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Shaping the Future of Sustainable Food Ecosystems

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BOOK OF ABSTRACTS

- Challenges and Opportunities in the Food System of the Transborder Region
- Innovation, Technology, and Food Security in a Changing Global Landscape
- Nutrition and Consumer Trends: Enhancing the Value of Endogenous Resources
- Quality, Food Safety, and Environmental Responsibility
- Marketing, Digitalization, and the Future of the Food Sector
- Strategic Developments in the Net4Food Project

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P62 | NUTRITIONAL AND PHYTOCHEMICAL PROFILING OF GRAPE BY-PRODUCTS: TOWARD HIGH-VALUE BIOACTIVE EXTRACTS

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Grape by-products, generated as solid residues from winemaking, are rich in dietary fiber and phenolic compounds, mainly anthocyanins, offering strong potential for sustainable valorization. Their fiber-dominant composition, moderate protein and lipid content, and high antioxidant capacity make them suitable for applications in functional ingredients, dietary fiber enrichment, and natural pigment utilization.

Valorizing these residues contributes to circular economy strategies by transforming agro-industrial waste into high-value ingredients, reducing environmental impact, and improving resource efficiency in the wine industry. With growing demand for sustainable, biodegradable, and clean-label materials, the NOVAPACK project explores the potential of grape by-products as natural sources of antioxidants and bioactive compounds (Figure 1) to replace synthetic additives in food, nutraceuticals, and active packaging applications.

In this study, grape by-products were nutritionally characterized by AOAC methodology, revealing a low-moisture (3.9±0.0% moisture), (5.07±0.1 % ash), fiber-rich matrix comprising 68.3% total dietary fiber (64.5% insoluble), 10.1% protein, and 11.9% lipids. Phenolic compounds were extracted using environmentally friendly, food-safe, acidified water-based solvents, including ethanol, citric acid, lactic acid, and ascorbic acid. For example, during extraction with 1% citric acid, anthocyanins were detected by HPLC-DAD at 520 nm, with malvidin-3-glucoside identified as the predominant compound, while cyanidin- and delphinidin-3-glucosides appeared earlier in the chromatographic profile. Total polyphenol content was measured using the Folin–Ciocalteu method, and antioxidant activity was evaluated through, ABTS, and ORAC assays. Correlations between phenolic composition and antioxidant activity were explored further to elucidate the functional properties of the bioactive compounds and identify the most promising grape by-product extracts for valorization. These findings highlight the potential of grape pomace as a readily available, low-cost source of polyphenolic compounds, supporting its conversion into bioactive extracts for a range of industrial applications.

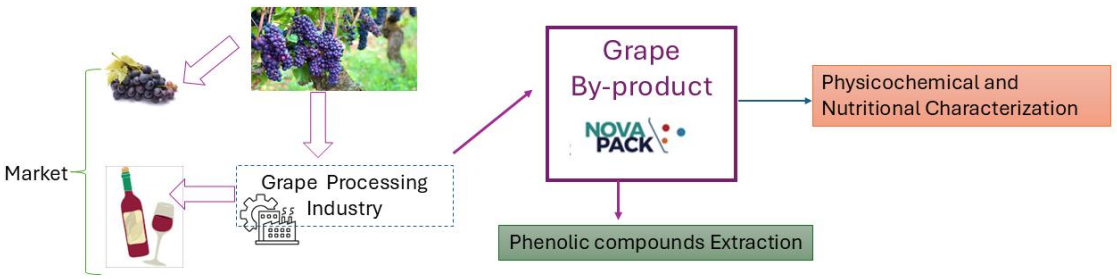

Figure 1 – Integrated Valorization Flow of Grape By-Products in NOVAPACK Project.

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