

## Phenolic Composition of Wines from Cultivar Carménère during Aging with Inserts to Barrels

**Authors :** E. Obreque-Slier, P. Osorio-Umaña, G. Vidal-Acevedo, A. Peña-Neira, M. Medel-Marabolí

**Abstract :** Sensory and nutraceutical characteristics of a wine are determined by different chemical compounds, such as organic acids, sugars, alcohols, polysaccharides, aromas, and polyphenols. The polyphenols correspond to secondary metabolites that are associated with the prevention of several pathologies, and those are responsible for color, aroma, bitterness, and astringency in wines. These compounds come from grapes and wood during aging in barrels, which correspond to the format of wood most widely used in wine production. However, the barrels is a high-cost input with a limited useful life (3-4 years). For this reason, some oenological products have been developed in order to renew the barrels and increase their useful life in some years. These formats are being used slowly because limited information exists about the effect on the wine chemical characteristics. The objective of the study was to evaluate the effect of different laubarrel renewal systems (staves and zigzag) on the polyphenolic characteristics of a Carménère wine (*Vitis vinifera*), an emblematic cultivar of Chile. For this, a completely randomized experimental design with 5 treatments and three replicates per treatment was used. The treatments were: new barrels (T0), used barrels during 4 years (T1), scraped used barrels (T2), used barrels with staves (T3) and used barrels with zigzag (T4). The study was performed for 12 months, and different spectrophotometric parameters (phenols, anthocyanins, and total tannins) and HPLC-DAD (low molecular weight phenols) were evaluated. The wood inputs were donated by Tonelería Nacional and corresponded to products from the same production batch. The total phenols content increased significantly after 40 days, while the total tannin concentration decreased gradually during the study. The anthocyanin concentration increased after 120 days of the assay in all treatments. Comparatively, it was observed that the wine of T2 presented the lowest values of these polyphenols, while the T0 and T4 presented the highest total phenol contents. Also, T1 presented the highest values of total tannins in relation to the rest of the treatments in some samples. The low molecular weight phenolic compounds identified by HPLC-DAD were 7 flavonoids (epigallocatechin, catechin, procyanidin gallate, epicatechin, quercetin, rutin and myricetin) and 14 non-flavonoids (gallic, protococatechuic, hydroxybenzoic, trans-cutaric, vanillinic, caffeic, syringic, p-coumaric and ellagic acids; tyrosol, vanillin, syringaldehyde, trans-resveratrol and cis-resveratrol). Tyrosol was the most abundant compound, whereas ellagic acid was the lowest in the samples. Comparatively, it was observed that the wines of T2 showed the lowest concentrations of flavonoid and non-flavonoid phenols during the study. In contrast, wines of T1, T3, and T4 presented the highest contents of non-flavonoid polyphenols. In summary, the use of barrel renovators (zig zag and staves) is an interesting alternative which would emulate the contribution of polyphenols from the barrels to the wine.

**Keywords :** barrels, oak wood aging, polyphenols, red wine

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