

Boron Relationship to Certain Qualities of Two Types of Iraqi Dates

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Abstract: This research observes Boron in relation to a traditional Iraqi dates and the wide range of essential nutrient and high nutritional value of traditional food in Iraq, with multiple benefits, as well as Boron which the body needs in small amount and can't be dispensed, so this study is to clarify the role of boron in the qualitative qualities that have to do with human life. In this research two type of famous Iraqi dates Bream & Barhi have used, the samples have been taken from soil contains enough Boron all samples from the same area to standardize research conditions to study the date characters in connection with Boron content. This research was conducted in summer 2016-2017, where samples taken from two types of dates (Berhi and Bream), and Boron was measured using Azomethine -H method and then measured by Spectrophotometer 420mm, also involved measuring level of sugar, Amino Acids and total Polyphenol contains. the study carried out that B in small amount affect qualitative characteristics such sugar concentration, amino acids, protein and phenols of dates, protein decrease during growth stage to give the best test for dates especially in Bream, this give the reason Bream is preferred some time than Barhi. In addition, reducing sugar contain related to boron concentration, sugar content depends upon the type of sugar which is not harmful to human health, a positive relation between amino acid in connection with B content, Bream amino acid content higher than in Berhi, phenols materials decrease, during maturation

Key words: dates, Boron, sugar, amino acid, phenols

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I. Introduction

Dates are an important traditional crop in Iraq, use dry or soft, dates provide wide range of essential nutrient and high nutritional value such as soluble solids 82% and acidity 5-6% [1], vitamins such as A, is 10 units, thiamine or vitamin B1 4%, riboflavin vitamin B2 4%, niacin B3 8%, pantothenic B5 12%, vitamin B6 13%, folic acid 5% B6 13%, vitamin C 1% vitamin E less than 0.5% and vitamin K 3%. In addition to its content of calcium, iron, manganese, magnesium, phosphorus, potassium, 44-88%, fat 0.2-0.4% and protein 2.3-5.6%, fiber 6.4- 11.5% and 18% moisture [2].

Dates source of energy and carbohydrates about 70-80%, which 74% of the total sugars, despite the high carbohydrate content, but most of the sugar is fructose and glucose, which is easy to absorb in the human body [3]. Dates considered the second largest content of antioxidants, the total content of phenols is high, especially date nuclei, recommended as natural antioxidants [4], phenols 1623-25700 micromole/ 100 g Dry matter [5].

The active compounds found in date nuclei can be summarized as follows: Flavones include: Naringenin, Luteolin, Rhamnetin, and other such as Qlycon, Aglycon and some of titian materials, it is worth noting that phenolic compound from the decomposed dates in the early stages of the dates are much larger than those in maturity stage and the efficiency of the antioxidants is high which is a combination of dietary fiber, phenols & flavones, date can be used to produce novel antioxidant [6],[7], an increasing in the inhibitory oxidation of the extract in storage [8].

Dates resistant to bacteria for the presence of tannin in the, date protein high in amino acids, about 23 types in it, and has proven that the dates reduce the incidence of heart disease, Cancer, Parkinson's and Alzheimer's disease [9], Therefore [10], the high content of fiber reduces the incidence diseases such as constipation or the result of hemorrhoids, as well as for people with diabetes.

The American medical institutions recommended: eating dates rich in carbohydrates, fiber, reduces the fluctuation occurs in blood sugars, also contain some energy substrates such as triglycerides, glucose & nitrogen which reactive oxygen species, and estrogen.

The Important of Boron in plant:

Boron helps to reduce the accumulation of fat and reduce the high level of cholesterol in the blood, and is a participant in the daily enzymatic reactions, [11]. Boron deficiency leads to an abnormal reversal in the role of calcium and magnesium leading to hormonal imbalance, osteoporosis, arthritis and neurological dysfunction [12]. therefore, boron has a role in stopping this deterioration in plant, also, found that boron organizes the

transformation of carbohydrates to sugars therefore [13], [14] mentioned that Boron plays an important role in maintain sugar /acid ratio by maintaining the content of vitamin C of the plant.

