



SOCIETÀ ITALIANA DI FITOCHIMICA E  
DELLE SCIENZE DELLE PIANTE MEDICINALI  
ALIMENTARI E DA PROFUMO



UNIVERSITÀ  
DEGLI STUDI DI BARI  
ALDO MORO

dipartimento di farmacia  
– scienze del farmaco

**XVII CONGRESS OF THE ITALIAN SOCIETY OF  
PHYTOCHEMISTRY  
JOINTLY WITH**

<sup>rd</sup>  
3 *International Congress on Edible, Medicinal and Aromatic  
Plants (ICEMAP 2022)*

***BOOK of ABSTRACS***



**22-24 June 2022**  
**Aula Magna "Aldo Cossu"**  
**Università di Bari**  
**P.zza Umberto, 1 – Bari**

## ***Local Organizing Committee***

Maria Pia Argentieri

Santa Cirmi

Luca Piemontese

## ***Scientific Committee***

Maria Pia Argentieri – University of Bari

Stefania Benvenuti – University of Modena and Reggio Emilia

Anna Rita Bilia – University of Florence

Angela Bisio – University of Genova

Rosy Caniato – University of Padova

Nunziatina De Tommasi – University of Salerno

MariaCarla Marcotullio – University of Perugia

Luigi Menghini – University of Chieti

Giorgio Pintore – University of Sassari

Luisa Pistelli – University of Pisa

Federica Pollastro – University of Piemonte Orientale

## ***Scientific Secretariat***

Maria Pia Argentieri

Università degli Studi di Bari “Aldo Moro”

Dipartimento di Farmacia-Scienze del Farmaco

Via Orabona, 4 – Bari

[mariapia.argentieri@uniba.it](mailto:mariapia.argentieri@uniba.it)

## EXTRACTION OPTIMIZATION OF BIOACTIVE COMPOUNDS FROM *THYMUS VULGARIS* L.: COMPARISON OF HEAT-ASSISTED AND ULTRASOUND-ASSISTED EXTRACTIONS

Cristina Caleja<sup>a</sup>, Eliana Pereira<sup>a</sup>, Rafael Mascoloti Spréa<sup>a,b</sup>, Tiane C. Finimundy<sup>a</sup>, Márcio Carochó<sup>a</sup>, Joana Amaral<sup>a</sup>, Miguel Ángel Prieto Lage<sup>b</sup>, Lillian Barros<sup>a</sup>

<sup>a</sup>Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal

<sup>b</sup>Nutrition and Bromatology Group, Department of Analytical and Food Chemistry, Faculty of Food Science and Technology, University of Vigo-Ourense Campus, E-32004 Ourense, Spain

[ccaleja@ipb.pt](mailto:ccaleja@ipb.pt)

Plants have been used since ancient times due to their biological action associated mainly with several phytochemicals, including phenolic compounds<sup>1</sup>. *Thymus vulgaris* L. is a species described as a potential source of natural molecules with applications in the food industry, but also in the cosmetic and pharmaceutical industry due to its antibacterial, antifungal, and anti-inflammatory effects<sup>2</sup>. In this sense, the present study aimed to compare extraction systems in terms of phenolic compounds from *T. vulgaris* through the heat-assisted (HAE) and ultrasound-assisted extraction (UAE) techniques, aiming to improve its potential for industrial applications. For this propose, an extraction optimization was studied using three independent variables, time (*t*, minutes), solvent (*S*, % of ethanol), and temperature (*T*, °C) or power (*P*, W), in a three-level Box-Behnken design, analyzing the surface methodology (RSM). The extraction yield and the content in phenolic compounds identified by HPLC-DAD-ESI/MS were the experimental responses applied. The polynomial models were successfully fitted to the experimental data and used to determine the optimal HAE and UAE conditions. Nineteen phenolic compounds were identified, nine of which were phenolic acids (mainly caffeic acid derivatives) and ten flavonoids: flavan-3-ols (catechin derivatives), flavones (quercetin derivatives), flavonols (apigenin and luteolin derivatives) and flavanones (eriodictyol derivatives). The conditions obtained for the optimal extraction of phenolic compounds, that allowed the experimental validation of the predictive model are 3% ethanol (*v/v*) for 89 minutes at a temperature of 98° C for HAE and 77% ethanol (*v/v*) for 17 minutes at 207 W for UAE.

Extraction optimization is important from an industrial point of view, as it allows obtaining extracts with a high content of bioactive compounds. Considering that the phenolic composition appears in literature as a direct influence on bioactive properties, the optimization processes will allow a better exploitation of extracts, ensuring the greatest cost reduction for the industry.

### References

- [1] Spréa, R.M. et al., 2020. *Food & Function*, 11: 1292-1303.
- [2] Salehi B. 2019. *Trends Food SciTech*, 85: 287-306.