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Stability and influence of agro-environmental conditions on phenolic compounds and biological properties of Grape (*Vitis vinifera L.*) stems

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The winery industry is one of the most important industries worldwide, with an economical and social impact in Europe and specially in northern Portugal. This socio-economic activity entails large quantities of by-products generated annually, causing economical and environmental problems. In a close connection with the 40 years history of investigation on agro-food valorization, nowadays, a growing interest has wake up on recycling winery wastes boosted by the more and more reported putative health-promoting effects. Furthermore, the continuous emergence of multidrug resistant bacteria is becoming a huge threat to human, animal and environmental health (One health approach). Therefore, the research for new natural antimicrobial compounds is the most promising alternative to effectively control multidrug bacterial infections. Hence, qualitative and quantitative evaluation of polyphenolic extracts of grape stems as sources of individual phenolic compounds and their biological activity *in vitro* (radical scavenging power and antimicrobial activity) were assessed. Grape stems revealed to be a rich source of phenolic compounds, even after some months of storage. Furthermore, all extracts (with and without storage) were able to inhibit the bacterial growth of the Gram-positive bacteria and Gram-negative bacteria (except E. coli and K. pneumoniae), revealing the potential inclusion of these bioactive compounds in the food, cosmetic, and pharmaceutical industry as functional ingredients. Furthermore, and as expected, it was also verified a year-to-year variation proved by a significant increase of these parameters from 2017 to 2018, revealing the high influence of growing seasons in the phytochemical composition of these by-products. The antimicrobial activity determined in these samples demonstrated to be not severally affected by the climate conditions of each year of study, however, the high altitude induced generally a lower activity in the stem samples, results confirmed by the multivariate analysis.

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