

Impact of enological tannins on laccase activity

Sourced from the research article "Impact of enological tannins on laccase activity" (OENO One, 2019)¹.

>>> Enological tannins are commonly used in winemaking for various reasons^{2,3}, and in particular for their inhibition of laccase activity. Their use is particularly indicated in vintages affected by *Botrytis* bunch rot, to protect wine color against browning. Nevertheless, until very recently, this anti-laccase effect was merely empirical and without scientific evidence to support it. For this reason, the OIV created a specific working group to study the practical application of enological tannins. Following its investigations, the results presented below demonstrate the effectiveness of enological tannins in inhibiting laccase activity and thus protecting wine color^{1, 4}. <<<

■ Experimental method

The inhibition effect of different types of tannin on laccase activity was measured in a healthy must with the addition of sufficient botrytized grapes to reach a level of 1.5 laccase units per milliliter. Tests were carried out in a control medium both with and without addition of 20 or 40 g/hL of different enological tannins. After 10 minutes' contact, the laccase activity was determined using the syringaldazine test method⁵.

In parallel, two types of vinification experiment were carried out on musts from healthy and botrytized grapes. The first experiment was carried out directly on white must (white vinification) while for the second, 50 mg/L of malvidin-3-O-glucoside was added to the white must (to simulate red vinification), to determine how laccase affects the red color and anthocyanins and also the possible protective effect of enological tannins. In both experiments, a sufficient proportion of botrytized must was added to the healthy must in order to achieve an activity of exactly 1.5 laccase units per milliliter.

■ Inhibition of laccase activity

Figure 1 shows the inhibition effect of different types of commercially available tannin on laccase activity. It can be seen that all the enological tannins studied had an inhibition effect on laccase activity of between 20 and 45 % depending on the dose and the type of tannin used. This data seems to indicate the usefulness of enological tannins in protecting must and wine from browning when grapes are infected with *Botrytis* bunch rot.

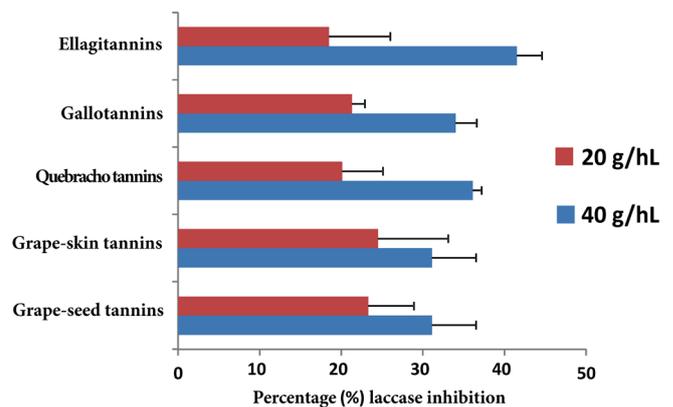


Figure 1. Inhibition effect of different enological tannins on laccase activity.

To confirm that this inhibition of laccase activity actually protects against the browning of white musts and wines and oxidative deterioration of red wines, micro-vinification studies were then carried out. These were conducted both with and without the presence of laccase activity and with and without addition of the different enological tannins.

Figure 2 shows the results obtained for white vinification. They clearly demonstrate that wines showed a markedly higher yellow color intensity (A_{420nm}) in the presence of a laccase activity of 1.5 units/ml, confirming the occurrence of browning. The graphs also show that addition of enological tannins resulted in a significant decrease in the difference in yellow color between the samples with and without laccase. In addition, these color differences were generally smaller when the dose of tannin was higher.

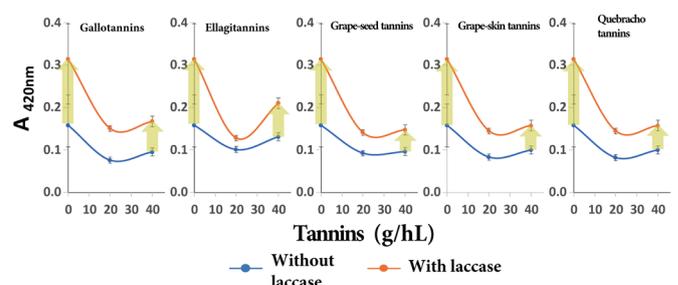


Figure 2. Influence of the addition of enological tannins to must on the color of white wine in the presence or absence of laccase activity.

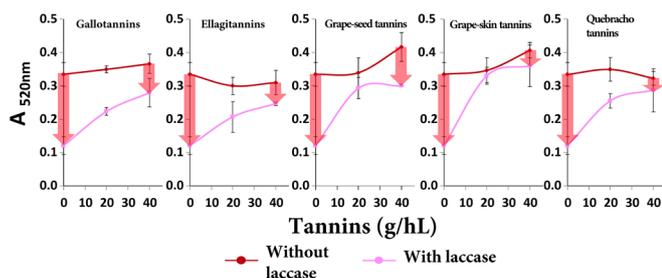


Figure 3. Influence of the addition of enological tannins to must on the color of red wine in the presence or absence of laccase activity.

Figure 3 shows the results obtained for red vinification. In this case, the red color intensity (A_{520nm}) was measured and a significant decrease in red color was observed in samples containing laccase activity. This confirms the destructive effect of laccase on the red color of wines. However, addition of the different enological tannins had a protective effect on the color of the wines. The color difference was reduced in the presence of tannins and the effect was even more pronounced as the dose of tannin was increased.

■ Conclusions

Together, these results confirm that all enological tannins serve to inhibit laccase activity and that they do indeed protect the color of both white and red wines. Consequently, it can be said that they are a tool of choice to be used when the crop is affected by *botrytis* bunch rot. ■

Following these results, the 17th General Assembly of the OIV approved two new resolutions (Oeno-Techno Resolutions 17-612 and 17-613) which include new scientifically proven functions of enological tannins, including their inhibition of laccase activity.

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