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Sustainable Valorization of Wine Production Waste: Unlocking the Potential of Grape Pomace and Lees in the Vinho Verde Region

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Abstract : The wine industry produces significant quantities of waste, much of which remains underutilized as a potential raw material. Typically, this waste is either discarded in the fields or incinerated, leading to environmental concerns. By-products of wine production, like lees and grape pomace, are readily available at relatively low costs and hold promise as raw materials for biochemical conversion into valuable products. Reusing these waste materials is crucial, not only for reducing environmental impact but also for enhancing profitability. The Vinhos Verdes demarcated region, the largest wine-producing area in Portugal, has remained relatively stagnant over time. This project aims to offer an alternative income source for producers in the region while also expanding the limited existing research on this area. The main objective of this project is the study of the sustainable valorization of grape pomace and lees from the production of DOC Vinho Verde. Extraction tests were performed to obtain high-value compounds, targeting phenolic compounds from grape pomace and protein-rich extracts from lees. An environmentally friendly technique, microwave extraction, was used for this process. This method is not only efficient but also aligns with the principles of green chemistry, reducing the use of harmful solvents and minimizing energy consumption. The findings from this study have the potential to open new revenue streams for the region's wine producers while promoting environmental sustainability. The optimal conditions for extracting proteins from lees involve the use of NaOH at 150ºC. Regardless of the solvent employed, the ideal temperature for obtaining extracts rich in polyphenol compounds and exhibiting strong antioxidant activity is also 150ºC. For grape pomace, extracts with a high concentration of polyphenols and significant antioxidant properties were obtained at 210ºC. However, the highest total tannin concentrations were achieved at 150ºC, while the maximum total flavonoid content was obtained at 170ºC.

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