

Innovative Approach for Bioactive Compounds Extraction from Beetroot Crown (*Beta Vulgaris L.*)

¹Moh Moh Zin, ²Chukwuka Bethel Anucha and ¹Szilvia Bánvölgyi

¹*Department of Food Engineering, Hungarian University of Agriculture and Life Sciences, Ménési út 44, 1118 Budapest, Hungary*

²*Department of Chemistry, Karadeniz Technical University, 61080 Trabzon, Turkey*

Abstract

Bioactive compounds are non-nutrient molecules existing in a wide variety of foods but in small quantity with extraordinary health benefits and so mostly consumed as nutraceuticals. Valorisation of them from food wastes drew the attention of entrepreneurs and environmentalists due to their accessibility to sustainable developments. Regarding the processing waste of agro-industries, the crown part of beetroot (*Beta vulgaris L.*) was utilized as a raw material in this study. To innovate the conventional way of extraction, the following techniques were accomplished: microwave-assisted extraction, leaching, infusion and maceration. The leaching process was performed by the central composite design of response surface methodology using R software with two variables of processing time (20 min, 40 min and 60 min) and temperature (30 °C, 45 °C and 60 °C). To accommodate the novelty of extractions, fresh crown samples were pretreated with microwave for 3 min at 800 W prior to infusion with hot water for 5 min; and maceration with distilled water, 15% aqueous ethanol and acidified water (0.5% citric acid) for 40 min. Meanwhile, the control samples were prepared without microwave pretreatments. Characterization of the extracts' profile was realized for betalain colour compounds analysis by Nilson's method; total phenolic compounds analysis by Folin Ciocalteu method; and antioxidant activities by FRAP, DPPH and ABTS methods, respectively. From our study, short-time pretreatments of microwave boosted the recovery amounts of the examined bioactive compounds compared to conventional extractions. In conclusion, time and energy consumption efficiency for the valorisation of bioactive compounds from beetroot processing waste was achieved through microwave irradiation.

Keywords: betalains, phenolic, antioxidant, microwave, beetroot crown

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