From Soil Profiles to Flavor Profiles: Is There a Connection When it Comes to Winemaking?

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In the picturesque valley of Napa, California, visitors enter the tasting room at Etude to sample an array of wines. Along with the bottles of reds and whites, they find an artistic and educational addition to the room. Cabinets lining one wall hold displays of the soils in which the vines that produce Etude’s wines are grown. The displays offer tasters a look at a part of winemaking that is usually hidden—the soil layers deep below the vineyard surface.

“We brought our soils into our tasting room because we can’t bring all of our customers out to the vineyard,” says Franci Dewyer, Etude’s viticulturist. “And even if they were in the vineyard, they couldn’t see the soil profiles.”

With the addition of the soil profile displays, tasters are able to learn about the wine and the soil that supports the vines and grapes. But with all that goes into producing a bottle of wine, what role does the vineyard soil actually play?

The concept of terroir (often translated as a “sense of place”) has grown in popularity in recent years. Terroir is a set of characteristics, such as landscape, climate, and soil types, that are said to create the unique wine of an area. While each of those components do affect vineyard planning, grape selection, and vine growth, many soil scientists warn that the idea that soil type directly drives the flavor of a wine is unfounded.

“I’m going to throw doubt on the notion that soils are what drive the flavor of wine, the flavor in the bottle,” says John Havlin, professor and extension specialist at North Carolina State University. “The plant takes up water and nutrients and has to make flavor compounds. The plant cannot take up compounds from the soil that you would consider flavor.”

Climate Drives Flavor

Instead, Havlin says, the climate around the vineyard drives the flavors of the wines much more than the soil type. The amount of rainfall during a season, the rainfall distribution, and the temperatures that the vines encounter can all drastically change the amounts and types of flavor compounds and the final wine in the bottle.

As an example, Havlin suggests thinking about the differences in a single wine made from the same vines from one year to the next. A wine drinker buys a 2008 Cabernet Sauvignon from his favorite vineyard. The price is high, but so is the quality. He decides to buy more, but the store only has that wine in the 2009 vintage. He buys that instead, but it is of much poorer quality—and cheaper—than the 2008 wine. “So what’s driving the change in quality of that wine between 2008 and 2009?” asks Havlin. “The soils never changed. But the growing conditions were different.”

The importance of climate when growing quality grapes can also be seen by comparing different areas of the country. Havlin says that while grapes grown in Napa, California soils could be grown to produce quality wine in North Carolina soils, the climate won’t allow it. Napa Valley has warm days during which the grapes produce good flavor compounds. At night, the temperatures drop, slowing the plant’s metabolism and keeping flavor compounds concentrated in the grape. But in North Carolina, temperatures stay high at night, and some of the good flavors in the grapes are lost as the fruit continues to metabolize. It is the climate, not the soil, that prevents some quality wines from being produced in North Carolina.

In fact, as more winemakers set up shop in North Carolina, they are doing so at higher elevations. “You add another thousand feet in elevation, and nighttime temperatures are going to be cooler,” Havlin explains. “That’s really what you want—to shut down the plant at night, so it doesn’t metabolize all those flavor compounds.”

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