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A PILOT STUDY ON THE PHYSICOCHEMICAL PROPERTIES AND QUALITY INDICATORS OF HONEY IN HEBRON GOVERNORATE, PALESTINE

S u m m a r y

Background. Honey is a natural, nutritious substance produced by honey bees, with its composition heavily affected by the floral source and environmental factors. However, it is also among the most commonly adulterated foods worldwide, raising concerns about its quality and authenticity. This pilot study aimed to conduct a preliminary evaluation of the physicochemical characteristics of honey from Hebron Governorate, Palestine. Nine honey samples (three each from the northern, middle, and southern regions of Hebron) were analyzed for pH, free acidity, moisture content, soluble solids, insoluble matter, ash content, and hydroxymethylfurfural (HMF).

Results and conclusions. The findings were summarized as overall and regional mean values and compared with established honey quality standards. The honey samples exhibited good freshness, with a pH of 4.53 and free acidity of 22 meq/kg, both falling within acceptable ranges. They also showed appropriate maturity, having a moisture level of 16.93 % and soluble solids of 81.42 %. These figures suggest suitable harvesting and acceptable overall quality. A statistical analysis showed no significant regional differences in the studied parameters, except for insoluble solid content, which was significantly higher in certain areas. Insoluble matter in honey from the northern (0.245 g/100 g) and middle (0.228 g/100 g) regions exceeded the 0.10 g/100 g limit set by Palestinian standards, suggesting possible contamination or insufficient filtration. Conversely, the ash content was at an acceptable level of 0.41 %, signifying suitable mineral levels. Hydroxymethylfurfural (HMF) levels were elevated (78.59 mg/kg), possibly resulting from excessive heat or extended storage.

Key words: Palestinian honey, Physicochemical properties, HMF content, Acidity

Introduction

Honey is a complex natural substance produced by honeybees from the nectar of flowers, prized not only for its nutritional and medicinal properties, but also for its economic and cultural significance [38]. It is rich in carbohydrates, mainly fructose and

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glucose, and contains minor amounts of vitamins, minerals, amino acids and bioactive compounds with antioxidant, antimicrobial and anti-inflammatory properties, making it both a source of energy and functional food [2]. The composition and quality of honey, though, vary significantly depending on the factors such as the botanical source of the nectar, the topographical area, climate conditions and storage practices [40]. These factors influence not only its flavor, aroma and color, but also its nutritive and therapeutic properties, underscoring the importance of understanding and evaluating honey according to its source and production conditions [29].

Beekeeping and honey production are key elements of Palestine’s agricultural economy, with approximately 86,500 beehives managed by around 2,150 beekeepers, yielding about 1,050 tons of honey in 2020 [31]. In Palestine, particularly in the Hebron region, honey production is a traditional agricultural practice extremely rooted in local culture and serves as a vital income source for many families [30]. The country’s rich biodiversity, shaped by its unique geophysical and climatic conditions, supports more than 2,780 species of flowering plants, whose abundance and variety play a crucial role in sustaining honey production [1, 6]. However, despite its importance, honey is often adulterated with cheap sugar syrups – such as high fructose corn syrup and similar products – which degrade its bioactive compounds, alter its chemical and biological properties and reduce its overall quality and value [11, 42].

Honey's physicochemical characteristics, which indicate its purity, freshness and place of origin, determine its quality and cost [40]. These characteristics have an impact on its safety, shelf life, sensory appeal and standard compliance [42]. To guarantee authenticity, stop adulteration and comprehend how botanical and environmental elements affect honey composition, it is imperative to evaluate them [10]. Key quality factors including moisture content, electrical conductivity, free acidity, HMF levels, diastase activity, sugar composition, phenolic content and antioxidant capacity have all been investigated in earlier research on Palestinian honey [1, 4, 22]. The majority of the samples in these studies met international quality requirements, while there were notable differences between geographic locations and floral sources. Despite the increasing demand for quality assurance in both local and export markets, scientific studies offering a comprehensive assessment of honey from the Hebron Governorate remain scarce. Furthermore, the relative ease of honey adulteration in Palestine, due to weak regulatory oversight, highlights the urgent need for rigorous testing and evaluation to verify its chemical and physical quality and ensure its authenticity. In response to this gap, this pilot study aims to systematically evaluate the quality of honey from the Hebron Governorate by analyzing its physicochemical properties, assessing its compliance with standards and providing recommendations to improve product quality and enhance its global competitiveness.