Also, [15] pointed out the role of boron in the movement of auxin (IAA), and the movement of sugars from the leaves to the fruits., boron also affects the total solid compound of the grapes and decreased its acidity when boron element was added to the nutritious solution one week before harvest [16]. In sugar beet, absorption of boron by root from the soil led to a high quality of it. [17] Noted the increase in the weight of sugar beet root. In strawberry, there were significant increasing in vegetative and flower growth in all boron concentrations.

Boron treated plants, gave the highest results for the properties (leafy area, flowering ratio, average fruit weight, average yield of one plant and total yield), and in some plants also had an effect on dry matter ratios leaves and the percentage of total dissolved solids (total soluble solids TSS), [18] spraying pomegranate with boron resulted a significant increase in the percentage of flowers, fruit as well as the anthocyanin of juice [19]. In sunflower plant, spray boron had an effect and superiority in the genotypes characters , such as paper surface, diameter, number of seeds, protein [20], the boron effect on the qualitative characteristics of cotton found that 24 ppm boron had an effect in all the studied traits, and gave the highest percentage of total nuts and an average number of nuts open and increase the cotton crop compared to the non-spray treatment [21], mentioned the boron had an effect on local apricots also, the plants treated with boron 20 mg / l , gave the best results in terms of "seedling height, remarked an increasing in weight of leaves, chlorophyll, dry weight of the total vegetative" [22].

Effect of spray boron on the seedlings of tomato at the level of 10 mg B / L, gave the highest rate of plant height and the number of branches and flowers and floral shoots and the proportion of nodes in flowers and a significant increase in average number of fruits / plant, fruit weight, total fruit Weight and earlier yield [23], [14]. The Cabbage crop were significantly increased the total crop and the dry matter by addition both boron and urea, in addition, the results showed that the leaves contained some antioxidant compounds, (Glucobrassicin and Sinigrin. When sprayed different types of sesame plant, the results varied from the superiority in height of the plant and the percentage of oil increase in the number of plant branches, highest cans of fruit exceeds, the number of fruit cans and the number of seeds for pack [24].

II. Materials and methods:

The study was conducted for summer season for the year 2016-2017, where samples collected two types of dates, from Al-Rasheed area, Al-Berhi, and the other species is Al-Bream. The samples were collected at different stages of growth (Habbuk, kemri, Khelal ,Rutab ,the samples taken from the two regions were identical in terms of environmental, and samples similar in length, weight and period range as far as possible. The samples were taken for the period from May to October and collected three replicates from each stage of growth.

Boron concentration was measured according to others using the A zomethine- H method (1g sample of dry matter ashed at 500 C for 8 h, extracted with 20ml of 2M HCl at 90c for 10 minute the extract was filtered ,2ml of it added 4ml of buffer solution and 4ml of A zomethine - H then measure by spectrophotometer 420 nm (Fullerton, California).

Total and reduced sugars were estimated according to the Lane and Eynon 1975 method. Non-reducing sugars were estimated by finding the difference between total sugars and reduced sugars. Proteins were evaluated by multiplying the value of nitrogen x 6.25 and nitrogen by 16% of protein.

Method of Determination of Total Amino Acids: 100 g of mature fruit was weighed and placed in a tube and 3 ml of HCL was added. The 6-point concentration, after discharge of the tube from the air, is placed in a 110 c° oven for 24 hours and then washed with distilled water several times, the samples are then measured by TLC and amalgam calculations are adjusted / 100 g dry weight.

Total poly phenol content determined by the Folin- Ciocalteau [25], the method is based on the colored reaction of phenolic with reagent, total N determined by Kjeldahl method.

Statistical Analysis: Statistical Analysis System (S.A.S 2010) was used and the averages were compared with the least significant difference (LSD5%

III. Results and discussion:

3.1 Date content of N%, Protein and its relation with boron

Protein consumption depends on percentage of nitrogen, N content reduce, there is an inverse relation between Protein & Where increasing B reduce the protein contains during growth stage (tab:1) their concentration differ between the varieties due to difference in cultivation [26]. Protein play role in the non-oxidative browning and the precipitation of tanning during ripening decrease [27]. Protein gives the best test for dates, this give the reason test of Bream is preferred some time than Barhi.

