

GreenNutriFood

2025

April 7th - 9th

BOOK OF ABSTRACTS

1ST INTERNATIONAL CONGRESS ON
SUSTAINABLE FOOD, GREEN CHEMISTRY
AND HUMAN NUTRITION

Dubrovnik riviera, Croatia

University of Zagreb, Faculty of Food Technology and Biotechnology

Universitat De València, Faculty of Pharmacy and Food Sciences

**1st International Congress on Sustainable Food, Green Chemistry and Human
Nutrition**

GREENNUTRIFOOD2025

Book of Abstracts

Srebreno - Dubrovnik, Croatia

07. – 09.04.2025.

Organisers:

University of Zagreb, Faculty of Food Technology and Biotechnology

Universitat De València, Faculty of Pharmacy and Food Sciences

Co-Organizers / Supporters:

The Environmental Protection and Energy Efficiency Fund – Zajedno čuvamo okoliš

Under Auspices:

EuChemS – European Chemical Society

ISEKI – Food Association

HDPBN – Croatian Society of Food Technologists, Biotechnologists and Nutritionists

Antioxidants – Open Access Journal by MDPI

Published by:

Faculty of Food Technology and Biotechnology, University of Zagreb

Editors:

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Sven Karlović

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ISBN:

978-953-6893-22-5

WEB:

greennutrifood.pbf.hr.

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SUSTAINABLE EXTRACTION OF RAPESEED PROTEIN: COMPARISON OF DEEP EUTECTIC SOLVENTS AND ALKALINE EXTRACTION

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Abstract

The growing global population and increasing food demand require sustainable protein sources, with rapeseed meal emerging as a promising alternative to meat. It contains over 40% protein with a favorable amino acid composition. Traditionally, protein isolation relies on alkaline extraction, but this method can lead to protein denaturation and reduced digestibility. Therefore, alternative methods such as enzymatic treatment, ultrasound-assisted extraction, and deep eutectic solvents (DESs) have been explored. DESs are eco-friendly and biodegradable solvents that enhance protein extraction efficiency while preserving the native structure and functionality of proteins.

This study compares the efficiency of two DESs (ChCl:urea and betaine:citric acid) with conventional alkaline extraction at pH 12 for rapeseed protein isolation, focusing on yield and antinutrient content. The highest yield was achieved with ALK12 (36.9%), followed by DES2 (betaine:citric acid) at 31.3%, while DES1 (ChCl:urea) had the lowest yield (23.2%). Interestingly, despite its lower yield, DES1 provided the highest protein purity (95.8%), significantly surpassing ALK12 (86.0%) and DES2 (70.3%). These differences may be attributed to the physicochemical properties of the solvents, such as viscosity, polarity, and alkalinity, which influence protein solubilization, diffusion, and stability during extraction and precipitation. The antinutrient content varied depending on the extraction method. Isolates obtained with DESs contained approximately 1.4 times more phytic acid compared to the ALK12 isolate, likely due to pH conditions favoring its solubility. The total phenolic content in the ALK12 isolate was nearly three times higher than in DES2 and almost four times higher than in DES1, indicating enhanced polyphenol extraction under alkaline conditions. Similarly, tannin content in the ALK12 isolate was about 1.5 times higher than in the DES isolates. No glucosinolates were detected in any of the isolates.

These findings suggest that DESs represent a sustainable alternative for rapeseed protein isolation, with acidic formulations offering a balance between extraction efficiency and retention of antinutritional compounds. While ALK12 achieved the highest yield, DESs provide environmental benefits and better protein structure preservation, making them promising candidates for advancing plant protein extraction technology.

Acknowledgements: This research was supported by the Science Fund of the Republic of Serbia, grant no. 6673, PROTein from Rapeseed Oil Processing Waste: Application in Food and Wastewater Treatment –PROTOPOWER and the Ministry of Science, Technological Development and Innovation, Republic of Serbia (Contract No. 451-03-136/2025-03/200222).

Keywords: rapeseed protein isolate, alkali extraction, DESs, antinutrients