

Effects of the Use of Essential Oils on the Organoleptic Characteristics of Honey

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Abstract

The paper presents the results of the organoleptic analysis of honey after feeding colonies with sugar syrup with addition of essential oils. The honey samples were collected from the Murani apiary, Timis County, between 29.03.2021 - 10.05.2021, totalling a number of 135 samples. These were classified into samples collected before the administration of the sugar syrup with essential oil, samples collected after the administration of the syrup with the addition of essential oil and samples collected after the rapeseed harvest. In the sugar syrup administered to colonies, the following essential oils were used: essential oil of thyme, rosemary, basil, mint, juniper, oregano, cloves, cinnamon. The honey samples were transported, stored and processed in appropriate conditions. The organoleptic evaluation was performed in terms of taste, smell, consistency, appearance and colour. Results with improvement effects were recorded by the essential oils used, in terms of the sensory characteristics analysed, compared to the control variant.

Key words: organoleptic evaluation, honey, essential oils

1. Introduction

Honey is a natural product that comes from flower nectar or the secretion of living parts of plants and is produced by bees. Nectar can also be produced by the excretions of some insects that live on different parts of the plant, and after harvesting and processing by bees, it is called manna honey [1-4].

The food of bees consists of the flower nectar, which provides them with a source of energy, and the flower pollen, which is used as a source of protein [5-7].

Supplementary feeding of colonies is essential during periods when food resources are scarce, when there are few natural sources available, and to replenish food supplies [8-9].

At the beginning of the twentieth century, the basic principle of the technique of organoleptic analysis of honey was the personal experience of the experts in field.

Although this method involves low costs, it has not been fully considered an effective organoleptic analysis. So, in the middle of the twentieth century, the methods of organoleptic evaluation of honey were improved by using a committee of very experienced evaluators, applying appropriate techniques to obtain statistical results [10 -14].

Studies conducted by [15], showed that, with the help of the 5 senses, we can determine the organoleptic properties of honey. Research by [16], has shown that before the organoleptic analysis, the preservation of honey is a very important factor, so honey samples must be stored properly because if the humidity in the storage room exceeds 60%, honey with a normal humidity will absorb the humidity from the air.

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[17] performed additional feeding to colonies with sugar paste and addition of vitamins and proteins to determine the organoleptic characteristics compared to the control hive that was fed only with the honey produced. The results obtained for the control hive showed that certain characteristics such as the smell and colour of honey were significantly different compared to the batches fed with sugar paste and addition of protein and vitamins.

2. Materials and methods

The experiments were performed in the apiary from Murani, Timiș County, on 90 colonies divided into 9 experimental groups of 10 colonies each; 8 of the batches were fed with sugar syrup and essential oils, and the control batch was fed only with sugar syrup (Figure 1).

We collected 5 samples of honey from each experimental lot. The first harvest took place before the administration of sugar syrup with addition of essential oil and consisted of honeycomb with crystallized honey (polyflower) from the reserves of the colonies after winter. The second harvest took place after the administration of sugar syrup with essential oils, and the third harvest was carried out after the harvest of rape. The honey samples were transported and stored properly until the organoleptic analyses were performed. The number of samples collected was 5/batch, according to Table 1.

The organoleptic examination of honey is essential as it may reveal fermentation defects, the presence of smoke odour, impurities or the presence of non-specific tastes [18].



Figure 1. Administration of syrup with essential oils (original photo)

Table 1. Honey sampling scheme

Experimental batches	Essential oils incorporated into sugar syrup	Total no of samples collected	Sampling dates
LE 1	Thyme	5	29.03.2021
LE 2	Rosemary	5	15.04.2021
LE 3	Basil	5	10.05.2021
LE 4	Juniper	5	
LE 5	Oregano	5	
LE 6	Cloves	5	
LE 7	Mint	5	
LE 8	Cinnamon	5	
LE 9	Control	5	

The sensory analysis of honey samples was performed at the Interdisciplinary Research Platform “Ecological agriculture and food safety”, Laboratory of chemistry, from Banat’s University

of Agricultural Sciences and Veterinary Medicine “King Michael I of Romania” from Timișoara. The organoleptic examination of the 135 samples (45 at each harvest) consisted in assessing the

appearance, smell, taste, colour and consistency. Prior to analysis, the honey samples were transferred to clear glass tubes and placed in a 40°C - 45°C water bath for 30 minutes. After 30 minutes, they were removed and analysed (Figures 2 and 3). The appearance of honey was appreciated by carefully viewing the sample in natural light, thus noting the different shades present. The odour was examined by smelling the sample and then we noted the dominant aroma and the intensity felt. The taste was appreciated by

tasting the honey sample, noting the intensity of the sweet taste and its possible secondary nuances. The colour was appreciated by viewing the sample from a clear glass tube on a white background in natural light. The consistency was assessed with a glass rod, which was inserted into the honey sample and raised, thus noting the flow of honey (Figures 4-6).

