

January 2002

Recent Research on Barrels and Alternatives

Oak or Steel?

by Curtis Phillips

Judging by some of the wines produced during the last couple decades, oak is catnip for humans. It seems that a lot of wines use oak merely as a flavoring agent. Every time I think that there is no way anyone can extract more oak tannin into wine, someone pulls a cork on a bottle that better matches my dining room table than the food on it. Personally, I'm more interested in other aspects of oak's role in winemaking than its flavor. In my former role as an industrial-scale corporate winemaker, I have long used toasted oak powder as a color-stabilizing agent during primary fermentation.

Differences in Phenolic Profile between Oak Wood and Stainless Steel Fermentation in White Wines

M. Ibern-Gómez, C. Andrés-Lacueva, R.M. Lamuela-Raventós, C. Lao-Luque, S. Buxaderas, and M.C. de la Torre-Boronat, "Differences in Phenolic Profile between Oak Wood and Stainless Steel Fermentation in White Wines" *AJEV* 52:2, 159 - 164.

An interesting "Research Note" was published in the latest issue of the *American Journal of Enology and Viticulture*. It's fairly accepted that barrel-fermentation adds a complexity to wine beyond the simple extraction of oak tannin into the wine. A research **group at the Nutrició i Bromatologia-CeRTA, Facultat de Farmàcia, Universitat de Barcelona** in Spain has set out to identify some of the phenolic compounds in barrel-fermented wines.

In their paper, M. Ibern-Gómez, C. Andrés-Lacueva, R.M. Lamuela-Raventós, C. Lao-Luque, S. Buxaderas, and M. C. de la Torre-Boronat compared the phenolic composition of industrial-scale lots of barrel-fermented Chardonnay and Picpoll (AKA Picpoul Blanc) with similar lots of steel-fermented wine.

As one would expect, they found elevated levels of characteristic oak-wood phenols in the barrel-fermented wines. These phenols were identified as the aromatic aldehydes coniferaldehyde, sinapinaldehyde, syringaldehyde. Additionally, the coumarin scopoletin was also identified. Finally, the group detected a spectrum of volatile compounds, including the volatile phenols 4-ethyl-guaiacol, 4-vinylphenol, eugenol, and the lactone β -methyl-g-octalactone, as well as the furan derivatives furfural, 5-methylfurfural, and furfuryl alcohol in the barrel-fermented wines, but not in the steel-fermented lots.

While the fact that the researchers found higher levels of phenols in the barrel-fermented wine is hardly surprising, the identification and quantification of the individual phenolic compounds, oaklactones and furan derivatives is interesting.

Removal of Vegetal Aromas from Red Wine by Toasted Oak Powder During Fermentation

In a research brief published by **World Cooperage**, James Swan, Jennifer Newton, and Michael Eddy explore the use of toasted oak powder in removing "vegetal" aromas from wine. This is not mere masking of vegetal aromas with a strong vanilla or coconut character. Swan *et alia* find that the addition of toasted oak powder during fermentation at levels *below* the sensory threshold significantly reduces the amount of volatile organosulfur compounds in the finished wine.

Organosulfur compounds have long been identified as contributing to vegetal aromas in wine. Sensory descriptors for these compounds include cabbage, rubbery, green vegetable and "swampy." In aqueous acidic conditions, like must, these compounds bind with the constituent chemicals in toasted oak powder. Since the toast oak powder is easily removed from the wine, any vegetal aroma in the finished wine should be greatly reduced.

For this study, Swan's group used an addition of four pounds per ton of toasted oak powder. They describe it as "American oak medium toast 24 month seasoned." Because only a small addition was required, there was "no significant change in oak extractives."

Swan *et alia* determined that the use of toasted oak powder during primary fermentation removes up to 64 percent of the organosulfur compounds in the finished wine. They also found that dimethyl sulfide *increases* when toasted oak powder is used. They posit no explanation for the increase, but note that the elevated dimethyl sulfide levels did not seem to affect the wines' flavor or aroma profile negatively while also noting that sensory threshold for dimethyl sulfide is high compared to that for the organosulfur compounds associated with vegetal aromas.

It should be noted that toasted oak in any form should have a similar affect on the wine. Toasted oak powder is preferable because of its high surface area to weight. Furthermore, it can be handled by conventional winery equipment. Additionally, the process requires no additional handling, the oak powder is simply mixed into as part of a routine pumpover. Swan's group added the toasted oak powder at the fermenter, but I generally have made the addition at the grape-hopper.