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QUANTIFICATION OF L – ASCORBIC ACID AND IRON IN HONEY

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ABSTRACT
Following the general trend of using what nature is directly offering, bee products got an increasing importance as essential natural resources in promoting healthy food. Honey contains many trace minerals that are essential to health. The objective of this study was to determine relationship between iron content and content of L – ascorbic acid (vitamin C) in honey. Method for the analysis of iron in bee products is atomic absorption spectroscopy. Average content of iron in dark honey is 1,79 mg/kg, and in lighter honey sorts 1,40 mg/kg. For quantitative determination of L – ascorbic acid in honey samples in this work used Thilmans method. Average content of L – ascorbic acid (Vitamin C) in dark honey is 1202,85 mg/kg, and in lighter honey sorts 599,96 mg/kg.
KEYWORDS:
Honey, Vitamin C, ferum, atomic absorption spectroscopy

1. INTRODUCTIONS

Honey has an extensive history of traditional human medicinal use, in a large number of societies. Honey is easy digestion alimentary food, which contains important nutritive substances. Honey is composed primarily of the sacharides, but honey also contains amino acids, organic acids, minerals, colors, aromatic substances and trace of fats. [1,3,7] Honey from a single type of flower is monofloral, and from more type of flower is polyfloral. If we direct bees to compile nectar from referred types healthy herbs we can produce different types healthy honeys.

Color of honey depends from colored substances in nectar: karotin, ksantophyl, melanin and others. Colors of honey form a continuous range from very pale yellow through ambers to a darkish red amber to nearly black. Acacia honey is the lighter. Trefoil, sallow and lime honey belong to lighter type honey. Color of honey can be measured by optical scale «Pfunden» and a specially colorimeter.[5]

RDA for L-ascorbic acid is 70 mg. That is twice bigger then for other vitamins. For protection from cold illness it is recommended 1 – 3 g L-ascorbic acid per day.

L-ascorbic acid is commonly used in treatment of malignant disease in daily dose of 20 – 30 g.[9] Iron is the most important essential microelement in the living organism. The most important role of the iron in biological organism is in metabolism of oxigen. Iron ion properties allows transport and involvement of oxigen in the chain

of biochemical reactions.[8] Common oxidation state of iron in biological systems are: iron(II) (Fe^{2+}) and iron (III) (Fe^{3+}).

RDA for iron depends of years, highness and weight of human organism. For children RDA is 10 mg, for adult 10-15 mg, in pregnancy 30 mg and in period of lactation 15 mg.[2,6]

2. METHODOLOGY

Atomic absorption spectroscopy method was applied for quantitative determination of iron in honey samples. Instrument used for iron determination is "Perkin Elmer" model 3110. Determinations are performing in the direction with standard ASTM E 1024 – 84 i ASTM E 1812 – 96.

For quantitative determination of L-ascorbic acid was used the Thilmans method. That is volumetric method for determination of lower concentrations L-ascorbic acid in food samples.

3. FINAL RESULTS

Metals are notable for their tendency to accumulate in select tissues the human body and their overall potential to be toxic at high levels of exposure. In this purpose thirty honey samples were investigated.

TABLE 1. Content of L – ascorbic acid and ferum in darker and lighter honey samples

Sample	L – ascorbic acid [mg/kg]	Fe [mg/kg]	Color
1	608,0	0,68	Dark
2	646,0	0,58	Dark
3	616,0	0,30	Dark
4	622,0	2,94	Dark
5	631,0	5,83	Dark
6	723,0	2,56	Light
7	1249,9	1,56	Dark
8	1476,9	0,61	Dark
9	3783,0	1,19	Dark
10	372,2	1,73	Dark
11	424,8	0,80	Light
12	561,0	2,15	Light
13	832,0	1,00	Dark
14	424,0	0,40	Light
15	556,4	2,44	Light
16	756,0	0,40	Light
17	756,0	2,11	Dark
18	311,0	0,75	Light
19	574,0	1,97	Light
20	777,0	1,47	Dark
21	858,0	0,98	Light
22	493,0	0,78	Light
23	1982,0	1,72	Dark
24	678,0	1,20	Light
25	1427,0	1,38	Dark
26	702,5	1,39	Light
27	1288,8	2,47	Light
28	459,0	1,51	Dark
29	985,8	3,43	Dark
30	646,5	2,38	Dark

Althrought L – ascorbic acid can be toxic at high levels of exposure. L - ascorbic acid was first known to prevent scurvy. L - ascorbic acid is largely used in therapy as an anti-infections factor. It is essential to the normal functioning of cells. Iron is essential to life and play irreplaceable roles in, for example, the functioning of critical enzyme systems. Analyzis shows that are concentration of L-ascorbic acid and iron lower in lighter than in darker honey samples. These results are in correlation with resources of Nicoleta M. and sure. [4]

Average content of L-ascorbic acid is 49,88 % lower in light honey samples than in dark one.

