

Effect of Boron Content on Movement of Nutrient During Ripening Stage of Iraqi Dates

*Jabrah Ahmed Ankush

Dept. of Desertification Comb. College of Agriculture-University of Baghdad, Iraq

Corresponding Author: *Jabrah Ahmed Ankush

Abstract: *The old man said, "The palm tree supply them with all their necessities except cereals". Fruit of dates served as the staple food for millions of people around the world for several centuries, dates recognized as a healthy food, date fruits are highly nutritious and have several potential health benefits, there are at least 15 minerals in dated, this research aims at the movement of the elements in connection with Boron content during the different stage of maturity for two of the most famous Iraqi dates (Bream & Berhi) this due to role of B in the balance of mineral element to increase the efficiency of the plant in the middle period of ripening and its effect on the morphological characteristics of the ripening fruits, the result also show the effect of Ca/B ratio on the movement of macro and micro nutrients which is necessary to ensure a healthy life and less diseases according to a dynamic trace element which can affect the physiological amounts and the metabolism or utilization of numerous other substances involved in life processes.*

Keywords: Boron, Dates, nutrient

Date of Submission: 13-07-2017

Date of acceptance: 14-08-2017

I. Introduction

Date palm (*Phoenix dactylifera* L.) adds to the aesthetic importance of great economic importance not only in Iraq but in the whole world. Date palm belongs to the Palmas family. The Italian scientist OcardoBeccari pointed out, that the original palm home is Arabian Peninsula, and the first documented appearance of palm date in the Old World in Tal Awili and Tal Abu Shahr in the city of Aridu (Ur) in the far south of Iraq 4000 years BC, [1] has been found a lot of Sumerian inscriptions that show how old is the palm, Palm is generally a sacred tree, the importance of palms in Iraq mentioned by Strabo : The old man said, "The palm tree supply them with all their necessities except cereals". Fruit of dates served as the staple food for millions of people around the world for several centuries, study on the health benefits are inadequate and recognized as a healthy food by the health professionals and the public, date fruits are highly nutritious and have several potential health benefits, [2], also date fruit is the richest of vitamins and various minerals which is necessary to the natural balance [3].

There are at least 15 minerals in dated, the percentage of each mineral dried dates varies from 0.1 to 916 mg/100g dates depending on the type of mineral, potassium can be found at a concentration as a high as 0.9%-0.5%. Other minerals and salts are found in various proportions include Boron, Calcium, Cobalt, Copper, Fluorine, Iron, Mg, Mn, Na, and Zn in addition to its content of, phosphorus, potassium, [4]. Dateds contain Selenium which believed to help prevent cancer and important in immune function (3), fluorine in dates four times than other fruits, therefore plays a role in maintaining safety and preventing caries of teeth, this explain, the people of Al-Bedween have healthy teeth due to eat amounts of dates rich in fluorine, calcium, and phosphorus, [5] those also have less cancer-related to high magnesium content [6]. Boron is an important element of basic nutrients, but its importance is ignored in the human diet, it is necessary to ensure a healthy life and less diseases is a dynamic trace element which, in physiological amounts, can affect the metabolism or utilization of numerous other substances involved in life processes including macro minerals. Through these effects, B can affect the function or composition of several body systems, including the brain, skeleton and immune system, generally in a beneficial fashion. Moreover, homeostatic mechanisms apparently exist for B because it is rapidly excreted in the urine, does not accumulate in tissues, and is maintained in a relatively narrow range of concentrations in blood of healthy individuals [7], [8].

II. Materials And Methods

The study was conducted for summer season for the year 2015-2016, where samples collected two types of dates, from Al-Rasheed area, Al-Berhi, and the other species is Al-Braem. The samples were collected at different stages of growth (Habbuk, chemri, 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. The samples were washed and dried for subsequent laboratory analysis. The processes for elements were cutting and drying in a normal oven at 105 ° C The sample in a ceramic and burn it in a Muffle furnace oven at a temperature of 550 m for 12 hours and then transferred to a moisture-proof device to cool and then add 10 ml of 20% HCL, then filter and complete the volume to 50 ml with distilled water, Atomic Absorption Spectrophotometer 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

Chemical composition: (table No. 1, Figure 1) show dates content of macro element in various stages of ripping, generally the highest percentage of N%, P%, K% found in both phases kimri and Khalal in both dates varieties, N% in Brahi than in bream, K% was the highest value in the bream in kimri and Khallal period, P value high in hababuk stage of the Braem and gradually decrease in the following stage of ripping. However, if we look at date content of B (tab .6) the result shows the highest in the advance stage of ripping, the positive relationship between B & N, K explain by the role of B to increase the efficiency of plant adsorption of these elements and the balance of mineral [4]. However, if we look at the Boron data will find the highest value in the advance period of ripping, this due to role of B in the balance of mineral element to increase the efficiency of the plant in the middle period of ripping and its effect on the morphological characteristics of the fruits in the final version [9], without effect of B some few difference and no significant difference among cultivars [4]. Analysis of mineral composition of dates generally high in both dates, (table 2), there is no significant difference between Ca, Mg content, in addition to compere result between periods growth and type of dates, Bream recorded high Mg percentage than in Rutab and tamer(dates) stage, than in Berhi, the lowest value show in kimri and the highest in hababuk, this explain the role of Boron to increase Mg uptake in food consumption. (fig3).

