



THE CHANGING
CLIMATE THAT IS
SHAPING NORTHWEST
VINEYARDS

WEATHER

REPORT

BY JULIA WAYNE

What happens to crops when farmers can't control the expectation for precipitation or the supply of water? For many agricultural products, the immediate reaction might be to imagine the worst. Most crops desperately need water: constantly and in great quantities. Avocados, lettuce, tomatoes, even hardy apples suffer and die without the right amount of water—but grapes are different.

In 2015, farmers all up the West Coast were forced to consider how a drought would affect their livelihood. Meanwhile, a larger problem has been brewing: climate change. This hot topic involves not just the higher temperatures some fear, but also more extreme weather in every sense.

Scientists, growers, producers and other wine industry professionals in the Pacific Northwest have identified key issues beyond the obvious. And while not everyone agrees with what is happening in the atmosphere, studying the effects on vines brings a bigger conversation to the surface.

INTENTIONAL STRESS

"The viniferous vine is indigenous to Mesopotamia and is well suited to desert-like conditions," says James Lechner, a Seattle-area sommelier and wine director. "Many viniferous varieties thrive in areas that get less than 20 inches of rain annually, with most of that falling in the winter."

Stressing plants through dehydration has long been understood to be a strategy that improves the flavor of wine. The basic principle is that withholding water from easily found, plentiful sources causes vines to go deeper into the soil in search of water sources. This "stress" can have temporary effects that appear to be negative, but it leads to better grapes and better wine in the long term, as the complexities of the grapes become more concentrated.

PHOTO BY ANDREA JOHNSON PHOTOGRAPHY





Coeur de Terre Vineyard



Doubleback Winery



Benson Vineyards Estate Winery

“SO OUR VINES, BY NATURE, BECAUSE OF THE WAY WE GROW THEM IN OREGON, ARE MORE SUITED TO WITHSTAND DRY SEASONS LIKE WE HAD” IN 2015.

—RUDY MARCHESI, MONTINORE ESTATE

In 2015, Washington endured through its second year of drought. Lack of rainfall and high temperatures left more than 68 percent of the state in extreme conditions. The Washington State Legislature allocated \$16 million for 2015-17 to help reduce or eliminate hardships from the statewide drought.

In Oregon, many growers employ a technique known as “dry farming,” which is the intentional starvation of plants from accessing water. Although these farmers have the capability to irrigate their vines if needed, dry farming is a more intense form of stressing that forces vines to find water on their own.

Montinore Estate owner and winemaker Rudy Marchesi points to his dry farming techniques and organic, biodynamic methods as the reason for more adaptive vines and better wines. Without water provided to them, vines reach deeper and wider each year, broadening their root systems with more varied food sources, thus creating more interesting wines and riper vines, Marchesi says of his Forest Grove, Oregon, vineyard.

Organic practices also come into play. “It’s been well-documented that plants that are organic have bigger, more developed root systems,” Marchesi says, noting Oregon has the greatest percentage of certified sustainable vineyards in the world. “So our vines, by nature, because of the way we grow them in Oregon, are more suited to withstand dry seasons like we had” in 2015.

At Washington State University, Michelle Moyer works as an assistant professor in the department of horticulture and as a statewide viticulture extension specialist. She is quick to note that all stress isn’t necessarily good stress. “Everybody performs better under a little

bit of pressure,” she says. “But, when you put too much pressure on them, nobody performs. That’s true with humans and plants.”

Southward down the coast, Napa Valley experienced its fourth year of droughts. A state of emergency was called all up the coast, and water restrictions mounted.

In California, a lack of water results in a cut across the board in water rights for everyone. However, in Washington, water rights are distributed differently. If there is a shortage in water availability, “senior” water rights holders—mainly tree fruit farmers—could continue to use water as usual while “junior” holders—including many grape growers—will lose out.

IRRIGATION AND CONSERVATION

In Washington, the most common way to irrigate is with drip irrigation systems, which run punctured hoses alongside plants to direct water with minimal waste and evaporation. It would seem to follow that with the threat of water’s continued scarcity, all vineyards would want to commit to this method, or to a similarly

sustainable style of water distribution. But inputting new irrigation systems is expensive, and it’s not always feasible to insert these systems until the threat is real.

At Fruition Sciences in Oakland, California, a vineyard irrigation researcher, they’ve invented a “Sap Flow Monitoring System,” which functions like a blood pressure cuff, informs sommelier Lechner. By monitoring the systolic and diastolic pressure of sap (which is 99 percent water) as it flows through the vine, it can tell how all parts of the plant move water.

“This not only tells us when the plant is experiencing hydric stress, but also where,” Lechner explains. “The ‘where’ is big. Researchers have discovered that the vine is able to detect when one side of a root system is experiencing stress, and then send water and nutrients over to the deficient side. Knowing when hydric stress occurs allows for dialing in irrigation schedules, and ultimately helps producers conserve water.”

And as for where that water actually comes from, sourcing is important—groundwater is carefully regulated in Washington. However, in California, it’s not as strictly monitored. WSU’s Moyer points out that in years when groundwater is not sufficiently recharging, the excess drawing of water from wells may hurt groundwater levels.



Montinore Estate

LEFT PHOTO BY CWK PHOTOGRAPHY,
TOP PHOTO BY ANDREA JOHNSON PHOTOGRAPHY

BOTTOM LEFT PHOTO BY DAVID LANTHAN REATHER,
CENTER RIGHT PHOTO BY ANDREA JOHNSON PHOTOGRAPHY



THE IMPACT OF FIRE

On August 14, 2015, rampant wildfires closed in on Chelan, Washington, causing a mass evacuation and severe damage to many homes and businesses, including one winery. Ventimiglia Cellars owner Ron Ventimiglia cleared his tasting room of his final customers, and was able to get out with only two cases of wine before the fires overtook his winery. The entire 2014 vintage, aging in barrels, was destroyed, alongside thousands of bottles of wine from previous vintages.

