

Determination of quality compounds in Some of Iraqi honey types

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Abstract:

This study was conducted on different types of honey brought Collected From Basrah, Maysan, Najaf, Karbala, Babylon, Wasit, Baghdad, Diyala, Kirkuk and Sulaymaniyah Included : The quality-related compounds of honeys samples were Determine within the permissible limits Including consist of proline, diastase, hydroxymethyl furfural (HMF); and vitamin C. honey content of proline the highest value was 687.34 mg kg⁻¹ in Karbala region and the lowest value in Najaf region 295.34 mg kg⁻¹, And diastase number the highest was 14.36 unit In Basrah region and the lowest diastase number in Babylon region 8.67 unit ,The hydroxymethyl furfal was the highest value in Babylon region 41.54 mg kg⁻¹ while the lowest value in Basrah and Baghdad honey 12.35 Mg kg⁻¹ each, the highest value of vitamin C 350.23 mg kg⁻¹ in Najaf region and the lowest value in Maysan region 190.54 mg kg⁻¹

Keywords: Honey, proline, diastase, hydroxymethyl furfural (HMF), vitamin C

****Part of dissertation of first researcher.**

تقدير مركبات الجودة في بعض انواع العسل العراقي

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المستخلص :

أجريت الدراسة على نماذج مختلفة من العسل جُلبت من محافظات البصرة وميسان والنجف وكربلاء وبابل و واسط وبغداد وديالى وكركوك والسليمانية وفيها قُدرت المركبات المرتبطة بجودة العسل والمتضمنة محتوى العسل من البرولين والدياستيز ومركب الهيدروكسي مثيل فورفورال وفيتامين C ووجد أنها كانت ضمن الحدود المسموح بها، ففي البرولين كانت أعلى قيمة له 687.34 ملغم.كغم⁻¹ في عسل موقع كربلاء وأقل قيمة في عسل موقع النجف 295.34 ملغم.كغم⁻¹ ، وبلغت أعلى قيمة لرقم الدياستيز 14.36 وحدة في عسل موقع البصرة وأقل قيمة في عسل موقع بابل 8.67 وحدة ، ولمركب الهيدروكسي مثيل فورفورال كانت أعلى قيمة في عسل موقع بابل 41.54 ملغم.كغم⁻¹ وأقل قيمة في عسل موقعي البصرة وبغداد 12.35 ملغم.كغم⁻¹ لكل منهما ، وبلغت

أعلى قيمة لفيتامين C 350.23 ملغم.كغم⁻¹ في عسل موقع النجف وأقل قيمة في عسل موقع ميسان
190.54 ملغم.كغم⁻¹ .

Introduction:

Natural honey is one of the most widely sought products due to its unique nutritional and medicinal properties which are attributed to the influence of the different groups of substances it contains. Codex Alimentarius Commission defined honey as the natural sweet substance produced by honey bees, *Apis mellifera*, from the nectar of blossoms of plants or from the secretions of living parts of plants or excretions of plant sucking insects on the living parts of plants, which honey bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in the honey comb to ripen and mature (3).

Proline is a major amino acid in honey, added to it by bees during its manufacture. It is a standard for honey ripening. it is very important in the classification of different types of honey based on the content of proline (17).

Diastase is one of the most important enzymes in honey, which is an indicator of its quality as it depends on the composition of many factors, including source of plant and geographical region . There are several factors interfere with the diastase activity in honey, including the stage of the phylogenetic flow of the enzyme glands associated with nectar During the season and the storage conditions and heating honey reduces the enzyme activity , which is effective with fresh honey and the enzyme uses standard in the classification of honey (7,16).

(HMF) hydroxymethyl furfural (HMF); 5-Hydroxymethylfurfural (HMF, C₆H₆O₃, CAS No 67-47-0) is a common product of the Maillard reaction and can be found in many foods and beverages in honey is found in very small amounts naturally. It is an intermediate product formed by the direct drying dehydration of sugars such as glucose and fructose. and in the initial stages of the Maillard reaction between sugars and proteins responsible for changes in color and flavor during storage under acidic conditions, It is indicative of increased thermal treatment (10,4). This compound a good indicator for heat processing of industrial manufactured foods.

Honey contains a many of vitamins, vitamin C the important of which is a dissolved in water and is one of the important as the return to the nutritional value and health as well as antioxidant activity (19).

Materials and Methods:

Honey Sample Collection and Preparation:

All honey samples sourced were mainly collected From Basrah, Maysan, Najaf, Karbala, Babylon, Wasit, Baghdad, Diyala, Kirkuk and Sulaymaniyah in 2016. The remaining samples were pure fresh honey obtained directly from specific beekeepers. After collection, honey samples were stored in air tight glass jars at ambient temperature.

