Multi-stage block freeze concentration process applied in aqueous extract of Boldo (Peumus boldus Mol.) leaves

ORELLANA-PALMA P. (1), GUERRA-VALLE M. (2), CASTILLO-SUERO A. (1), FUENTES-GODOY Y. (1), MEZA-VERGARA Y. (1)

1 Universidad de La Serena, La Serena, Chile
2 Universidad San Sebasti, Concepci, Chile

Block freeze concentration (BFC) is an environmentally friendly technology, and it requires lower energy costs, and in addition, BFC presents higher separation efficiency than other concentration techniques such as evaporation or membrane technology, since BFC occurs at sub-zero temperatures [1]. Whereby, different liquid foods have been treated with BFC technique such as juices [2], milk [3], tea [4], among other liquid foods, and in turn, various external forces have been added to the BFC technology to increase process parameters and nutritional properties in the final concentrate [5]. However, an evaluation on specific characteristics in aqueous herbal plant extracts obtained by centrifugal assisted BFC technology has not been studied appropriately. Therefore, the aim of this work was to study the effects of BFC at three centrifugal freezing-thawing steps applied to extracts of Boldo (Peumus boldus Mol.) leaves in terms of physicochemical properties, total bioactive compounds (TBC), and antioxidant activity (AA). After three stages, the concentration (%, w/w) showed a significant increase, with a final value close to 19.7% (w/w) (initial sample 2.4% (w/w)). Moreover, TBC and AA values presented an increase of 2.1, 2.0, 1.8, and 3.1 times compared to the initial values, with 745 mg GAE/100 g d.m., 256 mg CEQ/100 g d.m., and 102 mg C3G/100 g d.m., 1546, and 2130 ?mol TE/100 g d.m. for total polyphenol, flavonoid, and anthocyanin contents, DPPH and FRAP assays, respectively. For efficiency, percentage of concentrate, and solute yield, the values were close to 86%, 81%, and 0.9 (kg/kg), respectively. Therefore, this research offers the opportunity to see aqueous herbal plant extracts as concentrated products with interesting quality properties, and in turn, the impact of this study is based on the concentration of a valuable medicinal herb plant with a non-thermal and innovative technology, and the future massive production for sustainable utilization in food, beverage, and pharmaceutical industries.