Abstract

White wines are, in general, fruitier and fresher than red wines. These descriptors depend on the wine grapes varieties and, with no less importance, on the winemaking technology. Nowadays, the use of wood barrels in the elaboration of quality white wines becomes common in winemaking, and some studies showed the influence of wood compounds on the white wine volatile composition. Flavour notes that are common descriptions of wines exposed to oak include caramel, cream, smoke, spice and vanilla. In this work, monovarietal wines from two distinct grape varieties, Malvasia Fina and Gouveio, produced in stainless steel tanks and oak wood barrels, were analyzed chemically and sensorially five months after vinification. After SPME-GC-MS analysis and sensorial evaluation it was observed that Malvasia Fina white wines are more influenced by the vinification vat (oak wood or stainless steel) concerning aromatic and sensory attributes than the wines obtained from Gouveio grape variety.

This knowledge could be a tool for the winemakers in order to better choose the winemaking process to obtain wines with higher quality standards.

Introduction

Wine is one of the most complex alcoholic beverages and it is well-known that especially white wines do not all age well [1, 2, 3]. The use of oak plays a significant role in winemaking and can have a deep effect on the resulting wine, affecting colour, flavour, tannin profile and texture. Nowadays, the use of wood barrels in the elaboration of quality white wines becomes common in winemaking, and some studies showed the influence of wood compounds on the white wine volatile composition [4, 5]. Wine that aged or matured in oak barrels receives more oak flavours than wine produced in oak barrels, because yeast cells interact with oak components [6]. Thus, the aim of this study was to evaluate the physico-chemical composition, volatile and sensory characteristics of white wines from Malvasia Fina and Gouveio grape varieties, produced in oak barrels and stainless steel tanks.

Wine samples

Methodologies

Two young monovarietal white wines from Malvasia Fina and Gouveio Villas vinífera L. grape varieties (2011 vintage), were produced with grapes harvested at the technological maturity. The two wines were produced in stainless steel tanks and oak wood barrels. All winemings were performed in duplicate. The wines were analyzed five months after vinification. Alcohol content, pH, specific gravity, free and total sulphur dioxide, titratable and volatile acidity were measured according to the methods from OIV [7] (Table 1). All analysis were performed in duplicate.

Results

Table 1 - Phycho-chemical characteristics of Malvasia Fina and Gouveio wine fermented in Stainless steel (SS) and Oak wood (OW) barrel (mean ± SD).

<table>
<thead>
<tr>
<th>Wines and fermentation vessels</th>
<th>Specific gravity (g/mL)</th>
<th>Ethanol (% v/v)</th>
<th>Volatile acidity (g/L)</th>
<th>Titratable acidity (g/L)</th>
<th>SO2 free (mg/L)</th>
<th>SO2 total (mg/L)</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malvasia Fina (SS)</td>
<td>0.9994±0.0000</td>
<td>12.4±0.0</td>
<td>0.23±0.0</td>
<td>5.10±0.0*</td>
<td>36±0</td>
<td>120±2</td>
<td>3.14±0.01*</td>
</tr>
<tr>
<td>Malvasia Fina (OW)</td>
<td>0.9910±0.0000</td>
<td>12.2±0.0</td>
<td>0.39±0.0*</td>
<td>6.30±0.0*</td>
<td>25±1</td>
<td>152±2</td>
<td>3.19±0.00*</td>
</tr>
<tr>
<td>Gouveio (SS)</td>
<td>0.9990±0.0000</td>
<td>12.5±0.0</td>
<td>0.52±0.0*</td>
<td>5.30±0.0</td>
<td>36±1</td>
<td>151±2</td>
<td>3.18±0.01*</td>
</tr>
<tr>
<td>Gouveio (OW)</td>
<td>0.9903±0.0000</td>
<td>12.6±0.0</td>
<td>0.54±0.0*</td>
<td>6.29±0.02*</td>
<td>26±1</td>
<td>140±1</td>
<td>3.15±0.01*</td>
</tr>
</tbody>
</table>

Figure 1 - Sensory profile of monovarietal wines from Malvasia Fina and Gouveio grape varieties vinified in stainless steel (SS) tanks and oak wood (OW) barrel.

Conclusions

Wines produced in oak wood barrels, independently of the grape variety, are more aromatic and more pronounced in “body” character and “spicy aroma” (Figure 1).

In all wines, esters were the largest group of volatile compounds identified, followed by alcohols and fatty acids. The aromatic esters ethyl butyrate, isovaleryl acetate, ethyl hexanoate, hexyl acetate, ethyl ester-9-decenio and 2-phenylethyl acetate present significant differences (p < 0.01) among the wine samples evaluated (Table 2).

In the wines vinified in oak wood barrel, furfural and 5-methylfurfural were also detected and quantified.

References


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