Materials and Methods

Study Area

This research was conducted in the northern (NH), middle (MH) and southern (SH) districts of the Hebron Governorate (Figure 1), which is located in the Palestinian Territory of Asia and is centered on the city of Hebron. The governorate covers an area of around 1,067 km², between coordinates 31.3°N ÷ 31.7°N and 34.9°E ÷ 35.3°E, and features varied geography, including mountains, valleys and semi-arid areas. Elevations range from 140 m below sea level in the Ar Rawain area to 1,030 m above sea level in Halhul, the highest point in Palestine. The climate is Mediterranean, characterized by hot, dry summers and cool, rainy winters, with a mean yearly temperature of about 18 °C. The average annual rainfall is approximately 473.5 mm, most of which occurs between December and February, with the northwest areas receiving the highest amounts.

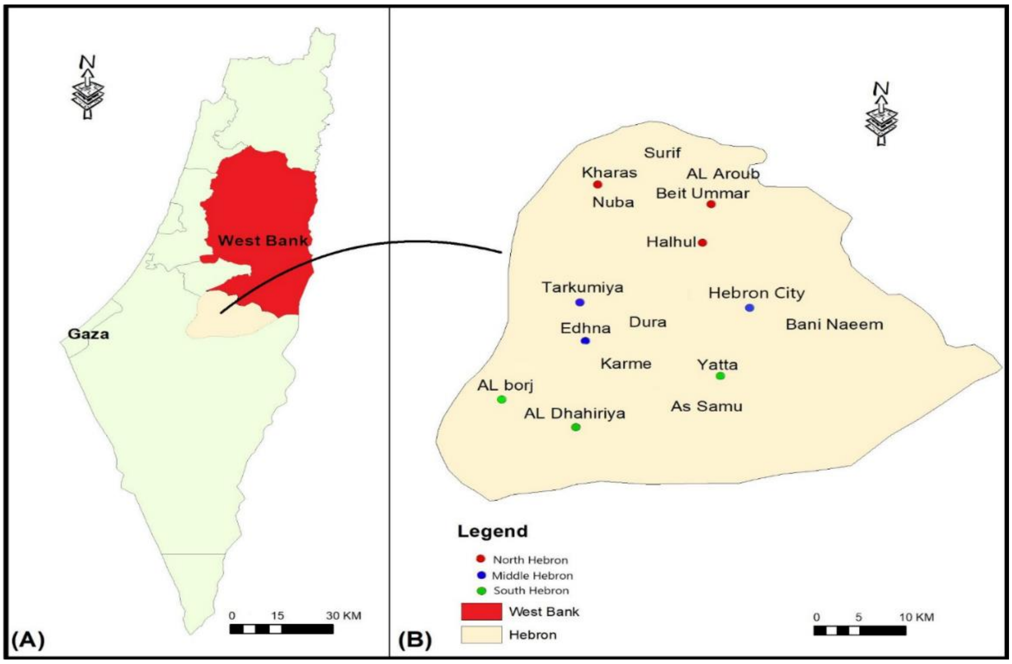

Figure 1. (A) Map of the occupied Palestinian territory; (B) Map of Hebron Governorate showing the sampling locations in the northern (NH), middle (MH) and southern (SH) regions.

Rycina 1. (A) Mapa okupowanego terytorium palestyńskiego; (B) Mapa prowincji Hebron pokazująca miejsca poboru próbek w regionach północnym (NH), środkowym (MH) i południowym (SH).

Sample Collection and Handling

Nine samples of summer wildflower (multifloral) honey (500 g each) were collected from Hebron Governorate, Palestine. Three samples were obtained from each of the northern, middle and southern regions, whereas one sample was collected per apiary, resulting in nine independent sources. The samples, donated by local beekeepers, were promptly transported to the Food Chemistry and Analysis Laboratory at Palestine Technical University, for analysis. To preserve their integrity, the honey samples were stored in the dark at room temperature until analysis.