All sensory characteristics were analysed using the 9-point hedonic scale method [19].

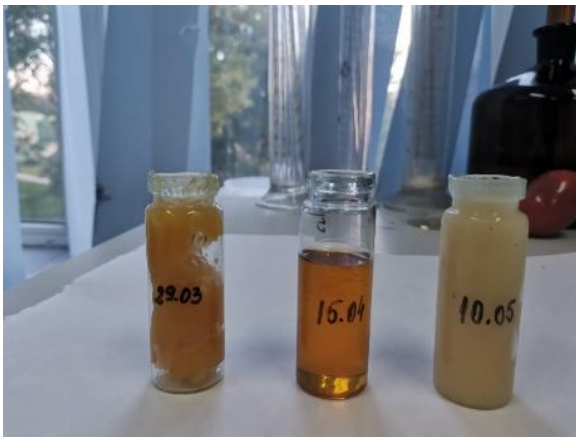


Figure 2. Transfer of samples to test tubes
(original photo)



Figure 3. Removal of samples from water bath
(original photo)



Figure 4. Sample analysis at the beginning of the experiment
(original photo)



Figure 5. Sample analysis after the administration of essential oils
(original photo)



Figure 6. Sample analysis after rapeseed harvest
(original photo)

3. Results and discussion

Samples collected before the administration of essential oils, after the administration of essential

oils and after the rapeseed harvest were represented on the hedonic scale as follows: the appearance was assessed by the score: 9-transparent, 5-bright, 1-opalescent; the smell was

represented as follows: 9-pronounced, 5-well highlighted, 1-moderate, the taste was appreciated as follows: 9-like extremely, 5-neither like nor dislike, 1-dislike extremely, the color was assessed as follows: 9-light, 5-moderate, 1-dark; consistency was assessed on the hedonic scale: 9-

like extremely, 5-neither like nor dislike, 1-dislike extremely. Table 2 shows the score given in terms of sensory characteristics to the samples collected before the administration of essential oils and contained crystallized honey from the hive reserve.

Table 2. Hedonic scale on samples collected before the administration of essential oils

Product analysed	Experimental batches	Essential oils administered in sugar syrup	Analysis of sensory characteristics					Total points
			Appearance	Odour	Taste	Colour	Consistency	
Polyflower honey	LE 1	Thyme	5	9	9	5	5	33
	LE 2	Rosemary	5	5	9	5	5	29
	LE 3	Mint	5	5	9	5	5	29
	LE 4	Juniper	5	9	9	5	5	33
	LE 5	Basil	5	9	9	5	5	33
	LE 6	Oregano	5	5	5	9	9	33
	LE 7	Cloves	5	9	5	9	5	33
	LE 8	Cinnamon	5	9	9	5	5	33
	LE 9	Control	5	5	9	5	5	29

The results obtained at the first harvest show that the honey samples had a very close number of points between batches, which indicates that the quality of honey was close in terms of sensory characteristics to all experimental variants. Experimental batches 1, 4, 5 and 8 had the same score on the organoleptic properties of each. A lower score was obtained for experimental batches 2, 3 and 9, but regarding the taste they

obtained a grade of 9 which indicates an unpleasant taste of the analyzed sample. Experimental batch 6 obtained acceptable marks on appearance, smell and taste, and experimental batch 7 obtained moderate results on appearance, taste and consistency.

Sensory samples according to table 3 were collected after administration of sugar syrup with the addition of essential oil.

Table 3. Hedonic scale on samples collected after administration of essential oils

Product analysed	Experimental batches	Essential oils administered in the sugar syrup	Analysis of sensory characteristics					Total points
			Appearance	Odour	Smell	Colour	Consistency	
Polyflower honey + sugar syrup with the addition of essential oils	LE 1	Thyme	9	9	9	9	9	45
	LE 2	Rosemary	5	9	9	9	9	41
	LE 3	Mint	9	9	9	9	9	45
	LE 4	Juniper	9	5	5	9	9	37
	LE 5	Basil	9	9	9	9	5	41
	LE 6	Oregano	9	9	9	9	9	45
	LE 7	Cloves	5	9	9	5	9	37
	LE 8	Cinnamon	5	9	9	5	5	33
	LE 9	Control	5	1	5	5	9	25

In the case of samples collected after the administration of essential oils, there are very large differences in the score obtained after the

analyses of honey organoleptic properties. The experimental variants to which we added thyme, mint and oregano essential oils obtained the maximum score on the sensory analysis of honey

samples. The experimental batches in which we introduced basil and rosemary essential oils obtained a very good score compared to the control variant. The batches with juniper and clove essential oil obtained a moderate score, and the batch to which we added cinnamon essential oil obtained 33 points compared to the

control batch, which was weaker in terms of organoleptic examination of the analysed honey. Table 4 analysed the samples collected after the rape harvest, respectively at 3 weeks after the administration of essential oils in the supplementary feed of colonies.

