EVALUATION AND COMPARISON OF ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY IN LAVENDER AND SAGE CALLUS CULTURES IN VITRO

Tabita Maryam[*1], Ilona Jonuškienė[1], Rima Stankevičienė[1], Ingrida Tumosienė[1], Kristina Kantminienė[2]

[1] *Department of Organic Chemistry, Kaunas University of Technology, Kaunas, Lithuania*
[2]*Department of Physical and Inorganic Chemistry, Kaunas University of Technology, Kaunas, Lithuania*
**tabmar@ktu.edu*

Natural extracts of lavender and sage are widely used in the pharmaceutical, cosmetic and food industries for their antioxidant, antibacterial, anti-diabetic, and anti-inflammatory properties. Both plants accumulate a wide range of phytochemicals, compounds, and essential oils, the composition and concentration of which can be influenced by various factors. These chemical compounds protect cellular functions and structures by reducing oxidative stress by neutralizing reactive oxygen species (ROS) [1]. The aim of this study is to evaluate and compare the antioxidant, phytochemical and antibacterial activity of medicinal plants [2].

The study was carried out using callus cultures of *Lavandula angustifolia* and *Salvia officinalis* grown in Murashige and Skoog medium supplemented with different cytokinins 6-benzylaminopurine (BAP) (0.2 mg/L) and thidiazuron (TDZ) (0.5 mg/L), the auxins 1-naphthylacetic acid (NAA) (0.1 mg/L), 2,4-dichlorophenoxyacetic acid (2,4-D) (0.5 mg/L) and indole-3-acetic acid (IAA) (0.1 mg/L) and the additive L-tryptophan (0.5 mg/L). The antioxidant activity of the plant materials was evaluated by DPPH, FRAP, ABTS, and reducing power assays. The antioxidant enzyme activity of *Lavandula angustifolia* and *Salvia officinalis* callus cultures and plant extracts of leaves, blossoms and shoots was also evaluated in vivo. Antibacterial activity against *Bacillus subtilis* and *Escherichia coli* was measured using the Kirby-Bauer disc diffusion method.

It was found that chlorophyll *a*, chlorophyll *b*, carotenoids, antioxidant enzyme activity and total phenolic acid concentration were highest by lavender callus culture with TDZ (0.5 mg/L), IAA (0.1 mg/L) and L-tryptophan (0.5 mg/L). Studies have shown that both callus cultures grown with NAA (0.1 mg/L), BAP (0.2 mg/L) and 2,4-D (0.5 mg/L) gave the highest antioxidant activity by DPPH, FRAP and ABTS. The highest antibacterial activity against *Escherichia coli* was found in extract of lavender blossoms in vivo.

List of references

1. W. Hassan, H. Noreen H, S. Rehman, S. Gul, et al. // Current Topics in Medicinal Chemistry, 2017, 17, 12, 1336-1370.
2. I. Jonuškienė, R. Stankevičienė, K. Kantminienė, I. Tumosienė // Agriculture, 2023, 13, 8, 1529-1543.