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From fig fruit leaves to functional products towards biocircular economy

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Abstract

Currently it is estimated that 1.3 billion tons of food are wasted annually, 45% concerns to fruit and vegetable production sector with high negative impact in the compliance of Circular Bioeconomy targets. It is necessary to find new technological solutions for the use of these wastes to convert in value-added products and re-introduce in Economy. This study aims to identify and characterize the functional biomolecules of the bioresidues from fig fruit production and to optimize the green extraction method for their recovery. The equitable mixture obtained from the leaves of the 5 fig fruit varieties (‘Pasteliere’, ‘Longue d'Aout’, ‘Dauphine’, ‘Bourjassote Noire’ and ‘Marseille’) was extracted by ultrasound assisted extraction using ethanol solvent. An experimental design was used to optimize the conditions, namely, temperature (25°C, 40°C and 50°C), extraction time (20min, 30min and 60min) and solvent (20%, 40%, 60%, 80%) which resulted in 36 trials with 5 central points. The effect of these variables on the yield and antioxidant potential was studied. The latter was evaluated through three parameters: ferric reducing antioxidant potential (FRAP), 2,2-diphenyl-1-picryl-hydrazylhydrate (DPPH) radical scavenging potential and total phenolic content (TPC). The results obtained showed that the best compromise between the antioxidant potential and the yield was obtained in experiment 20 (40ºC, 30 min, 20%). This condition presented a yield of 22,9% and revealed a higher antioxidant potential for the three parameters: (i) FRAP, 669,21 mM FeSO4 equivalents/gram of extract; (ii) DDPH, 109,81 mM Trolox equivalents/gram of extract; and (iii) TPC, 48,36 mg gallic acid equivalents/gram of extract. This study revealed that it is possible to obtain bioactive extracts from agrifood bioresidues to incorporate into functional products.

Keywords: agrifood bioresidues, antioxidant potential, circular bioeconomy, experimental design, ultrasound assisted extraction