Determination of Total Proline :

The total Proline in honey samples were determined using the methods of (12).

Determination of Diastase Number :

Diastase number was proposed by (1).

Determination of hydroxymethyl furfural (HMF) :

The quantitative method proposed by (9).

Determination of Vitamin C:

Vitamin C (Ascorbic acid) contents of the samples were determined by the 2,6-dichlorophenolindophenol titrimetric method as described by (11).

Results and discussion

Proline

The Fig 1 showed the values of proline in the honey samples. in addition The statistical analysis showed significant differences between the mean of proline ($P < 0.05$). Karbala honey was the Highest value of proline 687.34 mg/Kg compared with honey of Kirkuk region 600.13 kg^{-1} and Baghdad honey, where proline values 510.13 kg^{-1} and honey of Diyala, Maysan and Sulaymaniyah honey 480.65, 409.53 400.76 mg kg^{-1} respectively, Then honey region of Wasit, Babylon and Basra with 340.26, 330.35 , 315.04 mg/Kg respectively. The lowest value of proline in Najaf region honey was 295.34 mg kg^{-1} .

proline may be useful for describing plant origin, while free amino acids are added by honeybee themselves, which leads to a higher rate of variability of amino acid content within honey than the same plants source (6).

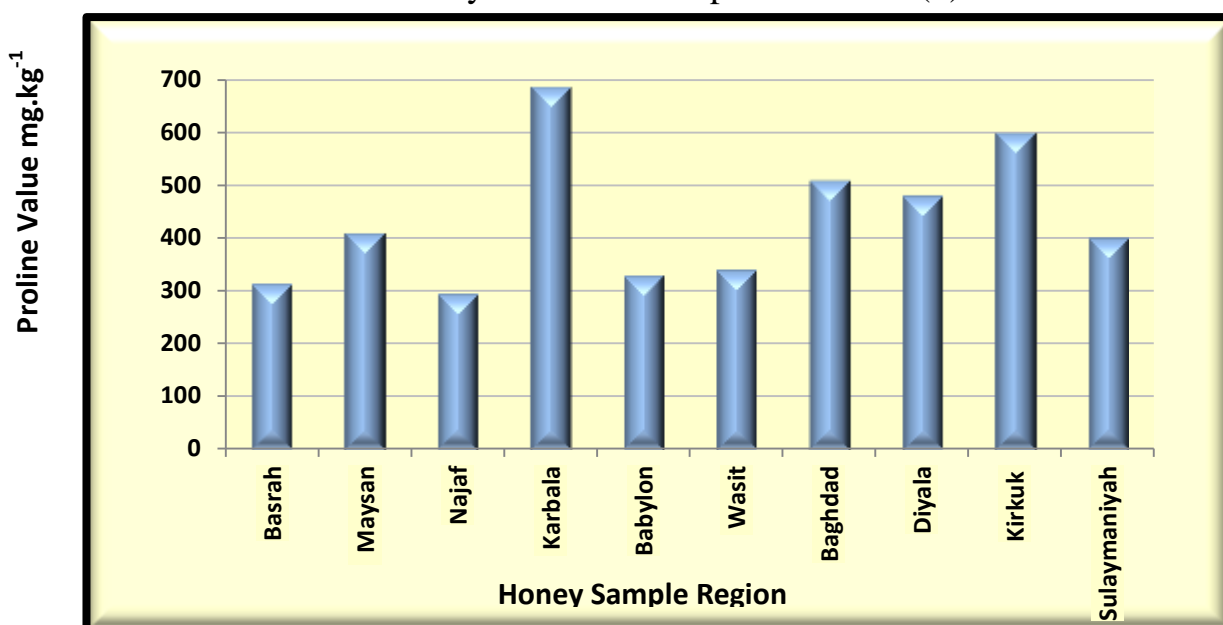


Fig1: Proline content value in honey.

