

Recovery of Polyphenolic Phytochemicals From Greek Grape Pomace (*Vitis Vinifera* L.)

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Abstract : Rationale: Agiorgitiko is one of the most widely-grown and commercially well-established red wine varieties in Greece. Each year viticulture industry produces a large amount of waste consisting of grape skins and seeds (pomace) during a short period. Grapes contain polyphenolic compounds which are partially transferred to wine during winemaking. Therefore, winery wastes could be an alternative cheap source for obtaining such compounds with important antioxidant activity. Specifically, red grape waste contains anthocyanins and flavonols which are characterized by multiple biological activities, including cardioprotective, anti-inflammatory, anti-carcinogenic, antiviral and antibacterial properties attributed mainly to their antioxidant activity. Ultrasound assisted extraction (UAE) is considered an effective way to recover phenolic compounds, since it combines the advantage of mechanical effect with low temperature. Moreover, green solvents can be used in order to recover extracts intended for used in the food and nutraceutical industry. Apart from the extraction, pre-treatment process like drying can play an important role on the preservation of the grape pomace and the enhancement of its antioxidant capacity. Objective: The aim of this study is to recover natural extracts from winery waste with high antioxidant capacity using green solvents so they can be exploited and utilized as enhancers in food or nutraceuticals. Methods: Agiorgitiko grape pomace was dehydrated by air drying (AD) and accelerated solar drying (ASD) in order to explore the effect of the pre-treatment on the recovery of bioactive compounds. UAE was applied in untreated and dried samples using water and water: ethanol (1:1) as solvents. The total antioxidant potential and phenolic content of the extracts was determined using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay and Folin-Ciocalteu method, respectively. Finally, the profile of anthocyanins and flavonols was specified using HPLC-DAD analysis. The efficiency of processes was determined in terms of extraction yield, antioxidant activity, phenolic content and the anthocyanins and flavonols profile. Results & Discussion: The experiments indicated that the pre-treatment was essential for the recovery of highly nutritious compounds from the pomace as long as the extracts samples showed higher phenolic content and antioxidant capacity. Water: ethanol (1:1) was considered a more effective solvent on the recovery of phenolic compounds. Moreover, ASD grape pomace extracted with the solvent system exhibited the highest antioxidant activity ($IC_{50}=0.36\pm0.01\text{mg/mL}$) and phenolic content ($TPC=172.68\pm0.01\text{mgGAE/g dry extract}$), followed by AD and untreated pomace. The major compounds recovered were malvidin3-O-glucoside and quercetin3-O-glucoside according to the HPLC analysis. Conclusions: Winery waste can be exploited for the recovery of nutritious compounds using green solvents such as water or ethanol. The pretreatment of the pomace can significantly affect the concentration of phenolic compounds, while UAE is considered a highly effective extraction process.

Keywords : agiorgitiko grape pomace, antioxidants, phenolic compounds, ultrasound assisted extraction

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