Nearby wineries and homes were vacated as the fire, caused by a lightning storm, tore through the area. By the end of the summer, more than a quarter of a million acres burned in Washington alone—about 100 square miles greater than the size of New York City. Across the country, upwards of 8 million acres went up in flames, with a significant portion of that on the West Coast. Beyond Ventimiglia, growers and winemakers worried about the effects the fires could have on their livelihood.

Even if vines do not burn, nearby fires can still damage grapes if the vines are exposed to ash from the fires. The ash brings the threat of smoke taint, a flavor that overwhelms grapes during production, oftentimes ruining the wine made from them with harsh smoky aromas and flavors that mute other positive qualities of the wine.

At Washington State University, viticulture specialist Michelle Moyer says the level of the smoke taint in wines has to do with the fire source. What burns matters, and in Washington, there is an abundance of deciduous wood species that can produce more smoke and smoke taint particles when burned.

Additionally, there's a big variance in smoke taint between the wines made in the threatened regions. Potential smoke taint-causing compounds are absorbed by grape skins, and because most red wines ferment on the skins and most white wines do not, red wines are typically more vulnerable to smoke taint than white. In Chelan, wineries produce a lot more white wines than they do red, further mitigating the effects of the 2015 fires.

Other than the acres that were burned directly, Moyer says there was very little impact on Washington. Compared to other factors—like climate change in general—she says fire takes a small hit on grape production overall.

In Oregon, 86,000 acres burned, with less drastic effects on the industry. Michelle Kaufmann, communications manager at the Oregon Wine Board, notes that while fires were a concern for winemakers and growers, putting all involved on high alert, they never made it to the vineyards.

Washington State Wine Commission Communications Director Michaela Baltasar isn't overly worried about the fires from 2015, especially considering the Chelan AVA makes up less than 1 percent of the state's wine growing regions and is the smallest in acreage. "Losing Ventimiglia was tragic," Baltasar says. "Most of the wineries in Lake Chelan area are small, family-run operations. People put their heart and soul into these businesses. The loss of any of these wineries is a blow to the local community."



Maryhill Winery



Tunnel Hill Winery

For much of the Northwest, the ability to withstand drought is tied to snowpack in the mountains and the changing climate will become more important as extremes affect expected quantities of precipitation. "If you actually look at total precipitation in the mountains, it was pretty good," Moyer says. "But it all fell as rain, and when it falls as rain it's not stored. Whereas snow is a great way to store water."

On paper, when the snow falls in the spring, it releases the water slowly into the irrigation systems, providing water for the entire summer. Moyer says when rain is all that falls, the water comes all at once without the capability to store it naturally and sustain for the system.

THE THREAT OF EXTREMES

Whether political semantics title it "climate change" or "global warming," top scientists in the field are worried about the effect that weather changes could have on the region.

"One of the biggest challenges we talk about (with) climate change is that people make the assumption that we know what's going to happen and we don't," Moyer explains.

While people may think climate change just means warmer weather, scientists don't believe it will come across so simply. Rather, Moyer agrees with the predictions of climate change models that state we may be seeing more instances of extremes—from storms and cold to heat, drought and precipitation.

"I honestly think this winter will really stimulate the discussion of where we go in (the region) and really start to focus on how we are going to conserve water and how to deal with more efficient water delivery systems in the future, versus staying with the status quo," Moyer

says. She worries that if snowfall increases this winter, most people may forget about the drought temporarily and the need for water conservation for production agriculture.

In regards to these extremes, the biggest problem is the randomness. In areas such as Eastern Washington, extremes are uncommon, and regular cycles of cold nights greeting warm days are the norm. Moyer says very cold weather events in the winter can damage grapevines by causing an unpredicted loss of yield. On the contrary, she says heavy rain events in the summer can pose a challenge for canopy management in areas where growers are using that method to control vine growth by withholding irrigation water.

For random spikes of heat, if these extremes include more or longer hot periods, canopy management will become increasingly more important. Hanging more vines can protect grapes from sunburn with extra canopies of leaves. Leaves bask in sun to kickstart photosynthesis, while



"ONE OF THE BIGGEST CHALLENGES WE TALK ABOUT (WITH) CLIMATE CHANGE IS THAT PEOPLE MAKE THE ASSUMPTION THAT WE KNOW WHAT'S GOING TO HAPPEN AND WE DON'T."

— MICHELLE MOYER, WASHINGTON STATE UNIVERSITY

dappled shade protects fruit from raisination, sunburn and over-ripening.

With extremes come new hazards. Moyer points out that high heat and low water actually decrease plant disease threat, while extreme cold can activate plant diseases, like crown gall which causes tumors that strangle the plant to death. Warm weather can cause more insect pressure and their spread of disease, resulting in reduced yields of fruit, lower berry quality and more. In short, extreme weather one way or another means more management of pests and disease among plants.

The wines from the 2015 vintage in Washington, Oregon and the greater Northwest could be among the best in recent history. In spite of the fires, droughts, impending climate change and potential plant disease, this was one of the driest years in the region and stressed vines spent the season shooting roots deep into the earth in search of water. Grapes above ground intensified their flavor, to the delight of winemakers. With the patterns of weather and climate conditions changing each year, the most producers can do is educate themselves, adapt to the changes and hold on for the ride. ●