Determination of pH and Free Acidity

Each test was performed separately. For both procedures, 10 g of honey was dissolved in 75 cm^3 of distilled water. The pH was measured using a calibrated Edge HI2002-01 pH meter (Hanna Instruments, Italy), following the method described by Silva et al. [39]. For free acidity determination, the solution was titrated with standardized 0.1 M NaOH until the pH reached 8.3, under the procedure of Iftikhar et al. [21]. Free acidity was then calculated using the following formula:

$$\% \, Acidity = Volume \ of \ NaOH \ used \times Weight \ of \ Honey$$

Determination of moisture content

Moisture content was determined using the method described by Bako et al. [12]. A 5 g portion of honey was placed in a pre-weighed porcelain flat-bottom dish and dried overnight in an oven (BOV-T30C, Biobase Bioland Co., Ltd., China) at 105 °C. The loss in weight was considered as the moisture content and calculated using the following formula:

$$Moisture \,\% = \frac{Weight \ of \ fresh \ sample \ (g) - Weight \ of \ dry \ sample \ (g)}{Weight \ of \ Honey \ (g)} \times 100$$

Determination of Soluble Solids Content (°Brix)

The °Brix value of each honey sample was measured using a refractometer (Atago, Japan), and the soluble solids content was calculated and expressed as a percentage (SSC %), following the method described by Dobrinas et al. [17].

Water-Insoluble Solids

Water-insoluble solids (WIS) were determined gravimetrically using the method described by Albu et al. [3]. Briefly, 10 g of homogenized honey was diluted with 75 mL of distilled water and filtered through pre-dried, pre-weighed filter paper. After thorough washing, the filter paper containing the retained solids was dried in an oven (BOV-T30C, Biobase Bioland Co., Ltd., China) at 135 °C for 1 hour. The WIS content was calculated using the equation below, and the results were expressed as a percentage.

$$\text{Water} - \text{insoluble solids (\%)} = \frac{\text{Weight of dried insoluble matter (g)}}{\text{Weight of honey sample (g)}} \times 100$$

Ash Content

First, the porcelain crucibles were heated in an oven (BOV-T30C, Biobase Bioland Co., Ltd., China) at 105 °C for three hours, then cooled in a desiccator and weighed. Subsequently, 5 g of honey was added to each crucible, and they were reheated at the same temperature for further three hours. The crucibles containing the dried honey samples were then transferred to a muffle furnace (Bifatherm Furnace MS 8, Bifa, UK) and ashed at 550 °C for 16 hours. After cooling in a desiccator, the ash content was determined using the following formula, as described by Tan et al. [41].

$$\text{Ash Content (\%)} = \frac{\text{Weight of Crucible and Ash (g)} - \text{Weight of Crucible (g)}}{\text{Weight of Honey (g)}} \times 100$$

Hydroxy methyl furfural (HMF)

Following the method of Salih and Al-Jaf [37], 5 g of honey were dissolved in 25 cm^3 of double-distilled water. Subsequently, 0.5 cm^3 each of Carrez I and II were added, mixed, and the solution was diluted to 50 cm^3 with distilled water. After filtration through Whatman No. 1 filter paper, the first 10 cm^3 of filtrate was discarded. From the remaining filtrate, two 5 cm^3 aliquots were taken: one was mixed with 5 cm^3 of distilled water (test solution) and the other with 5 cm^3 of 0.2 % sodium bisulfite solution (reference solution). Absorbance was measured at 284 nm and 336 nm using a UV-Vis spectrophotometer (Jenway 6100, Dunmow, Essex, UK). HMF concentration was calculated as shown in the equation below and reported in mg/kg.

$$\text{HMF} = \frac{(A_{284} - A_{330})}{w} \times 74.87$$

where:
A_{284}: absorbance reading at 284 nm
A_{330}: absorbance reading at 330 nm
w: weight of sample [g]

Statistical Analyses

Data are presented as a mean ± standard deviation. Differences among geographical regions were analyzed using a one-way ANOVA followed by the Least Significant Difference (LSD) post hoc test. All analyses were performed in SPSS (version 27.0; IBM Corp., Armonk, NY, USA), and a p-value < 0.05 was considered statistically significant.

