

Crop Science and Technology: Shaping the Future of Agriculture

International Scientific Conference



BOOK OF ABSTRACTS

September 29 - October 2, 2025 - Belgrade, Serbia

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Maize Research Institute Zemun Polje

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CROP SCIENCE AND TECHNOLOGY: SHAPING THE FUTURE OF AGRICULTURE

Editors

Snežana Mladenović Drinić, Jelena Vukadinović, Beka Sarić

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Valorization of Pea Pod waste and seeds for the development of novel food products

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The *Pisum sativum* L. (green pea) is one of the most widely consumed legumes, or vegetable crops, known for fresh eating, processing, or livestock feed. Besides the edible part of the pea, 35%-40% consists of solid waste (pods), an abundant by-product with health-promoting properties. Although pea pods are often thrown away, this waste contains many bioactive compounds (polyphenols and natural pigments). Pea powder can serve as an encapsulation carrier, efficiently using both pea pods and seeds. This study aimed to optimize ultrasound-assisted extraction (UAE) to increase the yield of bioactives from pea pods and to encapsulate the extract, maximizing the value of both pea components. Extraction parameters were varied, including time (15 min, 30 min, 1 h), ethanol concentration (30%, 50%, 70%), and the solvent-to-sample ratio (1:10, 1:20, 1:50), using Design Expert software. The best pea pod extract (58.51% ethanol, extraction time of 45 min, and a solvent-to-sample ratio of 1:48) was concentrated and encapsulated in three forms: pure pea pod extract (1); extract combined with freeze-dried pea powder (2); and combined with whey protein (3), a common protein carrier. Total polyphenolics (TPC) and natural pigments (chlorophyll a, chlorophyll b, and carotenoids) were analyzed in each sample to assess how different carriers affected compound retention. UAE efficiently extracts high levels of bioactives from pea pods, enabling uses across various industries. All encapsulates had high levels of bioactives, although adding freeze-dried pea powder significantly increased chlorophyll a and b to 1758.40 µg/g and 2539.86 µg/g. Using pea powder as an innovative carrier for stabilizing bioactives from pea waste highlights the potential of both as nutraceuticals and functional foods. Both peas and pea pods can be used as key nutrients to support healthy diets, valorize this by-product as an alternative food, and promote sustainable agricultural waste management.

Keywords: *pea pod waste; seed, innovative carrier; encapsulation; ultrasound-assisted extraction*

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