



Original Research Article

Physio – Chemical Parameters of Some Libyan Samples

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ABSTRACT

Honey is a natural nice substance produced by bees, physicochemical properties of bee's honey to help beekeepers procreation high-quality bee's honey. A total number of 20 Libyan honey samples were collected from different areas in Libya through 2016 – 2017, from east, west, southeast and southwest regions. These samples were analyzed for six physiochemical parameters of honey control i.e., pH, moisture, ash content, insoluble matter proline control and HMF. The aim of this study is to give view about the quality of Libyan honey, which is suffering from paucity of characterization data. The results of physiochemical characteristic of Libyan honey samples, the pH of Libyan honey samples range from 3.25 to 5.00, with a mean of 4.101. These values are comparable to the pH values of U.S. honey (range 3.4 to 6.1), the moisture content of honey samples range from 7.76 to 15% which is found within the limits prescribed by Codex Alimentarius Commission(1969), i.e. not more than 21%. The mean of ash content of honey samples were 0.313%, with the range of 0.1-0.95%. These values are comparable to the values of U.S. honey which has mean of 0.169%, with a range from 0.020 to 1.028%. The Hydroxymethylfurfural (HMF) content of Libyan honey samples are found within the limits prescribed by the Codex Alimentarius Commission(1969), Insoluble matter content of Libyan honey samples range from 0.005 to 0.149% with mean of 0.06175%. The range of proline content of Libyan honey samples are from 350 to 1079.4 mg/kg, with mean of 626.2 mg/kg.

Keywords: Honey Quality, Ph, Moisture, Ash, Insoluble Matter, Proline, HMF

Introduction

Bees make honey, a popular sweetener throughout the world, generally from nectars extracted from the nectarines of flowers. From ancient times, honey was used as both a natural sweetener

and a healing agent. [1] The composition and flavor of honey varies, depending mainly on the source of the nectar (s) from which it originates and to a lesser extent on certain external factors – climate conditions and beekeeping practices in removing and extracting honey. [2]

There are large volumes of data on the characterization of honeys from North America, Europe, Australia, India and South Africa; there is a paucity of data on Libyan honeys.

In the paper, we present the results of our preliminary studies of Libyan honey samples from sixteen locations in the east, two locations in the west and two locations in the southwest, southwest regions of Libya. This study covers six physical parameters- pH, moisture, ash content, insoluble matter, proline contents, HMF of each of the honey samples.

Materials and Methods

UV/VIS Spectrophotometer (JENWAY model-6405, U.K), Halogen Moisture Analyzer [(Mettler Toledo (HG53)] , Switzerland), PH meter (digital, Mettler Toledo GmbH model (MP220), Switzerland), Electric furnace [(CARBOLITE model (AAF1100)] England, Oven (Stuart scientific BIBBY, U.K.), Hotplate (BIBBY STERILIN LTD, U.K), Thermostatic water bath[(Stuart scientific BIBBY model (SWBD), U.K.), Analytical balance [Mettler Toledo model (AB54-S)], Switzerland.

The samples were collected through 2017, except two samples through 2016 from different areas in Libya : east regions (Ras El-Helal, Sousa, Wadi El-Koof, Taknis, Al-Marj, Jurdas, El-Hamida, Deryana, El Qwarsha, Ejdabia, Ben Gerdan,) samples 2-16; west regions (Qasr El-Sharief, Msallata,) samples 1,17 and 18; southeast region (Tazerbo)sample 19 and 20 southwest region (Aobari) .

Analysis:

Six Physio-chemical parameters pH, moisture, ash content, insoluble matter, proline contents, HMF. The PH was measured using a digital PH meter.[3] While the moisture content, were determined by using Halogen moisture analyzer. For the determination of ash content, 5-10gm of each sample with two drops of ashless olive oil was put in crucible and dried by hotplate at 350-400oc. After preliminary ashing , it was ashed in a electric furnace, and then cooled and weighed to a constant weight.[4] For insoluble matter determination, 20gm of honey sample dissolved in 200 ml distilled water and then filter it through known weight crucible. Dry the crucible at 135oc for an hour, cool in the desiccator and weigh. Return to the oven for 30-minute intervals until constant weight is obtained.[5] The proline content was determined according Harmonized methods the International Honey Commission.[6] HMF (Hydroxymethylfurfural) by UV/VIS spectrophotometer according Winkler.[7]

Results and Discussion:

