The Effect Tannin Addition on the Sensory Qualities of Chambourcin Port-Style Wine(2016)

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Summary

This study examined the impact of adding increasing levels of Querplus (oak tannin from Laffort) to Chambourcin Port-style wine on its sensory characteristics. The treatments for this study were no addition, 50ppm addition, 100ppm addition, and 150ppm addition (5g/hL, 10g/hL, and 15g/hL, respectively). All other treatments between wines were kept the same. Because of sugar and ethanol differences between the control and treatment wines (due to mixing effects), the control wine was not tasted. Barrels were not identical between treatments, but 10-year-old barrels were used for each treatment. Adding Querplus did not affect wine chemistry or phenolics. Overall, higher amounts of Querplus were preferred by judges. 150ppm had a slight tendency to increase the perception of Sweetness, and 100ppm tended to increase the perception of Alcohol and Body. Astringency was not very affected by the treatments. None of these impacts were very pronounced, however. More work is needed on the interaction of tannin, ethanol, and sugar in Port-style wines.

Introduction

The balance of sugar and ethanol in Port-style wines can greatly impact the perceived body, sweetness, and burning sensation of the wine. As such, balance between these two components is crucial for establishing a high quality Port-style wine. Tannins also have a large impact on the body of wine. In general, an inverse relationship exists between the perception of sweetness (caused by sugar, polysaccharides, and ethanol) with acidity and astringency. A more acidic or astringent wine will generally taste less sweet, and visa versa. Dry tannins are masked by ethanol, but not by sugar. Additionally, bitterness can be enhanced by both ethanol and tannin (Delteil, 2003; Zoecklein 2004). These relationships apply mostly to dry red wines, however. The goal of this study was to investigate the impact of adding exogenous tannin (Querplus) on the quality of Chambourcin Port wines, especially with regard to the perception of sweetness, ethanol burning sensation, bitterness, astringency, and body.

Results and Discussion

The control wine tended to have lower ethanol and higher sugar, suggesting that mixing effects resulted in different chemistry in this wine. As such, it was removed from further consideration in this study. Adding Querplus did not affect wine chemistry or phenolics.

Juice Chemistry

	Brix	pH	TA (g/L)	Malic Acid (g/L)	YAN (mg N/L)
Juice	21.5	3.32	7.37	3.67	363

Wine Chemistry

	Ethanol (%vol/vol)	Residual Sugar (g/L)	pH	TA (g/L)	Volatile Acidity (g/L)	Lactic Acid (g/L)	Total SO2 (ppm)	Free SO2 (ppm)
Control	16.77	103.9	3.53	5.16	0.37	0.30	27	7
5g/hL Querplus	17.22	64.9	3.53	5.23	0.39	0.31	25	<7
10g/hL Querplus	17.21	65.1	3.54	5.23	0.38	0.31	27	<7

15g/hL Querplus	17.22	64.4	3.53	5.23	0.38	0.31	28	7

Laboratory Data from ICV from Mid April 2017

Color Profile

	A420	A520	A620	Hue (420/520)	Intensity (420 + 520)	Intensity (420 + 520 + 620)
Control	0.431	0.801	0.140	0.538	1.232	1.372
5g/hL Querplus	0.440	0.809	0.140	0.549	1.254	1.389
10g/hL Querplus	0.447	0.815	0.140	0.549	1.262	1.402
15g/hL Querplus	0.447	0.817	0.140	0.548	1.265	1.404

Laboratory Data from ETS from Mid April 2017

Phenolic Profile

	Caffeic Acid (mg/L)	Caftaric Acid (mg/L)	Catechin (mg/L)	Epicatechin (mg/L)	Catechin: Epicatechin	Catechin: Tannin	Gallic Acid (mg/L)
Control	10	18	N/A	N/A	N/A	N/A	17
5g/hL Querplus	12	18	N/A	N/A	N/A	N/A	20
10g/hL Querplus	12	18	N/A	N/A	N/A	N/A	20
15g/hL Querplus	12	18	N/A	N/A	N/A	N/A	20

