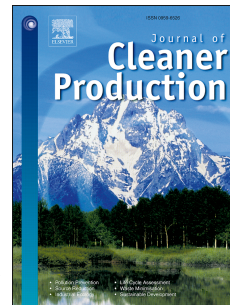


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Optimization of microwave-assisted extraction of natural antioxidants from spent espresso coffee grounds by response surface methodology

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Abstract: Optimization of microwave-assisted extraction of natural antioxidants from spent espresso coffee grounds by response surface methodology

Espresso spent coffee grounds (SCG) that is a waste material abundantly produced by restaurants, cafeterias and in domestic environment could be used as a low-cost and rich source of valuable polyphenol compounds. The benefit would be twofold: extraction of health beneficial natural polyphenol antioxidants and reducing the cost to facilitate SCG waste management. The overall objective of this study was to examine an optimal range of extraction conditions for extraction of antioxidants from spent espresso coffee. Optimization of the extraction process from SCG was carried out using response surface methodology (RSM). Microwave-assisted extraction (MAE) has been used as a potential alternative to conventional solvent extraction for the isolation of polyphenol compounds from SCG. A complete central composite 2^3 factorial experimental design has been used to monitor the extraction characteristics, as affected by different variables, extraction time (ET), liquid-to-solid ratio (LSR), and microwave power (MWP). Low concentration ethanol in aqueous solutions was employed as non-toxic extracting media. With the reduced time of extraction, low power and medium liquid to solid ratio while using minimal concentration of ethanol, the polyphenols extract with high antioxidant activity can be achieved. The obtained experimental values were in solid agreement with predicted values. The FRAP and the DPPH antioxidative activity showed good correlation with the total polyphenol content (TPC), with high correlation factors. The presented data could be a reliable guidelines for establishing full-scale, sustainable cost-effective and resource-effective industrial process.

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