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AN ENOLOGY EXTENSION SERVICE QUARTERLY PUBLICATION

The Effects of Pre-Fermentative Addition of Oenological Tannins on Wine Components and Sensorial Qualities of Red Wine

What the authors did. They investigated the effects of pre-fermentative addition of various types of enological tannins on wine color, volatile compounds and sensory properties of red wine

Where they did it. Spain

Why they did it. They wanted to understand how different types of tannins (oak tannins vs grape skin tannins vs grape seed tannins) affect the color intensity, stability, the volatile profile and the sensory profile of red wines.

How they did it. They used Syrah must that had been processed through the Flash thermo-vinification process, which is known to increase color and tannin concentration in red wines. They kept one batch as "control" then added oak tannins, skin derived tannins and seed derived tannins at two different concentrations (40 mg/L and 80 mg/L each, respectively) to Syrah must. Following that, they inoculated and fermented the musts to dryness.

Wine. What Where Why How

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Articles:

1. The Effects of Pre-Fermentative Addition of Oenological Tannins on Wine Components and Sensorial Qualities of Red Wine.

Chen, Kai, et al. Molecules 21.11 (2016): 1445.

2. Postharvest ozone fumigation of Petit Verdot grapes to prevent the use of sulfites and to increase anthocyanin in wine

Bellincontro A, et al .Australian Journal of Grape and Wine Research 23.2 (2017): 200-206.

3. Impact of cover crops in vineyard on the aroma compounds of Vitis vinifera L. cv Cabernet Sauvignon wine

Xi, Zhu-mei, et al. Food chemistry 127.2 (2011): 516-522.

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What they looked for. The authors were interested in possible differences in color, hue, color stability, volatile profile as well as in sensory profiles of the different treatments. They recorded the basic parameters (alcohol, pH, acids) as well as analyzed the wines' phenolic and anthocyanin profiles. They used analytical chemistry techniques to detect and measure various volatile (aroma) compounds in the wines. They also performed a small sensory trial on the wines.

What they found. From a color intensity perspective, control wines (no tannin additions) had the lowest ratings. Increased tannin addition led to increased color intensity. Astringency was highest in the Skin Tannin treatment (40 mg/L) and the Oak tannin treatment (40 mg/L). Color anthocyanins were increased by grape seed tannins (80mg/L). From a sensory perspective, aroma quality was significantly higher for grape seeds tannins (80 mg/L) and French oak tannins (80 mg/L) while fruitiness was higher for grape seeds tannins (80 mg/L); the body of the wine was evaluated as significantly higher in the French oak and grape skin tannin treated wines.

So what? Tannin addition is a safe and effective way of increasing color intensity and can help improve the aroma profiles of red wines, particularly grape seed tannins.

Yes, but…. Care must be given with dosage, as too much tannin, regardless of the source, can lead to excessive astringency.

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Postharvest ozone fumigation of Petit Verdot grapes to prevent the use of sulfites and to increase anthocyanin in wine

What the authors did. They evaluated the use of ozone before vinification as a replacement for SO2 as sanitizing/preserving agent

Where they did it. Italy.

Why they did it. There is a strong push by consumers for safer foods in general that is motivating the wine sector to find alternative solutions to the use of sulfur dioxide. The organic wine producing segment could also be a possible beneficiary of this development.

How they did it. They used Petit Verdot grapes picked in Montecchio, Italy. They divided the grapes in two groups – Control (no ozone) and Treatment (ozone). They placed each batch of grapes in perforated plastic crates and placed the crates in two separate cold rooms. To one of the rooms they applied ozone treatment (gas pumped at controlled rates) while to the grapes in the other room (Control) they applied SO2 in powder form. The ozone treated grapes were vinified using equipment that was treated with ozonated water. No SO2 additions were made to these grapes at any time. The Control grapes were vinified in the traditional way, with two SO2 additions – one at the beginning of fermentation (5g/hL) and after MLF (3 g/hL).