Results and Discussion

The present research on honey from the Hebron Governorate revealed differences in physicochemical parameters across the three regions. Nonetheless, the statistical evaluation revealed no notable regional variations, apart from insoluble solid content, which showed a significant difference. It is important to mention that certain values, especially those for HMF and insoluble matter, surpassed the national standard (PS 86/2020) [32].

pH and Acidity

When assessing the quality of honey, pH and acidity are regarded as freshness and stability factors that might affect the honey's flavor, texture and scent [20]. The pH and acidity of the honey samples, calculated as mean ± SD, are shown in Table 1. The statistical analysis revealed no significant differences in pH among the regions (p > 0.05). The overall mean pH was 4.53 ± 0.26, with North Hebron (NH) having the highest pH at 4.64 ± 0.21, Middle Hebron (MH) at 4.56 ± 0.25, and South Hebron (SH) at 4.37 ± 0.32. The pH of NH and MH was marginally higher than the optimum range frequently reported for honey (3.2 ÷ 4.5), even though all readings fell within the acceptable pH range (3.4 ÷ 6.1) defined for honey [18, 24]. These pH values are slightly higher than those reported for Palestinian honeys by Abdulkhaliq and Swaileh [8], Abu-Farich et al. [4] and Imtara et al. [22], who recorded pH values of 3.44, 3.80 and 3.90 respectively. However, these values are comparable to those of Eastern Romanian honeys (4.12 ÷ 4.48) as reported by Albu et al. [7], and to honey from the Ethiopian midland, with a pH of 4.35 [8]. The relatively elevated pH observed in NH and MH honey may be attributed to the floral composition and mineral-rich soils characteristic of these regions. The free acidity of the honey samples averaged 22.00 ± 3.59 meq/kg, well below the PS 86/2020 boundary of ≤ 50 meq/kg, confirming the absence of fermentation or decomposition. The mean acidity values for SH (24.67 ± 3.06 meq/kg), MH (21.33 ± 4.73 meq/kg), and NH (20.00 ± 3.00 meq/kg) were statistically similar, with no significant differences found between the regions (p > 0.05). These findings are consistent with the findings of Imtara et al. [22], who reported the acidity of approximately 24.3 meq/kg. The slightly higher acidity detected in SH compared to MH and NH may reflect regional variances in floral sources [17]. The results not only verify the acceptable quality of the honey samples but also highlight the critical role of botanical origin in determining honey composition.

Table 1. Mean pH and acidity of honey samples from three distinct geographical regions in Hebron Governorate

Tabela 1. Średnie pH i kwasowość próbek miodu z trzech różnych regionów geograficznych w prowincji Hebron

Parameter	Region	Mean ± SD	Min	Max	PS 86/2020 Standard [26]
pH	NH	$4.64^a \pm 0.21$	4.40	4.80	NA
	MH	$4.56^a \pm 0.25$	4.30	4.80	
	SH	$4.37^a \pm 0.32$	4.10	4.72	
Acidity (meq/kg)	NH	$20.00^a \pm 3.00$	17.00	23.00	50 meq/kg
	MH	$21.33^a \pm 4.73$	16.00	25.00	
	SH	$24.67^a \pm 3.06$	22.00	28.00	

Explanatory note: NH = Northern Hebron Governorate; MH = Middle Hebron Governorate; SH = Southern Hebron Governorate, SD = Standard Deviation, NA = Not Applicable. Columns within the same category sharing the same letter are not significantly different ($p > 0.05$, one-way ANOVA, LSD test).

