International Journal of Advance and Applied Research
www.ijaar.co.in
ISSN – 2347-7075 Impact Factor – 7.328
Peer Reviewed Bi-Monthly
Vol.9 No.6 July – Aug 2022

QUALITATIVE ASSESSMENT OF VIABLE NON-BRAND HONEY FROM CHANDRAPUR, MAHARASHTRA, INDIA

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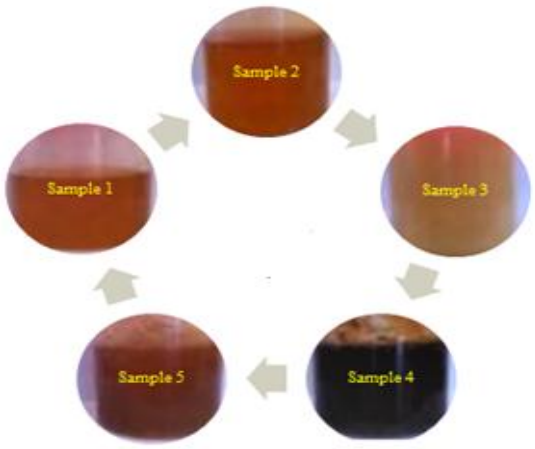
DOI- 10.5281/zenodo.7084886

Abstract:
Honey is a naturally sugary substance formed by honeybees and certain other social insects. It has been used as a foodstuff and remedial product since ancient times. There are several sources available for honey. Among these, some are branded and some are non-branded. It will be necessary to analyze non-branded honey for its quality. The present work aims to analyze the physical and chemical properties of non-brand honey available in the Chandrapur city area. Several physical factors of honey for example pH, moisture content, electrical conductivity, total dissolved solids, colour intensity and total content were dignified. The most of honey sample experimental results were found within an adequate range of global honey standards.

Keywords: *sugary, honey, honeybees, moisture content, electrical conductivity.*

Graphical Abstract



Introduction

Honey is a sweetened liquid formed by the bumblebee from honeydew, which consist of over and above 90% of the honey contents as a biological compound such as carbohydrates, nutritional supplements, enzymes, amino acids, organic acids, polyphenols, minerals and a variety of photochemical and other substances, which may serve as a source for dietary antioxidants. The configuration of honey and other products of bees depends on the kind of floras used by honeybees and the weather situation in which the plants raise and develop.[1–3] Wild honey is used to categorize honey typically formed in the jungle, and it is formed by wild bumble bees predominantly by Apisdorsata. These honey bees draw juice from forest floras and accumulate it in the hive attached to trees[4,5]. Honey has been used from ancient times among human beings. It has been used as a sweetening and flavouring agent in various foods and medicines. Since

remote times, honey has been recognized for its nourishing and salutary values. Honey is a globally manufactured product.

The worldwide formation of honey is nearly 1.20 million tons per annum. The main constituent of honey is carbohydrates existing in the form of monosaccharides, fructose, etc. and the sweetness of honey is due to these components. It has also oligosaccharides including the anderose and panose. Honey is normally used as an anti-rheumatic, anti-oxidant and antibiotic agent. Honey is exceptionally appreciated by operators for medicinal purposes as a substitute remedy[6,7]. The strength stimulating features of bees are essentially due to the existence of various metabolites such as folic acid, tocopherol, biotin, thiamine, niacin, phytosterols polyphenols, also enzymes and co-enzymes[8]. Almost 320 different varieties of honey have been invented from several floral bases. The essence, colour, and aroma of a particular kind of honey are dependent on the numerous liquid bases of the floras and flowers contacted by the honey bee. Miscellaneous types of honey are akin in terms of temperature and weather conditions. Honey colour varies from light to dark brown depending upon where the honey bees droned [9–12].

As the present global production and promotion, validation of food is a vital issue to confirm food quality. Anticipation of racket in the food division and elevation of a genuine product is needed to certify the marketable attainment of high-value agro-food yields on the national and global markets. Fraudulent practices, like exchanging novel product constituents with low-priced substituents will have a bad impact on customer assurance and the keenness and productivity of authentic manufacturers. Evaluating the validity of honey is a severe issue that is paid attention to universally as honey has been subject to several duplicitous applies, including mischaracterized botanic and topographical basis and mixing with sugar juices or honey of poor quality. To keep the health of customers and elude competition, which could make an unsteady market, customers, honey farmers and directing organizations are attentive to having the standard operating procedure to detect contrary honey[13–17].

The non-branded honey is available in the market, so it was a necessity to test the quality of such non-branded honey. Therefore, the study was carried out to evaluate the physiochemical quality of some non-branded honey from Chandrapur, Maharashtra, India

Materials and Methods

Chemicals

All the chemicals were used of A.R. grade. High purity water was used in all the experiments.

Instrumentation

A spectrophotometer, pH meter, electrical conductivity meter, and Abbe refractometer were used for experimental measurements.

Honey samples

Typical non-branded samples were collected directly from the hawker of different regions of Chandrapur city. The samples were kept in a fridge in impenetrable plastic vessels until analysis.

Methods

The measurement of Physico-chemical parameters, for example, moisture content, electrical conductivity and pH have been executed as specified by the methods reported in Harmonized methods of the European Honey Commission[18–20].

Density

The density (Specific gravity) was examined by taking the ratio of the weight of a specific gravity bottle (50 ml) filled with honey to the weight of the same bottle, filled with water[21].

