

USING EXOTIC WOODS TO TOAST BARRELS

Hickory, Mesquite, American Oak and French Oak

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World Cooperage

ABSTRACT

Six American oak barrels were toasted using hickory, mesquite, French oak and American oak then filled with Chardonnay. Pinot Noir was also used. A sensory panel assessed the wine to determine if the species of wood used to toast a barrel can significantly impact wine flavor. Initially the strong aroma of hickory and mesquite wood did affect flavor. However this impact diminished over time with only slight differences in aroma detectable after two months in bottle.

INTRODUCTION

A cooper's fire used to toast barrels normally consists of unused wood pieces from barrel production. Thus, an American oak barrel will normally be toasted with American oak pieces.

In the food industry, many other woods are used to give foods a distinct, smoky flavor. Hickory and mesquite are examples. We worked with Golden State Vintners to test the use of these woods for toasting American oak barrels and aging Chardonnay. Additionally, French oak pieces were used to toast American oak barrels. They were compared to American oak barrels toasted with American oak pieces to determine if flavor differences developed in the wine. Rodney Strong Vineyards tested three of these barrels using Pinot Noir. Some results from their trial are presented here.

MATERIALS AND METHODS

Golden State Vintners crushed Chardonnay grapes from the Napa Valley in September 1998. Prior to fermenting, 2 lbs/1000 gallons DAP was added. The juice was fermented with Premier Cuvee yeast, 1 lbs/1000 gal and fermentation lasted 12 days. At the end of fermentation MCW malolactic culture was added.

American oak barrels were toasted with hickory, mesquite, French oak or American oak pieces to a medium plus specification. Six barrels of each type were produced. The wine matured in barrel for 153 days.

RESULTS

Table 1: Harvest data of Golden Stave Vintners' juice

Total acidity	6.9 g/l
Brix	22.7°B
pH	3.60
Solids	< 1.0%

**Table 2: GSV wine analysis
as of April 20, 1999**

Alcohol	12.4 % v/v
Total acidity	6.6 g/l
Volatile acidity	0.03 g/100ml
Free sulfur dioxide	25 ppm
Total sulfur dioxide	80 ppm
pH	3.54
Malic (by enzymatic)	20 ppm
Residual sugar	0.25 %

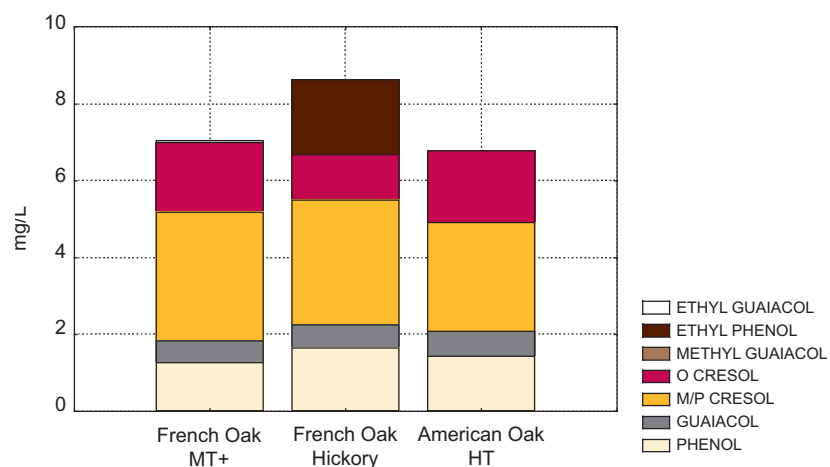
Samples of wine from Rodney Strong were analyzed for smoke phenolics and oak extractives. The results are presented in Table 3.

