Co-fermentation of Chambourcin with Vidal Pomace and Pressed Merlot Skins

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Summary

The purpose of this experiment was to explore the chemical and sensory effects of the co-fermentation of Chambourcin with pomace from Vidal and Merlot. In three separate fermentations, Chambourcin was fermented alone, with 15% Vidal pomace and with 15% Merlot pomace. Co-fermentation lowered pH in both cases. Co-fermentation of Chambourcin with Vidal led to higher color measures, but not higher anthocyanins. This wine was described as bright with berry aromas and noticeable acidity. Co-fermentation with Merlot pomace led to wine with less color but higher tannin concentration and perceived tannin structure. A panel of four judges indicated the wines were different but had no consensus favorite.

Introduction

The purpose of this experiment was to explore the chemical and sensory effects of the co-fermentation of Chambourcin with pomace from Vidal and Merlot. Chambourcin, a French-American hybrid variety, is relatively resilient to the wet growing conditions that can occur in Virginia. After the 2018 vintage, there was a renewed discussion around growing varieties that are tolerant to this aspect of our terroir (i.e. rain). However, varietal Chambourcin wines often lack the complexity and phenolic structure desired in fine red wines. Hybrid wines can have as much as five times lower concentration of tannins than *Vinifera* wines made with comparable winemaking techniques[1]. In general, phenolic composition and color, along with polysaccharides, have been shown to be primary drivers of perceived wine quality[2]. These characteristics have also been correlated with consumer liking and bottle price in red wines[2]. Identification of winemaking procedures to improve the sensory characters of Chambourcin could have a significant impact on acceptance and marketability of wine made from this grape variety. Co-fermentation with other varieties is one potential approach.

Winemakers use co-fermentation for many reasons. Some cite a “lifting of the aromas”, “enhanced texture”, “softening of the wine” or “improved brilliance and intensity of color”[1,2]. Previous published studies have found varying results when examining the effects of co-fermentation. One study found color enhancement when Sangiovese was co-fermented with Malvasia and Trebbiano while another found color was diluted in a co-fermentation of Syrah with Viognier[5]. Neither of these studies examined sensory aspects, however. In a previous WRE study in 2015, Emily Pelton from Veritas Vineyard and Winery found lower color when Cabernet Franc was co-fermented with 6% Viognier pomace. These wines were significantly different, with a preference for the control (100% Cabernet Franc) wine. In 2017, Milt and Sandy McPherson from Hunting Creek Vineyards co-fermented Petit Verdot with 10% Viognier

pomace. In this trial, color was also lower in the co-fermented wines, but there were no sensory differences.

In this study, Chambourcin was fermented three ways:

- 100% Chambourcin
- 85% Chambourcin, 15% Vidal pomace
- 85% Chambourcin, 15% Merlot pomace

When pressed, Vidal pomace often contains notable residual pulp. Additional flavor could be extracted from these skins during a red wine fermentation, leading to a lifting of the sensory characteristics and production of a lighter, fruitier wine. Merlot pomace was thought to have the potential to convey higher tannin to the wine, producing a more structured expression.

Methods

Vidal was pressed on 9/17/19, two days prior to Chambourcin processing. Pomace was collected and SO_2 was drizzled over the top to protect against oxidation and microbial spoilage. This pomace was stored in a cool cellar until use. Merlot was pressed on the same day as destemming for co-fermentation and therefore received no additional processing.

Macrobins were randomized at the time of Chambourcin processing. Grapes were destemmed and crushed into three bins:

1. Control (100% Chambourcin)
2. Vidal Co-ferment (85% Chambourcin, 15% Vidal pomace)
3. Merlot co-ferment (85% Chambourcin, 15% Merlot pomace)

Each bin contained 0.8 ton total weight of fruit after the addition of skins. For both Vidal Blanc and Merlot treatments, 225 lbs of pomace were added. All other additions and cellar operations were the same among bins. Each fermentation received 25 ppm SO_2, 1 lb/ton Med Plus French oak chips, and 100 ml/ton Color X. Bins were inoculated with D80 yeast rehydrated in GoFerm. Fermentations were punched down twice per day and monitored daily for Brix and temperature. VP41 malic acid bacteria was added after Brix depletion, prior to pressing (on 9/24). All three bins were pressed on 9/26, at the completion of alcoholic fermentation. Wine was settled for two days then racked to comparable barrels. After the completion of malolactic fermentation, wine was racked and returned to barrel with the addition of 55 ppm SO_2.

Due to restrictions put in place during the COVID-19 pandemic, group sensory analysis was not done on these wines. However, four winemakers tasted the wines blind with randomly assigned codes and wrote open ended notes followed by a recorded panel discussion of the sensory properties of the wines. The full discussion can be found on the WRE YouTube channel.

Results

Chambourcin fruit measured 21.6° Brix with a pH = 3.42 at harvest. Vidal used for co-fermentation measured 21.6 ° Brix with a pH = 3.67. Fermentation kinetics were faster and warmer for the co-fermentation with Merlot skins, likely due to a higher initial inoculant of yeast from previously fermented Merlot (Figure 1). This fermentation also reached the highest temperature. The Vidal co-fermentation had the lowest overall temperature, never rising above 72°F though the fermentation kept pace with the control.

