INVESTIGATION OF ANTIOXIDANT AND ANTIMICROBIAL EXTRACTS OF SANGO RADISH AND KOHLRABI MICROGREENS AND THEIR ENCAPSULATION

Anja Saveljić, Olja Šovljanski, Teodora Cvanić, Vanja Travičić, Aleksandra Ranitović, Jelena Vulić, Gordana Ćetković, Jasna Čanadanović-Brunet

Faculty of Technology, University of Novi Sad, Bulevar Cara Lazara 1, Novi Sad, Serbia
e-mail: anja.saveljic@uns.ac.rs

Abstract

The development of functional foods has been fueled by several factors, including human health promotion, urbanization, its effects, food security, busy lifestyles, and a competitive food market. The term functional food includes food with added value beneficial to consumers' health outside of merely meeting their nutritional needs. Microgreens are regarded as functional foods because of their high mineral nutrient and phytochemical contents. They are vegetable or herb seedlings consumed at an early growth phase, 7–21 days after germination, and are a new specialty crop with great market value. The *Brassicaceae* family's species, which includes radish and kohlrabi crops, are rich in bioactive substances and have a good nutritional profile. These substances include some phytochemicals such as chlorophyll, polyphenols, carotenoids, anthocyanins, ascorbic acid, and total and reducing sugars, and show antioxidant, anti-inflammatory, anti-diabetic, and some even antimicrobial activity. Because of the high water content in microgreens, they are susceptible to spoilage and have short shelf life. Encapsulation is a good option for the preservation of bioactive compounds and their further use. It entails covering the active substance or its mixture with a polymer to shield it from harmful external factors and enable the regulated release of the active substance in a specific environment.

This research aimed to determine the presence of important bioactive compounds (phenolics and chlorophyll) and the potential of various biological activities (antioxidant, antihyperglycemic, antimicrobial, and perform encapsulation of obtained extracts using pea protein. Extracts were obtained using combined ultrasound-assisted extraction with maceration on laboratory shakers, with acetone: ethanol (50:50) solvent on lyophilized plant samples.

Three antioxidant assays (DPPH, ABTS, RP), phenolics and chlorophyll content, as well as antihyperglycemic activity, were performed spectrophotometrically. The antimicrobial potential was determined using the disk-diffusion method against 6 different bacterial species and two yeasts. Encapsulation was performed using pea protein as wall material and the efficiency of encapsulation was measured according to the internal and external content of total phenolics. Results of Sango radish and kale extracts showed a high presence of phenolic compounds (52,12 and 126,97 mg/100 g FS) and chlorophylls (94,85 and 266,34 mg/100 g FS). Furthermore, antioxidant potential proved to be significant with the highest scavenger activity against ABTS radicals (489,61 and 653,49 μM TE/100 g FS). Antimicrobial tests showed a lower bacteriostatic effect of Sango radish against the bacteria *E. coli* (14 mm), *S.* Typhimurium (12 mm), and *S. aureus* (15 mm) and an antifungal effect of not detected. Meanwhile, kohlrabi extract showed no antimicrobial activity. Encapsulation was performed with an efficiency of 63,65% for Sango radish and 68,61% for kohlrabi extract encapsulates.