Table (1) Relationship between nitrogen, protein and boron

	Protein %	%N	B mg/kg
Braem			
Hababek	7.13	1.14	17.1
kemri	7.75	1.21	15.8
Khalal	7.37	1.18	19.4
Rutab	5.58	0.893	20.1
Tamer(date)	5.45	0.872	21.1
Berhi			
Hababek	8.19	1.31	17.5
kemri	8.69	1.39	17.2
Khalal	7.94	1.27	16.3
Rutab	6.38	1.02	18.4
Tamer(date)	6.17	0.987	18.7
LSD5%	1.093 *	0.217 *	2.166 *

3.2 Dates content of sugars Dates:

Dates consist mainly of carbohydrate and the largest proportion of sugar and other elements, the decomposition of reducing sugar and decomposition of sucrose to glucose & fructose is very important to give the good quality of sugar s dates, table : 2 Fig 1,2) show un seen area of sucrose, and the area of glucose is closely equal to Boron content, there was significant difference between dates content value of sugar in both dates ,Repining is closely related with color variability, Tamur stage is Characterized by a firm texture with dark color and its storability color which correlated to glucose, fructose and sucrose levels [28], so the importance of sugar content depend upon the type of sugar which is not harmful to human health, from here comes the role of boron in the transformation of sugars in the final maturity[29]. The graph shows the relationship between two types of dates and their content of boron & sugars, the correlation between boron and their content of glucose and fructose and notes low sucrose show in tab:2.

Table (2) Dates content of sugars

Glucose/ fructose	Reducing Sugar	Total Sugar content	Total sugar			fruit
			sucrose	glucose	fructose	
1.25	19.3	80.27	0.27	35.6	44.4	Barhi
1.05	36.6	63.3	0.41	30.6	32.3	Bream
0.642 NS	8.91 *	6.742 *	0.122 *	2.319 *	3.584 *	LSD5%

Figure (1): Sugar content of dates in the stage of recent maturity of sugars and their relationship with boron (1. Glucose 2. fructose 3 sucrose 4. Boron content)

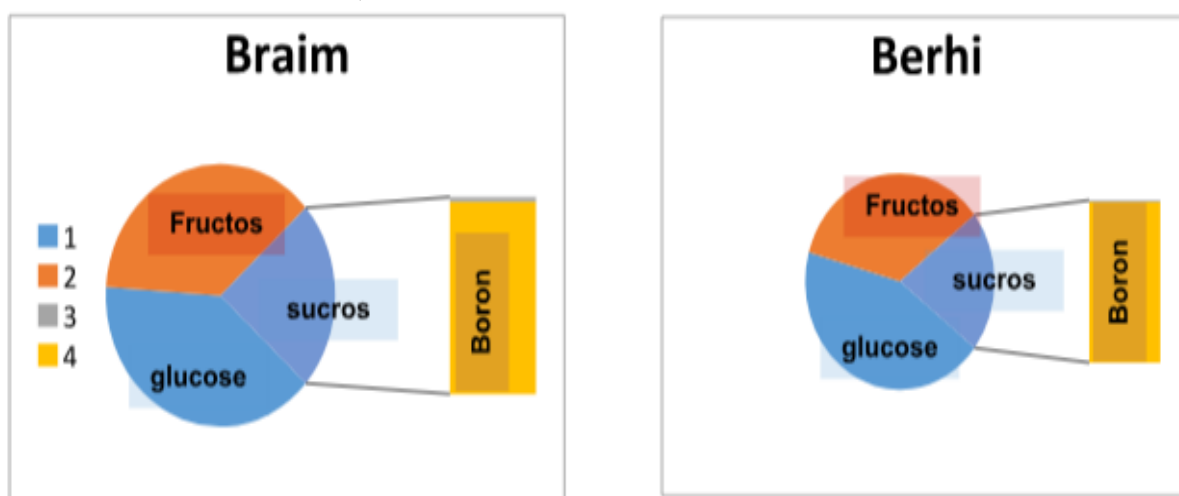
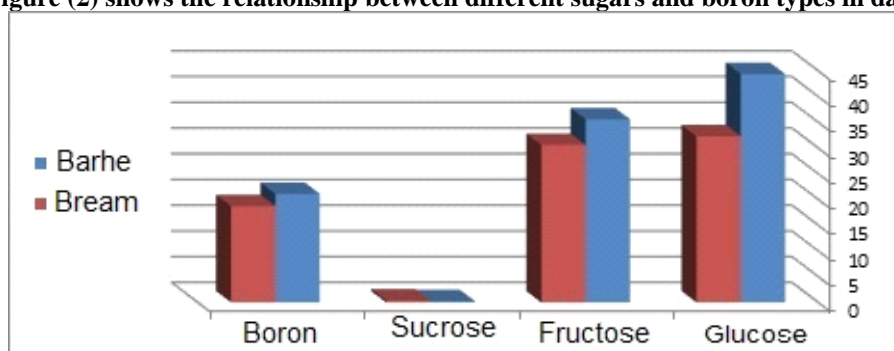