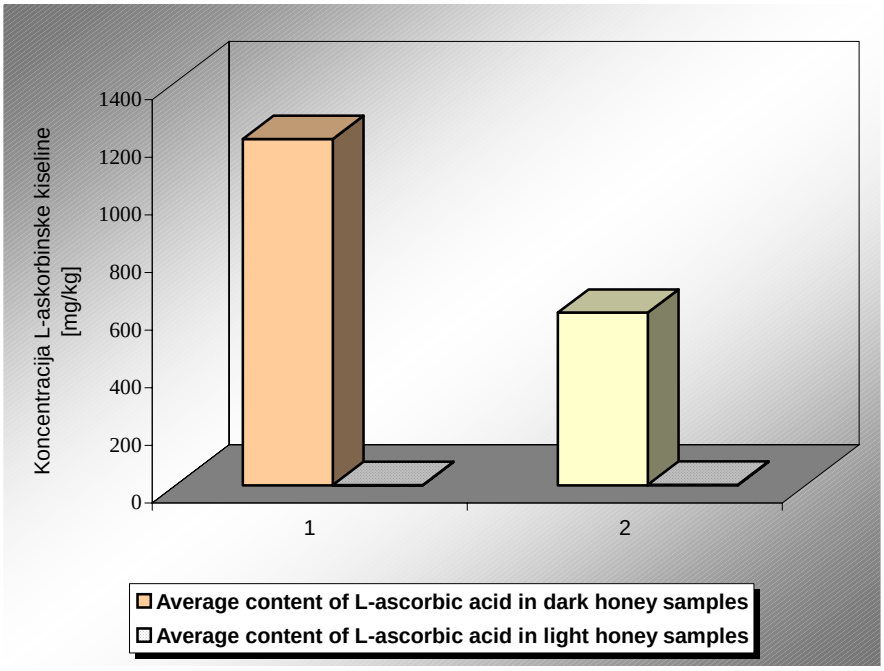

Figure 1. Average content of L-ascorbic acid in darker and lighter honey samples

Content of L-ascorbic acid in some plants is: spinach (50 mg/kg), lettuce (50 mg/kg) and wheaten sap (3788 mg/kg).[11] If we compare this results with content of L-ascorbic acid in honey samples, conclusion is that is honey very important source of L-ascorbic acid in nutrition.

Table 1. Content of L-ascorbic acid in some plants and honeys[11]

	Nutritient				
L – ascorbic acid [mg/kg]	Spinach	Lettuce	Wheaten sap	Dark honey	Light honey
	50	50	3788	1202,85	599,96

In the direction with resources of White and Landis lighter honey samples contains average 2,4 mg/kg the iron, and darker 9,4 mg/kg. [10] Our resources are in correlation with these one. In the directions with our investigations, average content of iron in dark honey is 1,79 mg/kg, and in lighter honey samples this values is 1,40 mg/kg.

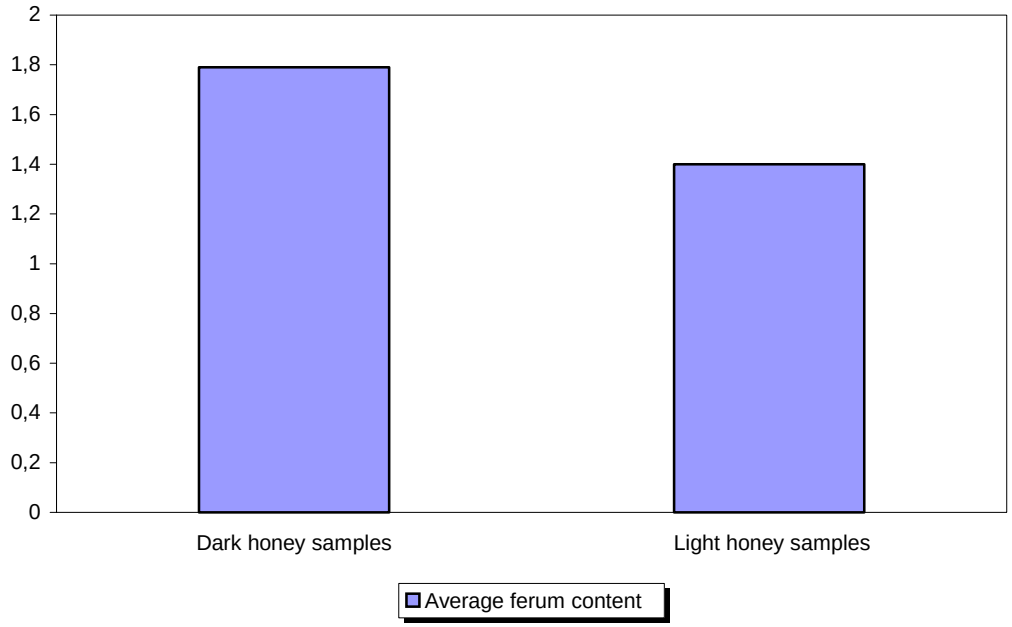

FIGURE 2. Average ferum content in dark and light honey samples

4. THE CONCLUSIONS

Honey contains many trace minerals that are essential to health. In the direction on RDA values for L – ascorbic acid and iron our resources showed that honey can be useful natural source of this substances in nutrition. The analyzed light honey samples had low content of L – ascorbic acid and iron. It can be observed that concentrations of L – ascorbic acid and iron are higher in dark honey samples than in the light one.

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