Moisture and Soluble Solids

The moisture content of honey is a crucial stability factor. Across all samples in this study, the mean moisture content was 16.93 ± 1.05 %, fulfilling the PS 86/2020 limit of ≤ 20 %, as shown in Figure 2. It was marginally higher in NH (17.06 ± 0.93 %**)** than in MH (16.75 ± 0.53 %) and SH (16.98 ± 0.31 %), remaining below the maximum allowable boundary. However, the statistical analysis indicated no significant differences ($p > 0.05$) in moisture content among the three regions, suggesting that geographical location did not have a measurable effect on this parameter. These values are steady with those reported for Palestinian honeys by Abdulkhaliq and Swaileh [1], who found a mean of 16.5 %. The values measured were also within the range of 14.0 ÷ 19.0 % stated by Rysha et al. [35], and lower than the ranges reported by Boussaid et al. [16], 17.27 ÷ 19.80 %, and Albu et al. [7], 17.42 ÷ 18.11 %, further supporting the high quality and greater stability of the samples investigated in this study. Water content, a key quality parameter, is influenced by the factors such as floral source, harvest time, hive maturity, processing and storage conditions [17, 35].

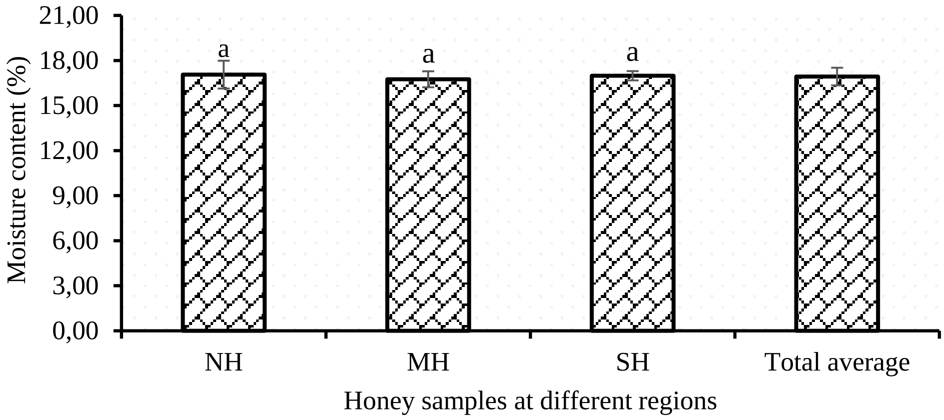

Figure 2. Moisture content of honey from Northern (NH), Middle (MH) and Southern (SH) Hebron Governorate. Data are mean ± SD. Bars with the same letter are not significantly different ($p > 0.05$, one-way ANOVA, LSD test)

Rycina 2. Zawartość wilgoci w miodzie z północnej (NH), środkowej (MH) i południowej (SH) prowincji Hebron. Dane przedstawiono jako średnią ± odchylenie standardowe. Słupki oznaczone tą samą literą nie różnią się istotnie ($p > 0,05$, jednoczynnikowa analiza wariancji, test LSD)

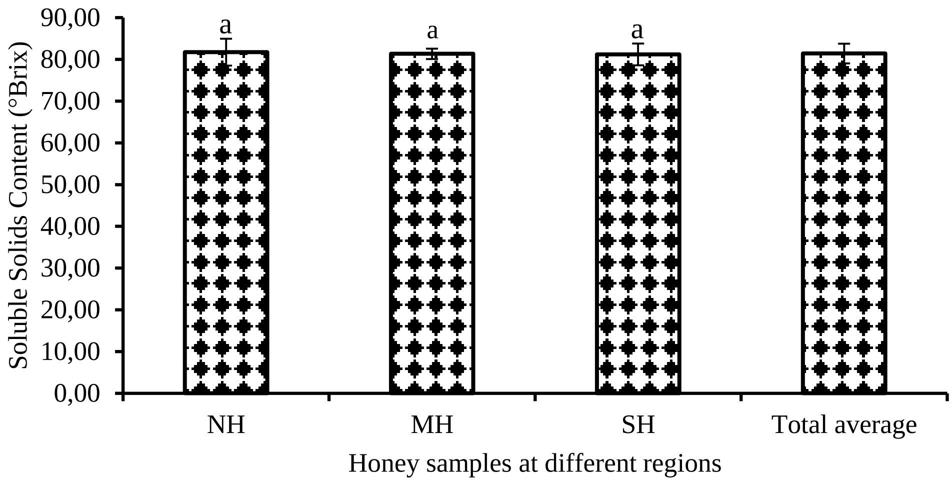

Figure 3. Soluble solids content (°Brix) in honey from Northern (NH), Middle (MH) and Southern (SH) Hebron Governorate. Data are mean ± SD. Bars with the same letter are not significantly different ($p > 0.05$, one-way ANOVA, LSD test)

