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AN UPDATE ON WINE AGEING AND SULFONATIONS

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ABSTRACT

Wine is a unique food matrix, in which grapes, yeasts, bacteria, oxygen, chemistry, wood and humans collaborate to deliver one of the richest matrices in terms of the number of metabolites. The common oenological practice of adding the antioxidant and antimicrobial sulfur dioxide (SO2) has a major impact on wine metabolomic fingerprint. Even if SO2 is indispensable in winemaking, sulfites are among food allergen, so legal limits have been established for the maximum concentration of this chemical in wine. On the other hand, the recommendations about the minimum necessary SO2 doses take in account very general characteristic of the wine, such as wine style (red, white, sparkling, etc) and pH. Therefore, often expert/veteran enologists use SO2 based in empirical knowledge.

Previously, through LC-MS based metabolomics studies, a) the sulfonated monomeric and dimeric flavanols (epicatechin and procyanidin B2) were detected in red wine and were positive correlated with wine ageing and storage conditions [1,2]; and b) the sulfonated tryptophol and sulfonated indole lactic acid glucoside were detected in white wine and were correlated with packaging oxygen [3]. In this study, we investigated these novel discovered oenological reactions occurring between wine metabolites and sulfur dioxide. The aims were the synthesis of the above sulfonated metabolites, the development of an LC-MS targeted method and the analysis of a wide range of wines. The general result was that the chemical profile of the oldest wines was strongly characterised by sulfonated flavanols and indoles, indicating that could be fundamental metabolites in explaining quality in both red and white aged wines. Moreover, was found that the sulfonation of tryptophan metabolites characterised more white wines, in contrast to red wines, where sulfonation of flavanols was preferred. These findings offer new prospects for more precise use of SO2 in winemaking and maybe for wines with less sulfites.

Keywords: tannins, indoles, tryptophan, sulfur dioxide

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