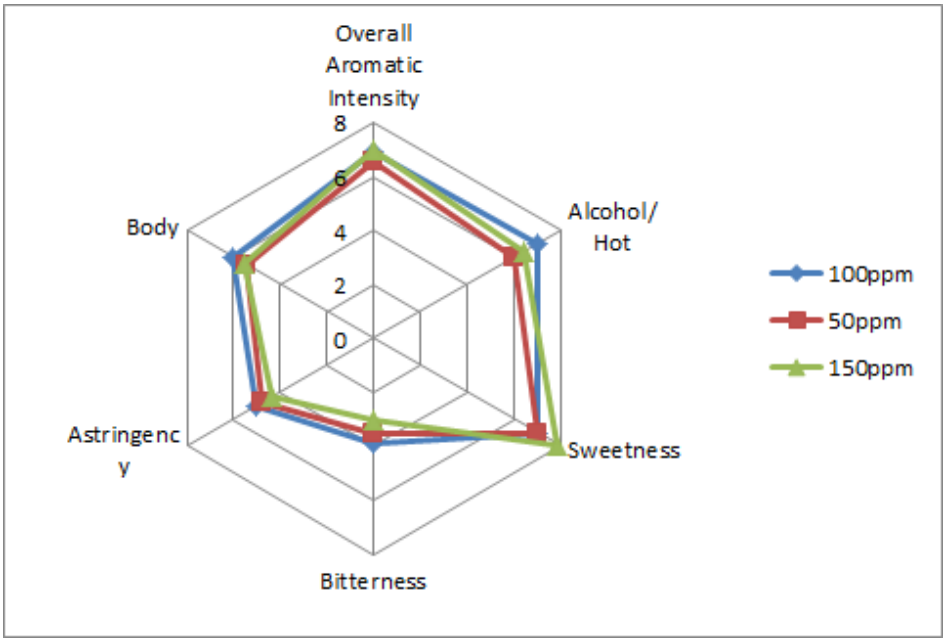
Laboratory Data from ETS from Mid April 2017

Phenolic Profile

	Malvidin glucoside (mg/L)	Monomeric Anthocyanins (mg/L)	Polymeric Anthocyanins (mg/L)	Quercetin (mg/L)	Quercetin Glycosides (mg/L)	Tannin (mg/L)	Total Anthocyanins (mg/L)	Resveratrol (mg/L)
Control	134	794	34	5	27	305	828	<0.2
5g/hL Querplus	132	900	36	5	27	314	936	<0.2
10g/hL Querplus	133	911	35	5	27	314	946	<0.2
15g/hL Querplus	135	918	35	5	27	314	953	<0.2

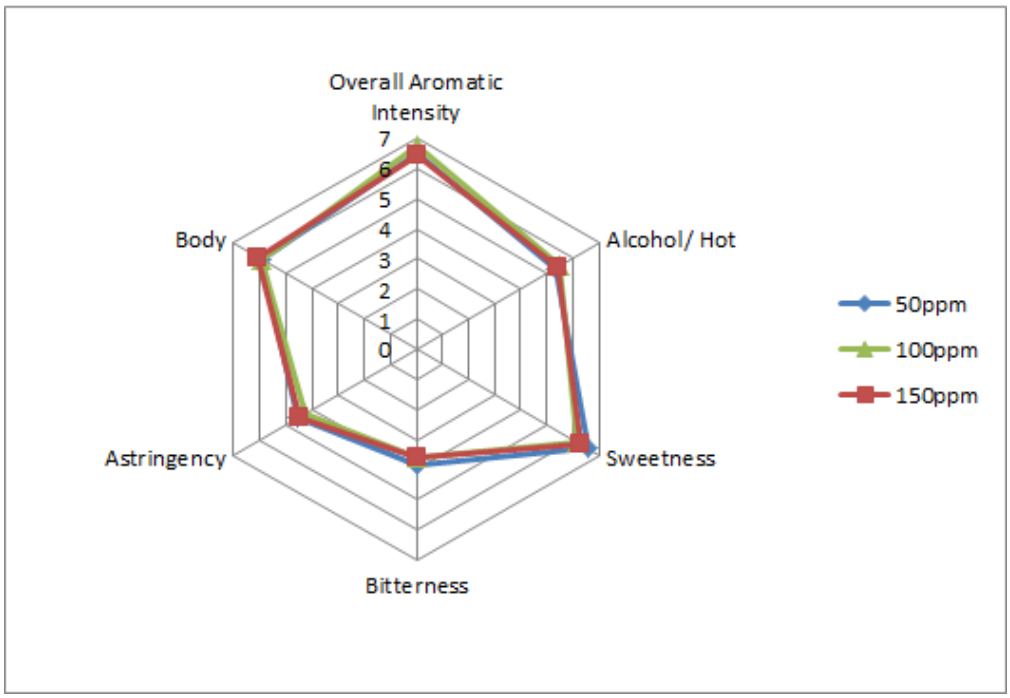
Laboratory Data from ETS from Mid April 2017