Rycina 3. Zawartość rozpuszczalnych substancji stałych (Brix) w miodzie z północnej (NH), środkowej (MH) i południowej (SH) prowincji Hebron. Dane przedstawiono jako średnią ± odchylenie standardowe. Słupki oznaczone tą samą literą nie różnią się istotnie ($p > 0,05$, jednoczynnikowa analiza wariancji, test LSD)

Soluble solids content (SSC) represents the concentration of dissolved solids, primarily sugars, in honey and is another critical indicator of quality and maturity. The overall mean SSC was 81.42 ± 0.98 %**,** demonstrating the good concentration of sugars and maturity**,** as shown in Figure 3. The statistical analysis confirmed that the soluble solids content did not differ significantly ($p > 0.05$) across the three regions (NH: 81.73 ± 0.64 %, MH: 81.33 ± 1.26 %, SH: 81.20 ± 1.04 %). These results are consistent with the 82.0 % SSC reported by Abdulkhaliq and Swaileh [1] for Palestinian honeys and are slightly higher than 78.7 % reported by Aykas [11]. However, they are lower than Tanzanian honey from Uvinza (84.84 %), reported by Muruke [27]. High soluble solids reflect low water activity, which supports inhibit microbial development [33]. Due to the increased sugar content of nectar from certain plants, the modest geographical variations may be explained by the date of harvest and the floral composition [5].

Water-Insoluble Solids and Ash

Water-insoluble solids and ash content (Table 2) are important markers of honey quality that show the product's botanical origin and integrity of manufacture [40]. Excessive amounts of water-insoluble solids – including wax, pollen, bee detritus and environmental particles – indicate either insufficient filtration during processing or possible contamination, serving as key indicators of honey's quality and purity [36]. The inorganic residue left over after burning, ash, indicates the mineral content that was impacted by handling procedures, soil composition or flower source [34]. Although moderate ash levels can signify botanical diversity (black honeys typically contain greater minerals), raised values may indicate environmental contaminants or insufficient decantation [15]. In this study, the average content of water-insoluble solids was 0.18 ± 0.04 g/100 g. The statistical evaluation showed notable regional differences ($p < 0.05$), with the average value for SH (0.073 ± 0.042 g/100 g) significantly lower than those of both NH (0.245 ± 0.065 g/100 g) and MH (0.228 ± 0.026 g/100 g), which were statistically similar. Whereas SH was conforming, the results for NH and MH exceeded the PS 86/2020 limit of 0.1 g/100 g. The values measured (0.073 ÷ 0.245 g/100 g) were lower than 0.62 g/100 g stated for Ethiopian honeys from the Sekota region by Alemu et al. [8] and 0.34 g/100 g found in Omani marketplace samples by Al-Hadhrami et al. [9], but higher than 0.14 g/100 g reported for Harenna forest honey, Ethiopia by Belay et al. [13]. Compared to other countries, the results were within the range of 0.01 ÷ 0.67 g/100 g reported for Algerian honeys by Nair and Maghraoui [28], but noticeably lower than 0.4 ÷ 2.5 % found in Malaysian honey samples by Jaafar et al. [23]. However, greater pollen concentration or less effective filtering might be the cause of greater insoluble matter in NH and MH, which could be the result of conventional extraction techniques. To increase clarity and customer acceptability, proper filtering is essential.

