TRACKING OF SULFONATED FLAVANOL FORMATION IN A MODEL WINE DURING STORAGE

SERGIO GÓMEZ-ALONSO[1,2], EDUARDO GUISANTES BATÁN[1,2], ROCÍO BRAVO DE GRACIA[2], JOSÉ PÉREZ-NAVARRO[1,3]

Universidad de Castilla-La Mancha

[1] Regional Institute for Applied Scientific Research (IRICA), University of Castilla-La Mancha, Av. Camilo José Cela 10, 13071 Ciudad Real, Spain.

[2] Faculty of Chemical Sciences and Technologies, University of Castilla-La Mancha, Av. Camilo José Cela, 10, 13071 Ciudad Real, Spain.

[3] Higher Technical School of Agronomic Engineering, University of Castilla-La Mancha, Ronda de Calatrava 7, 13071 Ciudad Real, Spain.

sergio.gomez@uclm.es

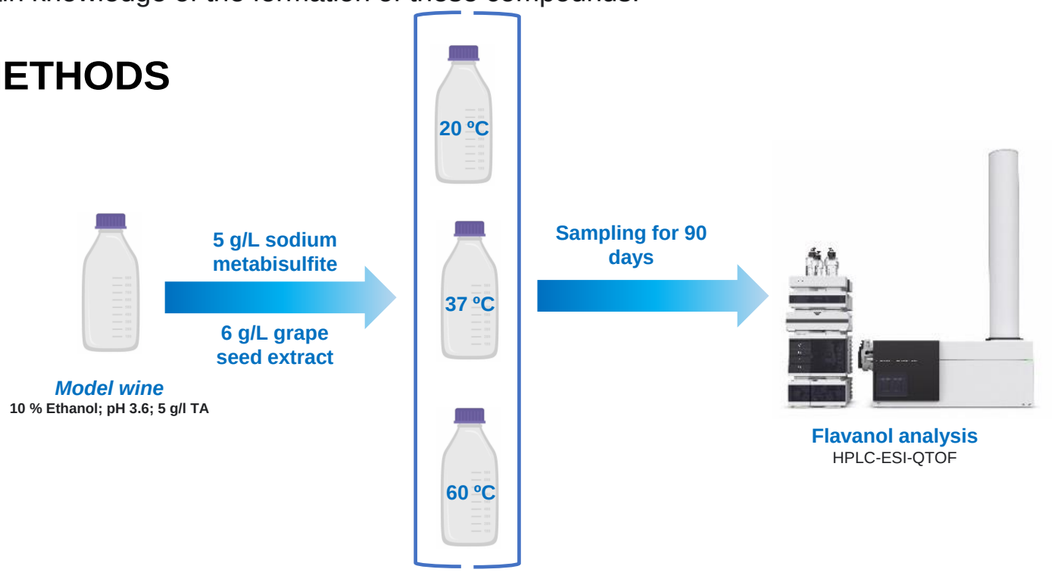
INTRODUCTION

The use of SO_2 in winemaking process generates controversy due to its possible adverse effects on wine consumers health. However, alternatives studied to date have not been able to completely replace the complex properties of SO_2, which have an essential role during the wine elaborating, aging and conservation processes [1]. Sulfites ability to react with wine compounds, such as acetaldehyde, pyruvic acid, glucose and anthocyanins, has been acknowledged for decades. However, unknown sulfonated products of flavan-3-ols, hydroxycinnamic acids and indoles have recently been described, which may have important repercussions on the wine quality and could be markers of wines stored under inappropriate conditions [2, 3].

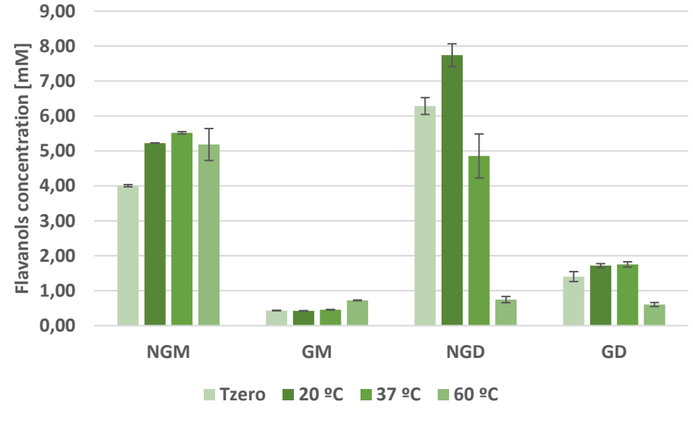
AIM

The aim of this work was to determine the reaction products of bisulfite with grape seed flavanols and changes therein over different storage conditions in a model wine in order to gain knowledge of the formation of these compounds.

METHODS

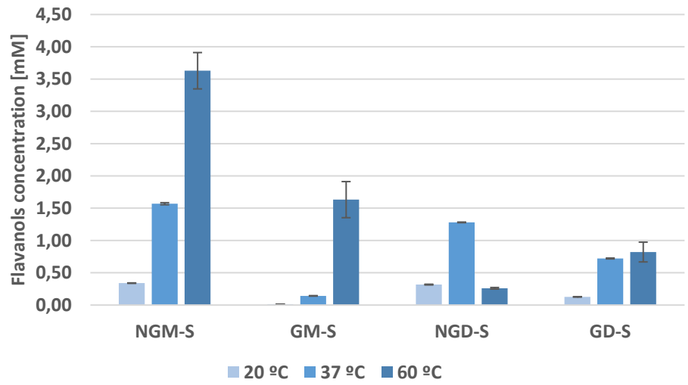


RESULTS



Concentration of flavanols at time zero and after 90 days of storage at different temperatures.

NGM, non-galloylated monomers; GM, galloylated monomers; NGD, non-galloylated dimers; GD, galloylated dimers.



Concentration of sulfonated flavanols after 90 days of storage at different temperatures.

NGM-S, non-galloylated monomer sulfonates; GM-S, galloylated monomer sulfonates; NGD-S, non-galloylated dimer sulfonates; GD-S, galloylated dimer sulfonates.

The sulfonation reaction gave rise to several non-galloylated and galloylated flavanol sulfonates, mainly products of (epi)catechin, found at higher concentrations in the grape seed extract. Storage time led to the formation of these compounds, even though it was observed greater sulfonated flavanol concentrations at higher temperatures. At 60 ºC, dimeric flavanol sulfonates were quickly degraded, being a further factor for the sulfonated monomeric and non sulfonated monomers product rise during storage.

REFERENCES

1. Guerrero R.F., Cantos-Villar, E. (2015) Demonstrating the efficiency of sulphur dioxide replacements in wine: A parameter review. Trends in Food Science & Technology, 42, 27-43.
2. Arapitsas, P., Speri, G., Angeli, A., Perenzoni, D., Mattivi, F., 2014. The influence of storage on the 'chemical age' of red wines. Metabolomics 10, 816–832.
3. Mattivi, F., Arapitsas, P., Perenzoni, D., Guella, G. (2015) Influence of storage conditions on the composition of red wines. ACS Symp. Ser. 1203, 29–49.

CONCLUSIONS

Temperature contributed to the sulfonation reaction in a model wine, favouring the formation of sulfonated flavan-3-ols derivatives and also to tannin depolymerization. A deeper study of sulfonated flavanols formation and presence in wine would be useful for better understanding the chemical changes during wine ageing.

macrowine Virtual June 23 - 30 2021

ACKNOWLEDGMENTS The authors thank UCLM/FEDER (Spain) for financial support under project grant 2019-GRIN-27164.