7TH PORTUGUESE YOUNG CHEMISTS MEETING

BOOK OF ABSTRACTS

19th – 21st May 2021

Bragança – Portugal

Title	Livro de Resumos do 7th Portuguese Young Chemists Meeting
Authors	Maria Inês Dias, Carla Pereira, José Pinela, Bruno Melgar
Support	Electronics
Support detail	PDF
Edition	1st Edition
Bar Code	
Editor	Sociedade Portuguesa de Química
Country	Portugal
E-mail	secretariado@spq.pt
Editor prefix	978-989-97667

HIGH HYDROSTATIC PRESSURE AS A TOOL TO IMPROVE THE ANTIOXIDANT ACTIVITY OF WATERCRESS EXTRACTS

José Pinela,[1*] Mikel Añibarro-Ortega,[1] Lillian Barros,[1] Jorge A. Saraiva,[2] Isabel C.F.R. Ferreira[1]

[1]Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal; [2]LAQV-REQUIMTE, Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal. *jpinela@ipb.pt

Watercress (*Nasturtium officinale* R. Br.) belongs to the Brassicaceae family together with broccoli, cabbage, mustard and Brussels sprouts. This semiaquatic plant is source of bioactive phytochemicals such as polyphenols, glucosinolates, and carotenoids, which have received great importance due to their several health benefits linked to antioxidant activity [1,2]. To obtain plant extracts, the extraction method must be thought out carefully to ensure successful recovery of the bioactive compounds. Therefore, the selection of an appropriate extraction method is important for the production of high quality antioxidant extracts, otherwise the extraction can lead to degradation of the target compounds. High pressure processing (HPP) has been used in the extraction of bioactive molecules from plant matrices with very promising results because, since no heat is used, it avoids harmful effects on thermosensitive compounds and, consequently, preserves better their biological activities. HPP provides higher extraction yields and selectivity for target compounds than conventional extraction methods [3]. Pressure can disrupt plant tissues and enhance mass transfer of solvent into the materials and the soluble constituents into the solvent. Thus, this study was carried out to outline the best extraction conditions to obtain antioxidant extracts from watercress.

Powdered watercress was processed according to a central composite design of 20 runs, in which five levels of time (1.5–33.5 min), pressure (0.1–600 MPa) and ethanol concentration (0–100%, *v/v*) were combined. The antioxidant activity of the obtained extracts was measured *in vitro* by the DPPH$^{\bullet}$ scavenging activity and reducing power assays, and the results were presented as EC_{50} values and used as response variables in the optimization by response surface methodology. Design Expert software was used for regression and graphical analysis of the data. A quartic polynomial equation that correlates the response as a function of the independent variables and their interaction was developed. The models were successfully fitted to the experimental data, statistically validated based on high F-values (>64.9) and R^2_{adj} (>0.96), and used to navigate the design space and predict the optimal extraction conditions. Considering both response criteria, the HHP conditions that sustainably maximized the extract antioxidant activity required a low processing time (1.5 min) and an intermediate pressure (319 MPa) and solvent concentration (55% ethanol, *v/v*), and yielded EC_{50} values of 0.45 mg/mL and 0,41 mg/mL for the DPPH and reducing power assays, respectively. HHP extraction revealed so to be a time-saving process comparatively with conventional methods.

References

[1] J. Pinela, L. Barros,… C. Santos-Buelga, I.C.F.R. Ferreira, Food Chemistry, 254 (2018) 70.
[2] N. Giallourou, M.J. Oruna-Concha, N. Harbourne, Food Chemistry, 212 (2016) 411.
[3] J. Pinela, J.; Prieto,… J.A. Saraiva, I.C.F.R. Ferreira, Separation and Purification Technology, 192 (2018) 501.

Acknowledgments

To FCT and FEDER under Programme PT2020 for financial support to CIMO (UIDB/00690/2020); to FCT/MEC for the financial support to QOPNA (FCT UID/QUI/00062/2019) and LAQV-REQUIMTE (UIDB/50006/2020), through national funds and, where applicable, co-financed by the FEDER, within the PT2020 Partnership Agreement; to the contracts of J.Pinela and L.Barros (national funding by FCT, through the institutional scientific employment program-contract); and to the grant of M. Añibarro-Ortega (project ValorNatural, Norte-01-0247-FEDER-024479). Work funded by FEDER through the Regional Operational Program North 2020, within the scope of Projects NORTE-01-0145-FEDER-023289: DeCodE and Norte-01-0247-FEDER-024479: ValorNatural®.