The overall mean ash content was 0.41 % (± 0.14). Regional variations showed NH with the highest ash content (0.56 ± 0.01 %), followed by SH (0.36 ± 0.20%) and MH (0.32 ± 0.22 %). The statistical analysis revealed no significant difference ($p > 0.05$) in ash content between all regional groups (NH, MH, SH). Values in this study were higher than those found in earlier research on Palestinian honey, including 0.30 % reported by Abu-Farich et al. [4], the range of 0.065 ÷ 0.208 g/100 g found by Imtara et al. [22], as well as superior 0.23 g/100 g reported for Saudi Arabian honey [18] and 0.07 g/100 g observed in Ethiopian samples by Gebremedhin et al. [19]. On the other hand, these findings were within the ranges reported by Bako et al. [12] and Boussaid et al. [16] for Nigerian and Tunisian honeys, at 0.14 ÷ 0.52 g/100 g and 0.08 ÷ 0.69 g/100g respectively. While all readings were within usual floral honey criteria, the high 0.56 % ash content in NH indicates considerable mineral inputs from local soil and plants, proving the usefulness of ash content as a botanical and geographical indicator.

Table 2. Mean insoluble matter, ash content and HMF in honey samples from three distinct geographical regions in Hebron Governorate

Tabela 2. Średnia zawartość substancji nierozpuszczalnych, popiołu i HMF w próbkach miodu z trzech różnych regionów geograficznych w prowincji Hebron

Parameter	Region	Mean ± SD	Min	Max	PS 86/2020 Standard [26]
Insoluble Matter (g/100 g)	NH	$0.245^{a} \pm 0.065$	0.180	0.310	≤ 0.10
	MH	$0.228^{a} \pm 0.026$	0.200	0.250	
	SH	$0.073^{b} \pm 0.042$	0.040	0.120	
Ash Content (g/100 g)	NH	$0.56^{a} \pm 0.01$	0.55	0.58	NA
	MH	$0.32^{a} \pm 0.22$	0.20	0.58	
	SH	$0.36^{a} \pm 0.20$	0.20	0.59	
HMF (mg/kg)	NH	$82.75^{a} \pm 17.03$	63.39	95.37	≤ 40
	MH	$74.84^{a} \pm 6.05$	71.11	81.83	
	SH	$78.18^{a} \pm 5.24$	74.90	84.20	

Explanatory note: NH = Northern Hebron Governorate; MH = Middle Hebron Governorate; SH = Southern Hebron Governorate, SD = Standard Deviation, NA = Not Applicable. Columns within the same category sharing the same letter are not significantly different ($p > 0.05$, one-way ANOVA, LSD test).

HMF Content

The overall mean HMF content in the honey samples (Table 2) was 78.59 ± 9.44 mg/kg, exceeding the PS 86/2020 maximum of 40 mg/kg and indicating some degree of aging or heat exposure. No notable statistical differences ($p > 0.05$) were detected between the regions, with average values of 82.75 ± 17.03 mg/kg for

Northern Hebron, 74.84 ± 6.05 mg/kg for Middle Hebron and 78.18 ± 5.24 mg/kg for Southern Hebron. While Palestinian honeys were previously reported to have HMF the levels of 81.86 mg/kg [22] and much lower levels of 12.3 mg/kg (the range of 2.1 ÷ 34.2 mg/kg) by Abdulkhaliq and Swaileh [1], the present findings are closer to the previous ones. In contrast, Aykas [11] documented 17.6 ÷ 86.9 mg/kg (the mean value of 34.6 mg/kg) in Turkish honeys, and Boussaid et al. [16] detected 12.07 ÷ 27.43 mg/kg in Tunisian samples. Similarly, Al-Hadhrami et al. [9] reported 8.98 ÷ 45.35 mg/kg for Omani market honeys, Iftikhar et al. [21] found 15.0 ÷ 95.6 mg/kg in Pakistani honeys from Rawalpindi and Islamabad, and Muruke [27] reported 5.0 ÷ 26.4 mg/kg in Tanzanian samples. The elevated HMF levels, mainly in NH, may result from longer storage durations and higher surrounding temperatures. Markedly, despite exceeding the suggested HMF limit, the honey samples showed acceptable levels of acidity, moisture and SSC, indicating good maturity and proper harvesting [14]. This apparent discrepancy is explained by the fact that HMF buildup is primarily affected by post-harvest handling practices – such as prolonged storage, exposure to high ambient temperatures and heating during extraction or bottling – rather than the intrinsic quality of fresh honey [25]. Prior investigations showed that storage at 28 ÷ 35 °C significantly increases HMF over time, with strong positive association between storage period and HMF accumulation [26]. In addition, excessive heat during processing can further expedite HMF formation, ultimately reducing honey quality [14]. These findings highlight the importance of proper storage and handling practices, chiefly maintaining lower temperatures and avoiding extreme heat to preserve honey quality and freshness.