Figure (2) shows the relationship between different sugars and boron types in dates



3.3 Amino acid

The protein in date contains 23 type of amino acids, some of which are not present in most popular fruits such orange, apple and bananas, [2]. Dates contain many essentials amino acids which favorable to the human needs. (Tab:9) show the positive relation between amino acid in connection with B content, Braim amino acid content higher than in Berhi, this result agrees with [30], results shown in (tab.3)

Table (3) Dates content of amino acid mg/100g

Boron mg/kg	Total Free Amino acid	
Bream	21.1	80.27
Barhi	18.7	63.30

3.4 phenols content of Dates

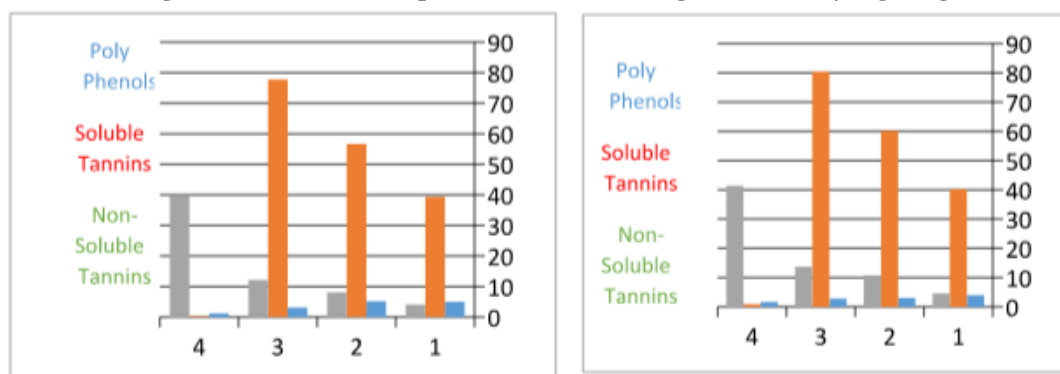
The soluble form of tennis convert into insoluble ones during ripening stage, high content of soluble and insoluble form of tennis protect fruit from microorganism, Dates content of phenols in various stages of maturity, show table (4) the amount of simple phenols materials decrease, during maturation. The titanic material is deposited into insoluble granules and the clutch taste disappears, here the amount of phenolic tannins is greater than the simple phenols. These results are consistent with the [31] there is negative relationship between fruit decay and its content of tannins, this due to Boron content, (Fig:3).

Table (4): Phenolic Compounds in different stages of maturity

Bream				
mg/100g	Hababuk	kemri	Khalal	Rutab
Poly Phenols	3.95	3.03	2.79	1.65
Hydrolysable Tannins	40.2	60.2	80.4	0.87
non soluble	4.60	10.7	13.7	41.4

Berhi				
mg/100g	Hababuk	Kemri	Khalal	Rutab
Poly Phenols	5.01	5.20	3.13	1.23
Hydrolysable Tannins	39.4	56.7	77.7	0.32
non soluble	4.10	8.12	13.2	30.5

Figure:(3) Phenolic Compounds in different stages of maturity mg/100g



IV. Conclusion:

The purpose of this study is to know the role of Boron with dates and to improving the nutritional culture and consider dates a basic material in nutrition especially if accompanied by the presence of Boron which necessary for many vital processes, day by day proving the need for Boron not only in human life but for animal and plant. This study resulted the role of Boron in regulated sugar content of dated in harmless to health also increase amino acid and reduce phenol.

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