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RESEARCHES CONCERNING THE HEAVY METAL CONTENT OF THE RAPE HONEY ORIGINATING FROM THE BANAT AREA IN THE YEARS 2006-2007

CERCETĂRI PRIVIND CONȚINUTUL ÎN METALE GRELE AL MIERII DE RAPIȚĂ, PROVENITĂ DIN ZONA BANAT ÎN ANII 2006-2007

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The purpose of the researches was the observation of the heavy metal quantity existing in four rape honey samples, originating from Bulgarus and Grabat localities from 2006-2007 production.. In 2006 besides the other elements observed in 2007, has been noticed the nickel that varied between 0.02 mg/kg in Bulgarus and 0.002 mg/kg in Grabat. From the data, it is observed that in the 2007 collected honey, besides the existing metals from 2006 has been identified the zinc that in Grabat has had a very high concentration of 0.07 mg/kg and in Bulgarus its concentration was 0.03 mg/kg and the ferrum with the following values : 0.03 mg/kg in Bulgarus and 0.005 mg/kg in Grabat. In all four collected samples the chromium has had the same concentration of 0.001 mg/kg in both years of experiments. The paper is original through the research and honey samples' collection manner, the location and the years of research and also due to the fact that the researches were developed in two neighboring localities that during the year don't get the same precipitation quantities according to the climatic data existing in the town hall registers.

Key-words: heavy metal, bee, honey, determination, substance

Introduction

Honey is a product made by bees exclusively from the nectar of flowers or from the sweet juices from other parts of the green plants, that are collected by bees, are improved with substances and are transformed in a specific way finally obtaining the so-called product, which is deposited in the honey combs cells in the hive in order to represent their energetic food (N. Popescu 1997).

The metals, in very small quantities are vital for all life forms, they enter into the cells like cations, but their inclusion is strictly regulated, because actually, in large quantities, all metals are toxic. The human being, like the other vertebrates, needs

metal's cations, because they assure the development of many processes of vital importance. We are mentioning: heavy metals – cobalt, copper, ferrum, manganese, molybdenum, zinc and in very small quantities chromium, vanadium, nickel and lead. The division of the metals in required, neutral and toxic may be inaccurate and often mislead, because all the required elements in small doses become toxic and very toxic in large doses (Popescu Gh.- 2005).

The difference between the concentrations in which they are useful and in which they are harmful can sometimes be very small. At present, in the condition of the strong human impact over the nature, it is very important to supervise the level of the metal's content in the alimentary products, in the environment, because there are known cases of human intoxication with heavy metal's compounds.

Heavy metals are dangerous through: in the first place, in the processing of food the metals doesn't decompose, on the contrary their concentration referred to the mass unit increases. Secondly, the metals posses the feature to accumulate in the human organism, in this way they are slowing or even blocking the intracellular biochemical processes. Thirdly, the majority of the metals possess cancerigen and mutagen proprieties. Once they are assimilated is very difficult to remove them from the human organism. We need better methods of pesticides' analysis at bees and plants (Tisseur M. – 1996).

Materials and Methods

The experiments were developed in two localities from Timis county: Bulgarus and Grabat, and the honey samples collection took place during April-May in 2006-2007.

From every hive were collected two equal honey samples. They were homogenized and it resulted a single honey sample from the rape culture, from which a 100 grams quantity of honey was extracted and sent to the Laboratory of Atomic and Molecular Spectroscopy from the Faculty of Agro-alimentary Products, USANV-Timisoara for micro and macro elements determination.

Results and Discussions

The results that were obtained due to the laboratory analyses confirm the pollution of the environment with different heavy metals having different origins, these metals manage to get in the honey resulted from the rape flowers nectar through different sources. The main source of origin is the reserve from the soil in which they get at the same time with the chemical fertilizers and some pesticides residues.

The data obtained in the two years of research present different concentrations of metals in the honey according to the year of research and the locality from which the samples were collected.

In 2006 were collected honey samples that were analyzed in order to determine the heavy metal content, thus honey samples were collected from Bulgarus and Grabat, and the results are presented in table 1.

Table 1

Heavy metals (mg/kg) determined in rape honey collected in 2006 from Bulgarus and Grabat

Sample name	Ash	Cd	Cu	Zn	Ni	Mn	Fe	Pb	Co	Cr
Honey Bulgarus 2006	0.062	0.01	0.03	0	0.02	0.05	0	0	0	0.001
Honey Grabat 2006	0.051	0.007	0.08	0	0.002	0.005	0	0	0	0.001

From the obtained data we can observe the difference of concentrations between the heavy metals existing in the honey samples collected in 2006 in the two localities. The difference of concentration which is visible is relying on the soil type where the rape was cultivated, on the used chemical fertilizers and on the precipitations from the blossoming period of the rape.