Determination of moisture content

The moisture content was found by using a refractometric technique. Conventionally, the refractive index of honey rises with a rise in the solid content of a sample. The refractive indices of honey samples were calculated at room temperature using a refractometer, and it was modified for the standard temperature of 20 °C by the addition of the correction factor i.e. 0.00023/°C. The percentage of moisture content following the corrected refractive index was determined using Wedmore's table[22].

Determination of total soluble solids

Total soluble solids were calculated as designated by ISO 2173: Hand refractometer with ranges of 50°Brix - 85°Brix, which was first normalized. The prism was then cleaned with distilled water and dried with soft tissue. A drop of the honey sample was employed on the refractometer prism and the reading was recorded. The Brix of the sample was then calculated and temperature correction applied[18].

Water insoluble solids

Water-insoluble solids were found to correspond to the guidelines of the Harmonized Methods of the International Honey Commission[23].

Determination of pH

A pH meter was used to determine the pH of a 10% (w/v) honey solution prepared in highly pure water[24].

The free acidity

It was calculated under the titrimetric method: By the addition of 0.05 N Sodium hydroxide which is stopped at pH 8.50 (free acidity). Results were expressed as meq/kg [25].

Determination of electrical conductivity

Electrical conductivity EC of 20% (w/v) solution of honey suspended in milli-Q water was measured by using a digital conductometer[26].

Honey color analysis

To dissolve sugar crystals, the honey samples were warmed to 50 °C and the colour was recorded by using a spectrophotometer of the absorbance of aqueous solution honey of proportion of 50% (w/v) at 635 nm. The honey was categorized accordingly to the Pfund scale after changing the absorbance values: mm Pfund = -38.70 + 371.39 x Abs. Where Abs is the absorbance of honey solution [27].

Results

Numerous quality variables for 5 honey samples were analyzed and recorded i.e. Density, moisture content, total soluble solids, total sugar, water-insoluble solids content, pH, free acidity, electrical conductivity and colour (Pfund index)[13,28].

Moisture is a factor associated with the stability of honey and temperature. In the present investigation, the moisture content is found between 11.0 and 17 %. The moisture content of honey is based on several factors for example harvesting time, the extent of stability attained in the hive and climatic factors. However, the moisture content of honey is an extremely significant factor in advancing its stability towards fermenting and exudating during storage[28].

Sugars are the chief ingredients of honey which are present in the range of about 96-99% of honey dry weight glucose and fructose are the foremost sugar components of honey and they are formed by hydrolysis of sucrose and characterize 85-95% of the total sugars. The ordering of unifloral honey is linked to sugar content. The calculated sugar values are noted in table 1, Total sugar content ranged from 76 to 78 g/100g with the uppermost endorsed to sample 5 and the lowest to 1 and 4. The total water-insoluble solids matters were found from 0.144 to 0.210 which was found in the permissible range.

All the Non-branded honey examined was found to be acidic. Honey pH values

wide-ranging from 4.89 to 5.70. Issued reports designate that pH should be between 3.2 and 4.5. By these values, honey was found the separate from this range (4.89, 5.70). The low pH of honey hinders the existence and development of microorganisms and makes honey harmonious with numerous foodstuffs concerning pH and acidity. This factor is very important for the duration of the extraction and storage of honey as it affects its consistency, strength and shelf life. The pH values in honey assist to define its beginning i.e. flower or forest; the values are found to be higher for the honey from forest[18].

The free acidity was assorted from 31.041 to 42.156 meq kg-1. The free acidity of honey may be elucidated by considering the existence of organic acids in equilibrium with their equivalent lactones, or esters present inside, and certain inorganic ions, such as phosphate.

The electrical conductivity values of the honey were found to range from 0.07 to 0.09 mS. The electrical conductivity of honey may be described by considering the ash and acid content of honey, which reveals the existence of ions and organic acids; the more their content, the more the resulting conductivity.

The colour of honey diverges from colourless to dark yellowish-brown, dependent on its foundation and ingredients. It also corresponds to its chemical composition particularly pigments resembling carotenoids, chlorophylls, flavonoids, tannin derivatives and polyphenols. Sample 3 had the lowest lightness and sample 4 had the greatest. From the values, it can be understood that the honey samples contain brown and yellow colour components. The lightness values were lesser, as the samples were dimmer in colour. The honey colour is the important parameter that explained its industrial application [13,18].

Conclusion

The most of honey sample's experimental results (moisture content, electric conductivity and acidity) were found within the adequate range of global honey standards, which shows that these honey samples are suitable for domestic purposes. This valuation study was projected to determine the quality and physiochemical characteristics of honey collected from different honey suppliers.

Table 1: Physicochemical feature of Non-branded honey

Sample Code	Density g/ml	Moisture Content (%)	Total soluble solids (°Brix)	Water insoluble solids content	pH	Free acidity (meq/kg)	Electrical conductivity (mS/cm)	Color (Pfund index)
Sample 1	1.353	11	76	0.190	4.89	31.041	0.07	40
Sample 2	1.362	13	77	0.144	5.51	33.547	0.08	35
Sample 3	1.323	17	76.5	0.201	5.33	42.156	0.08	30
Sample 4	1.325	15	76	0.150	5.60	39.541	0.09	59
Sample 5	1.306	14	78	0.210	5.70	31.648	0.09	55
Limits of international standards		Not more than 20 g/100g /		Not more than 0.5 g/100g		Not more than 50 meq/kg	Not more than 0.8 mS/cm	

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