Mineral Content of Serbian Propolis as a Tool in Tracing Regional Differences

J. Trifković,1 P. Ristivojević,2 J. Nešić,2 Z. Tešić,1 D. Milojković-Opsenica1

1Department of Analytical Chemistry, Faculty of Chemistry, University of Belgrade, P.O.Box 51, 11158 Belgrade, Serbia
2University of Belgrad, Innovation Centre, Faculty of Chemistry, d.o.o.Belgrade, Serbia;

jvelicko@chem.bg.ac.rs, ristivojevic@chem.bg.ac.rs, jelenanesic@chem.bg.ac.rs, ztesic@chem.bg.ac.rs, dusankam@chem.bg.ac.rs

Propolis is a resinous material with a complex composition. It is collected by honeybees from sprouts and plant exudates and is modified in the beehive by the addition of salivary secretions and waxes. Propolis sample can contain more than 300 components, depending on the plant source and its geographical origin. The major compounds present in propolis are resins, mainly composed by flavonoids, phenolic acids, and esters, which often form up to 50% of all the ingredients. The composition of propolis is completed by waxes (30%), volatile essential oils (10%), pollen (5%), and other organic and inorganic compounds (5%).

Propolis is one of the few natural products which are offered today with valuable nutritional and medicinal qualities. These properties are determined, among others, by its mineral components. The propolis mineral content is influenced by the content of the minerals in the soil, climatic factors (temperature, humidity, wind), and also by the degree of pollution in areas visited by the bees.

The mineral content of the Serbian propolis have not insofar been analyzed despite the long tradition of its production. The aim of the present study was to characterize propolis samples from different locations of the Serbia as well as to evaluate similarities and differences among them by the application of chemometric tools on their mineral content. Therefore, 54 samples of propolis were collected from seven regions of Serbia. Determination of the 22 heavy metals and trace elements was performed using optical emission spectrometry with inductively coupled plasma (ICP-OES) technique. It can be noted that potassium is the most abundant component considering all of studied samples, calcium is the second one followed by magnesium, iron, zinc, aluminum, and sodium. The minor and trace elements include titanium, manganese, boron, copper, nickel, plumb and strontium.

Kruskal-Wallis test were applied to differentiate groups of samples according to geographical origin of honey. It was used to compare the medians and variances of mineral content for seven regions. Based on the results significantly higher content of zinc was observed in East region and Vojvodina. Also, Central region was differentiate from East, West and South region by the content of potassium, and magnesium

KEYWORDS: Propolis, Serbia; mineral content, ICP-OES

Acknowledgement: This work has been supported by The Ministry of Education and Science of the Republic of Serbia, Grant No. 172017. The presented study is a part of activities in framework of FP7 RegPot project “Reinforcement of the FCUB towards becoming a centre of excellence in the region of WB for molecular biotechnology and food research” (FCUB-ERA 256716).