

MICRO- AND MACRO- ELEMENTS OF WATER EXTRACTS FROM BEES

Elena P. Lapynina*

FSBSI "FBSRC"

*Corresponding author: elena.p56@yandex.ru

Abstract

The body of a bee is a rich source of biologically active components. Bees are widely used in apitherapy in various forms. The article presents the results of determining the elemental composition of aqueous extracts of bees. The influence of the thermostating temperature and the extraction time on the elemental composition of aqueous extracts is shown.

The object of research were bees and bee water extracts.

The purpose of this work was to accumulate experimental data on the content of biologically active components and the mineral composition of bees and water extracts from them for inclusion in the regulatory and technical documentation.

During the study, the optimal extraction temperature was determined, it is 60 C, and the extraction time is 2 hours.

Keywords: *Biologically active components, mineral composition, bee death, extracts*

Introduction

Recently, bees are increasingly used in the practice of apitherapy. The chitinous cover of a bee contains substances such as heparin, melonin, heparin-like compounds, lysozyme and enzymes. Bee bodies include amino acids, peptides, bee venom, which itself is a complex, vitamins, minerals and other compounds.

They have anti-inflammatory, bactericidal, analgesic, radioprotective, antitoxic, regenerating and other effects and serve as a raw material for the manufacture of ointments, decoctions, alcohol and water extracts and other dosage forms (Krylov et al., 2007).

Water extracts from dead bees are able to increase the immune status of the human body and stimulate the growth of skeletal and cardiac muscles (Berikasvili and Bur, 2009; Kashina et al., 2014; Yasin and Mannapova, 2016).

It is reported that in order to achieve a positive therapeutic effect in all forms, it is necessary to preserve the components with medicinal properties. In this regard, it is of interest to study the composition of the body of a bee, to determine its biologically active components and ways to preserve them in various forms.

In our work, we evaluated the effect of temperature and duration of extraction on the content of chemical elements in aqueous extracts of dead bees.

Materials and methods

The material for the study was samples of bees collected at the apiary of the Research Institute of Beekeeping, and water extracts prepared from them with a concentration of 5%.

Water extracts were prepared from bees dried at 30 ° C without direct sunlight.

5% aqueous extracts were prepared by maceration: the bodies of the bees were poured with the required amount of bidistilled water and kept in a water bath at a certain temperature, then cooled to room temperature and filtered. Samples of the obtained extracts were examined in the laboratory of the Federal Scientific Center for Beekeeping. To determine the elemental composition, the method of atomic absorption spectrophotometry on a SpectrAA 220FS spectrophotometer was used.

Results and discussion

The largest amount in water extracts of bees contains components such as calcium, magnesium, potassium, sodium. In fig. 1 shows the effect of the extraction temperature on the elemental composition of aqueous extracts of bees during extraction for one hour.

