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RESEARCH ON QUALITY ANALYSIS OF AN ASSORTMENT OF FIVE TYPES OF HONEY IN ROMANIA

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Abstract

This paper emphasized the natural qualities of the five types of honey (Coriandrum sativum, polifloral, mana honey, Robinia pseudoacacia, and Tilia sp.), which were produced without any intervention from the beekeeper side. It si known that sometimes beekeepers supply the bees with a kind of sugar syrup which is processed into a low-quality honey. The analyzes pointed out that the bees collected the nectar from flowers alone and then turned sucrose into glucose and fructose nectar. All the studied honey varieties were natural, even organic, because they had a water content below 20%. This was because of the bees 'capacity' to put honey comb cells preserved only after the water has been evaporated up to this proportion. There are several kinds of honey, so in this study we analyzed five types. These types depend on what kind of flowers the bees have collected nectar from (nectar and pollen they collect and honey but only resulting from the processing of nectar).

Key words**:** *natural honey, quality analysis*

INTRODUCTION

Honey is a natural product derived from a complex floral nectar of plants, bee-enriched own substances. Bees produce honey and manna frequently[1].
Natural honey is the sweetest and miraculous product of nature resulting from processing by honey bees into nectar or other sweet substances found in all kinds of honey (manna of vegetable or animal origin, fruit juices), by their transformation under the enzymatic action of saliva and gastric juice of the bees [2, 6, 7, 8].
During the storage of the nectar of cells, the water which is in addition will be removed by ventilation.
After this, the honey is ready for consumption (honey should be consumed only if it contains 20% water) [3,7].
The physical-chemical and microscopic quality conditions (pollen spectrum) are subject to honey STAS 784/2-1989 in Romania.
The European rules are more lenient for honey on the physical-chemical quality conditions [4, 5].

MATERIALS AND METHODS

Before starting to analyze the honey is it required to homogenize the sample.
This supposes to shake it with a glass rod or a spoon until it becomes smooth. In order to melt the previously crystallized honey it should be heated at a temperature of 45°C and then mixed.
Water determination. The water content can be determined in two ways: in the refractometer by drying in an oven. On the lower prism of the refractometer apply a drop of honey in the sample and then immediately close the camera.
With the mirror directs a beam of light through the prism moving the rack until dark side reach the center of the visual field where visual lines intersect. Then, read the refractive index of the ladder (Table 1) [9].
In some refractometers, in addition to index of refraction of the scale, it is expressed as a percentage of the dry matter content or water. The refractometers which are determined only by the refractive index, the percentage of dry substance or the water content, is determined by means of a refractometer accompanying table.

If the analysis is determined at a different temperature of 20°C, the water content correction is obtained by subtracting water by 0.07 per degree of temperature above 20°C and 0.07 by adding water for each degree of temperature below 20°C.

Photo 1. Preparing samples for analysis honey (original photo)

Acidity determination. The sample of honey is diluted with water titrate with 0.1 N sodium hydroxide in the presence of phenolphthalein, and the acidity calculated and expressed in ml of sodium hydroxide 1N to 100 g honey. In a cylindrical glass Weigh out 10 g of honey, diluted with 50 ml of water and titrated with 0.1 N sodium hydroxide in the presence of 2 or 3 drops of the phenolphthalein solution until a pink color persisted for 30 seconds,
In Table 2. it is presented the calculation and expression of results.
Acidity is calculated with the following formula:

$$\text{Acidity} = \frac{V \cdot 0,1}{10} \times 100 = V$$

Determination of the Gotham Diastatic Index. The natural bee honey has several enzymes. Amylase is the enzyme with the highest resistance to heat treatment, being the last to be destroyed. Based on this characteristic, amylase can be used as a general assessment test (enzyme or diastatic index) for natural honey quality. Natural honey, brutally subjected to heat treatment, will have low even zero diastatic index values [9].
Diastase index is the basis for determining amylase activity. The diastatic index is defined as the number of ml of a 1% solution of starch which was converted to dextrin for one hour, at 45°C and optimum pH, the amylase contained in 1 g of honey [5,6].

