Pinot Noir, so we've got both ends of the spectrum. We try to move people who are entry-level drinkers from sweet red to different dry varieties over time."

Its customers' favorite white wine is not in line with the nation's preference for Chardonnay. The Cooper's Hawk white, a blend of Pinot Gris and Riesling, is just slightly off-dry with a hint of sweetness. The company's third highest-selling red wine? Barbera. McEnery relates that Barbera, sourced from California, was the top-selling red for about three years until the winery's growing list of varieties provided even more choices.

While most wines are made at the Woodridge winery, grapes from contracted partnerships are harvested in California and other locations, and the base bulk is produced off-site to Cooper's Hawk specifications, depending on the particular tier—sweet, medium and luxe.

Its preference for the sale of exclusively house-branded wines will change by the time this article is published, as the company takes the big leap to opening a three floor, 24,000-square-foot location in downtown Chicago. McEnery said this mega-retail/restaurant will feature an estimated 10,000 different bottles "from some of the greatest wineries around the world" and not just Cooper's Hawk wines.

Ultimate Key to Sales Success: Avoiding the Three-Tier System

McEnery never planned to sell his wines in third-party retail establishments. "We decided just to keep it unique and a little bit boutique-like. Keeping sales totally proprietary means that in order to buy our wine, people have to visit with us, and we can tell them about the wines and educate them. The system of selling wines off-premise is such a complicated—and competitive—universe, we thought we would stick to our knitting, and it's worked out really well," McEnery said.

This approach has allowed the company to truly capture its audience. So as long as Cooper's Hawk can keep its captive sales base satisfied with ambiance, food and wine, there is no need or desire to deal with third-party retailers, wholesalers or any of the profit-sharing that is part and parcel with the three-tier rigamarole. Sure, this involves its own insular infrastructure and logistics. But hey, if Cooper's Hawk's 2018 revenue of $300 million says anything, it's a method that's working quite well.

The Future of the Winery

As a coda to the success Cooper's Hawk has achieved since it began back in 2005, this past July, the company confirmed Los Angeles-based **Ares Management** will take a minority stake in the Chicago restaurant and winery. "With the significant resources across the Ares platform, we believe together we can accelerate our growth trajectory," McEnery, said in a statement. "I continue to own a meaningful portion of Cooper's Hawk and will lead in our unwavering commitment to provide the very best food, wine and innovative experiences."

Ares is paying between $700 and $800 million for the Illinois-based restaurant/winery chain. Restaurant and financial sources report that it means a valuation multiple between 23 and 26 times the company's 2018 earnings before interest, taxes, depreciation and amortization. That number is also reported to be $31 million. **WBM**

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Wineries Adapt to Tariff Wars and Rising Transportation Prices

Trade and tariff wars, along with increases in shipping and labor prices, mean mounting expenses for the U.S. wine industry and the need for resourceful business adjustments.

Michael S. Lasky

Michael S. Lasky is the former editor of *AppellationAmerica.com* and is the author of hundreds of articles for national magazines and newspapers.

AS THE TARIFF WAR continues, there's no *visual* war-based property damage to the wine industry but look no further than financial statements for proof of damage. More specifically: bills from glass suppliers.

"We are definitely getting doubly squeezed," said **Stephanie Honig**, director of communications, sales and export at Napa Valley's **Honig Vineyard and Winery**. "The 10 percent and then 25 percent tariff on Chinese glass directly taxed our bottle supply and, so far, we've absorbed the increases. Then our business suffered yet more because the nearly 100 percent tariff imposed on U.S. wine exports all but wiped out the sales of our premium wine to China. That was a healthy export business that took years of fine-tuned development."

Demonstrating the resilience needed to succeed in the wine business, Honig has developed new markets. "Japan is growing. So is Singapore, Mexico and now even the Philippines," she said. "We're not sitting on the wine that would have gone to China. But my idea is to have a little bit of wine in a lot of places and to have the visibility in the right places. When you work really hard to build something up like we did in China, and then all of a sudden you have some outside factor come in and *kibosh* all your work, investment, time and money, that's really frustrating," Honig said.

The situation has prompted Honig and other, like-minded wineries to find and cultivate new avenues for sales. As for mitigating the price of Chinese glass and international transportation costs for that glass, Honig said, "The only way we have been able to minimize our cost of glass is by importing in volume and being efficient in shipping. We were doing that before the tariffs increased, since that is one of the ways we can be sustainable and help the environment."

Stay with Chinese Glass or Switch to Domestic?

Some wineries and glass suppliers are keeping their contracts with tariffed Chinese glass manufacturers, but others have made the switch to domestic producers despite concerns about ostensibly tight production capacity issues in the U.S. **Kathy Brooks**, regional vice president and general manager of **TricorBraun WinePak**, summed up the dilemma tariffs created nicely. "It requires longer lead times due to North American capacity. Our global scale of glass sourcing helps us to ensure a continuous supply for our customers, but the tight capacity of domestic glass production means we must have clear direction and precise planning to meet these longer lead times," she said.

Sacramento-based **West Coast Bottles**, which caters to small- and mid-sized wineries, continues to source 100 percent Chinese glass. Managing partner **Cynthia Fisher** said that rising costs haven't hampered the business or the accrual of new customers.

"Prices were increasing in China *before* the tariffs even hit," Fisher said. "The factories in China were under strict environmental guidelines to improve their factories, and so they would shut down furnaces in order to convert them over to natural gas. When that started happening, they started raising their prices because they had lower productivity."

As a small company, however, West Coast Bottles cannot absorb all the steady price increases and must pass some along. "When the first tariff was imposed at 10 percent, our prices went up 10 percent. Likewise, when the tariff went to 25 percent, our prices had to go up 25 percent. We only raise prices on glass that has been subjected to tariffs. We already have bottles in

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our warehouse that we purchased pre-tariff, and that inventory sells at the original, lower price," Fisher said.

Napa-based **Global Package** also continues to play in the Chinese market, noting that it's a result of better pricing. "Chinese glass pricing used to be 15 percent cheaper compared to domestic, and now it's on par with domestic," said **Erica Harrop**, the company's president. "Another reason to continue with Chinese glass is there's not a lot of availability of U.S. glass production for our needs. But there's still the variety that China offers, and they are still able to run faster with scheduling that's much shorter and running faster."

Domestic Glass Producers See Advantage

"The tariffs on Chinese glass have certainly created more opportunities for us," said **John Shaddox**, chief commercial officer for the **Ardagh Group**. Back in 2017 the company launched a new sales initiative called **Ardagh Direct**, which focuses on selling to small- and mid-sized wineries. "The tariff costs brought more attention to our division. Customers actually have alternatives for domestic supply that allow them to buy directly from the manufacturer—an option previously only available to larger companies," Shaddox said.

While the total amount of glass the U.S. can manufacture can be viewed as tight, Shaddox pointed out that demand for glass from breweries has actually shrunk over the years, and Ardagh has converted some of its beer bottle production to wine bottle production at its Oklahoma location (one of five plants in the U.S.) to meet the wine demand.

Gallo's **G3 Enterprises** glass production in Modesto has also expanded to meet demand, especially since the advent of Chinese tariffs. What's more, **Saverglass** has opened a large-capacity manufacturing unit in Mexico to further add to domestic glass production capacity.

Rising Trucking Costs

When it comes to having that glass shipped to the U.S., the costs continue to rise. Harrop estimates that about 20 percent of the Chinese glass cost comes from transportation. "Even in the U.S., trucking companies are charging higher prices, and they've risen about 20 percent from a comparable low the last few years," she said.

To help keep costs low, West Coast Bottles has looked to level off additional costs caused by those rising shipping and trucking rates. "We use a lot of local truckers when we can and have some good pricing through some smaller, local independent drivers," Fisher said. The company also offers customers the option to pick up their items at the Sacramento warehouse—which isn't too far from Napa and Sonoma's wine regions.