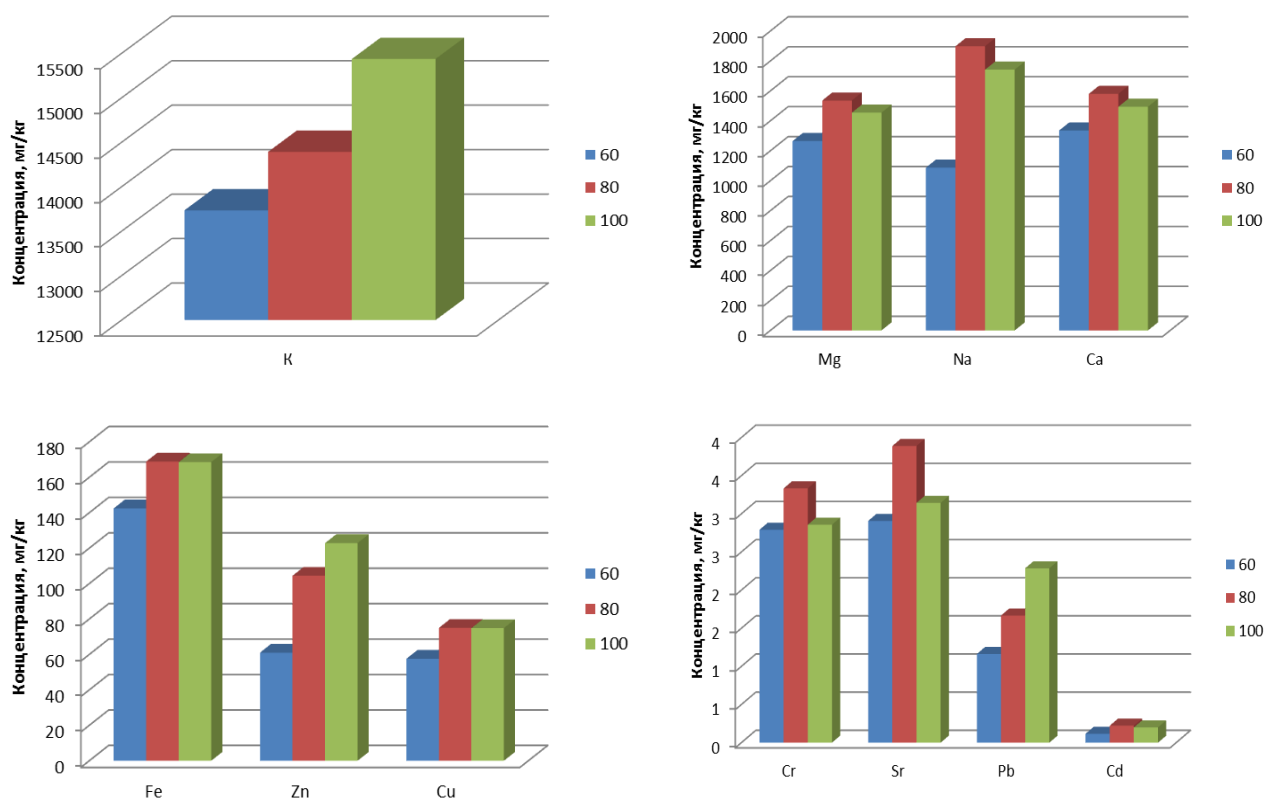


Figure 1. The content of mineral components in bee extracts

The figure shows that the maximum amount of mineral elements is transferred into aqueous extracts at a temperature of 80 ° C. An increase in the temperature regime from 60 to 80 ° C increases the concentration of sodium and zinc in the extracts by 73%, copper, strontium by 30%, magnesium, calcium, etc., iron by 25%, potassium by 9%. The lead content in extracts increases by 43%, cadmium by 87%.

A further increase in the thermostating temperature to 100 ° C leads to a decrease in the concentration of some determined mineral elements in the extracts. Thus, the strontium content is reduced by 20%, chromium - by 17%, sodium, calcium, magnesium and cadmium - by 10%. The content of iron and copper is slightly reduced (by 3%). However, the concentration of lead, zinc and potassium during extraction at 100 ° C increases by 37%, 17% and 7%, respectively.

It was found that the main part of mineral elements is converted into aqueous extracts during the first hour of extraction. In fig. 2 shows the mineral composition of 5% aqueous extracts of the bee population at different thermostating times.