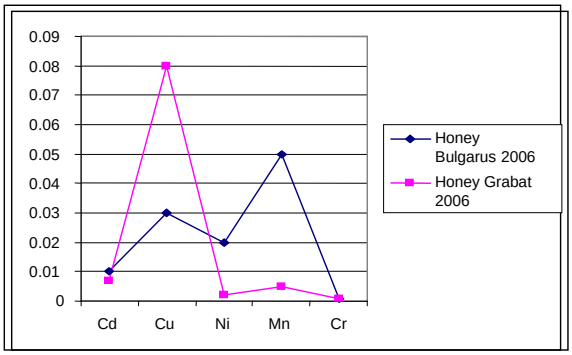

Fig. 1. Plotting of the heavy metals identified in rape honey collected in 2006 from Bulgarus and Grabat

In figure 1 is presented the quantity of metals detected in the two honey samples ant their variations according to the locality from which they originate. The concentration of cadmium identified in Bulgarus was 0.01 mg/kg, and in Grabat 0.007 mg/kg, the copper had the following values : 0.03 mg/kg in Bugarus and 0.008 mg/kg in Grabat, the nickel quantity varied between 0.02 mg/kg in Bulgarus and 0.002 mg/kg

in Grabat, the manganese values were : 0.05 mg/kg in Bulgarus and 0.005 mg/kg in Grabat, the chromium obtained according to the analyses had the following value : 0.001 mg/kg in both honey samples.

In table 2 are presented the different concentrations in heavy metals of the honey samples resulted from the 2007 yield.

Table 2

Heavy metals (mg/kg) determined in rape honey collected in 2007 from Bulgarus and Grabat

Sample name	Ash	Cd	Cu	Zn	Ni	Mn	Fe	Pb	Co	Cr
Honey Bulgarus 2007	0.056	0.002	0.01	0.03	0	0.02	0.03	0	0	0.001
Honey Grabat 2007	0.063	0.001	0.008	0.07	0	0.001	0.005	0	0	0.001

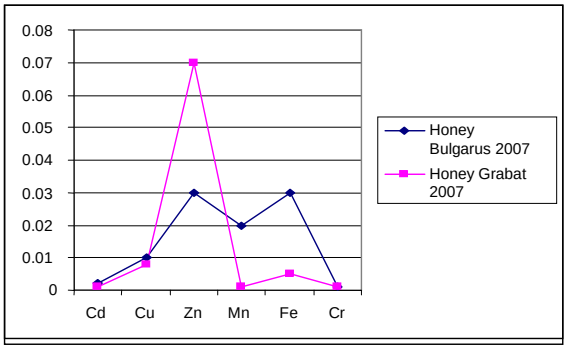

Fig. 2. Plotting of the heavy metals identified in rape honey collected in 2007 from Bulgarus and Grabat.

From this figure (fig. 2) is observed that in the honey collected in 2007 besides the metals that were present in 2006 , it was also identified the zinc that in Grabat has had a very big concentration 0.07 mg/kg and in Bulgarus its concentration was 0.03 mg/kg , and the ferrum with 0.03 mg/kg in Bulgarus and 0.005 mg/kg in Grabat. From those data we may state that the lack of precipitations and the high temperatures from April and May have had as a result the increase of the metals concentration from the soil solution and they were also identified in the honey in a higher concentration.

In table 3 are presented comparative data between the 2 years of research referring to the quantity of metals identified in rape honey samples collected in 2006-2007 in Bulgarus.

Table 3

Heavy metals (mg/kg) determined in rape honey collected in 2006 and 2007 from Bulgarus

Sample name	Ash	Cd	Cu	Zn	Ni	Mn	Fe	Pb	Co	Cr
Honey Bulgarus 2006	0.062	0.01	0.03	0	0.02	0.05	0	0	0	0.001
Honey Bulgarus 2007	0.056	0.002	0.01	0.03	0	0.02	0.03	0	0	0.001

