

MACRO- AND MICROELEMENTS OF A PRODUCT BASED ON HONEY AND COMMON CENTAURY

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Abstract: The medicinal plant common centaury (*Centaurium umbellatum* Gilib.) of the gentian family is highly valued in pharmacy for its favourable effect on problems of the digestive system. The aim of our research was to examine the contents of macro- and microelements in common centaury, honey, and a product based on honey and common centaury, so that common centaury can be more widely used together with honey as a food supplement. Calcium, magnesium, sodium, copper, zinc, iron and manganese contents were established in quantitative terms by the atomic absorption spectrum-photometry method, the phosphorus contents by the spectrum-photometry method, and potassium contents by the burning photometry method. The research results indicate an important enrichment of the mineral composition of the obtained product, relative to honey, especially regarding the contents of magnesium, calcium, manganese, potassium and phosphorus.

Key words: honey, common centaury, dietetic product, macro- and microelements.

Introduction

Many researchers (Mladenov, 1978; Škenderov and Ivanov, 1983) have pointed out a great importance of mineral matter, aminoacids, enzymes and other ingredients of honey for the human body. However, honey cannot be treated

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as a source of vitamins and mineral matter, since their presence in honey is much below the daily needs of the human body (Škenderov and Ivanov, 1983). According to the data given by the mentioned authors, honey as a foodstuff should mainly be considered as a source of energy (carbohydrates) easily absorbed by the body.

Also, honey has been used since ancient times to meet human needs in nutrition, medical treatment, cosmetics, etc. (Abadžić, 1982; Belčić et al. 1985).

Common centaury (*Centarium umbellatum* Gillib.) is medicinal plant of the gentian family. It has been highly valued in pharmacy for its favourable effect on the digestive system. It inhabits various hill-mountainous habitats.

In the available references, no data have been found on the mineral composition of common centaury.

Under the assumption that common centaury is rich in macro- and microelements, it was of interest to study its mineral composition so that common centaury can be more widely used together with honey as a food supplement.

Therefore, the aim of our research was to examine the contents of macro- and microelements in the dry centaury plant, honey and a honey- and common centaury- based product.

Material and Methods

The research included flower honey, ground common centaury, and a product based on honey and common centaury. The product was obtained in the laboratory, by homogenising honey and common centaury powder in a defined proportion.

Within the general chemical composition, dry matter of honey, was analysed refractometrically dry matter of common centaury and the product by drying mineral matter by burning at 600°C, nitrogen by using Kjeldah's method, cellulose by the Hennenberg-Stokman method, total sugars by the Luff-Schorl method (Trajković et al., 1983).

In samples, the contents of the following elements were examined in quantitative terms: calcium, magnesium, sodium, potassium, phosphorus, zinc, iron and manganese. Calcium, magnesium, sodium, copper, zinc, iron, and manganese were established by the atomic absorption spectrum-photometry method (Komite for Levedsmidler, 1965; Rowe, 1973), and potassium by the burning photometry method (Trajković et al., 1983).

The results are shown as mean values of the three measurements.

Results and Discussion

The results of examination, concerning the general chemical composition of honey, common centaury and the product based on honey and common centaury are shown in Table 1, and macro- and microelements are shown in Table 2.

Tab. 1. - Chemical composition of honey, common centaury and the product based on honey and common centaury

Parameter (%)	Honey	Common centaury	Product
Water	18.00	7.94	17.80
Total ash	0.15	3.56	0.20
Ash undissolved in HCl	0.00	0.13	0.00
Proteins	0.50	5.00	0.56
Cellulose	0.10	18.70	0.45
Total sugar	79.22	13.36	77.49
Reducing sugar	76.38	6.64	74.95

Table 1 shows that total sugars are highly present in honey (79.22 percent), accounting for 98.58 percent of the total dry matter. The obtained value is in accordance with the data given by Škenderov and Ivanov (1983), according to which the content of total sugars in honey accounts for 95-99 percent of dry matter.

The content of reducing sugars in honey (76.38 percent) is also within the range of 75-80 percent, corresponding to data given by the same authors.

