

Valorization of Viticultural Waste: Phenolic Composition of Grape By-Products Characterized by HPLC-UV

The winemaking process generates large quantities of solid by-products, such as grape pomace, stems, and residual grapes, which are often considered waste despite their richness in bioactive molecules [1]. This study evaluated the phytochemical potential of five winemaking-derived matrices: fresh grapes (7U), white pomace (8V), red pomace (9V), white grape stems (10R), and red grape stems (11R). The solid matrices were freeze-dried, while moisture content was determined for the fresh grapes (69.3%). Two types of extracts (aqueous and hydroalcoholic, EtOH:H₂O 50:50) were prepared from each matrix at a concentration of 50 mg/mL, using Ultraturrax homogenization followed by ultrasound-assisted extraction. The extracts were characterized using HPLC-UV, and each sample was analyzed in duplicate.

Pomace, particularly from red grapes (9V), exhibited an interesting phenolic profile, with high levels of catechin, epicatechin, and resveratrol (up to 21.8 µg/mg DE), confirming its value as a source of stilbenes and flavanols. White pomace (8V) stood out for its content of glycosylated flavonols such as hyperoside and rutin, and phenolic acids like gallic and caftaric acids. Red stems (11R) recorded the highest concentrations of 3-hydroxytyrosol (640.8 µg/mg DE) and catechin (371.7 µg/mg DE), while fresh grape extracts showed significant differences based on the solvent used.

The results confirm that winemaking by-products represent a valuable resource for the extraction of bioactive compounds, and that solvent choice significantly affects the phytochemical profile. Future studies will assess the impact of varying ethanol-to-water ratios to improve extraction selectivity and efficiency.

References

- [1] Lopes J da C, Madureira J, Margaça FMA, Cabo Verde S (2025) Grape Pomace: A Review of Its Bioactive Phenolic Compounds, Health Benefits, and Applications. *Molecules* 30:362. <https://doi.org/10.3390/molecules30020362>

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