STUDIES ON HONEY AUTHENTIFICATION AND FORGERY DETECTION

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ABSTRACT

The authenticity of honey is of great importance for commercial and health reasons. Six acacia, lime and mix flower honey samples provided from local market and hypermarkets were analyzed for their authenticity. All six honey samples were evaluated organolieptic and physicochemical. Thus, honey color ranged from light yellow to orange yellow and dark yellow shades. All honey samples presented clean appearance, without impurities and no foam. The taste and the smell were pleasant, specific for honey with shades of acid, bitter or astringent. All physicochemical indices investigated (water content, sugar content, sucrose, ash, hidroxymethilfurfurol) were according with standards. There were no detected additional additives like cereal flour, starch, gelatin, alinine.

INTRODUCTION

Honey is one of the most energy-dense foods in nature (Skinner, 1991). From ancient times, honey has been used as a medicine in many cultures for it's therapeutically benefits and it has been recommended for its nutritional properties (Molar, 1992). Because of its nutritional value and unique flavor, the price of natural money is much higher than that of other sweeteners such as refined cane sugar, beet sugar and corn syrup. The authentification of bee honey with cheaper sweetening materials has been reported in the literature (Tien and Shan, 1997; Gonzalez et al., 1998). Authentification is a wide-ranging issue and has come to predominance in recent years. The presence of high amounts of sugar from divers' origins coincided with abnormal sucrose and/or HMF contents, what indicate adulteration (Kerkvliet, 2000). Microscopic methods and liquid chromatography can also be useful for the detection of adulteration (Kerkvliet et al., 1995; Downey et al., 2003; Cabanero et al., 2006).

The goal of present study was to determine whether the six honey samples indicated adulteration evidence.

MATERIAL AND METHODS

Six honey samples provided from commercial network were used. Three honey types' samples (acacia lime and mix floral) were provided by food inspectors from local market and the other three samples from hypermarkets. All honey samples were analyzed regarding their aspect and honey crystallization by heating to 40-45^{o}C to the complete melting of crystals. Further honey samples were placed into glass tubes and examined directly to natural light. Sensory analysis of honey covered these features: appearance, consistency, color, taste, smell and contamination degree according with standard SR 784-2/2009 and Order 522/788/317-003. There were also investigated physical and chemical properties and unauthorized additives, such as: water content, ashes, acidity, reduced sugar, sucrose and hidroximetilfurfurol, cereal flour, starch, gelatin or aniline, according with previous standards, too.

RESULTS AND DISCUSSION

All honey samples presented clean appearance, without impurities and no foam. Except first honey sample (Acacia honey local market), all other samples showed partially or total crystallization. Honey color ranged from light yellow to orange yellow and dark yellow shades. The taste and the smell were pleasant, specific for honey with shades of acid,

bitter or astringent. It was observed that acacia honey had a special flavor and sweeter taste (Table 1).

Table 1

Organoleptic appreciation of honey samples

No.	Honey samples	Appearance	Consistency	Color	Taste and Smell
1.	Acacia honey Local market	Clean, smooth, without impurities and foam	Viscous, fluid, homogenous	Light yellow to colorless	Pleasant, fresh, sweet, specific Acacia flavor
2.	Lime honey Local market	Clean, homogenous, without impurities	Homogenous with fine crystals, without crystal deposition	Yellow orange	Sweet, pleasant, specific lime flavor
3.	Mix flower honey Local market	No foam, no impurities, homogenous, opalescent	Partially crystallized	Dark yellow with brassy shades	Pleasant, sweet, aromatic
4.	Acacia honey Hypermarket Craiova, Romania	Homogenous, no impurities, slightly opalescent	Fluid, viscous, with the beginning of crystallization but maintaining consistency, without crystal deposition	Light yellow	Pleasant, sweet, specific Acacia flavor
5.	Mix Flower honey, Hypermarket Craiova, Romania	Clean, homogenous, no impurities, no foam	Total crystallized with coarse crystals	Yellow with brown shades	Pleasant, sweet, flavored well evidenced
6.	Mix Flower honey Hypermarket Craiova, Czech Republic	Clean, homogenous, no impurities, no foam	Total crystallized with fine crystals dispersed	Yellow copper	Pleasant, sweet, aromatic

Physicochemical indices (Table 2) may show easily is honey is suspect of adulteration or not. Analyzing the honey samples it was observed that water content ranged between 17,19-18,55%, below standard value (<20% SR 784-2/2009). The hidroximetilfurfurol is a parameter which indicates the honey freshness. Its values were variable. Thus, for the lime sample from local market it was noticed 0,27 mg/100 g honey, specific value for fresh honey. Except, mix flower honey from Czech Republic, all other samples showed values below 4 mg/100 g honey, which is the highest limit for packed honey. Considering that the maximum level of hidroximetilfurfurol admitted in EU is 8 mg/100 g honey, then this parameter value recorded by honey originate from Czech Republic (6,8 mg/100 g honey) is acceptable. Knowing that hidroximetilfurfurol level up to 10 mg/100 g honey indicates adulteration and analyzed samples recorded values below this limit, this may lead to the conclusion that none of investigated samples were susceptible of adulteration.

The reducing sugar content expressed as invert sugar recorded higer values for all investigated samples up to 70% (70,92-74,25%), which is the lowest level accepted by standards.

Sucrose is an important indicator of honey authenticity and naturalese.This parameter values (0,95-2,75%) were below 5%, which is maximum addmited by standards.

Ash content ranged between 0,15-0,39%, below the maximum accepted leval (0,5% for mix flower honey).

All six honey samples were also analysed for their unauthorized additives, such as: cereal flour, starch, gelatin or aniline, according with previous standards, too. It was observed that none of the honey samples had unauthorized additives (Table 3).

Table 2

Physicochemical indices of honey samples

No.	Honey samples	Moisture (water content) (%)	Invert sugar (%)	Sucrose (%)	HMF (mg/100 g honey)	Ash (%)
1.	Acacia honey Local market	18,55	74,25	0,95	0,27	0,15
2.	Lime honey Local market	17,92	71,42	1,25	1,82	0,22
3.	Mix flower honey Local market	17,19	71,88	2,20	1,67	0,29
4.	Acacia honey Hypermarket Craiova, Romania	18,25	72,66	1,05	1,29	0,25
5.	Mix Flower honey, Hypermarket Craiova, Romania	17,62	73,35	2,50	3,55	0,2
6.	Mix Flower honey Hypermarket Craiova, Czech Republic	18,55	70,92	2,75	6,8	0,29

Table 3

Unauthorized additives of honey samples

No.	Honey samples	Cereal flour	Gelatin	Aniline
1.	Acacia honey Local market	absent	absent	absent
2.	Lime honey Local market	absent	absent	absent
3.	Mix flower honey Local market	absent	absent	absent
4.	Acacia honey Hypermarket Craiova, Romania	absent	absent	absent
5.	Mix Flower honey, Hypermarket Craiova, Romania	absent	absent	absent
6.	Mix Flower honey Hypermarket Craiova, Czech Republic	absent	absent	absent

CONCLUSIONS

Evaluation of honey quality, authenticity and natirales is very important and has relevant impact in industry and especially in consumer protection.Analysing honey samples there were not identified unauthorized additives. Organolipic features indicate a pleasant taste and smell for all samples. Physicochemical indices were within the limits set by the standards of admisibility.

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