The Effect of Juice Turbidity on Aroma Development of Sauvignon Blanc

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Summary

This study compares the effects of fermenting Sauvignon Blanc juice at a low (50 NTU) or high turbidity (250 NTU). Juice from the same pick of Sauvignon Blanc was settled and racked into stainless steel barrels. Turbidity was adjusted by adding back fine lees to the juice. All other treatments between wines were the same. No major chemical differences could be found between juice or wine, except that the juice with higher turbidity had slightly higher YAN and its wine had slightly lower alcohol. High turbidity greatly increased 3-mercaptohexanol and 4-methyl-4-mercaptopentan-2-one, but decreased 3-mercaptohexylacetate. Triangle testing suggests that the wines were significantly different ($p<0.001$). No major preference could be seen for one wine over the other. No major trends could be found for the descriptors used in this study, despite the wines being found to be significantly different. There was a slight tendency for the High NTU wine to have more Varietal Character and Overall Aromatic Intensity, while having less Body.

Introduction

Differing levels of juice turbidity from grape particulates is thought to help improve fermentation performance through yeast nucleation, toxin nucleation, and release of more nitrogen compounds. Sustained contact of grape particulates with juice results in greater extraction of grape aroma compounds and precursors. However, high turbidity juices often result in reductive qualities occurring during fermentation, which can lead to difficulties while preparing the finished wine. There is great potential, however, for the style of certain wines to be greatly impacted by the level of turbidity alone in juice. This study examines the impact of low and high juice turbidity on the chemistry and sensory characteristics of Sauvignon Blanc wine.

Results and Discussion

No major chemical differences could be found between juice or wine, except that the juice with higher turbidity had slightly higher YAN and its wine had slightly lower alcohol. High turbidity greatly increased 3-mercaptohexanol and 4-methyl-4-mercaptopentan-2-one, but decreased 3-mercaptohexylacetate. This could be due to the greater presence of grape solids in the high turbidity must, as well as the reducing environment that this would produce releasing free thiols more readily.

Juice Chemistry

	Brix	pH	TA (g/L)	Ammonia (mg/L)	NOPA (mg N/L)	Arginine (mg/L)	FAN (mg N/L)	YAN (mg N/L)
Low NTU	18.2	3.36	8.1	67	189	496	244	324
High NTU	18.2	3.36	8.1	69	193	516	250	333
Nitrogen Lab Results from Virginia Tech from Early September, 2016								

Wine Chemistry

	Ethanol (%vol/vol)	Residual Sugar (g/L)	pH	TA (g/L)	Volatile Acidity (g/L)	Malic Acid (g/L)	Lactic Acid (g/L)	Total SO2 (ppm)	Free SO2 (ppm)	Molecular SO2 (ppm)
Low NTU	12.11	<1.0	3.49	6.55	0.13	3.79	<0.15	116	15	0.43
High NTU	11.91	<1.0	3.47	6.81	<0.12	3.74	0.16	93	7	0.21