The glass companies report they are doing their best to keep costs low, but they can't always control each facet of the business. "Some trucking companies bundle in transportation costs, so it's not until it is itemized that the rise in cost is revealed," Harrop said. "Obviously, there is no way for us to absorb all costs."

In addition, the wine industry presents its own special set of challenges that increases rates: specifically, the costs associated with trucking bottles up to small properties located on mountains with windy, poorly paved roads; smaller producers are unable to purchase enough glass for a full truckload (which comes with cheaper rates); and many have a tendency to make a last-minute change in the order to account for increases and decreases in harvest yields.

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Lighter Glass Equals Lighter Truck Loads and Lower Shipping Costs

Tablas Creek Vineyard in Paso Robles, California managed to save big bucks on transportation while honoring a commitment to sustainability by simply reducing the weight of its 19-ounce bottles to 16.5 ounces.

General manager and partner **Jason Haas** explained in a July 2019 blog post that a decade ago flagship wines were housed in a 31.5 ounce bottle. The winery made a switch to a 19-ounce bottle, equating to a savings of 11 pounds per case, or 90,000 pounds total, of glass weight saved that year. This year, they decided to further lighten the load and moved to a 16.5-ounce bottle. Since the initial switch, Haas estimated that the winery has saved about 1.37 million pounds, or 685 tons, of glass weight in 10 years.

"That extra weight came with costs at every stage. We had to pay more to have it manufactured, shipped to us and then either trucked away for wholesale sales or sent via **UPS** or **FedEx** to our direct customers," Haas wrote, adding that the lower weight means the trucking company can now fit 22 pallets instead of 19 on a truck before reaching the legal weight limit, reducing the number of trucks that need to carry wine to the winery's warehouse in American Canyon, Calif. "And those are just the hard costs. The invisible environmental cost savings are massive as well, with less weight having to be driven or flown around in every stage between manufacture and consumption," he said.

Seconding that idea is **Julien Gervreau**, vice president of sustainability at **Jackson Family Wines** (JFW), a winery totally committed to sustainability in all endeavors. "There is a long-standing history in the wine industry to use a heavier glass bottle for higher price points and the luxury attached to them. From our standpoint, what we did with our light-weight initiative initially was look at areas where we could reduce the weight of the bottles without ultimately affecting this aesthetic," Gervreau told *Wine Business Monthly* in a recent interview.

Before making the move, Gervreau conducted research which revealed that there could be two possible downsides to lighter glass: the possibility of breakage and negative consumer pushback. However, JFW didn't see any of that happen. "We specifically did not say anything about lightening the weight because we didn't want to trigger that kind of consumer response. Rather, we wanted to do it quietly and see if anybody noticed it." With no negative blowback from distribution, trade partners, or the consumer, JFW continued to move toward lighter bottles and now 90 percent of its production is filled in lightweight bottles.

In addition to reducing greenhouse emissions and lowering supply and shipping costs, Gervreau made another finding.

"We've also discovered by reducing the weight of the bottles, you can actually fit more on a truck. The shipping companies see increased efficiencies in terms of reducing the number of truckloads, saving furl costs and passing along savings to customers. Shaving a couple of ounces per bottle off some 85 percent of our production saved us about $1 million a year." **WBM**

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Retail Sales Analysis

Wine Sales Flat but California Still Tops

Wines Vines Analytics

Produced by Wines Vines Analytics, the *Wine Analytics Report* is the wine industry's most accurate and objective source of market insights, analysis and data.

Sales Value Remains Flat in August

OFF-PREMISE TABLE WINE SALES showed slight weakness in the four weeks ended Aug. 10 but remained essentially flat versus a year ago at slightly more than $1 billion, according to scan data tracked by **Nielsen.** Sales rose nearly 2 percent in the 52 weeks ended Aug. 10 versus a year earlier, totaling nearly $14.1 billion.

Sales Volume Slips More than 3 Percent

Off-premise volumes of table wines sold in the four weeks ended Aug. 10 approached 11.4 million 9L cases, down nearly 3 percent from a year earlier. The latest 52 weeks saw volumes drop nearly 2 percent from a year earlier to 159 million 9L cases.

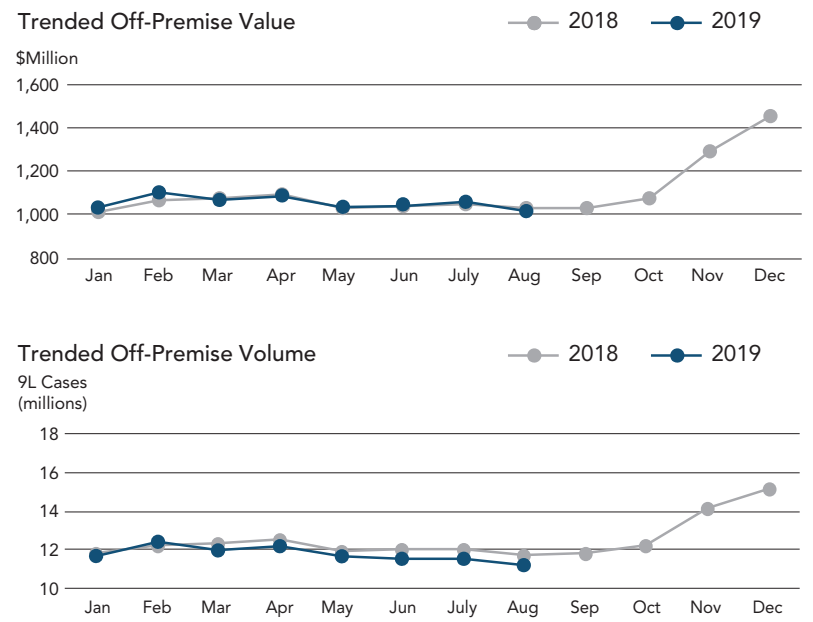
California Retains its Sales Lead

California holds a commanding lead among table wines sold through off-premise outlets tracked by Nielsen. The state was the source of nearly $9.5 billion worth of wine sold in the 52 weeks ended Aug. 10, up 1 percent from a year ago. This was nearly eight times the value of wines sold from Italy, the second-place region. However, it saw sales increase 2 percent in the period.

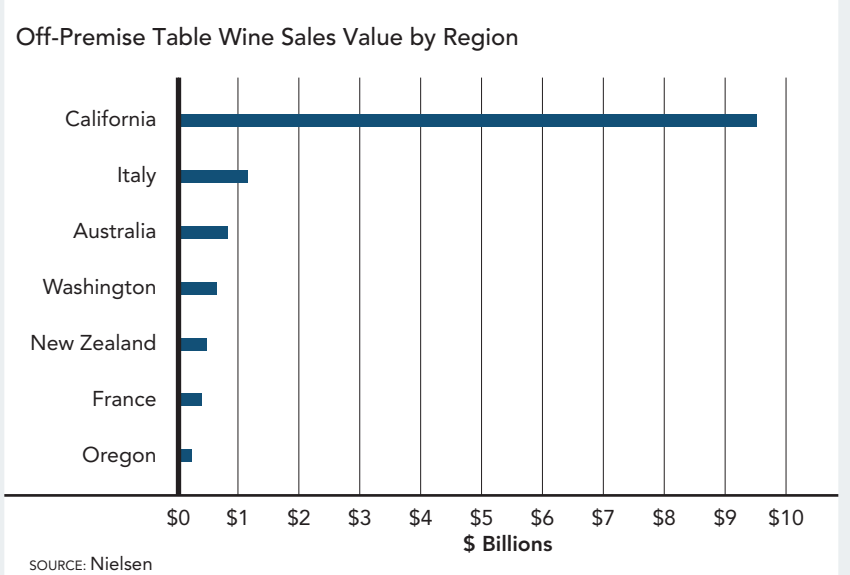
Australia ranked third with $719 million worth of sales in the period, followed by Washington, the second largest wine-producing state in the U.S. Washington sales totaled more than $610 million, the same as last year.

Rounding out the top five regions was New Zealand, with sales of nearly $484 million, up 9 percent from a year ago. The region's strong growth was second to Oregon, however, which saw sales increase 13 percent in the period to more than $206 million, placing it in seventh place.

