

ESSENTIAL OIL COMPOSITION AND ANTIMICROBIAL ACTIVITY OF *SALVIA OFFICINALIS* L. CULTIVATED IN KOSOVO

Mjellma Hatipi Ibrahim, Vilma Papajani

Institution where the work was performed: Laboratory for quality control of medicines, Kosovo Medicines Agency, Prishtina, Kosovo  
Chemical composition of *Salvia officinalis* L. cultivated in Kosovo

**Abstract**

The essential oil composition of the cultivated plant species of Sage (*Salvia officinalis* L.) originating from Kosovo was investigated. The water and ethanolic extracts of cultivated Sage were also tested for their antibacterial activity against *Staphylococcus aureus*, *Escherichia Coli* and *Candida albicans*. Extraction of essential oil was performed with water distillation method using Clevenger apparatus. Essential oil composition was analyzed by GC/MS. The result for the essential oil content was 1.57%, and the GC/MS analysis of the essential oil resulted in 7 principle components:  $\alpha$ -thujone (22.0%),  $\beta$ -thujone (3.03%), 1,8 cineole (12.68%), camphor (10.75%),  $\beta$ -caryophyllene (6.28%),  $\alpha$ -humulene (5.68%), and  $\alpha$ -pinene (2.30%). The antibacterial activity of the water and ethanolic extracts of Sage against *Staphylococcus aureus*, *Escherichia Coli* and *Candida albicans* resulted in significant activity, especially regarding the ethanolic extracts.

**Conclusion:** The cultivated Sage originating from Kosova complied with the standard requirements for the plant species, so that it can be used as a high quality raw materials for the production of herbal medicines. Most significant antimicrobial activity was resulted with the ethanolic extract of Sage against all three tested microorganisms.

**Keywords:** Chemical composition, GC/MS, essential oil, *Salvia officinalis* L., Sage;

**Introduction**

Main indications for *Salvia officinalis* L. (Sage) use are inflammation and infection of mouth and throat. Because of its vitalizing and antiseptic action on mucosal tissue (the effect of tannins and essential oil respectively), sage is used in many herbal preparations as gargle, in inflammation and abscess. Sage's dried herb, its extract and essential oil have an antimicrobial, spasmolytic, carminative, antioxidant and astringent action [1].

According to the *Salviae officinalis aetheroleum* monograph of German Medicines Codex (DAC), the Sage essential oil chemical composition criteria for five main constituents based on gas chromatography identification are: cineol (6.0 – 16%),  $\alpha$  – thujone +  $\beta$  – thujone (at least 20% in total), camphor (14-37%), bornyl acetate and borneol (not more than 5%) [2].

In Kosovo, medical herbs are also being cultivated and put in the market in the form of teas, and are being exported as raw material. Cultivation of some medical herbs is almost impossible without altering their characteristics [2]. In this research we aim to gain information on the overall quality of cultivated Sage in Kosovo, and to also determine the antimicrobial activity of some of its extracts. International standards and sophisticated techniques have been applied for evaluation. The study results have been compared to other similar publications.

**Materials and methods****Plant material**

The analyzed material consisted of dried leaves of *Salvia officinalis* L. cultivated by the company "Agroprodukt" in Syne village, municipality of Istog, Kosovo, at a level of 650m above sea. The plant has been collected in flowering period in June 2010 and leaves have been dried in shade in a well ventilated area.

**Essential oil determination**

Essential oil was extracted from the plant material through Clevenger distillation apparatus for 2 hours at a rate of 2 to 3ml/min, using xylene as organic solvent. For the procedure 20 g plant material and 400 ml of water have been used.

**Essential oil chemical analysis**

Determination of chemical constituents of essential