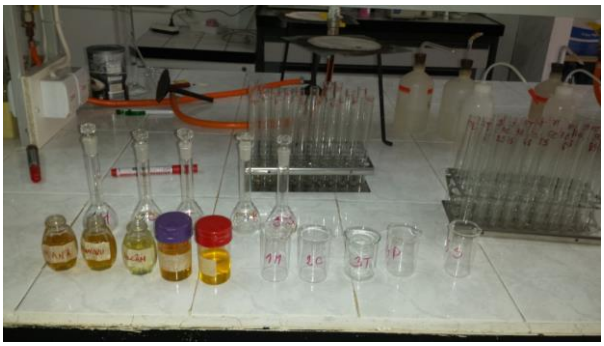
Photo 2. Specimen preparation and solution analysis (original photo)

The diastatic index is defined as the number of milliliters of a 1% solution of starch which was converted into dextrins over 1 hour at a temperature of 45°C, in the presence of a specific enzymatic activator (CL-on of sodium chloride) and the optimum pH of the amylase contained in 1 g honey.


Photo 3. Preparation of samples for determining the diastatic index (photo. orig.)

Starch, 1% freshly prepared (the day running analysis) in a glass cylinder was weighed 1g of starch, and then it was added about 75 ml of water and heated on a sieve of asbestos, homogenizing continuously by means of the glass rod, to boiling and clarification. Pass solution into the 100 ml flask and after cooling with water to volume, and mix.


Photo 4. Placing tubes in the water bath at 45°C (original photo)

In a glass cylindrical Weigh out 10 g of honey were dissolved in 50 ml of water, neutralized with sodium carbonate in the presence of the paper indicator and bring the flask to a volume of 100 ml with water (1 ml containing 0, 1 g of honey). Honey well stirred solution is placed in test tubes (numbered 1-10) decreasing amounts, according to Table 3. Each test tube pipette 0.5 ml of acetic acid and 0.5 ml of sodium chloride. The content of each tube with water volume of 11 ml, is presented in Table 3. An amount of 5 ml of 1% starch solution was added to each test tube, then it was mixed again by repeatedly turning the contents and then the tubes were immediately placed in a suitable stand in the ultra-thermostate controlled at 45°C. Water from ultra-thermostat exceeded 1 cm or 2 cm liquid level in the tube. From this moment timed for 1h. As long as the time expired, the tubes were immediately cooled in ice water to stop amylase activity, and then they were arranged in the increasing order in the support. Finally, in each tube it was added a drop of iodine solution and mixed by inversion.

Calculation and expression of the results

The threshold of the amylase activity is given by the blue color which firstly appears in the tube. For calculation, before it is in the deemed tube (containing honey immediately above) which is usually colored in dark purple.

The Diastatic Index value is taken from the table, or calculated using the formula:

Diastatic index $=\frac{5}{V} \times 10$

Where:

-The figure 5 means the number of ml of 1% starch solution

-V-volume of honey solution from the tube in ml.

To determine the diastazic index there were weighted about 5-7 g of the five varieties of analyzed honey. The results put in evidence the analytical balance to 4 decimal points as follows: *mana honey* -4.8621 g, *Coriandrum sativum honey* - 6.6512 g, *Robinia pseudoacacia honey* -5.0301g, *Tilia sp.honey* -5.2434g, *polyfloral honey* -6.3518 g.

RESULTS AND DISCUSSIONS

The content of H_2O was <20%, which notes that honey is adulterated.

Photo 5. Determination of water by refractometer (original photo)

Table 1. The water content and dry substance

Type of honey	Refractives index	H_2O (%)	Substance Dry(%)
Coriandrum sativum	1.4965	16	82.2
Robinia	1.4915	18	80.2
Mana	1.4920	17.8	83.1
Polyfloral	1.4910	18.2	81.0
Tilia	1.4905	18.4	82.1

Photo 6. The result in acid after analysis (original photo)

Table 2. The acidity of honey

Hooney Type	Honey (g)	NaOH	The acidity of honey in 100g
Polyfloral Honey	6.353	1.8	2.8
Tilia Honey	5.398	1.6	2.9
Mana Honey	10.482	3.43	3.27
Coriandrum Honey	9.182	1.74	1.89
Robinia Honey	10.264	1.55	1.51

In the tubes with the least content of honey, the starch was not completely hydrolyzed, and the blue color was present. The tubes in which

the starch hydrolyzate was full, there is a range of colors: white, yellow, orange, red tic, purple, violet.