Sandwiched between New Zealand and Oregon was France, with sales of $455 million. While Rosé has been a strong wine type for the region, overall growth stood at just 2 percent. Moreover, increased demand for Sauvignon Blanc from New Zealand has been a greater force among imports, according to some observers. The latest numbers underscore the shift while pointing to the rising fortunes of Oregon, both domestically and relative to the country's top packaged imports. **WBM**



SOURCE: Nielsen. Latest 4 Wks - W/E 08/10/19



SOURCE: Nielsen
Latest 52 Wks - W/E 08/10/19

Methodology

Sourced from Nielsen, these figures represent off-premise retailer wine sales to the consumer aggregated across a variety of channels nationwide, including grocery, drug, mass merchandisers, convenience, dollar, military, as well as a selection of warehouse clubs, and liquor channel geographies and liquor channel retail chains. Nielsen figures are updated and released every four weeks.

Nielsen Table Wine Category Segments

MARKET: Total US xAOC+Conv+Military+Liquor Plus **PERIOD:** Week Ending **August 10, 2019**

		Dollar Value		Dollar Value % Chg YA		9L Equivalent Volume		9L Equivalent Volume % Chg YA		Avg Equivalent Price Per 750ML	
		Latest 52 Wks - W/E 08/10/19	Latest 4 Wks - W/E 08/10/19	Latest 52 Wks - W/E 08/10/19	Latest 4 Wks - W/E 08/10/19	Latest 52 Wks - W/E 08/10/19	Latest 4 Wks - W/E 08/10/19	Latest 52 Wks - W/E 08/10/19	Latest 4 Wks - W/E 08/10/19	Latest 52 Wks - W/E 08/10/19	Latest 4 Wks - W/E 08/10/19
	TOTAL TABLE WINE	**14,276,324,953**	**1,017,554,398**	**1.0**	**-0.3**	**159,228,182**	**11,367,944**	**-1.6**	**-2.6**	**7.47**	**7.46**
PRICE TIERS BY CONTAINERS	BOX	1,395,430,822	106,975,007	5.4	5.7	33,737,846	2,538,876	2.4	1.6	3.45	3.51
	$0-$3.99	576,952,124	42,732,688	-1.2	-0.8	20,046,318	1,474,192	-2.0	-2.5	2.40	2.42
	$4+	818,369,973	64,201,955	10.6	10.4	13,689,418	1,063,898	9.5	7.8	4.98	5.03
	Total Table Wine Glass	12,614,400,404	886,802,889	0.3	-1.3	122,198,822	8,553,242	-2.9	-4.0	8.60	8.64
	Value Glass $0-$3.99	654,042,508	45,864,170	-6.2	-7.3	16,282,741	1,135,757	-8.3	-9.1	3.35	3.37
	Popular Glass $4-$7.99	3,151,388,494	222,658,524	-5.2	-5.4	47,755,777	3,341,336	-6.0	-6.5	5.50	5.55
	Premium Glass $8-$10.99	3,313,251,224	228,213,493	-1.7	-3.6	29,218,317	1,995,408	-2.3	-3.9	9.45	9.53
	Super Premium Glass $11-$14.99	2,783,328,154	203,585,263	6.4	3.6	18,386,978	1,341,350	5.8	3.3	12.61	12.64
	Ultra Premium Glass $15-$19.99	1,385,893,128	96,241,477	6.6	3.6	6,763,513	468,255	5.9	3.7	17.07	17.12
	Luxury Glass $20-$24.99	570,332,274	42,382,818	6.5	4.0	2,179,631	161,278	5.2	3.8	21.80	21.89
	Super Luxury Glass $25+	751,471,489	46,820,373	3.2	-0.4	1,573,429	99,042	0.6	-1.6	39.79	39.38
IMPORTED	IMPORTED	3,762,591,827	276,453,913	0.5	-1.2	39,608,980	2,870,483	-1.6	-2.5	7.92	8.02
	ITALY	1,189,100,539	80,964,873	1.5	-0.8	10,391,678	710,748	-1.3	-3.2	9.53	9.49
	AUSTRALIA	719,245,047	49,584,853	-0.5	-2.3	11,780,460	829,725	-1.4	-2.2	5.09	4.98
	FRANCE	455,342,636	42,548,116	2.6	-4.2	2,884,503	267,057	-0.7	-7.1	13.15	13.27
	CHILE	254,276,631	17,646,184	-3.1	-1.5	3,835,713	272,565	-1.7	1.3	5.52	5.40
	SPAIN	158,690,481	10,451,914	-5.4	-9.3	2,015,063	135,965	-4.4	-8.1	6.56	6.41
	GERMANY	80,745,447	5,390,669	-5.2	-8.0	801,715	53,057	-3.0	-8.1	8.39	8.47
	NEW ZEALAND	483,906,196	41,924,308	8.8	9.5	3,482,177	301,203	8.5	9.0	11.58	11.60
	ARGENTINA	330,802,290	21,367,580	-7.2	-5.9	3,609,426	240,098	-9.2	-6.5	7.64	7.42
	SOUTH AFRICA	23,141,283	1,614,813	-8.9	-12.2	198,525	13,906	-10.5	-12.5	9.71	9.67
	PORTUGAL	40,209,412	3,368,010	3.2	-1.7	428,191	35,080	-2.8	-7.8	7.82	8.00
DOMESTIC	DOMESTIC	10,513,733,126	741,100,485	1.2	0.026	119,619,202	8,497,461	-1.6	-2.7	7.32	7.27
	CALIFORNIA	9,465,879,126	666,549,617	1.1	0.2	111,009,123	7,891,676	-1.7	-2.6	7.11	7.04
	WASHINGTON	610,264,721	43,306,417	-0.1	-5.5	5,071,632	361,117	-1.3	-7.2	10.02	9.99
	OREGON	206,377,861	15,326,612	13.1	9.7	1,053,489	79,781	12.0	9.1	16.32	16.00
	TEXAS	32,483,013	2,320,955	0.4	0.2	390,655	27,205	-2.3	-5.6	6.93	7.11
	NEW YORK	36,603,700	2,820,403	-1.4	8.1	481,975	31,145	-6.8	-3.0	6.33	7.55
	NORTH CAROLINA	40,855,459	2,775,667	2.4	0.6	424,406	28,716	1.1	-0.9	8.02	8.05
	INDIANA	23,677,535	1,573,960	0.2	0.3	260,966	17,482	-0.8	-0.7	7.56	7.50
	MICHIGAN	22,081,944	1,468,498	-1.7	-1.4	240,204	15,099	-1.4	-2.9	7.66	8.10
TYPES	RED	7,352,375,761	464,227,318	0.4	-1.8	73,137,412	4,706,268	-2.4	-4.0	8.38	8.22
	WHITE	5,823,212,521	452,319,092	0.9	1.1	69,827,452	5,350,290	-1.2	-1.1	6.95	7.04
	PINK	1,099,394,339	100,995,630	6.3	0.5	16,250,272	1,311,216	0.1	-3.7	5.64	6.42
VARIETALS	TOTAL CHARDONNAY	2,523,581,038	192,956,264	0.2	0.3	29,542,033	2,239,224	-1.9	-1.8	7.12	7.18
	TOTAL CABERNET SAUVIGNON	2,650,197,399	170,301,419	3.2	1.3	24,581,426	1,613,485	0.5	-0.6	8.98	8.79
	TOTAL PINOT GRIGIO/PINOT GRIS	1,324,186,750	105,066,722	2.7	3.1	17,205,960	1,352,189	1.6	1.3	6.41	6.48
	TOTAL PINOT NOIR	1,083,544,199	69,572,309	2.9	0.8	8,373,352	539,567	0.1	-1.8	10.78	10.74
	TOTAL MERLOT	719,242,771	45,426,656	-6.5	-8.8	9,935,748	636,441	-8.4	-10.7	6.03	5.95
	TOTAL SAUV BLANC/FUME	964,138,983	81,742,595	6.5	6.1	8,460,636	710,997	4.9	5.0	9.49	9.58
	TOTAL MUSCAT/MOSCATO	639,445,106	44,213,381	-2.0	-1.8	9,679,279	668,775	-3.9	-4.3	5.51	5.51
	TOTAL WHITE ZINFANDEL	275,513,527	19,432,523	-8.0	-7.4	5,548,618	387,641	-9.2	-9.7	4.14	4.18
	TOTAL MALBEC	255,161,499	15,632,684	-7.2	-7.0	2,389,097	149,764	-8.9	-7.2	8.90	8.70
	TOTAL RIESLING	236,996,329	16,373,312	-6.4	-7.4	2,607,661	177,022	-7.7	-10.6	7.57	7.71
	TOTAL ZINFANDEL	223,623,128	13,882,149	-2.5	-6.6	1,582,729	97,779	-5.8	-8.6	11.77	11.83
	TOTAL SHIRAZ/SYRAH	146,560,132	9,107,521	-7.8	-10.0	1,664,366	103,712	-11.1	-12.5	7.34	7.32
	WHITE BLENDS (ex. 4/5L)	221,894,938	17,039,582	-5.0	-3.6	2,709,977	207,699	-4.7	-2.9	6.82	6.84
	RED BLENDS (ex. 4/5L + CHIANTI)	1,840,036,869	113,559,317	1.1	-1.6	16,908,948	1,062,210	-0.6	-2.6	9.07	8.91
	ROSE BLEND	538,442,462	61,414,220	21.4	4.5	4,623,310	494,722	21.9	2.6	9.70	10.34
GLASS SIZES	750ML	10,300,615,896	722,633,182	1.5	-0.6	81,784,332	5,722,890	-1.0	-2.6	10.49	10.52
	1.5L	2,040,394,327	144,754,371	-4.7	-4.5	34,987,278	2,456,826	-6.0	-5.9	4.86	4.91
	3L	60,864,634	4,097,502	-8.7	-8.4	1,569,222	103,012	-11.4	-13.0	3.23	3.31
	4L	77,093,513	5,240,679	-9.5	-9.9	2,443,065	165,399	-12.4	-11.8	2.63	2.64
	187ML	103,986,791	7,771,907	-4.2	-7.2	1,268,596	93,829	-5.9	-9.3	6.83	6.90
	375ML	18,070,493	1,296,541	7.5	3.3	67,685	4,992	3.1	4.3	22.27	21.66
BOX SIZES	ex. 4/5L	912,468,794	71,173,173	9.4	9.3	16,244,838	1,251,782	8.0	6.6	4.68	4.74
	1L	30,836,535	2,403,234	13.3	4.5	462,679	35,899	10.5	1.9	5.55	5.58
	1.5L	26,931,419	1,999,735	4.3	-1.9	533,282	39,116	5.2	-3.8	4.21	4.26
	3L	653,238,197	50,378,201	8.5	9.1	12,590,141	964,609	7.8	7.4	4.32	4.35
	5L	482,959,102	35,801,694	-1.4	-1.0	17,492,929	1,287,090	-2.4	-2.8	2.30	2.32
	TETRA	232,730,330	18,828,432	13.1	11.3	3,125,666	248,398	9.7	5.5	6.21	6.32