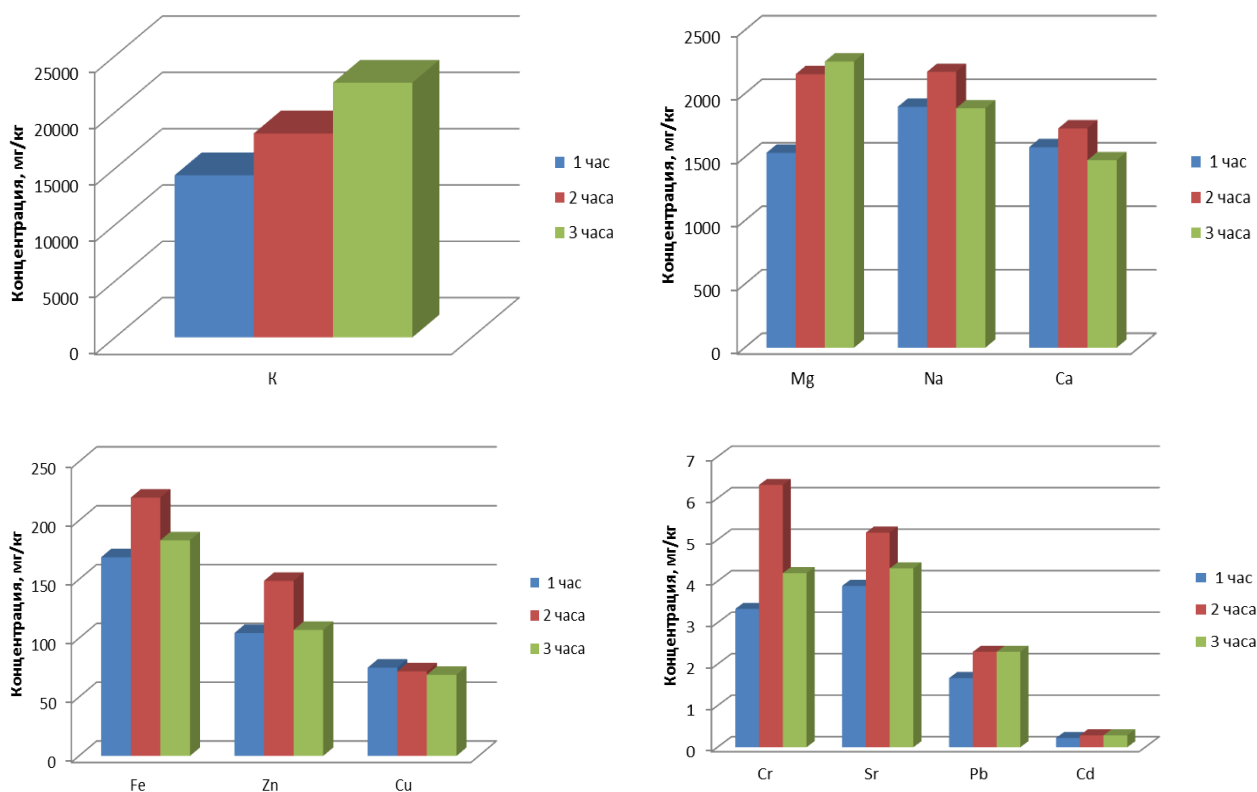


Figure 2. Influence of the extraction time on the concentration of mineral components in bee extracts

From this figure it can be seen that during the extraction for an hour, the following are extracted from the bodies of bees: potassium - 14392.56 mg / kg, magnesium - 1535.56 mg / kg, calcium - 1579.63 mg / kg, sodium - 1898.11 mg / kg, iron - 168.89 mg / kg, zinc - 104.44 mg / kg, copper - 75.00 mg / kg, chromium - 3.33 mg / kg, lead - 1.67 mg / kg, cadmium - 0.22 mg / kg.

Increasing the extraction time from one hour to two hours increases the recovery of almost all analytes. The content of chromium increases by 85%, zinc and magnesium by 35%, lead by 37%, strontium by 33%, cadmium by 29%, iron and potassium by 23%, sodium by 10%, calcium by 5%. At the same time, the copper content is reduced by 8%.

After extraction for three hours, there is a decrease in the concentration of chromium by 34%, zinc by 29%, sodium, calcium, iron, strontium - by an average of 16%, copper - by 4%. The potassium content increases by 24%, magnesium - by 4%.

Conclusions

Thus, the studies carried out have shown that the maximum amount of micro and macro elements is extracted at a thermostating temperature of 80 ° C for two hours of extraction. The transition from bee bodies to extracts of toxic elements makes it necessary to control the quality of raw materials.

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