The pH of the finished wine was lower in both co-fermentations than in the control (Table 1). Color intensity was higher for the Vidal co-fermentation than the other treatments (Table 2). Color can be influenced by pH (higher at lower pH) and SO_2 levels. Free SO_2 was within 4ppm for all treatments at the time of color measurement (data not shown). The pH in the Vidal co-ferment was lower, which may have contributed to higher color. However, pH of the Merlot was also lower than control without this color enhancement effect, indicating other factors may be contributing. In some co-fermentations with white wine, cofactors from the white variety help stabilize color to prevent SO_2 bleaching and oxidative loss[5]. This effect is variable and dependent on relative cofactor concentration in each variety but may be the mechanism leading to higher color intensity in the Chamboucin-Vidal conferment. The wine did not have higher anthocyanins overall (Table 3), further implicating co-pigmentation.

Co-fermentation with Merlot pomace lowered anthocyanins considerably (Table 3) relative to control, also lowering color intensity (Table 2). Most of the available anthocyanins in Merlot skins were likely extracted in the initial fermentation (anthocyanins are usually extracted within the first 6 days of fermentation[6]) and thus the addition of Merlot pomace may have diluted the concentration of extractable anthocyanins in the bin. Catechin and tannins, however, were notably higher in this wine. Though anthocyanins are quickly released, other phenolics continue to extract over time (at least 40 days) when in contact with ethanol[6]. Seed phenolics like catechin are not available until the waxy cuticle has been weakened by ethanol[7] and were also likely still intact after the first fermentation. When ethanol from the co-fermentation began to build, cell walls were already weakened and extraction of phenolics could continue where they left off in the first fermentation.

In a panel discussion of four winemakers who tasted the wines blind, the Chambourcin only wine was noted as a good, fruity, easy drinking wine with varietal character, soft tannins and magenta/purple color. The Chambourcin/Vidal co-fermented wine was noted to be bright with berry aromas, but with an acidity that some liked and others did not. The Chambourcin/Merlot co-ferment was noted by one winemaker to have riper fruit character, and all of the winemakers noted this wine had more perceived tannic structure. There was no consensus on a preferred wine, but comments during discussion indicate the three wines had sensory differences.

Figure 1: Fermentation kinetics for three treatments of Chambourcin (in-house data)

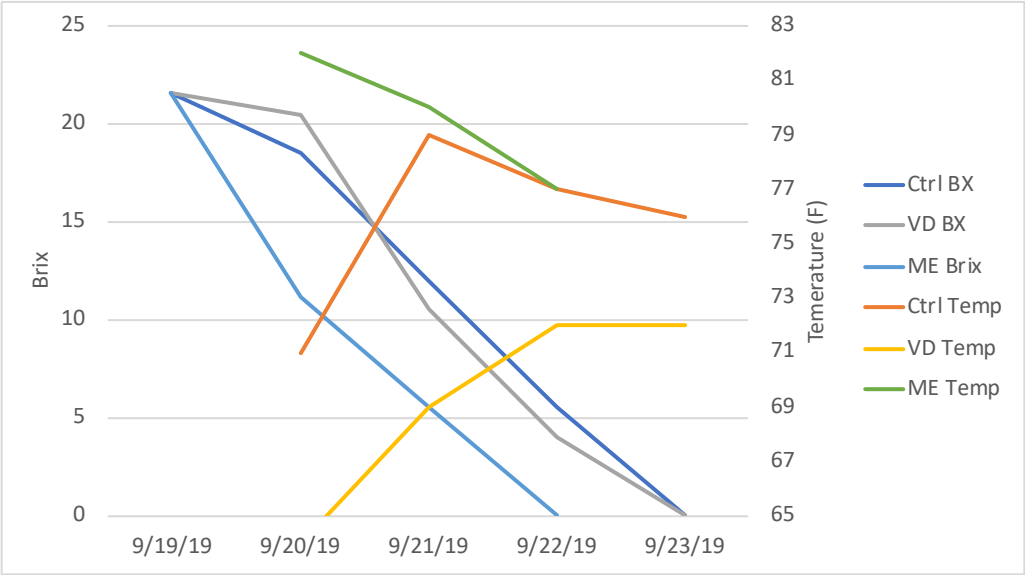

Table 1: Finished wine chemistry for three treatments of Chambourcin (ICV Labs)

	VA (g/L)	pH	TA (g/L)	RS (g/L)	Alcohol (%)
Chambourcin	0.91	3.62	5.8	2.9	12.6
Chambourcin/Vidal	0.92	3.54	6.24	2.8	12.45
Chambourcin/Merlot	0.98	3.48	6.24	1.9	12.25

Table 2: Color metrics for three treatments of Chambourcin (ICV Labs)

	A420 (AU)	A520 (AU)	A620 (AU)	Intensity	Hue
Chambourcin	3.06	4.63	1.07	8.76	0.66
Chambourcin/Vidal	3.37	5.29	1.1	9.76	0.64
Chambourcin/Merlot	3.03	4.39	0.95	8.37	0.69

Table 3: Phenolic analysis for three treatments of Chambourcin (mg/L) (ICV Labs)

	Polymeric Anthocyanins	Total Anthocyanins	Catechin	Tannin	Catechin/tannin	Polymeric anthocyanin/tannin
Chambourcin	14	927	11	204	0.054	0.069
Chambourcin Vidal	15	879	16	249	0.064	0.06
Chambourcin Merlot	16	696	33	286	0.115	0.056

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