The results of physiochemical characteristic of Libyan honey samples in the table. The pH of Libyan honey samples range from 3.25 to 5.00 , with a mean of 4.101 . These values are comparable to the pH values of U.S. honey (range 3.4 to 6.1)[2,8], except one sample which has 3.25. The low value of pH in this samples may reflect the ability to kill microorganisms at pH (3.2 to 4.5). [9] The international honey standards as Codex, [10-12] fixed a maximum of 40 millequivalents/kg for the acidity or maximum of 4 for pH, while the Codex draft, [13] increased the acidity value to 50 milliequivalents/kg, as there are some honeys, which have a higher natural

acidity. So the honey samples of the number 1,2,7,9,12,19 and 20 are not accepted the honey standard of Codex. [10-12]

Table 1. The location of sample collected

Locations are Classified relative to Benghazi City	Location / sample no.	Distance of road	Farness of houses	Farness of farms; others	The exposure to insecticides	
Seaboard east or near to seaboards	Ras El-Helal	3	4 to 5 km	Few mountainous houses	No, mountainous climate	No
	Deryana	4	17 km	Absent	2 to 3 km	Yes, due to locusts
		6				By uses planes
	Al-Hamida	5	3 km highway road, also off-road uses by tractors	Houses inside the farms	3 km. wheat and barley farms and > 20 km fuel station	No, but may be affected by insecticides planes (cognate place)
	Sousa	13	Very near	Far away	No. mountainous climate	No
Mountainous or inboard east	Ben Qerdan	8	40Km	No houses are present	No farms are present	No
Mountainous or inboard east	Ben Qerdan	8	40 km	Absent (desert climate)	Absent	No
	Taknis	9	Absent	7 km	Absent	No
	5	10	3 km	Absent	Wheat and barley farms	No

	Al-Marj	11	Off-Road uses by tractors and cars	Houses inside the farms	Surrounding by seven farms	Yes, for trees and vegetables
	Jurdas	14	Absent	7 km	Absent	No
	Wadi El-Koof	16	1.5 to 3 km	Small Village (near)	0.5 km Completely Surrounding by farms	Yes, trees
		18	2.5 to 3 km	4 to 5 km medical village	No, but 10 to 12 km there is fuel station	No
inboard west	Msallata	2	5 km	Few houses	2.5 to 3 km and 30 km fuel station	No
	Qwarsha	7	< 1 km	Houses inside the farms	Wheat and barley farms, 0.5 km trash place, cement plant and 5 to 6 km sewage station	No
	Ajdaabia	12	17 km	Absent	Absent	No
		17	Not estimated	1.25 km	No, but 1 km trash place and grazers bazaar	Yes, for grazers
Seaboard west	Qasr El-Sharief	1	Off-road uses by tractors and cars	300m, three houses; 0.5 km medial village	3 km, wheat and barley farms and 20 km fuel station	No
	Mesrata	15	4 to 5 km	2 to 2.5 km, few	0.5 km from sea	No
South Libya	Tazerbo	19	2 km	1 to 3 km	Surrounding by vegetables and palm trees farms	Yes, for palm trees
	Ubari	20	2 km	Houses inside the farms	Serval farms, specially orange trees	No

The moisture content of honey samples range from 7.76 to 15 % which is found within the limits prescribed by Codex Alimentarius Commission(1969), i.e. not more than 21%.[14] The fermentation of honey not occur at moisture content < 17.1% , [15] therefore all samples being analyzed can't ferment during long storage, which is good feature of Libyan honey.

The mean of ash content of honey samples was 0.313 %, with the range of 0.1-0.95 %. These values are comparable to the values of U.S. honey which has mean of 0.169%, with a range from 0.020 to 1.028%.[1] These variety of ash content among all samples reflect the different in elements amount of honey samples, due to variety of botanical sources and the geographical origin of each sample.[15]

Table 2. The locations and names of honey types

Sample no.	Location	Common name (Local name)	Scientific name
1	Qasr El-Sharief	Sedr	Ziziphus sp.
2	Masallata	Zaater	Thymus sp.
3	Ras El-Helal	Hannon	Arbutus sp.
4	Deryana	Qaamool	Cynara sp.
5	El-Hamida	Qaamool	Cynara sp.
6	Deryana	Rabea	Uncertain
7	Qwarsha	Kafoor	Eucalyptus sp.
8	Ben Qerdan	Sedr	Ziziphus sp.
9	Taknis	Zaater	Thymus sp.
10	Al-Abiar	Sedr & Zaater	Ziziphus sp. & Thymus sp.
11	Al-Marj	Rabea	Uncertain
12	Ajdaabia	Al-Shokeyat	Uncertain
13	Sousa	Al-Mun	Honeydew

14	Jurdas	Inmeela	Marrbuim sp.
15	Mesrata	Ghasool	Mesembryanthemum sp.
16	Wadi El-Koof (1)	Kharrob	Ceratonia sp.
17	Ajdaabia	Kafoor	Eucalyptus sp.
18	Wadi El-Koof (2)	Kharrob	Ceratonia sp.
19	Tazerbo	Saphsfa	Medicago sp. (Alfalfa)
20	Ubari	Athel	Tamarix sp.

