

# **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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## Supercritical CO<sub>2</sub> pretreatment of buckwheat for improved extraction of bioactive constituents

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Diversifying food resources through the incorporation of crops with nutritional and health benefits present a promising strategy in sustaining nutraceutical security under climate change and biodiversity degradation. Buckwheat is such underutilised crop, known for the abundance of bioactive compounds and nutrients that have a vast potential to support human health. Given the biological potential closely associated with polyphenolic content, particularly rutin, this study aimed to optimize ultrasound-assisted extraction (UAE) from the aerial parts of *Fagopyrum esculentum*. To assess the impact of raw material pretreatment, supercritical CO<sub>2</sub> extraction was initially applied. The resulting defatted biomass was then subjected to UAE, with response surface methodology (RSM) employed to evaluate key extraction parameters, including amplitude, pulse, and extraction time. All three studied parameters showed significant effects on the extraction efficiency of total phenolic compounds and rutin. Notably, pretreatment with supercritical CO<sub>2</sub> led to a marked increase in phenolic recovery compared to untreated biomass. According to RSM analysis, the treated material achieved optimal yields of 49.13 mg GAE/g DW of total polyphenols and 41.73 mg/g DW of rutin under conditions of 98.5% amplitude, 82.22% pulse, and 9.99 minutes. In contrast, under similar conditions (97.24% amplitude, 91.92% pulse, and 9.89 minutes), the untreated material yielded lower concentrations: 42.66 mg GAE/g DW of total polyphenols and 38.01 mg/g DW of rutin. Therefore, it can be concluded that supercritical CO<sub>2</sub> pretreatment has a beneficial effect on the downstream processing of buckwheat biomass, notably enhancing the efficiency of subsequent UAE. Processing the raw material derived from underutilised crops such as buckwheat holds significant potential to improve consumer nutrition and health and pave the way for incorporation into new natural products.

**Keywords:** *buckwheat; supercritical CO<sub>2</sub> extraction; ultrasound-assisted extraction; response surface methodology; rutin*

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