Table 4. Hedonic scale on samples collected after rapeseed harvesting

Product analysed	Experimental batches	Essential oils administered in the sugar syrup	Analysis of sensory characteristics					Total points
			Appearance	Odour	Smell	Colour	Consistency	
Rapeseed honey	LE 1	Thyme	5	9	9	9	9	41
	LE 2	Rosemary	5	9	9	9	5	37
	LE 3	Mint	5	9	9	9	9	41
	LE 4	Juniper	1	9	9	5	5	29
	LE 5	Basil	5	9	9	9	5	37
	LE 6	Oregano	5	9	9	9	9	41
	LE 7	Cloves	1	9	9	5	5	29
	LE 8	Cinnamon	5	9	9	5	1	29
	LE 9	Control	1	5	9	9	1	25

The results obtained after the sample analyses of the third harvest indicate that the batches in which we administrated sugar syrup with thyme, mint and oregano essential oil had the greatest effect in improving the sensory characteristics of honey. These were followed by experimental batch 2 (rosemary) and experimental batch 5 (basil). Also, the batches with addition of juniper, cloves,

cinnamon, that obtained a score of 29 points on the hedonic scale, presented qualitative properties regarding the sensory characteristics of honey. In order to highlight, as accurately as possible, the effect of improvement of the organoleptic properties, Figure 7 shows the results of the sensory characteristics obtained at the three harvests.

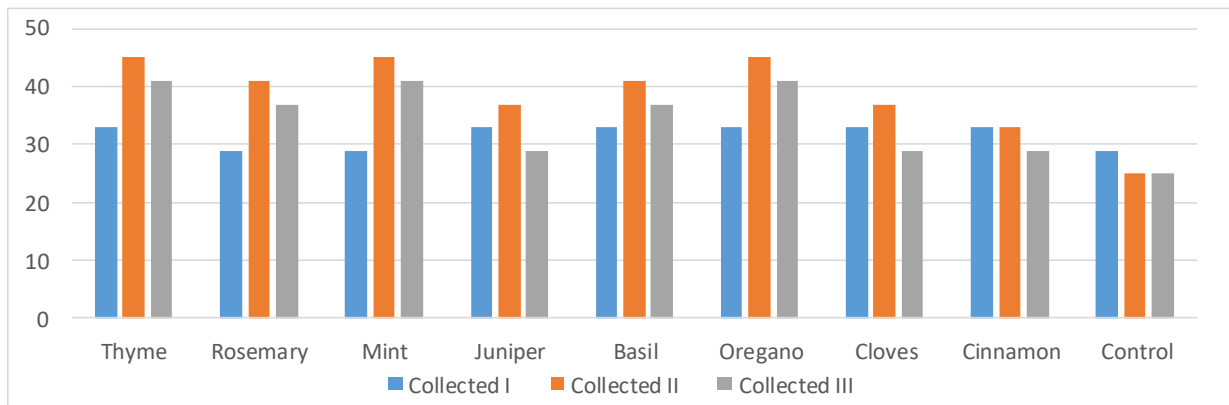


Figure 7. Presentation of the results obtained in each experimental variant, according to the 3 harvests

In terms of color the best score was obtained in the case of the essential oils of thyme, rosemary, mint, basil. The appearance obtained a good score in the case of essential oils of thyme, mint, basil, oregano. The smell was very good in the case of batches with administration of oregano, mint and rosemary essential oils. The taste was very

pleasant in batches with utilization of oregano and clove essential oils. Very good consistency scores were identified in the batches where thyme and mint essential oils were administered.

Conclusions

After analysing the sensory characteristics of the 135 samples with honey, we observed that all the essential oils had positive effects on the organoleptic properties of honey. Results with improvement effects were recorded by the essential oils of thyme, mint, oregano, basil and rosemary, in terms of the sensory characteristics analyzed, compared to the control variant. Following the data obtained in this research, studies will be resumed to evaluate the effect of essential oils on the organoleptic properties of honey.

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