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BOOK OF ABSTRACTS

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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

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EXPLORING THE TECHNO-FUNCTIONAL PROPERTIES OF RAPESEED PROTEIN ISOLATES AS A FOUNDATION FOR THEIR PRACTICAL USE

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Abstract

Techno-functional properties of protein isolates play a key role in determining their suitability for various applications in the food industry. This study investigated the solubility, water and oil absorption capacities, foaming properties, and gelation ability of rapeseed protein isolates obtained through alkaline extraction and extraction using deep eutectic solvents (DES) – betaine: citric acid (1:1) and ChCl:urea (1:2).

The isolate obtained through alkaline extraction exhibited the highest solubility across the pH range of 2–10, which can be attributed to partial denaturation in the alkaline medium, leading to the disruption of the compact protein network and exposure of polar residues on the surface. Differences in the solubility of isolates obtained via DES extraction can be explained by variations in their extraction conditions.

The highest water absorption capacity (WAC) was observed in the isolate obtained through alkaline extraction, while a slightly lower value was recorded for the isolate extracted with betaine: citric acid DES. The lowest WAC was found in the isolate obtained with ChCl:urea DES. A similar trend was observed for oil absorption capacity (OAC), with the highest value recorded for the alkaline isolate, while the DES-extracted isolates exhibited slightly lower but still significant OAC.

The isolate obtained through alkaline extraction also demonstrated the highest foaming capacity, whereas significantly lower values were recorded for the isolates obtained via DES extraction. Regarding foam stability, the alkaline isolate maintained a stable foam volume after an initial slight reduction. In contrast, the ChCl:urea isolate exhibited the lowest stability, with a pronounced decrease in foam volume over time. The betaine: citric acid isolate initially exhibited high foam stability, followed by a gradual decline, yet it still retained superior stability compared to the ChCl:urea isolate.

In terms of gelation ability, the minimum concentration required for gel formation was 14% for both the alkaline isolate and the isolate obtained with betaine: citric acid DES, although gel formation was observed even at 12%. In contrast, the ChCl:urea isolate formed a stable and firm gel only at a concentration of 16%.

These findings highlight the impact of extraction methods on the techno-functional properties of rapeseed protein isolates. The results provide valuable insights into their potential application in food formulations, with alkaline-extracted isolates offering enhanced functionality compared to those obtained using DES. However, the unique characteristics of DES-extracted isolates suggest that further optimization could expand their applicability in food systems.

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Keywords: rapeseed protein isolate, alkali extraction, DESs, techno-functional properties