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DEVELOPMENT OF BIOACTIVE PURPLE-RED COLORANTS FROM RED RASPBERRY WASTE USING HEAT-/ULTRASOUND-ASSISTED EXTRACTIONS COUPLED WITH RSM

Mikel Añibarro-Ortega, Rosiane Rocha, José Pinela,* Tânia C.S.P. Pires, António Nogueira, Isabel C.F.R. Ferreira, Lillian Barros

Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal. *jpinela@ipb.pt

Food colorants are increasingly used in the industry to preserve, improve or change the color of a wide range of food products. While the quite controversial artificial colorants are widely used in this sector, the natural counterparts have been less selected in part due to the limited availability of options, higher costs, and stability issues [1]. Within this additive class, anthocyanins are naturally occurring pigments that can be found in different plant matrices, including berries such as red raspberry (*Rubus idaeus* L.). These water-soluble compounds show attractive colors ranging from red to purple and present health-promoting effects [2,3]. Therefore, this work aimed to develop a novel anthocyanin-rich food colorant from red raspberry waste through the optimization of a sustainable extraction methodology and to characterize this ingredient for its functionality. Heat (HAE)- and ultrasound (UAE)-assisted extraction methods were implemented to recover the anthocyanins from red raspberry waste. Processing time, ethanol concentration, and temperature or ultrasonic power were the independent variables analyzed in central composite designs coupled with response surface methodology for processes optimization. The extraction yield and levels of anthocyanins (cyanidin-3-*O*-sophoroside and cyanidin-3-*O*-glucoside) were monitored gravimetrically and by HPLC-DAD-ESI/MS^n, respectively, and used as response criteria. The constructed polynomial models were fitted to the experimental data, statistically validated, and used to determine the optimal processing conditions. Overall, HAE originated slightly higher response values (61% extract weight and 8.7 mg anthocyanins/g extract) but needed 76 min processing at 38 °C, with 21% ethanol, while the UAE process required 16 min sonication at 466 W, using 38% ethanol, to obtain 58% extract weight and 8.3 mg anthocyanins/g extract. The predictive models were experimentally validated and the purple-red extracts obtained under optimal condition showed antioxidant activity through lipid peroxidation and oxidative hemolysis inhibition, and antibacterial effects against food-related bacteria, such as *Escherichia coli* and *Enterococcus faecalis* [4]. These results highlighted the potential of the developed red raspberry extracts as natural food colorants with bioactive/preserving effects. In future studies, it will be interesting to investigate the stability of the developed anthocyanin-rich extracts when exposed to different adverse factors and in real food matrices.

References

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