Source: Nielsen

Help Protect Your Winery from Cyber Threats by Using These Key Strategies

Kevin Villanueva and Michael Parker

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YOUR COMPANY'S IT SYSTEMS are central to its business functions, helping it automate key processes, effectively manage and grow the business and protect employees and customers' sensitive information.

Cybersecurity breaches affect approximately 50 percent of companies in a 12-month period, according to the **Ponemon Institute**. However, knowing which threats cause the most damage and implementing defenses against them can help your company prevent or efficiently negate threats if they arise.

Below are a few top-trending cybersecurity threats your winery should be aware of and ways to prepare for, or reduce damage caused by, a security breach.

Determine Potential Threats

To hackers, a winery's greatest asset is its valuable customer data—specifically, customers' credit card information. As technology rapidly develops, hackers have found new ways to infiltrate company systems and steal valuable data.

However, knowing how to identify potential threats can help your company avoid or address issues before they affect customer data or cause serious damage. Some common threats that impact the wine industry include the following:

PHISHING

Phishing scams take the form of emails that trick employees into providing sensitive information, such as IT system login information, customer payment information or banking details.

Identification

Phishing emails are typically sent from fake accounts that mimic email addresses of seemingly legitimate sources, such as business partners or management representatives from your own company. However, the sender's email address will be slightly different from the email address it's mimicking.

An individual can identify a phishing email from a spoofed or fake email account by verifying the intended sender's email address. Inspecting the source email address may show that the attacker has used different characters in the address, such as an uppercase instead of a lowercase letter, or they may have extended the email domain by adding additional words to make it look legitimate.

RANSOMWARE

In a ransomware breach, hackers gain access to a company's systems by using malicious software to infiltrate its security mechanisms. They then encrypt the company's data, making it impossible for employees to access critical data or conduct business until a demand—or ransom (usually in the form of cryptocurrency, like **Bitcoin** or **Monero**)—is satisfied.

However, paying the ransom doesn't guarantee the hacker will decrypt the data. That means it's critical for a company to have reliable backup data, as well as a tested incident response plan, in case a ransomware attack occurs.

Identification

Typically, ransomware attacks are triggered by a phishing email that diverts the victim to an infected web page, which, unbeknownst to the user, downloads the ransomware program. Once the program is downloaded, it automatically begins encrypting the hard drive of the affected workstation and infecting other systems on the network.

Phishing emails are commonly used to trick individuals into initiating the ransomware infection process. However, teaching employees how to recognize phishing emails can lower the risk of a successful ransomware attack. Companies can also protect systems by installing recent security patches from their vendors and verifying that antivirus software is running on all network systems.

DIRECT DATA BREACHES

Direct data breaches occur when a company stores all or the majority of its critical business data on unencrypted laptops, tablets or mobile devices, and the device itself is compromised.

For example, if a winery stores its wine club membership database on a single company laptop that is lost or stolen, a hacker need only gain access to the computer itself to access the company's bank information, membership demographic information and customer cardholder data.

These breaches are especially damaging if the company hasn't replicated its membership database to another source, such as a cloud service, or regularly backed up its data. This is also dangerous to business continuity because the single instance of the data could become inaccessible due to hardware failures or data corruption.

