State of the art on oenological strategies to counteract phenolic instability of red wines due to flavonols.

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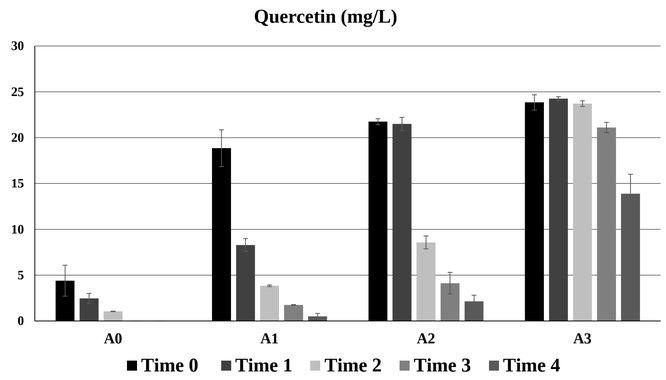
State of the art:

In recent years, due to climate changes, in several red wines, such as those obtained from the Sangiovese cultivar (*Vitis vinifera* L.), the formation of undesirable deposits of flavonols, especially quercetin (Q) occurs. This study considered different factors affecting Q solubility and oenological strategies to counteract this insidious phenolic instability in bottled red wines.

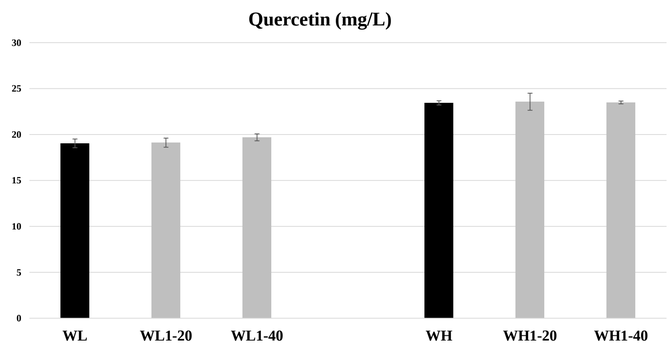
The solubility of Q is increased by:

• Anthocyanins



Content of Quercetin in experimental samples at different concentrations of anthocyanins. A0, A1, A2, A3: samples obtained by mixing Q (30 mg/L) with increasing amounts of anthocyanins (0, 50, 200 and 500 mg/L respectively) in model solution. Time 0=2h, Time1=24h, Time 2=144h, Time 3=312h and Time 4=840h.

• Mannoproteins and pH

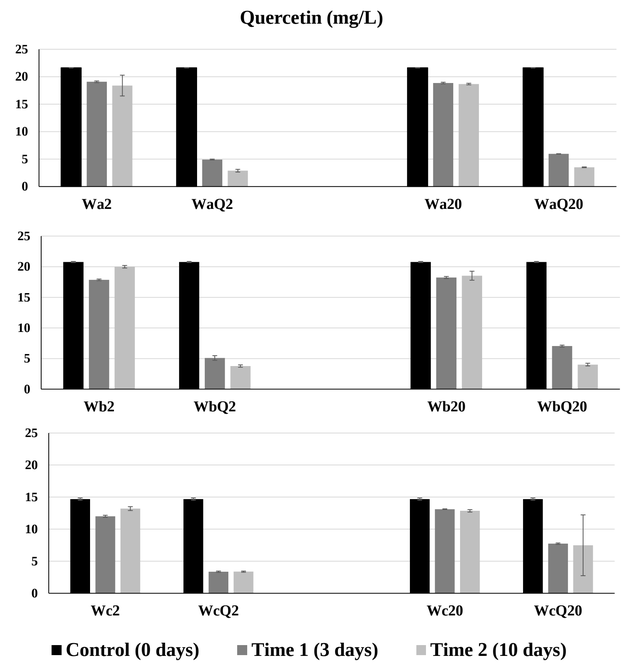


Content of Quercetin in Sangiovese wine with an initial pH of 3,8 (WH) added with tartaric acid to achieve a pH of 3,2. (WL). Both obtained wines were added to a specific mannoprotein (Polysaccharides (eq. Mannose) (g/kg) > 600) at two doses (20-40 g/hL). Time of contact :2 months.

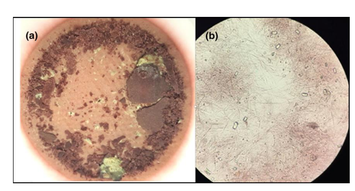
- Time
- pH
- Wine composition

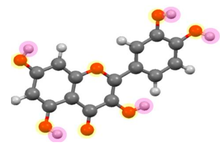
The precipitation of Q is increased by:

• Addition of Nucleation Seeds



Content of quercetin in experimental wines obtained by adding Q podwer as nucleation seeds in three wines (Wa, Wb and Wc) stored at two temperatures (2 °C and 20 °C) to obtain the experimental samples: Wa2, WaQ2, Wa20, WaQ20, Wb2, WbQ2, Wb20, WbQ20, Wc2, WcQ2, Wc20, WcQ20. The number at the end of the code for each wine is the temperature of storage. Time: 0 days (control), 3 days (time 1), 10 days (time 2).





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Some oenological strategies to counteract phenolic instability:

• PVPP

Content of quercetin in a Sangiovese wine treated with different doses of PVPP (5 g/hL; 20 g/hL; 40 g/hL; 60 g/hL; 80 g/hL; 120 g/hl; 160 g/hL) stored for 7 days under controlled conditions.

• MIX (PVPP-YEAST LYSATE)

Content of quercetin in a Sangiovese wine treated with different doses of MIX (5 g/hL; 20 g/hL; 40 g/hL; 60 g/hL; 80 g/hL; 120 g/hL; 160 g/hL) stored for 7 days under controlled conditions.

• YEAST LYSATE (YD)

Content of quercetin in a Sangiovese wine treated with different doses of Yeas Lysate (10 g/hL; 20 g/hL; 30 g/hL; 50 g/hL) stored for 7 days under controlled conditions.

Conclusions:

The data showed that the solubility of Q in red wine depends on the anthocyanin concentration, but also that the addition of nucleation seeds to red wine determines a strong precipitation of Q in solution, therefore a strategy to accelerate the precipitation can be proposed to limit the precipitation of Q before bottling. Among the oenological strategies considered, the fining treatment with PVPP and the preparation obtained by mixing PVPP and YD (MIX) drastically reduce the concentration of Q in wines. The enzymatic treatment was also shown to have an effect on the quercetin glycosides, releasing the aglycone into the medium to be subsequently removed by adsorption on fining agents or by crystallisation (data not shown). These results confirm the importance of further research to find the best fining agent, starting from natural resources such as yeast lysates, which also determine a decrease of Q in the medium, or the alternative oenological strategy to limit this problem by increasing its solubility in the wine.

References:

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