



Original Contribution

EFFECT OF SUPPLEMENTARY FEEDING OF BEES WITH SUGAR SOLUTION (1:1) AND ISOSWEET 77555P (IST) ON THE SENSORY CHARACTERISTICS OF BEE HONEY

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ABSTRACT

Bee colonies, equilized by the method of analogues, were reared free and isolated and were additionally fed stimulatingly and intensively with Isosweet 77555P (IST) (purified and concentrated water solution of saccharides – 55% fructose and 40% glucose). No negative effect on the organoleptic characteristics of samples obtained after feeding with sugar solution (1:1) was found. Upon assessment of sample flavour and taste according to the German legislation, in the control, I and II groups normal flavour and taste typical for honey have been recorded (by 5 points). The most significant changes in the organoleptic characteristics of the studied samples have been recorded in the III group with the flavour and taste characteristics. Flavour and taste not typical for honey have been found in the stimulating feeding of bee colonies and their cage rearing in cells (2x2x2 m.), while in intensive additional feeding flavour was lacking and the taste was not typical for honey with a bitter note. At the assessment according to the German legislation, flavour and taste not typical for honey have been recorded with the stimulating feeding (1 point), while with the intensive additional feeding with IST flavour was lacking (0 points), there was slightly bitter taste, alien to honey (0 points).

Key words: Bee nutrition, Sugar solution, Isosweet 77555P, Feeding up, Sensory tests.

INTRODUCTION

More and more frequently various sugar solutions are used in Bulgaria for feeding up bee colonies. When this is done at the beginning of the honey-yield period and in quantities that do not surpass the abilities of bees to process them, the feeding up does not result in any changes in the quality of bee honey (1, 2). However, when sugar solutions are used in greater quantities and in the active honey-yield season, a number of authors find considerable changes in the quality of bee honey (1, 2, 3, 4, 5, 6, 7, 8).

The contemporary European requirements concerning the quality of bee honey do not allow the latter to contain either additional supplements, or intensive feeding of bees with sugar solutions and (or) other ingredients that can result in changes in the specific organoleptic qualities of bee honey (9, 10, 11). The Bulgarian legislation states that no mixing of bee honey with sugar, starch,

dextrins, etc. is allowed, as well as adding synthetic or natural flavours and colouring agents for improving the taste and flavour of bee honey (12, 13).

Recently the possibility for feeding bees with glucose-fructose syrups of maize starch has been studied. According to some Bulgarian authors feeding bees with IST is easier and cheaper than with sugar solution, but it can enter honey and that would influence its quality as a product that is to be consumed by humans (14).

The effect of IST feeding on the development of bee colonies has been studied in Bulgaria (14). Comparative data about the influence of feeding bees with sugar solution (1:1) (4) and Isosweet 77555P (3) on some quality characteristics of bee honey have also been obtained.

One of the main stages in quality certification of bee honey is the organoleptic test, and along with the physico-chemical and microscope tests it comprises the overall quality assessment of bee honey. According to the current Bulgarian legislation concerning quality certification of bee honey organoleptic

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characteristics of honey are determined visually and by tasting without using special equipment (12, 13).

In compliance with the German legislation which is widely used in the EC countries, the organoleptic assessment of bee honey is done on the basis of a special scheme and different number of points are assigned for the various characteristics. The honey which is good for consumption is assessed according to a 5-point system (15).

The aim of this study is to make organoleptic assessment of honey samples, obtained after stimulating and intensive additional feeding of bee colonies with sugar solution (1:1) and Isosweet 77555 P (IST).

MATERIALS AND METHODS

The experiment has been carried out on a private apiary in August 2001 according to the following scheme:

Scheme 1.

Groups	Control ^a	I ^b	II ^c	III ^d
Number of bee colonies	2	2	2	2
Method of rearing	Free rearing			Cage rearing in cells (2x2x2 m)
Feeding		Sugar solution	Isosweet 77555 P (IST)	
Stimulating	No feeding	From 31.07. to 09.08. 2002 every day Dosage of 200 ml per bee colony per day		
Intensive		From 09.08. to 19.08. 2002 r. every day Dosage of 500 ml per bee colony per day		

^a - no feeding, free rearing;

^b - feeding with sugar solution (1:1), free rearing;

^c - feeding with IST, free rearing;

^d - feeding with IST, cage rearing in cells (2x2x2 m).

The bee colonies used were placed in Dadan-Blat hives and equalized in advance by the method of analogues (age of queens, bees from 2,5 to 2,75 kg and from 52000 to 54500 cells with capped worker brood). The bee colonies cage reared in cells have been provided water in outer water troughs.

The IST used in the experiment has been produced by enzyme hydrolysis of maize starch, isomerization of the dextrin solution and chromatographic separation of the fructose in "Amilium - Bulgaria" Ltd., Razgrad. It comprises purified and concentrated water solution of saccharides (55% fructose and 40% glucose) and it is for nutritional use. The IST used in the course of the experiment was transparent slightly opal-coloured, light yellow-greenish liquid with watery consistency, without perceptible flavour, sweet taste and typical slightly bitter aftertaste.

At the end of the two experimental periods (on 09.08. and on 19.08.) 250 - 300 g of mixed honey samples were taken by draining

some already decapped parts of storehouse combs.

The organoleptic study of the samples has been carried out pursuant to the Bulgarian state standard (13), and as far as the flavour and taste characteristics are concerned – pursuant to the German legislation as well (15).

Due to the process of honey crystallization in some of the samples the organoleptic study has been carried out after liquification of the honey at 37°C for 72 hours. The lack of accurate recording of flavour and taste in the Bulgarian standard requirements (12, 13), necessitated the quantitative assessment of the tested samples to be estimated according to these characteristics and in compliance with the requirements of the German legislation (15).