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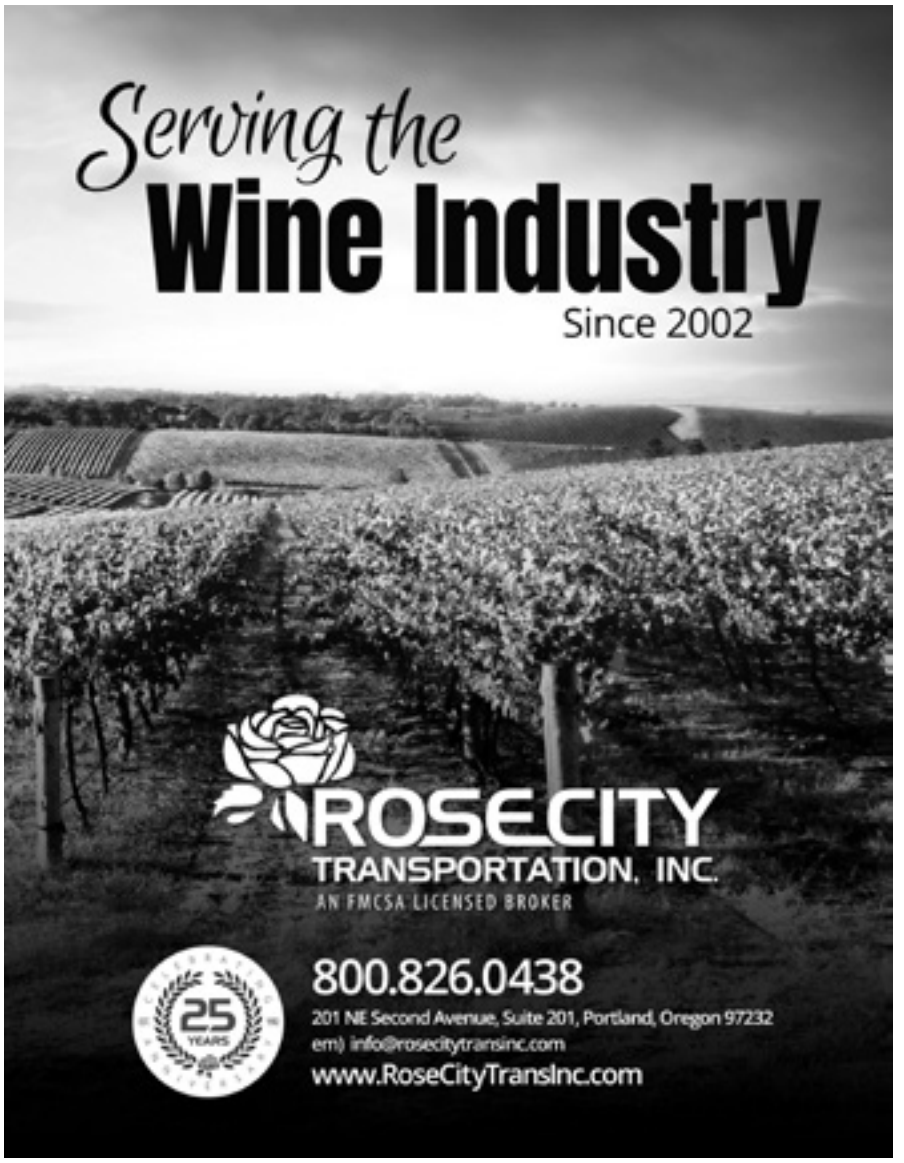

Help Protect Your Winery from Cyber Threats by Using These Key Strategies

Assess Your Vulnerabilities

After identifying potential threats, your company can begin assessing its vulnerabilities. In addition to lack of awareness, many wineries have vulnerabilities from failing to develop adequate processes around the following:

- Data controls
- IT systems access, security and use
- Incident response

IMPLEMENT DATA CONTROLS

Creating a system of controls is critical for having adequate defenses against cyberthreats. Here are a few primary controls your company can implement to help prevent or reduce damage:

- **Strong user authentication.** Using multifactor authentication, such as a one-time passcode or biometric reader, as well as individual login identifications and passwords, to authenticate a system user can help thwart a breach by an attacker who has access to user identifications and passwords.
- **Role-based access controls.** Role-based access controls limit the number of employees who have administrator access within a particular system. This can help reduce a breach's impact if the compromised user account has limited access to sensitive data.
- **Data leakage prevention.** Lack of data leakage prevention, such as allowing employees to extract data and transfer it to personal cloud storage locations, creates significant IT vulnerability. These storage locations may include **Dropbox**, **Google Drive**, **OneDrive** or portable media,such as USB thumb drives and portable hard drives. When a network isn't monitored for unauthorized data exfiltration, information can be lost, stolen or deleted.
- **Computer and mobile device encryption.** Computer and mobile device encryption is an essential part of keeping your winery and your customers' sensitive information safe. Strong encryption that has been implemented on a server, workstation and/or mobile-device storage can prevent sensitive data from exposure—even if the device has been lost or stolen.

INTEGRATE YOUR SOFTWARE SYSTEM

When a company's payment and data-management processes aren't integrated, it can create opportunities for error and inefficiency, increase the risk of a cyberattack and decrease the effectiveness of your incident response plan efforts.

Integrated Enterprise Resource Planning (ERP) and cloud-based systems can greatly increase operational efficiencies and reduce risk by providing the following:

- **Automated processes.** Automated processes significantly decrease the likelihood of phishing scams and direct data breaches. For example, if an automatic system or preapproved protocol doesn't exist for transferring funds or information, an employee is more likely to engage with a scammer instead of directing them to an online client portal.
- **Real-time visibility.** Real-time visibility allows your company to see and be alerted about data shifts as they occur. This can help your business monitor data across multiple branches and quickly respond to a threat as it occurs.
- **Centralized data.** Centralizing data on a server or in a cloud-based location allows your company to increase protections, decrease direct data breaches and quickly recover from an attack—provided there are appropriate backup and recovery processes in place. It also allows your professionals to safely access data from anywhere through remote access or a cloud-based storage browser.

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WINES VINES ANALYTICS

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DEVELOP AN INCIDENT RESPONSE PLAN

It's important to develop a recovery plan before an attack occurs. Your incident response plan should be applicable to the types of attacks that are most likely to impact your company, and each member of the designated incident response team should understand their role in the aftermath of a disastrous event.

In the event of a successful data breach, your company should follow these steps:

Phishing

- Notify your IT support provider about the suspected phishing email
- Block any further emails originating from the sender's email address
- Educate the victim of the phishing email and all other employees about recognizing future attacks
- Review logs on critical systems for any suspicious data exfiltration activities

Ransomware

- Notify local law enforcement or local **FBI** chapter
- Isolate the propagation of the ransomware as much as possible
- Enact your incident response plan to begin the recovery process
- Restore data from off-line backups or remote backup systems

Direct Data Breach

- Determine if the device that has been lost or stolen utilized whole-disk encryption
- Identify the type of data stored on the lost or stolen device.
- Request the user of the compromised account or device to change their network password and passwords to other online accounts with cached credentials
- Engage your legal department, local law enforcement and insurance carrier if there is a high probability that customer data will be exposed
- Initiate breach notification procedures to the victims of the attack, when appropriate

Create an IT Process

Developing a comprehensive, preventative IT process can help your company assess current risk and stay on top of future risks as they emerge. Your IT process may vary depending on the size or scope of your business.

SMALL BUSINESS APPROACH

If your company has fewer than 100 employees or less than $25 million in revenue, the following IT security process will likely stay within your security budget while helping you deter and address future threats.

- **Start the conversation.** Your company's ownership and management should discuss the company's IT risk and potential threats.
- **Establish a proactive risk approach.** Develop an approach for staying up-to-date on top-trending threats and consistently monitor your IT environment. This could include holding monthly cyber-risk meetings or hiring an outside advisor.
- **Create a system.** Create policies to govern user behavior and protect company, customer and employee data. Make sure your system's security controls help enforce those policies.
- **Provide ongoing employee education.** Ongoing education is especially important for small businesses because their technologies for protecting systems and data may be less robust. That means there are more opportunities for individual employees to make decisions that compromise your data. Educational opportunities make each employee aware of potential threats and their role in protecting the company.

LARGER BUSINESS APPROACH

If your company has more than 100 employees or more than $25 million in revenue, the following IT security process will help you monitor risks and protect your company.

- **Conduct a cyber-risk assessment.** Large companies may need to hire externally to conduct an initial cyber-risk assessment. An assessment identifies potential risk areas that can help threats materialize and recommends improvements for addressing them.
- **Identify controls.** Establish or strengthen controls revealed by the cyber-risk assessment. Controls could be technical, administrative or physical in nature, and should apply enterprise-wide. Examples include implementing data leakage prevention solutions, instituting a mobile device security policy and adding surveillance cameras to server rooms.
- **Create policies and procedures.** Assess and review your company's controls regularly, and create policies that govern how frequently cyber-risk assessments must be performed. These policies should identify who is responsible for planning regular assessments and how frequently they should occur.
- **Provide educational opportunities.** Providing ongoing training opportunities can help your company stay aware of emerging threats and steps each employee can take to protect company data. Regularly testing employees' awareness by periodically simulating attacks will help indicate if additional training is necessary.

