

11th Central European Congress on Food and Nutrition



CEFood Congress Book

“Food, technology and nutrition for
healthy people in a healthy environment“

Editors:

**Peter Raspor, Irena Vovk, Andrej Ovca,
Sonja Smole Možina, Bojan Butinar, Mojca Jevšnik**

Ljubljana, 2022

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CHEMICAL CHARACTERIZATION, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF WINEMAKING INDUSTRY BY-PRODUCTS

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The exploitation of bioactive compounds from agri-food by-products has been attracting an increasing interest from different industries within a circular economy context since several of compounds may have health properties or be used as natural colorants or preservatives. So far, several studies have been developed on the characterization of red wine grape pomace and its components (seeds, skins, and stems). However, less attention has been paid to other by-products, such as grape pomace from white wine, the residues after distillation, wine lees, and diatomaceous earth, the latter used in the filtration of wine and corresponding to about 250 tons/year of waste in Portugal. In this work, samples of these by-products were evaluated for their chemical composition by HPLC-DAD-ESI-MSⁿ and bioactivities (antioxidant activity by TBARS, DPPH, and reducing power assays, and antimicrobial activity against eight bacteria and two fungi). Fifteen non-anthocyanin phenolic compounds were found, including 5 phenolic acids, 4 flavan-3-ols, 2 O-glycosylated flavanols, 3 flavanol aglycones, and one unknown. In the red wine by-products 12 anthocyanins were detected, most being malvidin derivatives. Wine lees and white grape pomace before distillation presented the highest contents of phenolic compounds. All samples showed antibacterial and antifungal activity against most of the tested microorganisms, with red and white grape pomace and diatomaceous earth having the best bacteriostatic activity, while the lees stood out against fungi. All samples showed promising antioxidant capacity, with very good results obtained on TBARS for the white pomace after distillation and diatomaceous earth.

Overall, the results show that besides grape pomace other wine industry by-products are also good sources of bioactive compounds with high potential for exploitation.

Acknowledgements

To Campelo for the winemaking residues. To project "BacchusTech - Integrated Approach for the Valorization of Winemaking Residues" (POCI-01-0247-FEDER-069583) and national funds FCT/MCTES to CIMO (UIDB/00690/2020). L. Barros, M. Dias, S. Heleno thank FCT, P.I., for their scientific employment program-contract.