Lab Results from ICV from Late February, 2017

Variety Characteristics

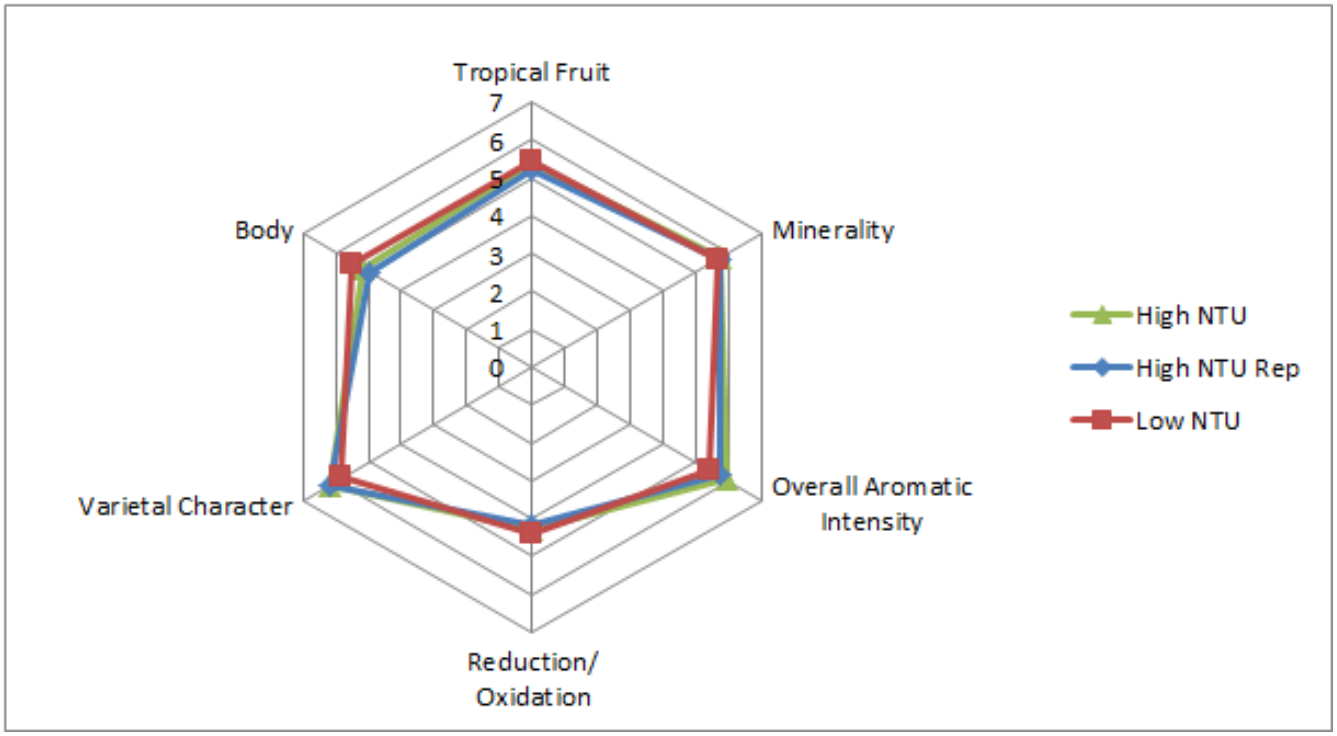
	3-mercaptohexan-1-ol (ng/L)	3-mercaptohexylacetate (ng/L)	4-methyl-4-mercaptopentan-2-one (ng/L)
Low NTU	499	16	<0.3
High NTU	796	9	0.8
% Change	60%	-44%	

Lab Results from ETS from Late February, 2017

For the triangle test, of 33 people who answered, 23 people chose the correct wine (70%), showing a statistically significant difference between wines ($p<0.001$). These wines were voted to have an average degree difference of 5.0 (out of 10), suggesting that the wines were moderately different. In general, people who answered correctly showed no major preference for one wine over the other. Some judges noted that the High NTU wine was slightly reduced, and that the Low NTU wine was slightly cleaner. This further supports the possibility of a reducing environment resulting in more free thiols.

	Low NTU	High NTU	No Preference	Total Votes
Preferred	52%	43%	4%	23

No major trends could be found for the descriptors used in this study, despite the wines being found to be significantly different. There was a slight tendency for the High NTU wine to have more Varietal Character and Overall Aromatic Intensity, while having less Body.



This study provides interesting stylistic insight into making Sauvignon Blanc wine with greater varietal character. However, reduction may pose an issue in the techniques used in this study, and the impact of other variables such as the addition of pectinases and the presence of grape particulates warrant future research. Investigations should continue in Virginia into stylistic variations of Sauvignon Blanc.

Methods

Sauvignon Blanc for this study was sourced from the same block in Mount Juliet Vineyards and picked on August 29. Whole clusters were crushed (not destemmed) and pressed the same day with no separation of press fractions. Potassium metabisulfite was added at 10g/hL (50 ppm sulfur dioxide), Cinn Free at 30mL/ton, cold settled until Sept 1, and racked into 2 stainless steel barrels. One stainless steel barrel had its NTU adjusted to 50NTU, and the other had its NTU adjusted to 250NTU by adding fine lees from the same Sauvignon Blanc after it had settled. At this point YAN was measured. All other fermentation practices, additions, etc. were identical between wines.

Yeast (Zymaflore X5) was added on September 1 at 20g/hL, Fermaid O was added on September 3 at 20g/hL, Fresharom was added on September 4 at 30g/hL, and Tanin Galalcool was added at 20g/hL on September 4 along with a second dose of Fermaid O at 20g/hL. On September 5 sugar was at 17g/L. Fermentation was stopped on September 18 with 10g/hL potassium metabisulfite.

This wine was tasted on March 15. For the triangle test and preference analysis, anybody who did not answer the form were removed from consideration for both triangle, degree of difference, and preference. Additionally, anybody who answered the triangle test incorrectly were removed from consideration for degree of difference and preference. Additionally, any data points for preference which did not make sense (such as a person ranking a wine and its replicate at most and least preferred, when they correctly guessed the odd wine) were removed.

In order to balance the data set to perform statistical analysis for descriptive analysis, 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 9 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 Tropical Fruit, Minerality, Overall Aromatic Intensity, Reduction/Oxidation (on a scale from most reduced to most oxidized), Varietal Character, and Body.