Descriptive analysis for the May 3 tasting did not indicate any strong trends with the descriptors used in this study. 150ppm had a slight tendency to increase the perception of Sweetness, and 100ppm tended to increase the perception of Alcohol and Body. Astringency was not very affected by the treatments. In general, the wine made with 150ppm Querplus was most preferred, and the wine made with 50ppm Querplus was least preferred. However, these preferences were based on a small number of votes.



	50ppm	100ppm	150ppm	Total Votes
Most Preferred	22%	33%	44%	9
Second Most Preferred	25%	25%	50%	8
Least Preferred	50%	38%	13%	8
Two Judges had no preference				

No strong trends could be found for the descriptors used in this study on the May 31 tasting. There was a slight preference for 100ppm, with 50ppm being slightly less preferred.



	50ppm	100ppm	150ppm	Total Votes
Most Preferred	23%	46%	31%	13
Second Most Preferred	38%	25%	38%	8
Least Preferred	50%	20%	30%	10

Overall, higher amounts of Querplus were preferred by judges. 150ppm had a slight tendency to increase the perception of Sweetness, and 100ppm tended to increase the perception of Alcohol and Body. Astringency was not very affected by the treatments. None of these impacts were very pronounced, however. More work is needed on the interaction of tannin, ethanol, and sugar in Port-style wines.

Methods

Chambourcin grapes were harvested and processed on 9/26 and destemmed/crushed on 9/27 into T bins. 50ppm sulfur dioxide, American medium toast oak beans at 0.1kg/hL, and 40g/hL VR Supra were added at processing, after which the must was allowed to cold soak for 24 hours. On 9/28, the must was inoculated with RC212 at 25g/hL, and on 9/29 a twice per day punchdown regimen was followed. On 9/29, 20mL/ton ColorPro was added. On 9/30, 20g/hL Superfood was added, and on 10/1 4kg/hL sugar was added. On 10/2 the fermentation was stopped by adding 70% alcohol vol/vol brandy at 0.49hL per t bin. The t-bins were then stored in a refridgerated truck until 10/5, with two punchdowns per day. The wines were pressed to tank on 10/5 and allowed to settle until 10/6, after which the

Chambourcin port-style wine was split into 4 different 10 year old barrels (non-identical). Each barrel received 31 ppm sulfur dioxide on 1/10, and 53g/L sugar on 1/17.

They then received the following treatments on 2/7:

1) Barrel 1: No tannin addition
2) Barrel 2: 50 ppm Querplus
3) Barrel 3: 100 ppm Querplus
4) Barrel 4: 150 ppm Querplus

All other treatments between barrel groups were the same.

This project was tasted on May 3 and May 31. In order to balance the data set to perform statistical analysis for descriptive analysis on the May 3 tasting, any judge who had not fully completed the descriptive analysis ratings were removed. In order to then make the number of judges between groups equivalent, one judge from group 1 and group 2 were eliminated. This resulted in a final data set of 3 groups, each with 3 judges (considered as replications within groups, and groups were considered as assessors). Data was analyzed using Panel Check V1.4.2. Because this is not a truly statistical set-up, any results which are found to be statistically significant ($p<0.05$) will be denoted as a "strong trend" or a "strong tendency," as opposed to general trends or tendencies. The statistical significance here will ignore any other significant effects or interactions which may confound the results (such as a statistically significant interaction of Judge x Wine confounding a significant result from Wine alone). The descriptors used in this study were Overall Aromatic Intensity, Alcohol/Hot, Sweetness, Bitterness, Astringency, and Body.

The same procedures for data analysis were used on the May 31 tasting. For the descriptive analysis in this tasting, one judge was transferred from group to group 2 one so that each group had four judges, for a total of 12 judges.

References

Delteil, D. 2003. Winemaking fermentation techniques and mouthfeel: an ICV perspective. Virginia Mouthfeel Meeting, July 15, 2003.

Zoecklein, B. 2004. Components of red wine mouthfeel. http://www.apps.fst.vt.edu/extension/enology/downloads/redwinemouthfeel.pdf.