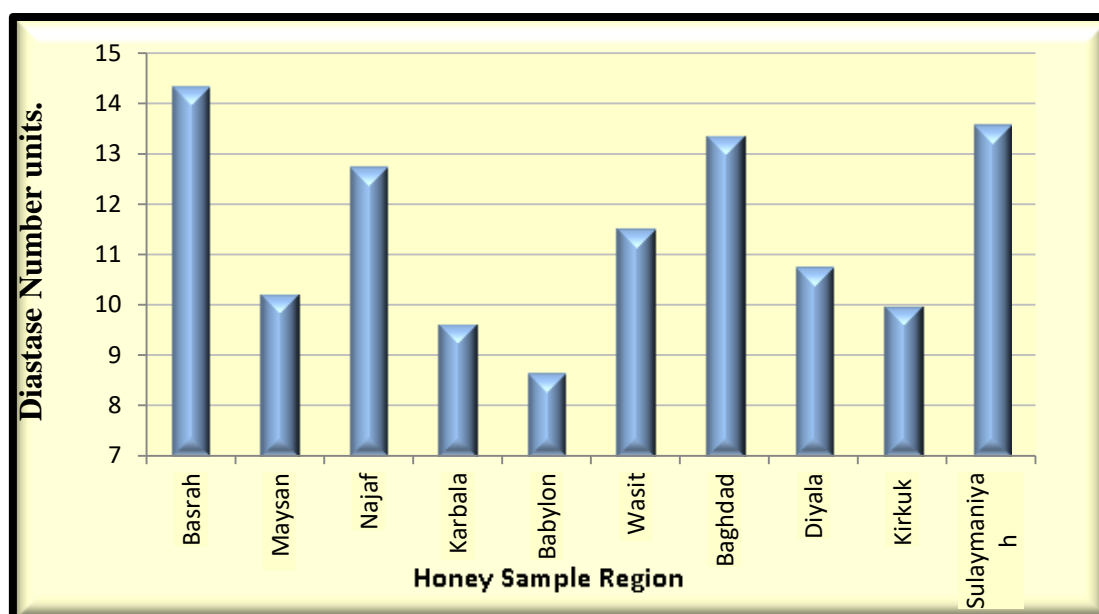
The content of proline in honey varies depended on different nectar types and geographical regions that bees collect (18), So The studies has been found that the content of proline varies during treatment periods the nectar and converted to honey by bee workers (13) The high values of proline in honey types study were associated with the values obtained by (20) The

Buckwheat honey 610.16 kg^{-1} Codonopsis honey was 494.49 kg^{-1} and Sunflower honey was 400.75 kg^{-1} and Turnips honey was 201.61 kg^{-1}

Diastase Number

Diastase Number in honey samples showed in The Fig 2. The statistical analysis showed significant differences between the means ($P < 0.05$). The highest Diastase Number in Basrah honey 14.36 units, Then honey of Al-Sulaymaniyah, Baghdad, Wasit, Diyala, Maysan, Kirkuk, and Karbala 13.59, 13.37, 12.76 , 11.53, 10.78 , 10.23 , 9.98 , 9.64 units respectively, The lowest diastese number in Babylon region honey was 8.67 units.

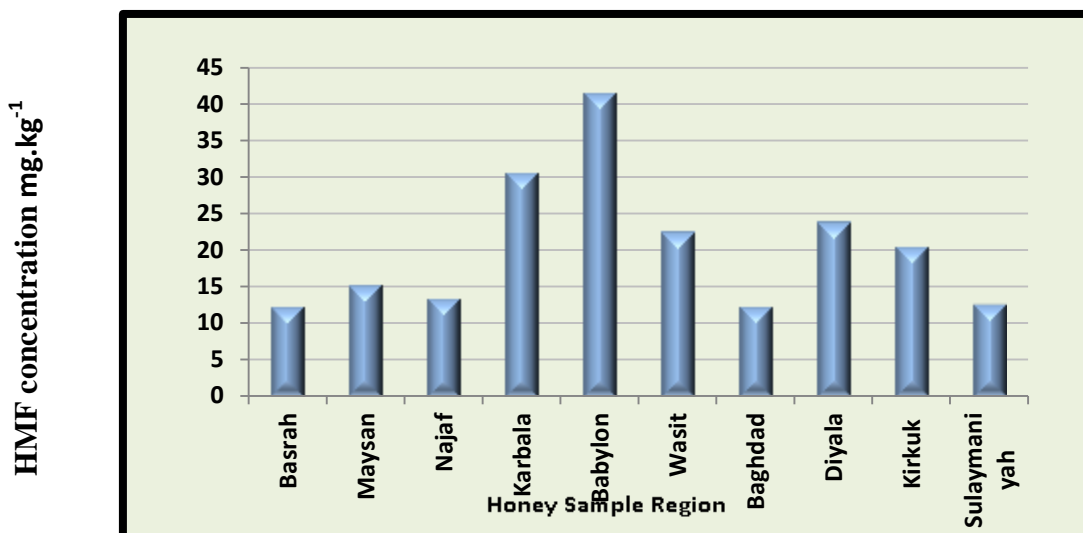
The levels of diastase in honey are influenced by many factors, including the geographical region, the plants source and the freshest of the honey produced, as well as some of the factors that may be exposed to honey after harvesting and during storage (9). The results were similar to (15) when they studied a honey taken from two different regions of Pakistan, The first group included 9 levels with a diastase number of 5.73-16.64 units, while the diastases number in the second group consisted of 6 levels Between 8.44 - 14.68 units.



Figur2: Diastase Number in honey samples .