Next Steps

Developing a proactive cybersecurity plan can help your company neutralize or prevent an attack before it compromises data and causes reputational damage. To learn more about identifying, addressing and preventing cyber-threats, contact a professional, watch our webcast or view our cybersecurity guide at *mossadams.com*. WBM

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Winemaking & Wineries

Winemaker **Willem Johnson** will join the growing community of Texas AVA wineries with his new project **Deschain Cellars** expected to open on US-82 in the fall of 2019. Johnson, winemaker for **4R Ranch Vineyards & Winery**, and his partner **Kristin Mapstone**, owner of a boutique marketing agency, purchased the ten-acre property in 2017 with the goal of building a winery out of recycled building materials to launch their own label.

Lisa Allen

Lisa Allen was hired as **Coursey Grave**'s first general manager. Allen will be responsible for daily operations for the Bennett Valley estate and the Healdsburg tasting room as well as sales through DTC plus a small distribution network. She joins Coursey Graves from **Young's Market Company** where she served as director of client services for **Trinchero Family Estates**, managing sales and programming for the general market of California.

Roust Corporation appointed **Scott Oliver** as CEO of Roust Americas. In his new position, Oliver will report directly to **Pavel Merkul**, CEO of Roust Corporation, and be responsible for all aspects of the company's consolidated business throughout the Americas. Oliver will carry out strategic planning and operational management of the company, including sales, marketing, finance, HR, production, supply and legal support of the business.

Ste. Michelle Wine Estates named **David Andrews** the new vice president—**Antinori USA**. In this national role, Andrews will be responsible for leading a dedicated Antinori sales team across the country to meet strategic sales goals for the Antinori wine portfolio and other strategic luxury wines in the Ste. Michelle Wine Estates portfolio.

O'Neill Vintners & Distillers appointed **Marty Spate** as vice president of winemaking and winegrowing. Spate, based in Paso Robles, brings 14 years of experience in enology, high case production winemaking and winery general management to the role. As vice president of winemaking, Spate will oversee the entirety of O'Neill's 7 million case wine production from grape to wine.

Bryan Moreno

WX Brands promoted **Bryan Moreno** to senior vice president of global sales. In this role, Moreno will oversee all sales management and development for the company.

Grassini Family Vineyards announced **Dean McKillen** as its new national sales manager. McKillen previously worked as a sales representative and the key accounts brand development manager at **J&L Wines** distribution company for 10 years, specializing in on- and off-premise high-end wine sales while representing some of the most coveted brands on the Central Coast.

Phantom Creek Estates hired **Francis Hutt** as its new winemaker. Hutt has made wine on both the north and south islands of his native New Zealand—in addition to participating in harvests in Oregon, Burgundy and Australia's Hunter Valley—developing a deep knowledge of organic and biodynamic winegrowing.

Jessica Kollhoff

J. Lohr hired **Jessica Kollhoff** as its director of hospitality and direct sales, and **Kasey Martin** as the company's wine club and member services director. Both Kollhoff and Martin operate out of J. Lohr's Paso Robles facilities. Kollhoff joined J. Lohr from compliance agency **Compli Beverage** where she was VP client services. Martin was most recently DTC program manager at **Adelaida Vineyards & Winery**, where she directed all aspects of consumer engagement strategies.

Phantom Creek Estates welcomed **Santiago Cilley** as its new CEO. Cilley started his wine career working for **Jackson Family Wines** in California, where he spent nine years spearheading strategic projects in close collaboration with late founder **Jess Jackson**. He's also worked for the export-oriented **Via Wines** in Chile, **Alejandro Bulgheroni Family Vineyards** in Napa and **Renwood Winery** in the Sierra Nevada Foothills. He holds a master in business administration from the **Haas School of Business** at **UC Berkeley**.

Hedges Family Estate named **Grace Ruehle** to the new role of vice president of sales. In this international role, Ruehl will be responsible for leading the sales team and growing sales throughout the U.S. and globally.

Round Pond Estate owners **Miles and Ryan MacDonnell** announced that **Michael C. Mathews** has joined the winery as vice president, finance. Mathews will oversee all financial operations of the family-owned winery based in Rutherford, Calif.

Opus One Winery hired **Ian Blessing** as its new hospitality manager. Blessing will be responsible for the training and development of associate talent within the guest relations department, along with implementing service strategies for the guest experience at Opus One.

Greg Miller was hired as the new sales and marketing manager for **Opus One Winery**. Miller will be responsible for the management of allocations, pricing and marketing projects, along with overseeing all requests made from sales force, distributors, négociants and accounts.

Constellation Brands, Inc., elected **Christy Clark**, senior advisor at **Bennett Jones LLP**, and **Jose Manuel Madero**, honorary advisor of the **COFINECE** (National Council for the Promotion of Investment, Employment and Economic Growth) at the Office of the Chief of Staff of the President of Mexico, to serve as members of its board of directors, effective September 24, 2019. This election increases the size of Constellation's board from 10 to 12 members.

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Distributors, Importers & Retailers

Wilhelm Klinger became the managing director of Austria's leading wine retailer **Wein & Co**, which since 2018 has been part of the German conglomerate **Hawesko Holding AG**. In this role, Klinger will also become a member of the **Hawesko Group**'s 'corporate strategy circle' and turning over the management of the **Austrian Wine Marketing Board** (AWMB) to his successor **Chris Yorke**, after serving for 13 years.

Ed Hogan

Chambers & Chambers announced that **Ed Hogan** is now its senior vice president of sales and marketing. In his role, Hogan will be responsible for leading a dedicated sales team across California and Hawaii to meet strategic sales goals.

Chris Cannon, owner of **Jockey Hollow Bar & Kitchen**, welcomed **A.J. Capella** as executive chef, replacing **Craig Polignano**. Capella has also worked with Anthony Bucco at **Uproot**, as well as in **Grant Achatz**'s restaurant, the **Aviary** (NYC). Most recently, he was head chef at **A Toute Heure** in Cranford, New Jersey.

Breakthru Beverage Group promoted **Gus Bozzo** to executive vice president, national accounts, a newly-elevated position reporting directly to COO **E. Lloyd Sobel**. The company has also hired four senior leaders who will report to Bozzo. The newly-expanded team is intended to allow the company to drive an increased focus on retail, on-premise, category development and national account client services. Today, national retail and on-premise customers account for nearly 30 percent of Breakthru's overall beverage alcohol sales nationally. Also, Breakthru Beverage Group appointed **Joseph Bruhin** senior vice president and chief information officer. Bruhin will serve on Breakthru's Executive Leadership Team and oversee the implementation and execution of a wholistic IT strategic plan.

Industry Services & Suppliers

Anne Deraisme

Anne Deraisme was appointed international sales manager for **Orchidees, Maisons de Vin**'s Loire Valley wine portfolios—**Meilleurs Terroirs and Esprit de Loire**. Under the guidance of managing director **Bernard Jacob**, she will be developing these two still and sparkling Loire Valley wine portfolios.

American Winesecrets LLC, (Winesecrets) announced that **Dan Towers** has joined Winesecrets' California team as a client solutions specialist. Towers, a certified sommelier, has an extensive background in the wine industry with over 20 years of experience in fine wine and brand strategy. Towers previously worked with **Southern Wine and Spirits**, **American Wines** and **Young's Market** in the wine industry.

Logan Lloyd

Graphic designer **Logan Lloyd** joined **Pen & Tell Us** to create compelling visual content for the agency's brewery, distillery, and winery clients. She has previously created stunning graphic design, package design, and advertisement for **Tito's Handmade Vodka**, **Austin Eastciders**, **Circle Brewing**, **Shiner Beers**, **BridgePort Brewing** and **Trumer Brewery**. She holds a bachelor of fine arts in digital and photographic imaging from **Texas State University-San Marcos**.

Tara Gutherie

Tara Gutherie joined **Pen & Tell Us** the staff as a marketing director responsible for public relations and digital media strategies for several of the agency's clients. Gutherie most recently served as director of marketing and public relations for Texas winery **William Chris Vineyards,** where she built and managed all marketing communications systems and user experience for the company's digital platforms.

Igor Boccardo is the new chief executive officer of **Genagricola SpA**, the agri-food holding company of **Generali Italia**. Boccardo joins Genagricola after gaining experience as head of marketing, sales and general manager in major multinational companies operating in the consumer goods sector.

