

INFLUENCE OF PHENOLIC ACIDS ON GROWTH AND INACTIVATION OF SOME LACTIC ACID BACTERIA FROM WINE

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Summary

It is known that certain wine phenolic compounds show an antimicrobial activity against both spoilage and malolactic lactic acid bacteria (LAB). Their susceptibility is apparently strain dependent and differs with the type and concentration of phenolic compounds concerned. This field of research has received relatively little attention and the scarce results in the literature are somewhat contradictory.

The phenolic composition of wines is very diverse and includes phenolic (hydroxycinnamic and hydroxybenzoic) acids in total concentrations ranging from 100 to 200 mg l⁻¹, depending on the grape varieties and vinification process.

The effect of structurally close phenolic acids on growth and inactivation of LAB can be very different. Several studies showed that some hydroxybenzoic acids can activate cell growth and reduce the malolactic fermentation rate whilst others are slightly inhibitory. Other authors report that some hydroxycinnamic acids markedly inhibit growth of wine-spoilage LAB

In this work we studied the effect of phenolic acids on the growth and inactivation of *Oenococcus oeni* and *Lactobacillus hilgardii*. Eight major phenolic acids that occur naturally in wine (*p*-coumaric, caffeic, ferulic, *p*-hydroxybenzoic, protocatechuic, gallic, vanillic and syringic acids) were tested at three different concentrations (100, 200 and 500 mg l⁻¹) for their effects on the growth and inactivation of these LAB. Growth experiments were done in MRS/TJ growth media at pH 4.5 with 5% ethanol (v/v). Bacterial growth was measured by spectrophotometry (optical density at 660 nm wavelength). Inactivation experiments were performed in KH₂PO₄ (0.15 M) buffer at pH 4.5 with 9% ethanol (v/v).

Generally, hydroxycinnamic acids proved to be more inhibitory to the growth of the two bacterial strains studied than hydroxybenzoic acids. On the other hand, some acids (protocatechuic and ferulic) showed a benefic effect on growth of *Lact. hilgardii*. The inhibitory effect of phenolic acids was stronger in *Oenococcus oeni* than in *Lact. hilgardii*. *p*-Coumaric acid proved to be the most inhibitory phenolic acid to the growth of both LAB. On the contrary, gallic acid was the least inhibitory of all phenolic acids tested.

The results obtained so far in the inactivation experiments show that all phenolic acids tested accentuated the inactivation of both LAB. This effect is stronger in hydroxycinnamic acids than in hydroxybenzoic acids. *p*-Coumaric acid had the strongest inhibitory effect of all tested phenolic acids with both bacteria.