

Nature, Nurture or Economics ... what's driving higher alcohol in wines?

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Alcohol levels in wines have increased over the last few decades along with the trend to bigger, bolder wine styles. Depending on the region and variety, that increase has amounted to 1 to 2 percent or more, from approximately 12 to 13 percent to 13 to 14 percent or higher. Since 2002, in fact, the average percent alcohol for all wines from California Crush District 4 (Napa) has been above 15%. Such changes have been quantified for wines from Australia (Australian Wine Institute, 2005), and even in Europe (Duchêne and Schneider, 2005) where the trend has been slower to catch on. Many are quick to blame climate change; others scoff, and point to modern viticultural practices or the influence of wine critics. However, each of these elements are at play here.

Overall, wine quality results from the balance of four ripeness clocks running simultaneously but at different rates: sugar accumulation, acid respiration, phenolic ripeness and fruit character. The balanced “sweet spot” timing for these clocks occurs when a variety is grown in its ideal climate and ripens at the tail end of the growing season during warm, dry days and cool nights. Each vintage's weather produces challenges of how in tune these ripeness clocks are. Every year grape growers and winemakers must choose when to harvest to achieve their preferred balance in these ripeness clocks. Unbalanced wines typically result from yields held too high for the vine to fully ripen the fruit, or vintages that were too cool or too hot. If balance is way out of sync on a regular basis, then we can assume that the variety is not suited to that climate.

Higher alcohol levels are often regarded as evidence of unbalanced wines, and changes in viticultural practices have made it easier to achieve higher sugar levels and therefore higher alcohol levels. Now we have better plant material, including clones and rootstocks with greater disease resistance; they also produce smaller vines with more exposed fruit and are better matched to soil characteristics. This has clearly allowed growers to more easily ripen fruit to higher levels. An example of this is in the Napa Valley where, prior to 1980, much of the area was planted to vines with leaf roll virus, which delayed ripening and made it very difficult to produce wines that reached 12 percent or more (Vierra, 2004). Further advances in viticultural practices such as well-timed and tuned irrigation, better management of vine nutrition, trellising changes that have allowed for more leaf and fruit exposure and better pest and disease control also play a role in producing riper fruit. Add to all this better winemaking techniques, including more efficient yeast strains, and there is no doubt of nurture's role in rising alcohol levels.

Yet nature shares some responsibility. Of all of the environmental factors influencing grape and wine production, soil and climate are the two most prominent. While soil is an important factor, it clearly does not change appreciably over short time scales. Climate, on the other hand, has changed: Over the last 50 years growing seasons in wine regions globally have warmed 1.3°C on average (Jones, 2007). These changes have lengthened the growth period, accelerated vine growth cycles and directly influenced fruit and wine composition (Jones and Davis, 2000; Schultz 2000; Jones et al. 2005; Duchêne and Schneider, 2005; Webb et al. 2008). Given the importance of these trends and

relationships there is plethora of other research occurring in both academia and the industry that will further substantiate the strong connections between climates, winegrape varieties and balance in wine.

So let's go back to the four ripeness clocks and think of the situation 30 to 50 years ago, where growers were growing varieties in climates based upon how they performed then, which arguably worked to varying degrees. All of the changes in plant material and vine management essentially fine-tuned the system, but in many cases there was no longer an ideal match to the climate. The sugar accumulation and acid respiration clocks started to come into balance earlier, while fruit character and phenolic ripeness would happen later. Throw in a warming environment with longer growing seasons and the result is a complex moving window with even earlier sugar/acid balance, more disconnected from fruit character and phenolic ripeness. To deal with this climate–variety mismatch, longer 'hang-time' in many regions was necessary to achieve the desired fruit character and phenolic ripeness. But, as Richard Smart has said, "the need for hang-time is being overstated and uncritically accepted ... if grapes need hang time, they are not being grown properly in the first place." (Smart, 2003/2005). While growers first used hang time to deal with climate mismatches, they've since extended it to play to higher and higher fruit character and phenolic ripeness.

And no wonder. Much of the market has embraced these riper, higher-alcohol wines. An average rating increase of 10 points on a 100-point scale from a powerful wine critic or publication can translate into a 200 to 300 percent price increase per bottle (Nemani et al. 2001). In response, a whole industry has developed that attempts to reverse-engineer high scores. Many growers and winemakers have extended hang-time even further to achieve higher fruit character and phenolic ripeness, hoping to "dial-in" a high score.

If climates continue to change as projected (1.5 to 2.5°C by 2050), then further changes in vine growth and variety suitability to the climate will continue. These changes will only widen the separation between the timing of sugar/acid balance, fruit character and phenolic ripeness. While there are technologies to "fix" unbalanced wines, it's not clear how far these technologies can go before some tipping point is reached. In my opinion variety and vineyard management changes will have to occur to truly deal with a changing climate.

In the end consumers are the key...if they keep buying bigger, bolder wines with higher alcohol, then that style will persist. However, many are clamoring for wines with lower alcohol and more finesse that age better and are more harmonious with food. This has led to a counter culture of consumers and winemakers who are essentially saying that they want balanced wines—or, in other words, wines produced from fruit grown in its ideal climate.

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