First Growth Brands (FGB), a Tiburon-based premium brand builder and owner of **Faire la Fete** sparkling wine, hired **Peter Neptune**, MS as senior wine advisor. In this role he will be conducting multiple consumer as well as trade and press seminars and events focusing on the First Growth Brands portfolio. Neptune is a a 31-year veteran of the wine industry; he achieved the title of Master Sommelier in 2005.

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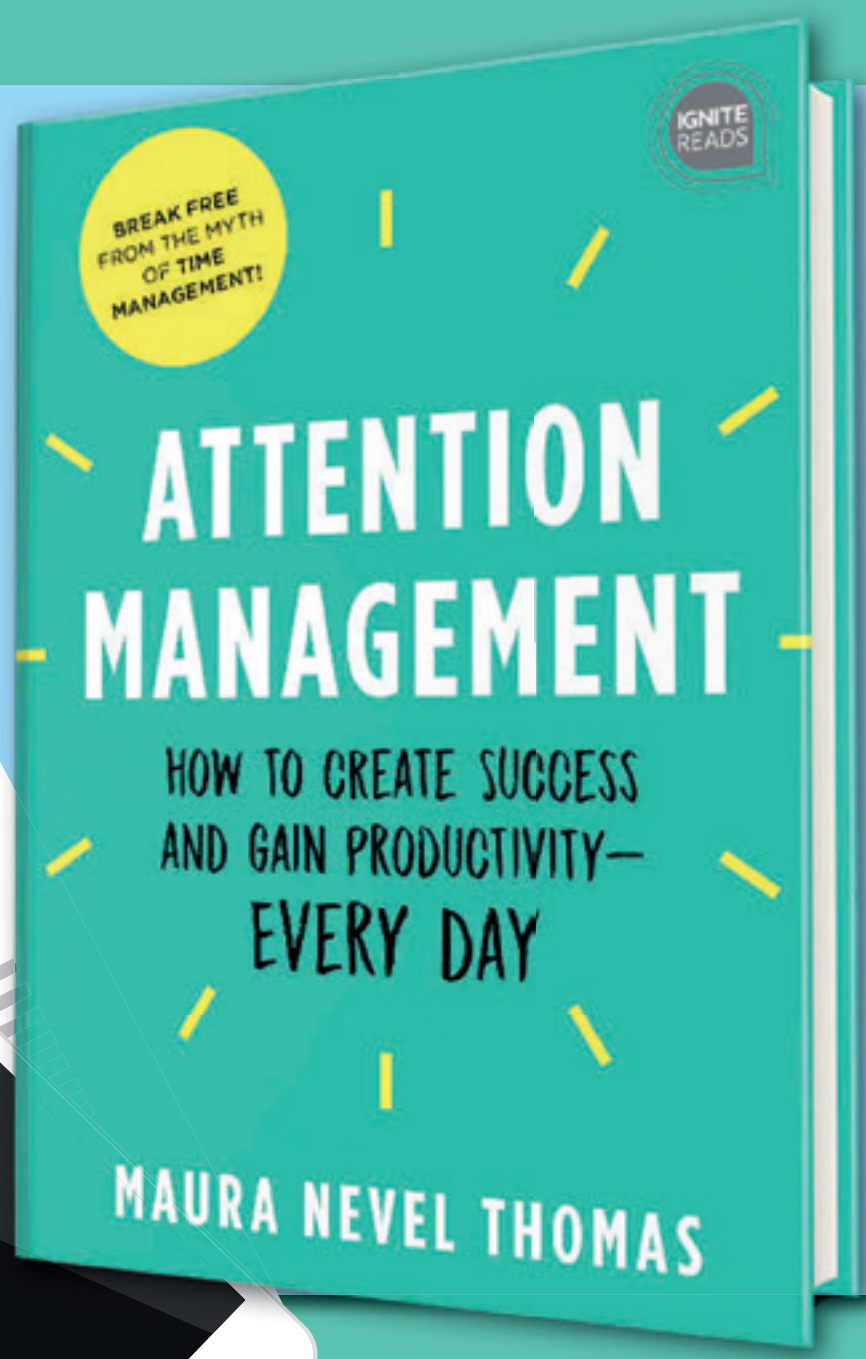

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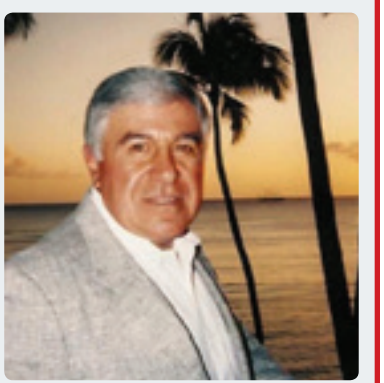
Associations & Education

The **Court of Master Sommeliers**, **Americas** is proud to welcome seven members to the organization: **Nick Davis**, **Medium Plus**, Seattle, WA; **Mariya Kovacheva**, **Pernod Ricard**, West Palm Beach, FL; **Justin Moore**, **Vetri Cucina**, Las Vegas, NV; **Vincent Morrow**, **ONE65**, San Francisco, CA; **Joshua Orr**, **Broadbent Selections**, San Diego, CA; **Jeremy Shanker**, **Michael Mina**, San Francisco, CA; and **Jill Zimorski**, Champagne Specialist Representing **Moet Hennessy** Champagne Portfolio, Chicago, IL.

Susan Sokol Blosser, co-founder of one of Oregon's original and most iconic wineries, was named the sole recipient of the 2019 Diploma of Honor by the **Fédération Internationale des Confréries Bachiques** (also known as the FICB). This award is given to individuals who have been globally recognized for their expertise and achievements in relation to wine and who support the values of the wine brotherhoods. Sokol Blosser is one of only a few Americans—and only the second American woman—to receive this honor.

Obituaries



Wine pioneer **Thomas Halby** has passed away. He helped establish many prestigious wineries from Napa and Sonoma, including **Kendall Jackson**. He traveled the world sourcing fine wines to bring to the American market by importing wines from Germany, France, Spain, Portugal, Italy, New Zealand, Australia, Chile and South Africa.

The Sierra Vintners Association (SVA) has retained **Camron King**, wine and luxury food industry veteran and founder of **Oakwood Strategic**, to serve as the association's executive director. Working with the **California Association of Winegrape Growers** (CAWG), the **Lodi Winegrape Commission** and **National Grape & Wine Initiative** (now **National Grape Research Alliance**), King brings a number of different experiences from marketing and public relations, research, and government affairs together with overall membership development, education and association management together to bring value to the SVA.

Peter Marks, MW has joined the **Napa Valley Wine Academy** as a partner and vice president of education, managing several key aspects of the Academy's business. Marks will lead corporate business development at the company's Napa headquarters; create new course content and offerings such as master classes and specialty tasting courses; and instruct courses at the academy. **WBM**

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STATEMENT OF THE OWNERSHIP, MANAGEMENT AND CIRCULATION as required by the Act of Congress on October 23, 1962, Section 4369, Title 39, United States code for Wine Business Monthly, published monthly, in Sonoma, CA.

1. The date of this filing is September 24, 2019

2. The location of the office of the Publisher is 35 Maple St., Sonoma, CA 95476

3. The name and address of the Publisher is: Eric Jorgensen, 35 Maple St., Sonoma, CA 95476

The name and address of the Editor is: Cyril Penn III, 35 Maple St., Sonoma, CA 95476

4. Wine Business Monthly is owned by Wine Communications Group, Inc. A California Corporation.

5. For the year preceding this filing:
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Eric Jorgensen, Publisher Wine Business Monthly

James Callahan, owner/winemaker, Rune Wines, Sonoita, AZ

"The remote nature of making wine in Arizona has made it difficult to gain knowledge on winemaking trends, research and technologies. *Wine Business Monthly* combats this by serving as an industry portal that brings knowledge into the palm of my hand. Being more than just a winemaker means *WBM* really serves me in multiple areas. An article from Nov. 2010 titled "Product Review: Buying Tractors for Narrow Row Vineyards" helped me decide which tractor to buy for my vineyard. This seemingly small decision ultimately affected the row width and orientation along the hillsides, which will impact the resulting wines for many years to come. Another great resource has been the recent series of Varietal Focus articles. It is interesting to see wineries from all over the country participate in the roundtable discussion of what they do to make the best possible wines in their given terroir."