HydroxyMethyl Furfural (HMF)

In the Figer 3 results showed the concentration of HydroxylMethyl furfural of honey and the statistical analysis showed significant differences between the HMF concentrations means ($P < 0.05$). The highest of the compound in Babylon honey was 41.54 kg^{-1} , Then the Karbala honey 30.68 kg^{-1} , and Honey of Diyala ,Wasit, where the concentration of the compound in them 23.95 , 22.64 kg^{-1} respectively, Then the honey of Kirkuk, which 20.58 kg^{-1} Maysan honey it was 15.34 kg^{-1} And the lowest concentration of HMF in honey of the of Basrah and Baghdad was 12.35 kg^{-1}

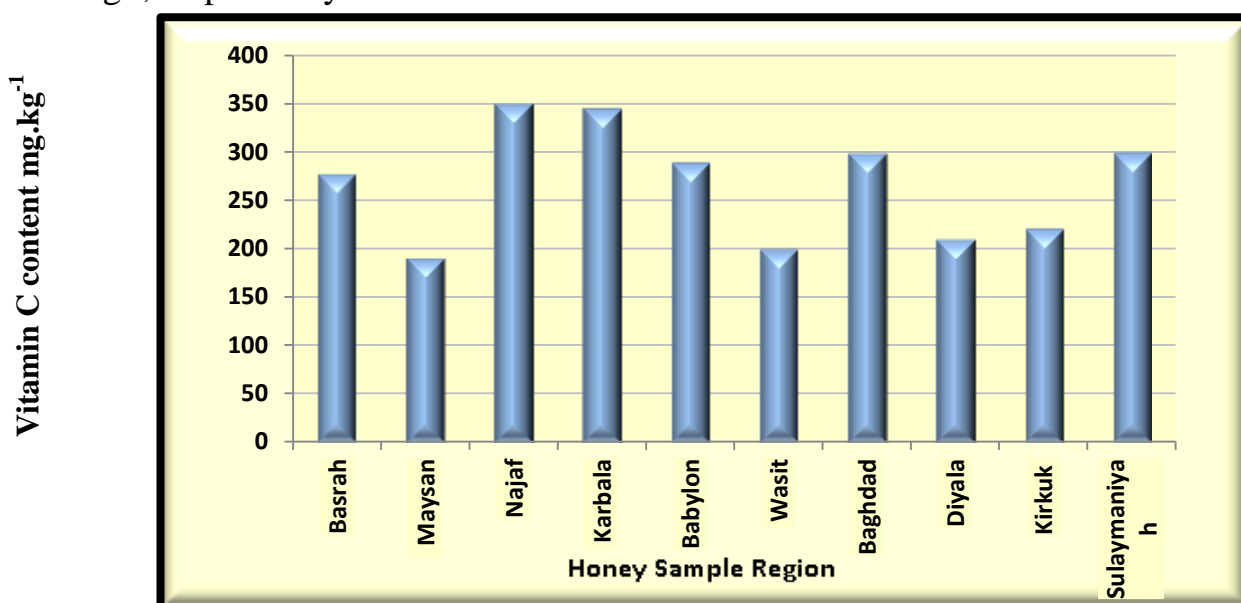


Figur3: HMF concentration value in honey samples.

The hydroxymethylfurfal concentration is important in determining the quality, stability and purity of honey, where its quantity in fresh honey is very low and almost non-existent and increases when honey is stored for a long time or when heated (2). The results were within the range found by (5) through their study of HMF content in Eucalyptus and Cocoa honey, between 13,824 to 74.112 mg

Vitamin C

In Figur4 the results showed the concentration of vitamin C in the honey samples, The statistical analysis showed significant between the vitamin means ($P < 0.05$). It showed the highest in Najaf and Karbala honey where the concentration of vitamin 350.23 and 345.34 kg^{-1} Respectively, Then Sulaymaniyah, Baghdad, Babylon, Basrah, Kirkuk and Diyala 300.1, 299.13, 289.56, 278.03, 221.33 and 210.34 kg^{-1} respectively. While the lowest value of vitamin C in the honey of Wasit and Maysan amounted to 200.02 and 190.54 kg^{-1} , respectively.



Figur 4: Vitamin C content value in honey samples.

Vitamin C content in honey depends on the variety of plant origin and on the nectar content collected by the bee workers, and is a Basic product of the plant's activities (14). The results were within the range reached by (8) when they studied a some types of Thai honey New Zealand manuka honey found the content of vitamin C was for the Korlan honey 200.19 kg⁻¹, Macadamia honey 323.75 kg⁻¹, Sunflower honey 219.35 kg⁻¹ kg⁻¹ Coconut honey 165.71 kg⁻¹ Mangosteen honey 379.31 kg⁻¹ Eucalptus honey 147.51 kg⁻¹ Sesame honey 134.10 kg⁻¹ and 1067.37 kg⁻¹ in New Zealand manuka honey.

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