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Green Extraction Processes for the Recovery of Polyphenols from Solid Wastes of Olive Oil Industry

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Abstract : Olive mill solid waste is an olive oil mill industry by-product with high phenolic, lipid and organic acid concentrations that can be used as a low cost source of natural antioxidants. In this study, extracts of Olea europaea (olive tree) solid olive mill waste (SOMW) were evaluated in terms of their antiradical activity and total phenolic compounds concentrations, such as oleuropein, hydroxytyrosol etc. SOMW samples were subjected to drying prior to extraction as a pretreatment step. Two drying processes, accelerated solar drying (ASD) and air-drying (AD) (at 35, 50, 70°C constant air velocity of 1 m/s), were applied. Subsequently, three different extraction methods were employed to recover extracts from untreated and dried SOMW samples. The methods include the green Microwave Assisted (MAE) and Ultrasound Assisted Extraction (UAE) and the conventional Soxhlet extraction (SE), using water and methanol as solvents. The efficiency and selectivity of the processes were evaluated in terms of extraction yield. The antioxidant activity (AAR) and the total phenolic content (TPC) of the extracts were evaluated using the DPPH assay and the Folin-Ciocalteu method, respectively. The results showed that bioactive content was significantly affected by the extraction technique and the solvent. Specifically, untreated SOMW samples showed higher performance in the yield for all solvents and higher antioxidant potential and phenolic content in the case of water. UAE extraction method showed greater extraction yields than the MAE method for both untreated and dried leaves regardless of the solvent used. The use of ultrasound and microwave assisted extraction in combination with industrially applied drying methods, such as air and solar drying, was feasible and effective for the recovery of bioactive compounds.

Keywords : antioxidant potential, drying treatment, olive mill pomace, microwave assisted extraction, ultrasound assisted extraction
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