NAME AND TITLE: James Callahan, owner/winemaker

WINERY NAME AND LOCATION: Rune Wines in Sonoita, Arizona is the culmination of a dream to establish an off-grid winery and vineyard in the rugged terrain of Arizona. Our high elevation (4,900 ft.), along with the summer monsoons, limestone soils and wild yeast fermentation, aid in creating wines that express finesse, balance and concentration.

ANNUAL CASE (OR GRAPE/TONNAGE) PRODUCTION: 1,500 cases

PLANTED ACRES: 3 acres

CAREER BACKGROUND: In 2005 I began my journey into the world of wine. Freshly minted with a history degree from Arizona State University, I did what every liberal arts major would do—I pursued a job in the restaurant industry. While learning the ins and outs of the wine industry from the server and sommelier side of the craft, I began to envision myself as a winemaker. In 2007 I completed my first harvest with PurVine Winery in Tempe, Ariz. Three years were spent making Napa Valley Cabernet Sauvignon and learning as much as I could in the process. I then traveled to Walla Walla, Wash., to work a harvest with Waters Winery. The experience really opened my eyes to the potential of a burgeoning wine industry. From Walla Walla, I ventured to Paddy Borthwick Vineyards in New Zealand. Here I gained an international view on the craft while working with Burgundian varieties for the first time. This international experience led me to Kosta Browne in 2010, where I worked as cellar master. Kosta Browne's wave of success led me back to where it all began, and in 2012 I came home to Arizona. I took a job as the winemaker for Aridus Wine Company in Willcox, where I crafted my first wines from Arizona fruit. In 2013, I left Aridus and started Rune. Over the past five vintages I have slowly built Rune into what it is today while making wine for multiple Arizona wineries in my spare-time.

WHAT HAS BEEN YOUR BIGGEST PROFESSIONAL CHALLENGE? The biggest professional challenge has been bootstrapping Rune from the ground up. Taking a raw piece of land and transforming it into a viable business with my own hands over the last few years has been immensely difficult but also incredibly rewarding.

VARIETALS THAT YOUR WINERY IS KNOWN FOR: Syrah, Grenache, Viognier, Petite Sirah, Mourvédre

Thinking Small


ILLUSTRATION BY BOB JOHNSON

THIS COMING JANUARY MARKS 20 years that we have been living in the "new" house. The house has held up well in the face of the onslaught of entertaining that goes on here. For the first 10 years, the La Bamba burrito wagon would set up every night across Hwy 12 in the empty dirt lot. La Bamba was a key component of entertaining at our house. Guests would come over, drink some sparkling wine and then sit at the table for a five- or six-course dinner with wonderful, eclectic wines. We'd finish dinner around 10, and then sit around talking, laughing and drinking wines while listening to music. By 1 or 2 a.m., people would get hungry, so we'd cross the highway and load up on delicious Mexican food for our late-night snack.

PG&E booted La Bamba out 10 years ago (an unconscionable act viewed by this detective almost as egregious as starting all the fires for the past several years). La Bamba moved just six blocks away; but after sucking down bottles of wine for hours, six blocks is a bit too far for our sweetly juiced guests to walk, and we certainly are not piling them into a car to drive. Instead of a La Bamba run, now we rely on Jakelyn's mother whipping up some of her famous, incredibly thin, deliciously crispy hash brown potatoes. I don't know why, but once the hash browns are served, it signals a switch to hard liquor for the guests, suggesting that the evening's festivities will soon be over.

Next to the dirt lot, where La Bamba parked for 10 glorious years, sits another neighborhood treasure, La Super Favorita Carnicería. This small market is Jake Lorenzo's primary grocery market, not to mention my favorite butcher in town. Walking into Super La Favorita is like walking into Mexico, and this detective makes the trek 15 to 20 times a week.

The market sells no wine, liquor or beer, but they sell Mexican brand beans, oil and cookies. Their tiny space is jam-packed with items. Virtually anything you might need can be found there, except parsley, because they only have cilantro. They have Mexican brand marinades for carne asada or pollo and plenty of choices of achiote paste. While their produce is not always the freshest, they often have beautiful Mexican papayas, an incredible selection of fresh and dry chile peppers and the cheapest price on cherries when they are in season. All the fish they sell is frozen, which means this detective ain't buying any, but like Chuy tells me, "Carnal, son una carnicería, no una pescadería." They are a meat market, not a fish market, and what a great meat market it is.

They get fresh whole pigs twice weekly and break them down by hand into marvelous cuts that you can't get elsewhere. While they have all of the typically thin-cut meats found in Mexico, they can also set you up with a 2-inch steak if you want or even a whole bone-in ribeye if, like Jake Lorenzo, you need to cook up some prime rib for the holidays. They have huge, fatty chickens that taste like real chicken when you cook them. When I request it, they get me bone marrow, rabbits, goats and whole suckling pigs.

More than the great meat, the Mexican products and the carnitas they cook each weekend, Jake Lorenzo just likes that the place is a small, family-owned operation. I love walking into La Super Favorita and being greeted with, "Jake, como estás?" This detective appreciates that they will try to get anything I request. I enjoy the camaraderie of the customers and their surprise when they hear me speaking Spanish. I enjoy meeting their kids, listening to their cooking advice and just watching the sheer quantity of food that the customers purchase, especially on weekends and holidays. It's not a fancy supermarket, but it has most everything I need, and I like everything about Super La Favorita just the way it is.

All too often, places start small but then get too big. Wineries want to make more wine. Chefs can't wait to open more restaurants. Small markets envision a chain of stores. Expansion is hard, especially if there is a quality standard you are trying to maintain. Jake Lorenzo thinks this has to do with our fascination with wealth and celebrity. Society seems to treasure success, and that success is measured in dollars. It is difficult in today's media-driven world to simply do something well in one place for a long time.

Jake Lorenzo remains attracted to small, quality places. I love a bakery that has its own unique flavor profile, especially if the bread has a toasty crust protecting a soft, flavorful dough center. I much prefer a stand-alone charcuterie with its case of homemade delicacies than waiting in line at a store deli that simply cuts meats they have purchased from giant conglomerates. It is rare, but whenever I encounter someone who really knows and understands cheeses, I will go there two or three times a week and follow every recommendation they give me.

Over the years, Jake Lorenzo has met wine shop purveyors who sought out special wines from small wineries. They knew the vineyard and vinification regimens for every bottle in their wine shop and could tell wonderful stories about the owners or winemakers. For this detective, a wine shop must have knowledgeable people, who are not trying to impress me with their knowledge, but who are instead excited to find a customer interested in and willing to try their wines. I want someone who will introduce me to new things and then remember which ones I liked most so that future recommendations are more likely to delight my palate.

"I want someone who will introduce me to new things and then remember which ones I liked most so that future recommendations are more likely to delight my palate."

On my last trip to Madrid, I visited the same wine shop every day for three straight days, just so I could talk to the owner about wines from Ribero del Duero. He would pull wines from the shelves, place them on his countertop and tell me about the wines, the flavors and which had the most tannin or the richest finishes. I bought three bottles of Ribero del Duero wine from him each day. When we were done, I had a pretty good idea of Ribero del Duero and a wine shop to revisit whenever I return to Madrid.

But Madrid is a long way off, and Jake Lorenzo needs wine every night. That's why there are wine cellars. A wine cellar is like a private wine shop and you are the owner. Talk to your guests about the choices but don't talk too much. Assess what they like and give them something they are sure to enjoy. Tell them a good story about the winery or the cellar rats, but keep the corks popping. Do a good job and those guests will be back every time they are in the neighborhood. **WBM**

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