The tests have been carried out in the laboratory of the department of Hygiene, Technology and Control of Animal Foodstuffs, Veterinary Legislation and Management, Faculty of Veterinary Medicine,

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RESULTS AND DISCUSSION

Table 1 describes the results obtained from the organoleptic study of bee honey samples. It is evident that the organoleptic characteristics of the samples from the control, I and II groups meet both the standard requirements for multifloral honey in our country (12, 13) and the requirements of the German legislation (15).

Most significant changes in the organoleptic characteristics of the studied samples have been found in III group (feeding with IST, cage rearing in cells (2x2x2 m). With the intensive feeding with IST in III group the colour of the studied samples was lighter (light amber colour) than that of the colonies with stimulating feeding in the same group (amber colour). This is even more obvious when we compare the honey in the bee combs of the control group to that of the IST feeding during the same stage of the experiment. It is notable that the honey produced by bee colonies in III group crystallizes soon after it's laid on the combs, even before the cells are capped (see Figure 1 and Figure 2).

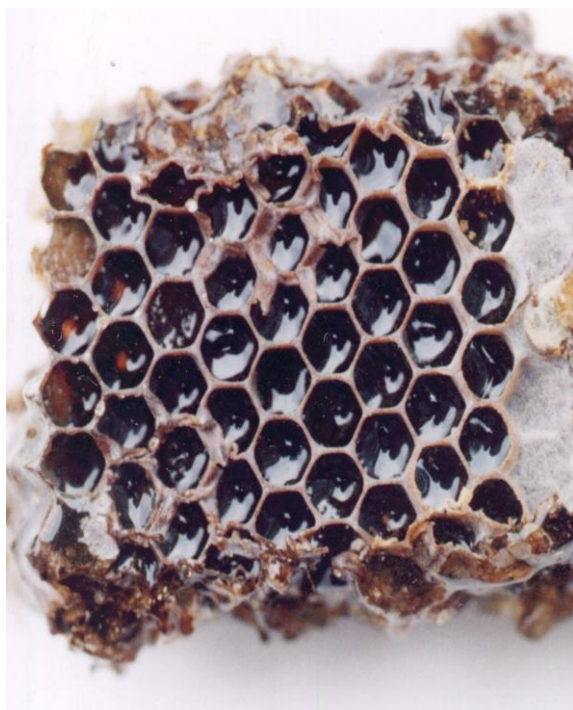


Figure 1. Part of comb with uncapped honey from the control group.

The most significant changes in feeding bee colonies with IST have been found in the flavour and taste characteristics of the III group. For example, with the stimulating

feeding of bee colonies and their cage rearing in cells, flavour and taste not typical for honey have been recorded, while with the intensive feeding – lack of flavour and taste not typical for honey with a bitter note (13).

When assessing the flavour and taste of the samples in compliance with the German legislation (15), normal flavour and taste, typical for honey have been recorded in I and II group (5 points). With the stimulating feeding of the samples from III group flavour and taste not typical for honey have been detected (1 point), while with intensive feeding with IST – lack of flavour (0 points) and taste alien to honey, slightly bitter (0 points).

Negative effect in some organoleptic characteristics (colour, flavour and taste), has been found in stimulating and intensive feeding of bees with IST and their cage rearing in cells on the quality of the obtained bee honey. These results are in conformity with what has been established by us (3, 4), and by a number of other authors (1, 2, 5, 6, 7, 8) – negative effect on the quality of bee honey when feeding bees with large quantities of concentrated sugar solutions.

The analysis of the results obtained from the organoleptic study of samples taken from free reared bee colonies fed with sugar solution (1:1) and IST shows that feeding bees with quantities used in the experiment has no negative effect on the organoleptic characteristics of the resulting honey.



Figure 2. Part of comb with uncapped honey after intensive feeding of the colonies with IST from IIIrd group.

Table 1. Sensory characteristics of bee honey samples

Characteristics	Control Group		I group		II group		III group	
	09.08.2001г	19.08.2001г.	09.08.2001г	19.08.2001г.	09.08.2001г	19.08.2001г.	09.08.2001г	19.08.2001г.
Bulgarian State Standard 2673 – 89								
1. Appearance	Non-transparent, opal-coloured with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Transparent (more slightly than IST), slightly opal-coloured, with no signs of fermentation	Non-transparent and with no signs of fermentation
2. Colour	Light yellow with greenish tinge	Amber-coloured	Dark ember-coloured	Amber-coloured	Dark amber-coloured	Amber-coloured	Amber-coloured	Lght amber-coloured
3. Consistence	Thick liquid	Thick semi-liquid	Thick semi-liquid (thinner than the control sample at the end of the intensive feeding)	Thick semi-liquid	Thick semi-liquid (thinner than the control sample at the end of the intensive feeding)	Thick semi-liquid	Thick semi-liquid (thinner than the control sample at the end of the intensive feeding)	Thick semi-liquid
4. Flavour	Pleasant, typical for honey	Pleasant, typical for honey	Pleasant, typical for honey	Pleasant, typical for honey	Pleasant, typical for honey	Pleasant, typical for honey	Not typical for honey	Lack of flavour
5. Taste	Sweet, typical for honey	Sweet, typical for honey	Sweet, typical for honey	Sweet, typical for honey	Sweet, typical for honey	Sweet, typical for honey	Not typical for honey	Alien to honey with slightly bitter aftertaste
Deutscher Imkerbund e.V.								
1. Flavour	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Not typical for honey – 1 point	Lack of flavour – 0 points
2. Taste	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Normal, typical for honey – 5 points	Not typical for honey – 1 point	Alien taste slightly bitter – 0 points

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