Table 3. the physical properties of honey types

Sample no.	Parameter Location	pH	Moisture %	Ash content %	Insoluble Meter %	proline Content mg/kg	HMF Mg/kg
1	Qasr El-Sharief	4.98	14.5	0.25	0.029	600.0	6.5
2	Ras El-Helal	3.75	11.5	0.20	0.045	395.0	27.5
3	Deryana	4.50	15.0	0.39	0.045	350.0	15.5
4	El-Hamida	3.95	13.0	0.35	0.135	750.0	9.3
5	Deryana	4.00	13.0	0.40	0.065	775.0	22.9
6	Qwarsha	3.35	12.5	0.15	0.005	575.0	15.75
7	El-Hamida	4.00	15.0	0.39	0.095	745.5	37.5
8	Ben Qerdan	5.00	11.5	0.31	0.009	859.5	2.2
9	Taknis	4.05	10.8	0.25	0.095	525.5	24.0
10	Al-Abiar	4.5	14.3	0.35	0.095	625.0	19.5
11	Al-Marj	3.25	12.5	0.10	0.075	677.3	19.4
12	Ejdaabia	3.75	13.25	0.25	0.085	725.3	9.4

13	Sousa	4.88	10.50	0.75	0.095	595.5	1.9
14	Jurdas	3.85	12.50	0.15	0.045	485.5	17.9
15	Wadi El-Koof	3.42	13.75	0.07	0.054	575.3	36.8
16	Ejdaabia	3.79	13.75	0.25	0.039	544.6	124.7
17	Wadi El-Koof	3.35	13.94	0.20	0.031	798.0	43.2
18	Mesrata	4.55	14.70	0.38	0.021	1076,4	34.3
19	Tazerbo	5.00	7.76	0.95	0.149	870.6	4.9
20	Ubari	4.10	8.75	0.12	0.034	842.5	15.1
Range	-----	3.25-5.00	7.76- 15	0.1-0.95	0.005-0.149	350-1079.4	2.2-124.7
Mean	-----	4.101	12.625	0.313	0.06175	626.2	24.4125
Total		82.02	252.5	6.26	1.235	12.524	488.25

The Hydroxymethylfurfural (HMF) content of Libyan honey samples is found within the limits prescribed by the Codex Alimentarius Commission(1969), except two samples No. 14 and 15, may be due to storage through 2016 to 2017 or these samples suffered an excessive heating during harvesting.

Insoluble matter content of Libyan honey samples range from 0.005 to 0.149 % . with mean of 0.06175 % . our results in limits given by the legislation of the Czech Republic 334/1997 (0.1%) and all international standard, except two samples No.3 and 19 which was higher than the limit. Of the amino acid we was determined proline which the most important from quantitative point of view. The range of proline content of Libyan honey samples is from 350 to 1079.4 mg / kg, with mean of 626.2 mg / kg. According to White and Rudyi (1978), proline ranged from 14.8 to 148 mg/kg. In Germany a honey with less than 180 mg/kg is consider as either non-ripe or adulterated.

Generally, the proline parameter does not used in international standardization of the honey.

Conclusion:

From previous results we consider the Libyan honey has high quality due to more than one property, as pH which all values are comparable with U,S. honey and from the low pH values of almost all samples, we except the Libyan honey has high antibacterial activity ; therefore it`s needed to broad study .

Also, the low of moisture content of Libyan honey make it more resistant to the fermentation, which is good feature especially from trade point view.

The HMF values of most samples are accordance to the limit of Codex Alimentarius Commission (not more than 40 mg/kg), which is an important property deal with effect of long storage and/or high temperature treatment of honey.

We also regard the Libyan honey has high nutrient value due to high ash content of some sorts, also all chosen samples have high proline content which reflect no adulteration occur.

To complete the standardization of Libyan honey, the other specifications as apparent reducing sugars, apparent sucrose and diastase activity will be study in the further investigations.

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