

# Wine connoisseurs face testing times as climate change alters flavors

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Global warming is affecting vineyards and the taste of wines.

Wine aficionados like to credit different soil and geographical conditions for producing a wide spectrum of flavors for the same [grape varieties](#)—even within the same area. When it comes to one of Europe's

favorite drinks, people tend to think a "typical" [taste](#) profile exists for each region.

The trouble is, climate change may be altering the baseline.

## **Goût de terroir**

Dr. Gabriella M. Petrick has thought a lot about how climate change affects the taste imparted to wines by their unique geographical and climatic profile—what is usually referred to in the business as the "terroir." The issue affects everything from full-bodied reds made from the Cabernet grape associated with the Bordeaux region of France to light whites such as Pinot Grigio common in northern Italy.

A historian, Petrick has spent the past two years researching how tastes in [wine](#), literally and in terms of preferences, have changed over time. She led the Red and White project, which ended in November 2022.

"When we think about the taste of an old-world-style wine like a Bordeaux versus a California-style Cabernet, they taste very different," said Petrick, a US national who conducted her research at the University of Stavanger in Norway. "And a lot of it has to do with the climate."

Global warming poses various threats to the European wine industry ranging from freak weather—severe hailstorms and spring frosts included—that can damage harvests to hotter temperatures that can cause grapes to ripen early and make wines too alcoholic.

At the same time, climate change is making wine production possible in areas traditionally too cold for it. One striking example is the UK, which now has more than 500 vineyards and produces a range of still and sparkling wines.

Generally, the riper a grape the more sugar and the higher the alcoholic strength of the resulting wine. A higher alcohol content can, for instance, distort the taste of a wine, according to Petrick.

Variations in alcohol levels due to changes in acidity and sugar content can affect people's perceptions of the quality of a wine. Sometimes, however, this is also a reflection of how they think the wine is "supposed" to taste.

## **Evolving tastes**

Petrick's historical research reveals that the flavor of wines has been evolving for far longer than previously thought.

When considering a typical Bordeaux red, for example, taste is not static. A "good" year will be quite different to a "bad" year and a wine from 1930 will be very different to a 1990 vintage.

In the 1960s, Bordeaux used to grow much more of the black-skinned Cabernet Franc—parent of the better-known Cabernet Sauvignon—until replacing these vines with another offspring: the fruitier Merlot grapes.

The move was at least partly a response to Californian and other New World blends and represented a bid to adapt to American buying power and global tastes.

Wine, after all, is a big business. The EU is the world's top producer of wine, accounting for 64% of global output in 2020. EU wine exports are worth more than €17 billion a year.

The Bordeaux "mix" is somewhat lighter as a result of the switch to Merlot. Cabernet Franc is a relatively acidic grape variety with more tannin.

While that particular change was aimed at appealing to American consumers, European winemakers are now finding that they may need to make even more adjustments to adapt to climate conditions.

## **Acid test**

French wine regulators recently allowed six new grape varieties—four red and two white—with higher acidity to be blended into Bordeaux wines. The reason was producers' concerns that warmer weather is resulting in more sugar and less acid in the grapes.

"They want to add some acidity back in so that the wines aren't too alcoholic," said Petrick.

The idea is that, by adding new grape varieties to the Bordeaux mix, wine makers can try to compensate for climate-induced changes and get the flavor back to what is considered "typical."

In future, producers may have to employ a range of strategies to maintain the typical taste profiles of their area—or resort to growing their wines in [different places](#).

For example, Pinot Noir, a dry, medium-bodied red that has helped make Burgundy in France a renowned wine region, has become more prevalent in Germany as temperatures warm there. Cultivation is gradually shifting north in a bid to maintain the traditional quality and sugar-acidity balance.

## **Vine stress**

Although rising temperatures are already altering how wines are produced, European researchers are looking into recruiting some natural

allies for growers.

Dr. Daniel Revillini works at the Spanish National Research Council, or CSIC, and is setting out to examine how the microbiome of grapevines—the bacteria, fungi and micro-organisms that live on and around the vines—can help mitigate the effects of climate change.

As part of the FUNVINE project running for two years until October 2024, Revillini plans to sample soil from 15 wine-growing ecoregions around the world. The goal is a better understanding of the stress factors being exerted on vines.

"You get this huge variation of climate stressors—from drought to extreme temperature variations and even flooding," Revillini said.

In addition, the intensification of wine production, with excessive use of plowing and chemicals, has eroded soil health and reduced the natural resilience of plants.

By comparing the grapevine microbiome in different areas, Revillini hopes to create a scale that can show growers what conditions maximize beneficial properties of bacteria and fungi while reducing stress and pathogens.

## **Friends and foes**

Microbes can aid plants in a variety of ways. These include extraction of nutrients from the soil, protection from disease and even retention of moisture.

The microbes also make sure they benefit in this highly symbiotic relationship.

"Plants can identify a good versus a bad microbe through hormonal signaling processes," Revillini said. "A plant knows when its leaf is being eaten, also through signaling."

Plants are able to reward any "good" microbes with natural sugars. If the plants refuse, the microbes simply won't cooperate.

When denied resources from plants, their microbial partners can hoard what they would provide in turn until the next reward. Identifying helpful microbes, such as those that retain water or fight off pathogens, might help grape vines to survive [climate change](#) and vineyards to become more sustainable.

"We hope to identify a [sweet spot](#) where you can minimize fertilizer inputs, minimize pesticide inputs and maximize the beneficial parts of the microbiome that can maintain plant and soil health," said Revillini.

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