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Grape Pomace Is Not Waste: Unlocking Hidden Value in a Circular Wine Economy

Réka Matolcsi[1,*] and Csaba Oláh[2]

[1]*University of Tokaj, Sztárai Institute, H-3950 Sárospatak, Eötvös út 7, Hungary*
[2]*University of Tokaj, Mathiasz Institute, H-3950 Sárospatak, Eötvös Street 7, Hungary*

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Abstract

The transition toward a circular economy has become a strategic priority within European environmental and agri-food policies, placing increasing pressure on food production systems to reduce waste and maximise resource efficiency. The wine sector generates large volumes of by-products during grape processing; however, these materials are often underutilised despite their high biological and economic value. Grape pomace, consisting of grape skins and seeds, represents a largely untapped bioresource with significant potential to support sustainable innovation in the wine and food industries. Driven by growing demand for health-oriented and functional foods, grape-derived by-products have attracted increasing attention due to their rich content of bioactive compounds, particularly polyphenols with antioxidant and antimicrobial properties. These compounds have been associated with beneficial physiological effects, including cardiovascular protection and immune system support. As a result, grape pomace should no longer be considered waste, but rather a strategic raw material within circular agri-food systems. This study provides a comprehensive overview of the valorisation pathways of winery by-products, with a particular focus on grape pomace utilisation. The research is based on a targeted review of international scientific literature, combined with market mapping of grape-derived products currently available in Hungary. In addition, practice-based insights were collected through qualitative expert interviews with two leading Hungarian winemakers to identify applied technologies and real-world challenges related to by-product processing. The analysis reveals a wide range of high-value applications for grape pomace, including grape seed flour, grape seed oil, cosmetic ingredients, functional foods for human consumption, and feed products for animals. Existing market examples demonstrate that integrating by-product valorisation into winery operations can contribute to economic diversification, improved sustainability performance, and enhanced resilience of wine enterprises. The findings highlight the need for integrated value chain approaches, technological development, and knowledge transfer to fully exploit the hidden value of grape pomace. Overall, the study argues that systematic utilisation of winery by-products represents a key opportunity for advancing circular economy principles while strengthening the long-term competitiveness and sustainability of the wine sector.

Keywords: grape pomace, circular economy, winery by-products, food innovation, sustainable agri-food systems