CHEMICAL CHARACTERIZATION OF ALGINATE-ENCAPSULATED PLANT EXTRACTS

Liliana POPESCU[1*], ORCID: 0000-0003-3381-7511
Maria-Loredana SORAN[3], ORCID: 0000-0003-3770-9702
Ildiko LUNG[3], ORCID: 0000-0003-4677-4602
Ocsana OPRIȘ[3], ORCID: 0000-0002-9765-2739
Irina KACSO[3], ORCID: 0000-0003-1039-0543
Alexandra CIORÎȚĂ[3], ORCID: 0000-0003-2991-3957
Aliona GHENDOV-MOSANU[1], ORCID: 0000-0001-5214-3562
Artur MACARI[1], ORCID: 0000-0003-4163-3771
Maria- Marcela BARBAROȘ[1], ORCID: 0000-0002-4339-5589
Rodica STURZA[2], ORCID: 0000-0002-2414-5874

[1]*Technical University of Moldova, Department of Food Technology, Chisinau, Republic of Moldova*
[1]*Technical University of Moldova, Department of Chemistry and Oenology, Chisinau, Republic of Moldova*
[3]*National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca, Romania*

[*]Corresponding author: Liliana Popescu, email liliana.popescu@tpa.utm.md

Aromatic plant extracts can serve as an alternative source of bioactive compounds with a broad spectrum of antioxidants. However, their use in food industry is limited by factors such as the instability of bioactive compounds during food processing and adverse effects on the sensory properties of food. An efficient approach to protect bioactive compounds sensitive to environmental factors is the encapsulation of extracts in biopolymer matrices, which leads to improved stability and bioavailability, controlled release in the gastrointestinal tract.

In this study, hydroethanolic extracts of three species of plants: basil (*Ocimum basilicum*), rosemary (*Rosmarinus officinalis*) and summer savory (*Satureja hortensis*) were encapsulated in sodium alginate using the drop technique. Afterwards the microcapsules were dried by lyophilization. In order to characterize the microcapsules, the following parameters were determined: solubility, swelling index, encapsulation yield and efficiency, scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR) and differential scanning calorimetry (DSC).

The values of the total polyphenol content of the aromatic plant extracts showed a variation between 26.18 mg GA/g DW obtained for basil and 43.10 mg GA/g DW for summer savory. SEM images revealed the presence of microparticles with spongy appearance, showing heterogeneous surface morphologies. The encapsulation yield varied between 76.8±1.1% in the case of basil extract and 81.0±1.3% in the case of rosemary extract, while the encapsulation efficiency varied between 1.41±0.03 for basil and 14.76±0.16 for rosemary. The swelling index and solubility varied in the range of 79.2±0.2–87.4±0.4% and 19.8±0.3–22.5±0.4%, respectively. The chemical constitution of the microcapsules was confirmed by FTIR and high thermal stability was proved by DSC. Alginate-encapsulated plant extracts were used to fortify cream cheese and concentrated yogurt.

The results suggested that sodium alginate forms stable interactions between the reactive sites of the polymer and the aromatic plant extracts, keeping the bioactive compounds intact. Therefore, alginate-encapsulated plant extracts are an effective and important tool in the preparation of high-quality products, improving their chemical, oxidative and thermal stability.

Keywords: aromatic plants, hydroethanolic extracts, polyphenols, encapsulation, cream cheese, yogurt

Acknowledgments. The research was funded by State Project no. 20.80009.5107.09 “Improving of food quality and safety through biotechnology and food engineering”, running at Technical University of Moldova.