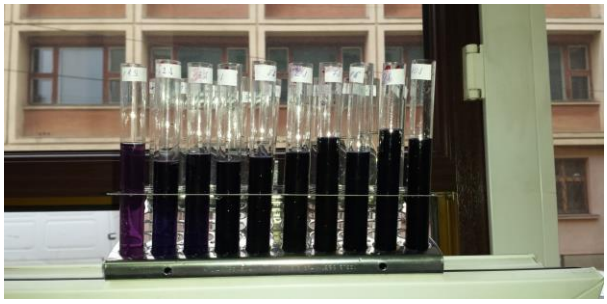

Photo 7. Robinia honey (orginal photo)

Photo 8. Mana honey (original photo)

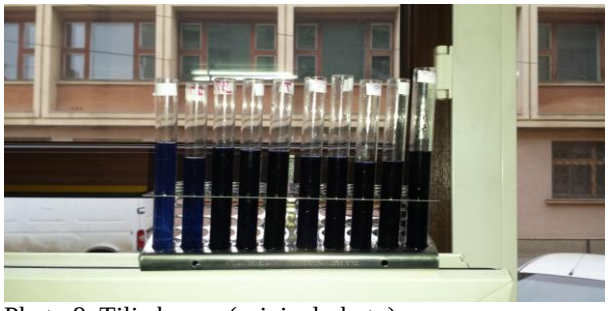

Photo 9. Tilia honey (original photo)

Photo 10. Coriandrum honey (original photo)

Result: diastatic index ≤ 5

Following the analysis we noticed that was crystallized honey; and to melt it it was supposed to a controlled heat treatment (maximum temperature of 45°C.).

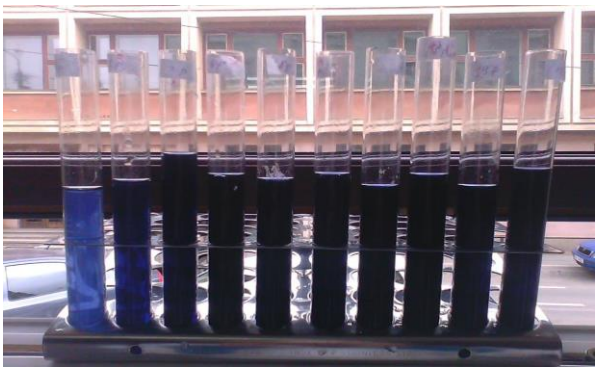

Photo 11. Polyfloral honey (original photo)

Table 3. The Diastatic Index for the 5 types of honey

Honey Type	Honey (ml)	Diastatic Index
Robinia	4	10.9
Mana	6	17.9
Tilia	4	10.9
Polyfloral	5	13.9
Coriandrum	7	23.8

CONCLUSIONS

The most famous honey type is the *Robinia pseudoacacia* honey, so we thought to be one of the varieties of honey obtained and analyzed late in April or early in May 2014. This honey had a white color and a specific aroma of *Robinia pseudoacacia*.

Another analyzed honey type was the lime harvest achieved by June 2014 knowing that the environmental conditions of the past year were unfavorably, this assortment of honey production was quite low. It depended on the weather and the temperature outside, the heyday of linden trees in the village.

The different types of the analyzed honey were collected by bees in the apiary in the summer of 2014, from the meadows on the outskirts Sibiel [10]. After the organoleptic examination, we can say that it had the best taste.

The manna honey came from trees such as fir, spruce, oak, beech, and from sweet excrement of aphids. This is the only honey of a dark brown color, very sweet and aromatic than the variety of sweet juice collected by bees.

As an exception from the varieties of analyzed honey, the *Coriandrum sativum* honey derived from plant species of the same name, which have a very strong taste and flavour.

All the five analyzed honey varieties were natural, and we can say that they could be considered organic honey. And the areas, where the picking was run, were not affected by air, water and soil pollution.

Regarding the water content, coriander honey has the lowest percentage (16%), followed by the manna (17.8%), acacia (18%) and the polyfloral honey (18.2%) and the highest water content had the lime honey (18.4%).

The content of dry matter was the higest in dew honey (83.1%), followed by *Coriandrum sativum* (82.2%), lime (82.1%), polyfloral (81%) and the lowest *content had Robinia pseudoacacia* honey (80.2%).

The acidity analysis can be interpreted as follows: 1.51 *Robinia pseudoacacia* honey, 1,89 *Coriandrum sativum* honey, 2.8 *polyfloral*, 2.9 *Tilia sp*., 3,27 *manna*, the highest acidity, meaning the number of NaOH ml obtained titration in the presence of phenolphthalein.

The results for the diastatic index were: 10.9 *Robinia pseudoacacia and Tilia sp.,* 13,9 *polyfloral*, 17.9 *manna* and 23.8 *Coriandrum sativum*, the highest index.

As a conclusion, *Coriandrum sativum* honey was the oldest sample subjected to analysis of the 2013 batch of honey.

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