

# GreenNutriFood

## 2025

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# 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**

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## DEFENOLIZATION OF RAPESEED CAKE: IMPROVING PROTEIN FUNCTIONALITY AND VALORIZING BY-PRODUCTS

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### Abstract

Polyphenols have become the subject of intense research due to their beneficial biological properties and potential for commercial applications. In rapeseed cake, which remains after oil extraction, the concentration of these bioactive compounds is significantly higher compared to other oilseeds. Although they can contribute to the nutritional value, their presence makes further processing difficult, especially during protein isolation, where they negatively affect protein yield, solubility and structure. In addition, polyphenols contribute to pronounced bitterness and dark color of proteins, limiting their application in food products.

This study investigates the reduction of phenolic content in rapeseed cake through defenolization using ethanolic solutions to obtain high-quality proteins with improved sensory properties.

Phenolic compounds in rapeseed cake exist in three forms: free, esterified, and bound. HPLC-DAD analysis indicated a significant decrease in total phenolic content after defenolization. Free polyphenols decreased from 8392.98 µg/g in cake to 542.96 µg/g in isolated proteins, with hydroxybenzoic, caffeic, syringic acids, and sinapin being completely removed. This is particularly important since sinapine is the dominant phenolic ester in rapeseed and is primarily responsible for the bitter taste and dark color of protein isolates.

Esterified polyphenols reduced from 4256.70 µg/g to 137.44 µg/g, while bound polyphenols were decrease from 519.24 µg/g to 163.39 µg/g. Sinapic acid, which is present in all forms, showed the highest residual content among the remaining phenolic compounds, but in a significantly reduced concentration. The defenolization process removed up to 95% of free and esterified phenolic compounds, while bound phenolics were reduced by approximately 68%. However, considering that bound phenolic compounds are present in significantly smaller amounts compared to free and esterified ones, their residual content should not negatively affect the protein isolation process, its functionality, or purity.

The results of this study confirm that the applied defenolization process effectively reduces phenolic content in rapeseed protein isolates, improving sensory attributes and expanding their potential food applications. Furthermore, the removed phenolic compounds, particularly sinapin, which constitutes about 73% of free phenolic compounds, may hold additional value in the food, pharmaceutical, and cosmetic industries due to their antioxidant and potential neuroprotective properties. This approach not only enhances protein functionality but also enables the valorization of by-products.

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