Conclusions

1. The results indicated acceptable overall quality, maturity and low fermentation risk, with most parameters within permissible limits. The ash content was acceptable, reflecting a typical mineral composition, while excess insoluble matter in Northern and Middle samples indicated inadequate filtration.
2. Moreover, elevated HMF values across all regions, likely due to prolonged storage, high ambient temperatures or excessive heat during extraction and bottling, highlight the influence of post-harvest handling on honey quality. Although Hebron honeys demonstrate favorable freshness, maturity and mineral composition overall, the high HMF concentrations and excess insoluble matter emphasize the need for improved filtration practices and careful storage under controlled conditions.
3. The primary constraint of this research is its limited sample size, which limits the applicability of the findings. This resulted from notable logistical challenges, such as inadequate funding and restricted access to laboratory resources. In spite of these difficulties, the information offers an important reference point. Future research

should focus on larger sample sizes and include additional quality assessments such as diastase activity to enhance the understanding of the properties of Palestinian honey.

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BADANIE PILOTAŻOWE WŁAŚCIWOŚCI FIZYKOCHEMICZNYCH I WSKAŹNIKÓW JAKOŚCI MIODU W GUBERNATORSTWIE HEBRON W PALESTYNIE

S t r e s z c z e n i e

Wprowadzenie. Miód to naturalna, pożywna substancja wytwarzana przez pszczoły miodne, której skład w dużym stopniu zależy od pochodzenia kwiatowego i czynników środowiskowych. Należy on jednak do najczęściej fałszowanych produktów spożywczych na świecie, co budzi obawy dotyczące jego jakości i autentyczności. Celem niniejszego badania pilotażowego była wstępna ocena właściwości fizykochemicznych miodu z prowincji Hebron w Palestynie. Dziewięć próbek miodu (po trzy z północnej, środkowej i południowej części Hebronu) przeanalizowano pod kątem pH, wolnej kwasowości, zawartości wilgoci, substancji rozpuszczalnych, substancji nierozpuszczalnych, zawartości popiołu oraz hydroksymetylofurfuralu (HMF).

Wyniki i wnioski. Wyniki podsumowano jako średnie ogólne i regionalne oraz porównano z ustalonymi normami jakości miodu. Próbki miodu charakteryzowały się dobrą świeżością, pH 4,53 i kwasowością 22 meq/kg, co mieściło się w dopuszczalnych zakresach. Wykazały również odpowiednią dojrzałość, z poziomem wilgotności 16,93% i zawartością rozpuszczalnych substancji stałych 81,42%. Dane te sugerują odpowiedni zbiór i akceptowalną ogólną jakość. Analiza statystyczna nie wykazała istotnych różnic regionalnych w badanych parametrach, z wyjątkiem zawartości nierozpuszczalnych substancji stałych, która była znacznie wyższa w niektórych obszarach. Substancje nierozpuszczalne w miodzie z regionów północnego (0,245 g/100 g) i środkowego (0,228 g/100 g) przekraczały limit 0,10 g/100 g określony przez normy palestyńskie, co sugeruje możliwe zanieczyszczenie lub niewystarczającą filtrację. Z kolei zawartość popiołu była na akceptowalnym poziomie 0,41%, co wskazuje na odpowiedni poziom minerałów.

Poziom hydroksymetylofurfuralu (HMF) był podwyższony (78,59 mg/kg), prawdopodobnie w wyniku nadmiernego ciepła lub długotrwałego przechowywania.

Słowa kluczowe: miód palestyński, właściwości fizykochemiczne, zawartość HMF, kwasowość