

# The contact surface of oak chips / wine determined by image analysis

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**Abstract.** The study is focused on measuring the oak chips/wine contact surface. Five samples were analysed with the doses used in oenology (2; 3; 4; 5 g.L<sup>-1</sup>). For example, for the dose of 2 g.L<sup>-1</sup> there were obtained the surfaces, as follows: XOVS US-71 cm<sup>2</sup>.L<sup>-1</sup>; XOVS Fr-76 cm<sup>2</sup>.L<sup>-1</sup>; DS Fr-72 cm<sup>2</sup>.L<sup>-1</sup>; OG Md 83 cm<sup>2</sup>.L<sup>-1</sup> and OS Md 154 cm<sup>2</sup>.L<sup>-1</sup>. The results were compared with the data known for the barrel, oak chips doses being calculated to have a similar surface, thus obtaining: XOVS US-2,57 g; XOVS Fr-2,41 g; DS Fr-2,52 g; OG Md-2,19 g; OS Md-1,18 g. Measurements were done with image analysis and this is a first approach to determine this parameter for the wine.

## 1 Introduction

Wine aging in oak barrels is a widespread practice in wine-making, especially when it comes to obtaining a quality red wine and occurs generally from the end of the alcoholic fermentation till wine bottling. This process allows the wine to develop new organoleptic characteristics (color, aroma, taste), valued by consumers, the wine becoming more stable and more complex [1].

Being quite expensive, wine aging in barrels cannot be used for all wines. Therefore, an alternative technology of wine aging is being used lately, by using oak chips associated with wine micro-oxygenation. This can speed up the aging period and lead to make wines with lower production costs compared to the traditional technique, while still obtaining wines with similar organoleptic characteristics [2].

To better control the process of wine aging on the oak chips, it would be good to know the contact surface between wood and wine so as to approach as much as possible to the conditions in the classical method of maturing wine in barrels, where this parameter is already known. Thus, this study comes to help to know this parameter and have a tool to better manage the aging process of the wine on oak chips.

The objective of this study is to determine the contact surface of oak wood/wine during wine aging when oak chips are used.

### 1.1 The influence of oak wood on wine quality

There are several parameters that can influence the accumulation of volatile compounds in wine and the color at its interaction with the oak wood during aging that will lead to the change of the wine kept in barrels, compared with the wine that is kept, for instance, in

stainless steel tanks. Among these parameters, some of the most important are the geographical origin of the oak wood and the type of wood heating used to produce the barrel.

#### 1.1.1 The influence of the oak wood

The oak tree belongs to the botanical genus *Quercus*, this genus being represented by over 250 species, and from among these species only three are mainly used in cooperage to manufacture oak barrels.

These species are as follows:

- *Quercus petraea* and *Quercus robur*, widespread in Europe, from northern Spain to the Ural Mountains.
- *Quercus alba*, this species is found in the USA and especially in the eastern part.

The analyses carried out showed that *Quercus robur* is rich in polyphenolic compounds, tannins and is less aromatic, while *Quercus petraea* contains less and medium polyphenolic compounds being more aromatic.

The American oak tree *Quercus alba* contains less phenolic compounds but is rich in aromatic compounds, especially in whiskey lactones. The molecules of whiskey lactones, eugenol and vanillin are the main substances with a strong aroma and are characteristic of the oak wood before it is subjected to heat processing [1].

#### 1.1.2 The influence of heat treatment

When manufacturing the barrel, the oak wood is subjected to a heat treatment process that can be decomposed into two stages [3]:

1. Heat treatment for oak staves bending – it supposes curving the staves that will be used to manufacture the barrel.

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