Influence of supplementation with different oenological tannins on malvidin-3-monogluicoside copigmentation

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Abstract. The effect as copigment of (-)-epicatechin and five different oenological tannins has been measured in a model wine solution containing malvidin-3-monogluicoside. The results show that all oenological tannins exert a positive effect on the color of the malvidine solution, increasing the global absorptivity spectrum and changing the CIELAB coordinates. Specifically, supplementation with oenological tannins increase a* and b* and decreases L*. Overall, the effect as copigments of all oenological tannins was higher than that of (-)-epicatechin.

1. Introduction

The use of oenological tannins is nowadays a very common practice in winemaking, not only as a technological aid for wine clarification but also for many other aims. However, the use of oenological tannins is only authorized by the OIV to facilitate the clarification of wines and musts [1]. Nevertheless, it is unquestionable that oenological tannins are also currently used for many other purposes.

In fact, the literature has attributed to oenological tannins several other features such as antioxidant activity (protection of wines against oxidation) [2], direct consumption of dissolved oxygen [3], ability to scavenge peroxy radicals [4], ability for chelating iron (II), preventing the oxidative damage mediated by Fenton-based reactions [5], antioxidasic activity (anti-laccase activity) [6], improvement of structure and mouthfeel of wines [7], color improvement and stabilization of red wines [8], copigmentation effect [9], direct formation of new pigments [10], elimination of reduction odors [7] and even bacteriostatic effects [11].

Among them it can be mainly highlight the following: protection of grape juice or wine against oxidation, improvement of structure and mouthfeel of wines, and specially the improvement of color intensity and stability.

With the aim of verifying the effectiveness of the different types of oenological tannins on some of their attributed functions a study about the influence on copigmentation of malvidin-3-monogluicoside has been performed.

2. Materials and methods

A model wine solution (ethanol 13%; tartaric acid 4 g/l; pH 3.5) containing 50 mg/l of malvidin-3-monogluicoside/l was prepared. This solution was also supplemented with 0.1, 0.2 and 0.4 g/l of five different commercial tannins: Ellagitannins from oak, Gallotannins from gallnuts and condensed tannins (proanthocyanidins) from quebracho, grape seeds and grape skins. This solution was also supplemented with (-)-epicatechin to compare the obtained copigmentation effect with previously published data.

The control solution and the tannin supplemented solutions were maintained in airtight conditions (closed Eppendorf). A week later, the full absorbance spectrum in the visible range (400–800 nm) was measured in order to determine the CIELAB coordinates [12].

3. Results and discussion

Figure 1 shows the absorbivity spectrum of the malvidine solution with and without supplementation with oenological tannins.
The results are very clear and confirm that (-)-epicatechin and all the oenological tannins originated an increase in the color of the malvidine solution and that increase was in all the visible rang spectrum.

Cielab coordinates were determined to better parameterize which is the real effect of the different oenological tannins as copigments. Figures 2A and 2B show the obtained results. Overall the results indicate that all oenological tannins have a clear positive effect on the color inasmuch as their supplementation to a malvidine solution originates an increase in \( a^* \) (green−red component) and \( b^* \) (blue−yellow) Cielab coordinates and a decrease in \( L^* \) (Lightness). In general, the enhancing effect on color of all oenological tannins was higher than that exerted by (-)-epicatechin.

It can be concluded that supplementation with oenological tannins can really improve the color of red wines because of their effect as copigments. Further studies are needed to determine the long term effect of oenological tannin supplementation in real wine conditions.

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References


