

## Prediction of astringency in red wine using tribology approach to study in-mouth perception

**AIM** Astringency is described as a 'dry puckering-like sensation' following consumption of tannins<sup>1</sup> that affect consumer preference of foods and beverages, including red wine<sup>2</sup>. To improve the understanding of astringency, which is a complex interaction due to multiple mechanisms occurring simultaneously, further studies are needed. In this view, oral tribology is considered a useful technique for beverage study to evaluate the thin-film lubrication properties of saliva resulting in oral friction-related sensations<sup>3</sup>. The aim of this study was to examine the film behavior of selected protein-based fluids under controlled friction conditions, to understand polyphenol-protein interactions involved in the sensation of astringency.

**METHODS** A mini-traction device was self-assembled to evaluate friction during a dynamic process under different test conditions. Moreover, several oenological tannins and red wines were analyzed to relate instrumental and sensory results, and the effect of selected parameters involved in astringency perception (acidity, ethanol, polysaccharides) was investigated.

**RESULTS** After a preliminary screening of several proteic fluids based on friction behavior, the addition of oenological tannins at increasing levels showed empirical evidence of linear range of interaction with protein ( $R^2$  up to 0.97) with increasing friction values. Results were greatly affected by the botanical origin of tannins, their degree of purity and the tannin-to-protein ratio. The tribological findings were confirmed by the chemical and sensory analysis of red wines, which highlighted the great contribution of phenolic compounds, in particular tannins.

**CONCLUSIONS** The inherent properties of the selected protein-based fluid allow a satisfactory prediction of astringency in wine and future work will focus on friction and film formation across a broader set of conditions to improve the characterization of wine astringency based on tribology-sensory relationship.

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