Dominant, with respect to the contents of macro- and microelements of honey, (Table 2) are K (314.98 mg/kg), Na (60.14 mg/kg), Ca (49.60 mg/kg) and P (47.55 mg/kg). The K content is in accordance with the data given by Škenderov and Ivanov, according to which this element accounts for 1/4 to 1/2 of the total quantity of mineral matter in honey.

Based on the results shown, conclusion can be drawn that macro- and microelements are highly present in common centaury, especially K, Ca, Mg, P, Na and Fe.

Tab. 2. - Contents of macro- and microelements in honey, common centaury and the product based on honey and common centaury

Parameter (mg/kg)	Honey	Common centaury	Product
Calcium	49.60	2,500.00	103.55
Magnesium	18.57	1,400.00	45.56
Sodium	60.14	242.18	66.00
Potassium	314.98	11,875.00	526.05
Phosphorus	47.55	1,374.70	78.88
Copper	1.32	6.62	1.37
Zinc	10.46	29.69	10.86
Iron	7.27	187.50	10.77
Manganese	0.64	39.80	1.32

The content of magnesium in common centaury (1,400.00 mg/kg) is higher 75 times, of manganese 62 times, and of calcium about 50 times than in honey. The share of phosphorus and iron is also considerable, their contents being about 29 and 26 times, respectively, higher than in honey.

By the addition of powdered common centaury to honey, the contents of all macro- and microelements in the product were increased, especially of Mg, Ca,

Mn, K and P, compared to their contents in honey. This can be illustrated by the content of magnesium in the product (45.56 mg/kg), whose concentration is increased about 2.5 times, or calcium (103.55 mg/kg), whose concentration is about twice higher than in honey.

The consumption of this product may provide a part of recommended daily intake of minerals in nutrition, especially microelements. Therefore, for example, daily need of Fe for adults is 10 mg (Vučetić et al., 1998). By intake of 50 g of preparation based on honey and centaury, we provide 0.54 mg of Fe that makes more than 5% of daily needs for this microelements.

By intake of 50 g of this preparation one intakes 0.07 mg of Cu which, according to the recommendation of the Academy of Science USA (1989), makes 5% of necessary daily needs (1.5 mg-3 mg).

Also, one intakes 0.54 mg of Zn, and it makes 4% of the recommended daily intake of 12-15 mg (Academy of Science USA, 1989).

Conclusion

According to the results of research on mineral structure in the analyzed samples of honey and centaury as well as products based on honey and centaury, the following may be concluded:

Preparation based on honey and centaury is formulated to maintain the remedial features of bitter structures of centaury and to ease its consumption.

Centaury is a rich source of macro- and microelements, especially with, K, Ca, Mg, P, Na and Fe. By adding thrashed centaury to honey, the mineral structure of the received product is greatly enriched in comparison to honey, especially regarding the contingency of Mg, Ca, Mn, Ka and P.

The consumption of this preparation provides a part of daily recommended intake of mineral materials in nutrition-more than 5% of Fe (0.54 mg), about 5% of Cu (0.07 mg), and 4% of Zn (0.54).

According to the previously mentioned, it can be seen that preparation based on honey and centaury, besides its positive effect on digestive system, is a highly valued product from energetic and nutritious value point of view. Therefore, it is recommended for wider utilization in nutrition.

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MAKRO- I MIKROELEMENTI PROIZVODA NA BAZI MEDA I KIČICE

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Rezime

Ispitan je sadržaj makro- i mikroelemenata kičice (*Centaurium umbellatum* Gilib.), meda i proizvoda na bazi meda i kičice, kako bi se kičica zajedno sa medom mogla šire koristiti kao dopuna ishrani.

Kvantitativno je određen sadržaj kalcijuma, magnezijuma, natrijuma, bakra, cinka, gvožđa i mangana metodom atomske apsorpcione spektrofotometrije, sadržaj fosfora spektrofotometrijski, a sadržaj kalijuma metodom plamene fotometrije.

Rezultati ispitivanja ukazuju da je kombinacijom meda i praha kičice dobijen proizvod obogaćenog mineralnog sastava u odnosu na med, posebno u pogledu sadržaja magnezijuma, kalcijuma, mangana, kalijuma i fosfora.

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