What they looked for. The authors monitored the presence of various microorganisms (yeasts and bacteria) on the surface of the grapes, compared fermentation kinetics between Treatment and Control, measured physico-chemical parameters of the wines, evaluated the wines from a sensory perspective and compared anthocyanin and phenolic levels .They wanted to understand if ozone treated grapes are as safe from microbiological contamination as SO2 treated ones, as well as understand how ozone treatment affects the color and aroma profiles of the treated wines.

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What they found. Microbial contamination on the grape skins decreased drastically with ozone treatment compared to SO2 treatment. Fermentation after inoculation with Saccharomyces yeast started immediately on the ozone treated grapes and completed in 10 days, while the SO2 treated grapes took three days to start fermentation, which lasted 16 days total. The extraction of phenolics and anthocyanins was significantly higher in Treatment versus Control as was the titratable acidity. The treated wine showed a more intense red color with purple nuances. From a sensory perspective "the panelists scored the treated wine higher than the Control for the olfactory sensations of fruity, small red fruits and particularly blackberry, which also received the highest score. Nuances of cherry liqueur, nail varnish and spices were perceived as significantly higher in the treated wine than in Control."

So what? For wineries that want to reduce the use of SO2 this is a very promising development, as it shows that ozone gas applied to grapes has strong antimicrobial effects. The use of ozone also appears to increase desirable characteristics such as color intensity and aroma profiles

Yes, but… The research stopped short of evaluating the wines long-term. Would wines age in a healthy way without the addition of SO2? Also – specialized equipment is required for the controlled application of ozone gas which may not be easy to acquire by all wineries.

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Impact of cover crops in vineyard on the aroma compounds of *Vitis vinifera* L. *cv* Cabernet Sauvignon wine

Zhu-mei Xi, Yong-sheng Tao, Li Zhang Hua Li

What the authors did. They investigated the influence of cover crops used in the vineyard on the volatile and aroma profile of Cabernet Sauvignon wine

Where they did it. China

Why they did it. Cover crops are a soil cultivation system that involves planting of various crops, mostly perennial grasses, between vineyard rows. The effects of cover crops on vine vigor and grape composition have been established before, but there are few studies looking at the influence of different cover crops on wine aroma and volatile composition. The authors sought to fill the void with information regarding Cabernet Sauvignon wine aroma based on the cover crop used.

How they did it. They planted three different cover crops in a Cabernet Sauvignon vineyard in the Shaanxi Province of China, as well as kept part of the vineyard without any cover crops, as Control. The three crops used were white clover (*Trifolium repens*), alfalfa (*Medicago sativa*) and tall fescue (*Festuca arundincea*). The cover crops were mowed three times a year and the residues were left on the surface to decompose. They picked the Cabernet Sauvignon grapes at 20 Brix and processed them through traditional red winemaking protocol.

What they looked for. The authors looked for differences in the basic chemical profiles (alcohol levels, pH, TAs) and volatile profiles of the wines (esters, aldehydes, terpenes, alcohols, etc) as well as differences in the sensory profiles of the wines (do they smell or taste different?). They compared the treatments to each other and compared all treatments to Control (no cover crop).

What they found. Cover crops treatments significantly decreased total acidity as well as increased pH and dry extract compared to Control, but no significant differences were found between the various cover crops. Aroma compounds were higher in the cover crops wines compared to control. Alfalfa cover had the highest concentrations of volatile compounds, followed by tall fescue.

From a sensory perspective the cover crops treated wines had a more floral aroma and presented sweet and ripened fruit notes, which are usually associated with higher quality wines. Alfalfa treatment was rated highest from a sensory perspective.

So what? Many vineyards in Texas use cover crops as a cultivating system. Understanding the benefits of these crops and how they may affect wine quality is important and can help grape growers and winemakers in deciding which crops to use. For those who do not use cover crops yet, this information may help them consider the benefits of this approach.

Yes, but…. Would the same conclusions hold for different grape varietals? Would soil type influence the impact of the cover crops on grape/wine quality?