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Oral Presentations

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Applying Response Surface Methodology to Phenolic Compounds from Arbutus unedo: Case Studies with Ultrasound and Dynamic Maceration Extraction

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Arbutus unedo L. is a small Mediterranean plant, being found mostly in southern Europe, north-eastern Africa, Ireland, Palestine, and the Canary Islands, and have been studied for its chemical composition. The objective of this work focuses on the identification and quantification of polyphenols of extracts of *A. unedo* through two different techniques, namely dynamic maceration (DM) and ultrasound assisted extraction (UAE). Three independent variables were tested: time (10-60 minutes), temperature (30-80 ºC) and solvent ratio (ethanol) (0-100%) for DM, and swapping temperature for ultrasonic power (50-500 W) in UAE. The analyzed responses for each extraction were the solid residue after extractions, the four most abundant phenolic compounds in both techniques, namely (+)-catechin, isorhamnetin-O-deoxyhexoside, quercetin-O-deoxyhexoside, luteolin-O-deoxyhexoside and the total amount of phenolic compounds, identified through HPLC-DAD-ESI/MS. The maximization function was used to determine the optimal conditions for each response, being set at 60 minutes, 73 ºC and 66% of ethanol for DM, and 13 minutes, 402 watts and 26% ethanol (for the solid residue). Although individual optimizations were performed for each phenolic compound, the desirability function, which considers all responses, was set at 60 minutes, 65 ºC and 32% ethanol for DM, and 30 minutes, 500 W and 0% ethanol for UAE. Overall, considering DM, while the dry residue was promoted by high temperatures and ethanol, the phenolics were better extracted at lower temperature and half the quantity of ethanol. For UAE, the polyphenols were better extracted with longer extractive time and power and no ethanol. These results help science and the industry design improved extractive conditions to maximize certain polyphenols and reduce the presence of unwanted molecules.

Keywords

A. unedo, Phenolic compounds, Response surface methodology, Dynamic maceration, Ultrasound assisted extraction