THE CONTENT OF MICRO- AND MACROELEMENTS IN PROPOLIS

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Abstract. In the study there are presented the results of the research regarding the content of the micro- and macroelements in propolis from different regions of the Republic of Moldova.

It was found out that the quantity of micro- and macro elements in propolis is not identical in different regions, and depends on the species of plants.

It was pointed out that the sum of the propolis studied microelements vary from 52.33 mg/kg (central region) to 132.83 mg/kg (south region). From all the macro elements sodium has the largest share – from 3.13 to 5.94 g/kg.

INTRODUCTION

Propolis – a wax-like resinous substance collected by honey bees that represents a complex chemical composition and used as cement and to seal cracks or open spaces in the hive. Honey bees will use propolis to attempt to seal any gap inside the hive. Propolis is now thought to: reinforce the structural stability of the hive; reduce vibration; make the hive more defensible by sealing alternate entrances; to prevent diseases and parasites in the hive; etc..

Ioris N.P. (1975), Hristea C.L. (1976), Marletto F., Olivero G. (1981), Taranov G.F. (1987) and others communicate that bees collect propolis from tree buds like poplar trees, cherry trees, hazel nut trees, plum trees, fir trees, peach trees, chestnut-trees, pines or other botanical sources. In the collected resinous substances the bees add the secretion of their salivary and pharyngeal glands and form a kind of balls which are placed on their lower limbs and which the bees take to the hive.

The composition of propolis will vary from hive to hive, district to district, and from season to season. Therefore, the exact composition is never absolutely the same between any two areas. Even propolis samples taken from within a single colony can vary. As a result of the study of the chemical composition of propolis it was found out that in its composition there are some substances from the class of flavonoids, and also terpenoids. Most of these components have been found by now in many plants.

A more specific composition was determined by Louveaux J.(1988), Atiasov N.I., Guseva M.P., Kuprianov V. A. (1990), Margitas L.A. (1997). They specified that it is made of mechanical impurities (2.9%), pollen (11%), essential oils (4.5%), bee wax A (17.2%), other waxes B (6.35%), balsams (6.1%), and resins (412.5%). The flower pollen in the propolis is rich in provitamin A, vitamins B₁, B₂, E, C, PP. Besides these substances there have been identified more than 149 substances in propolis: 21 flavonoides that protect the blood circulation, 17 mineral substances in the quantity of 0.5 - 2.0% like Al, Cu, Mg, Zn, Si, Fe, Mn, Ba, ST, Ti, Sn, Ni, Cr, Va, Cb, Mb.
During the previous experiments carried out by us it was found out that during the active season especially closer to autumn the quantity of microelements in propolis is reduced (Eremia N., Dabija T., 2007).

So, it can be mentioned that the quantity of the collected propolis depends on the bee breed, the geographical position, climate, the construction of the hive, its ventilation and other factors. At the same time, because the use of propolis is increased, it is necessary to examine the chemical composition of the propolis and the quality of this apicultural product of great importance and especially the content of micro- and macro elements in it.

MATERIAL AND METHOD

During the active season the technology of obtaining propolis was studied and improved. Propolis was collected with the help of an apiarian chisel from the boards of the floor and the cloth panel; it was collected and weighed apart for each hive, every time when a control of the bee colony was performed.

The propolis was weighed with the balance VLTK-500. Samples were taken from the propolis collected in different regions of the Republic of Moldova (south, center, north), and the presence of micro- and macro elements was studied. At the same time we studied the content of micro- and macro elements in the propolis collected in 2007 and in that which was more than ten years old. The content of micro-and macro elements in the propolis was determined using the method of atomic spectroscopy at the Laboratory of Atomic Spectroscopy of the Analytical Methods and Metrology Center of the Academy of Science of Moldova (ILAS CMMAC A.S.M.). The studies were carried out under the project from the science and innovation with the cipher 07.407.27 INDA.

RESULTS AND DISCUSSIONS

The microelements vary quantitatively and qualitatively in propolis depending on the telluric characteristics of the region and vegetal species used by bees. The biological activity of many microelements depends on the fact that they act synergically with enzymes and vitamins. Iron is a part of respiratory enzymes, zinc is a part of ferments which take part in the glucidic and proteinic metabolism. The study results have proved that the sum of studied microelements in the collected propolis in 2007 varied from 52,33 mg/kg (the central region) to the 132,83 mg/kg (the south region). A major quantity is shared by zinc – 39,1-98,6 mg/kg and manganese 8,4-14,6 mg/kg (chart 1). In the propolis from the north and central regions the quantity of copper is 2,18-2,40 mg/kg, and from the south region it is 5,71-6,28 times as much. In the propolis collected from different regions of the republic the quantity of cobalt is less then 0,05 mg/kg, and of the chromium varied from 0,6 to 5,4 mg/kg. It can be mentioned that in the propolis kept more than ten years the sum of the macro elements was 128,02 mg/kg.

Sodium has the largest percentage of all the macro elements studied by us; it varies from 3,13 g/kg (the central zone) and 5,94 g/kg (the south region). At the same time we can say that the propolis collected in the central region contains more calcium – 4,27 g/kg, that from the south region contains 1,0g/kg. In the propolis collected in different regions the quantity of potassium varies from 0,75 to 1,03 g/kg, the iron 407,5-876,9 mg/kg and magnesium 179,0-255,8 mg/kg (chart 2).

Table 1

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<th>Thee quantity of microelements in the collected propolis</th>
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So, the quantity of micro- and macro elements in the propolis is not identical in different regions of the republic and depends greatly on the species of plants from which it was collected.

CONCLUSIONS

1. It was found out that the quantity of micro- and macro elements in propolis is not identical in different regions and depends on the species of plants.
2. It was also found out that the sum of studied microelements in propolis varies from 52.33 mg/kg (central region) to 132.83 mg/kg (south region). From all the macro elements sodium has the largest share – from 3.13 to 5.94 g/kg.

BIBLIOGRAPHY