Table 3: Chemical analysis of Rodney Strong's Pinot Noir made in barrels toasted with hickory wood and our standard toasted American and French oak barrels

	French Oak MT+ (mg/L)	French Oak HT HICKORY (mg/L)	American Oak HT (mg/L)
Gallic acid	34.98	31.02	35.04
Hydroxy methyl furfural	0.17	0.13	0.21
Furfural	0.41	0.34	0.26
5-methyl furfural	0.38	0.39	0.42
Vanillic acid	0.67	0.74	0.67
Syringic acid	9.94	9.67	8.97
Ellagic acid	31.41	30.48	28.98
Vanillin	0.23	0.28	0.25
Syringaldehyde	9.32	3.44	7.66
Coniferaldehyde	0.59	0.58	0.4
Sinapaldehyde	0.16	0.12	0.09
Trans-lactone	0.043	0.063	0.03
Cis-lactone	0.126	0.125	0.425
Phenol	1.28	1.66	1.44
Guaiacol	0.56	0.6	0.66
M/P-cresol	3.36	3.25	2.82
O-cresol	1.81	1.17	1.88
4-methyl guaiacol	0	0	0
4-ethyl phenol	0.04	1.95	0
4-ethyl guaiacol	0	0	0

Figure 1 shows the total and individual smoke components present in the wines. The hickory wine had considerably more total smoke compounds, in particular 4-ethyl phenol and phenol. Phenol itself is not very aromatic; however, it is indicative of smoke compounds being present. It is normally higher in heavy toast barrels. Ethyl phenol has been identified as causing sweaty, horsey off-odors in wine. It can be produced during the toasting of wood. It can also be a fermentation by-product of *saccharomyces*, the standard wine yeast. At high concentrations it is normally attributed to the growth of *brettanomyces*, a wild yeast. Hickory smoke could contain a higher proportion of 4-ethyl phenol than American oak smoke. However, any differences due to fermentation should be tested further to confirm the only difference between the sets was the toasting method.

Figure 1: Smoke compounds present in Pinot Noir



Sensory analysis was carried out on the Chardonnay wine from Golden State Vintners. Table 4 shows the preference scores and sensory notes from this tasting.

Table 4: Descriptive analysis of wines made in American oak barrels toasted with different woods			
Chardonnay from Golden State Vintners			
	Aroma Comments	Flavor Comments	Preference % Favorite
American	Grapefruit, citrus, toasty, creamy, light smoke	Sweet, peppery, coconut, fruit driven, typical American oak	33.3
Hickory	Green floral, medium fruit, smoky	Hot peppery, bitter, strong pungent oak, tequila	26.7
French	Clove, grapefruit, smoke, nutty, wheat beer	Refined, balanced, nice fruit, well-integrated, clean taste, subtle	33.3
Mesquite	Sweet associated, hot smoky, low fruit, bacon	Different!, bitter, astringent	7.7

Sensory analysis indicated that both the hickory and mesquite smoked barrels produced wine with a distinct smoky character. Some panelists liked the hickory effect but few were partial to the mesquite. The wood overpowered the fruit and a definite bitterness was found in the finish.

Not a great difference was seen between the American and French oak smoked samples. Two panelists picked out a coconut flavor in the American smoked samples. The toasting of the American oak barrel with American oak pieces could have emphasized this distinctive American oak character. Otherwise the descriptors were similar for wines made in barrels toasted with American or French oak fires.

At the 4th International Barrel Symposium delegates tasted the composite wines. Quantitative descriptive analysis showed no difference in smokiness. It appears the impact of wood type used to heat barrels during toasting is low and may diminish with time. Table 5 gives the preference scores of the tasting.

Table 5: Results from the 4th International Barrel Symposium

	Preference
American Smoke	30%
French Smoke	31%
Hickory Smoke	21%
Mesquite Smoke	18%

CONCLUSION

We used exotic woods to toast American oak barrels to determine their effect on wine flavor. Initially, the hickory and mesquite woods produced quite distinctive wines, however the flavor impact appeared to diminish over time. The mesquite smoked sample was the least preferred. It was identified as the most different. There was no difference in preference between the American and French smoked samples.