



# **BIO-SUSTENTABILIDADE E BIO-SEGURANÇA ALIMENTAR, INOVAÇÃO E QUALIDADE ALIMENTAR**

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## Ficha Técnica

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## Variation of the chemical composition of red wine (Alicante Bouschet and Syrah) during the first eight months of maturation in new and reused oak wood barrels.

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Storage in wood barrels to acquire different aromas and stabilize colloidal colour matter is an important stage in the maturation of high-quality red wines or the ageing process<sup>1</sup>. Wood specie, their toasting level and the barrel usage (new or in a second or third maturation process) are vitally important factors because they are correlated with the wine evolution and consequently with their final quality and aroma profile. The natural micro-oxygenation through the wood pores and the barrel lid is also essential because it improves polymerization and condensation reactions between flavonoid compounds in wine, incrementing their organoleptic characteristics<sup>2</sup>.

This study aimed to follow the variation of the quality of a wine composed of a blend of the cultivars 'Alicante Bouschet' and 'Syrah' during the maturation process in French oak barrels produced with wood from Bertranges ou Tronçais region, comparing new barrels with third time reused barrel in the wine maturation. Four barrels (two of each modality) were used with a medium toasting level. This study was performed during the first eight months of the maturation process, and the wines were sampled every two months.

The chemical composition was monitored over time while measuring the acetic acid, alcohol, citric acid, density, fructose, glucose, glycerol, lactic acid, malic acid, pH, saccharose, tartaric acid, total acidity, and total sugars with a Fourier transform infrared spectroscopy (FTIR) with Attenuated Total Reflection (ATR) (Bruker spectrometer, Alpha) using a diamond crystal. The FTIR-ATR used was equipped with a flow-through cell with controlled temperature. The injection of water cleaned the cell in the flow-through cell, and the background was also measured with distilled water for every ten samples.

To evaluate the differences and the interaction between wood barrels and maturation time, Analyses of Variance (ANOVA) with two factors (barrel [2 levels] and maturation time [4 levels]) were performed. A Principal Component Analysis (PCA) was also performed to study the relationship between variables and samples.

According to the ANOVA, both factors indicated a significant effect, in which the maturation time accounts for a higher percentage of variance. On PCA, the first two components explain a percentage of variance higher than 70%. Lactic acid, saccharose, citric acid and alcohol content had an opposite variation in relation to total acidity, fructose, acetic acid, malic acid, total sugar, glucose content and density.

The results showed a similar evolution of the wine's chemical composition, despite some differences concerning the time of maturation and the kind of barrel used. Using the spectral information, it was also possible to distinguish the different times of the maturation process and the different kinds of barrels.

**Keywords:** Red wine; Wine maturation; Oak barrels; reused barrel.

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