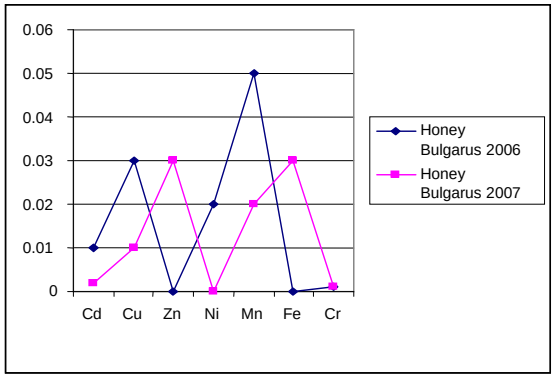

Fig. 3. Plotting of the heavy metals identified in rape honey collected in 2006 and 2007 from Bulgarus

From the figure 3 it can be observed the heavy metals variations existing in the rape honey from the same locality but from two different years. Thus we observe that in 2006 in Bulgarus the cadmium concentration was 0.01 mg/kg and in 2007 was 0.002 mg/kg, the copper concentration was 0.03 mg/kg in 2006, and in 2007 has had the value of 0.01 mg/kg, in 2007 the zinc was discovered in a concentration of 0.03 mg/kg, and in 2006 was not identified, the nickel identified in the honey samples from 2006 was in a concentration of 0.02 mg/kg, and in 2007 was not identified, the manganese from the 2006 honey samples was in a concentration of 0.05 mg/kg and 0.02 mg/kg in 2007, the ferrum was identified only in 2007 samples, and its value was 0.03 mg/kg, and the chromium quantity was equal in both honey samples from the two years : 0.001 mg/kg.

In table 4 are presented comparative data between the rape honey samples resulted from Grabat in 2006-2007.

Table 4

Heavy metals (mg/kg) determined in rape honey collected in 2006 and 2007 from Grabat

Sample name	Ash	Cd	Cu	Zn	Ni	Mn	Fe	Pb	Co	Cr
Honey Grabat 2006	0.051	0.007	0.08	0	0.002	0.005	0	0	0	0.001
Honey Grabat 2007	0.063	0.001	0.008	0.07	0	0.001	0.005	0	0	0.001

In this table it can be observed that besides the identified metals in 2006 , in 2007 were also identified the zinc and the ferrum.

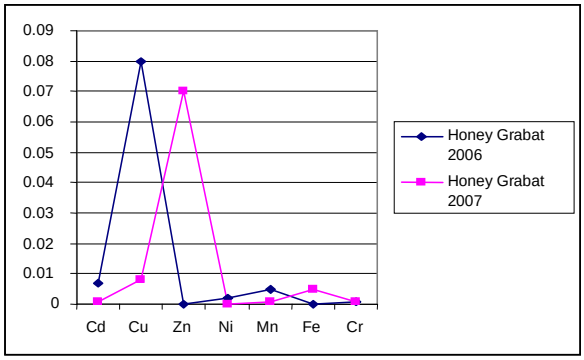

Fig. 4. Plotting of the heavy metals identified in rape honey collected in 2006 and 2007 from Grabat

From the figure 4 it can be observed the heavy metals concentration difference of rape honey existing between the two years. In 2006 at the analyzed honey sample from Grabat was observed the fact that the cadmium concentration was 0.007 mg/kg, and in 2007 – 0.001 mg/kg, the quantity of copper identified in the honey sample from 2006 was in a concentration of 0.08 mg/kg, and in 2007 was 0.008 mg/kg, the zinc was observed in a quantity of 0.07 mg/kg in the sample collected in 2007, and in 2006 was not detected. The nickel was detected in a quantity of 0.002 mg/kg in rape honey sample from 2006, and in 2007 was not detected, the manganese was in a concentration of 0.005 mg/kg in 2006, and in 2007 in a concentration of 0.01 mg/kg, the ferrum was discovered only in 2007 in a concentration of 0.005 mg/kg, and the chromium was discovered both in 2006 and 2007 and has had the same concentration – 0.001 mg/kg.

Conclusions

1. The results obtained after the laboratory analyses confirm the pollution of the environment with different heavy metals from different sources.
2. The honey samples from the 2006 yield have had besides the samples collected in 2007 nickel in a concentration of 0.02 mg/kg in Bulgarus and 0.002 mg/kg in Grabat.
3. In 2007, in the two rape honey samples, originating from Bulgarus and Grabat there were identified the following metals besides the existing ones in 2006 : Zn – 0.03 mg/kg in Bulgarus and 0.07 mg/kg in Grabat and Fe – 0.03 mg/kg in the honey sample collected in Bulgarus and 0.005 mg/kg in Grabat.
4. In 2007 relying on the high temperatures and the precipitations it is possible that some of those metals have modified their concentrations.

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