Optimized extraction of bioactive compounds from avocado oil by-products: a sustainable source of natural preservatives

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Vegetable oil production generates a large quantity of waste that is commonly improperly discarded. Industrial avocado oil wastes, such as peels and seeds, are characterized by a high amount of bioactive compounds, such as polyphenols and nutrients, with potential uses in the food and cosmetics industries. In order to limit the impact of these residues on the environment and to convert them into value-added materials, alternatives have been studied. However, further to the standard requirements for effective extraction of these valuable compounds, it is important to use a process that not only allows for environmentally friendly extraction techniques but also guarantees higher yields with minimal impact on the quality of the final product. Thus, the objective of this study was to optimize the extraction of bioactive compounds from the waste of industrial avocado oil (peels and seeds) using a central composite rotatable design (CCRD), solvents from a sustainable source, and assisted by ultrasound extraction. Three independent extraction parameters were optimized: ethanol concentration (%, X1), temperature (°C, X2), and solid-solvent ratio (g/mL, X3), with the dependent variable being the total phenolic content (YTPC). The results showed that ethanol concentration and the solid-solvent ratio were the most important variables. The temperature did not affect the extraction. The optimal conditions for extracting maximum TPC from avocado peels were 40% ethanol, 30 °C, and 0.225 g/mL of a solid-solvent ratio. For the seeds, the best conditions were 20% ethanol, 30 °C, and a solid-solvent ratio of 0.5 g/mL. The experimental results agreed with the predicted values, and the extracts obtained presented high antioxidant capacity. Hence, this optimized ultrasound-assisted method has been demonstrated to be very efficient in recovering bioactive compounds from avocado oil by-products, transforming these materials into value-added products with high antioxidant properties that may have different purposes. Acknowledgment: Coordination for the Improvement of Higher Education Personnel (CAPES), São Paulo Research Foundation (FAPESP), ESALQ Food, GETEP, and Paraíso Verde company kindly donated the samples. Project Sponsor: ESALQ/USP, CAPES, and FAPESP.