Ca slightly decrease during growth stage which give the soft texture to the fruit and keep the level of human needs to enhance the interest importance of dates for humans, where they provide the amount that they need for physiological and biochemical function in human body [10]. Boron with calcium also increases the durability of the fruit wall, making dates resistant to damage, from here come to this due to soil content of boron and its role in helping the plant absorb mineral (10) Ca/B ratio were evaluated as a possible guide to Boron toxicity or deficiency it was found for normal growth Ca/ B ratio between 150-300 for fruit [11].The figure (3) shows the indirect effect of B-Ca to realize the uptake of N which caused by the absence of B, the positive relationship between nitrogen and calcium in dated fruit which important for human and animal.

Table (1) Dates content of macro elements in different stages of maturity

	Bream	P%	N%	K%
1	Hababuk	0.172	1.14	1.13
2	kemri	0.151	1.21	1.39
3	Khalal	0.158	1.18	1.46
4	Rutab	0.112	0.893	1.02
5	Tamer(date)	0.116	0.872	0.97
	Berhi			
7	Hababuk	0.156	1.31	1.08
8	Jemri	0.149	1.39	1.11
9	Khalal	0.151	1.27	1.17
10	Rutab	0.121	1.02	1.07
11	Tamer(date)	0.111	0.987	1.01
	LSD5%	0.0355 *	0.281 *	0.288 *

s) shows the content of fruits of macro elements in different stages of ripping

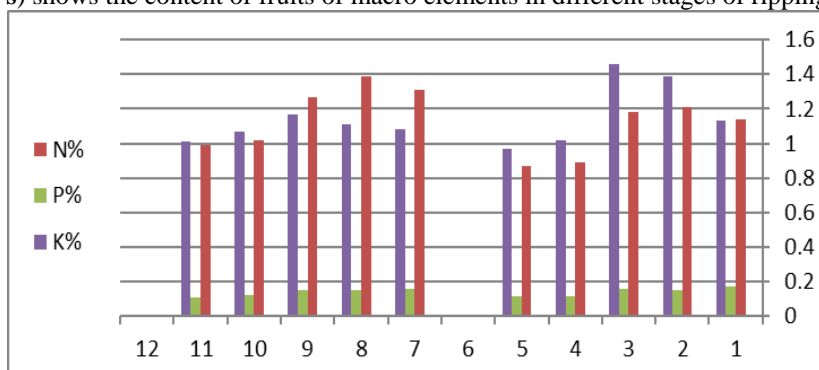
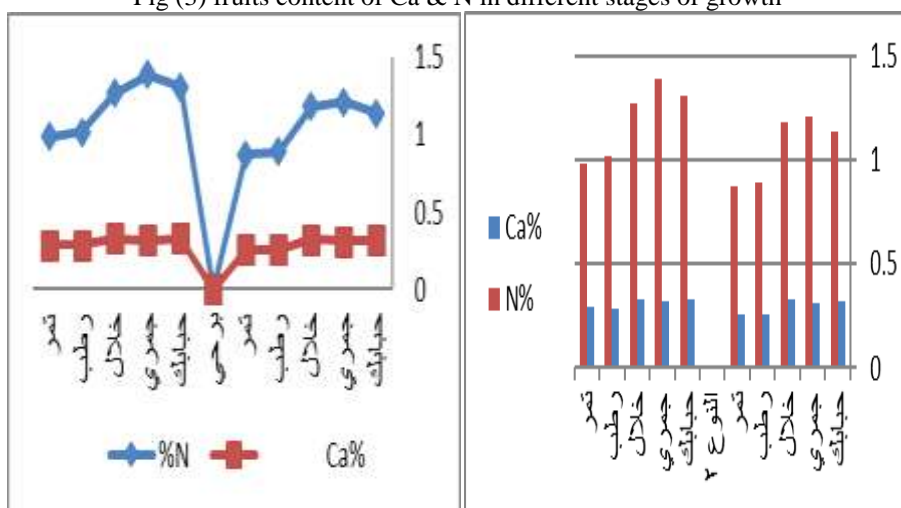


Table (2) shows the calcium and magnesium content of the fruits

	Bream	Mg%	Ca%
1	Hababek	0.081	0.318
2	Jemri	0.087	0.311
3	Khalal	0.084	0.326
4	Rutab	0.086	0.256
5	Tamer(date)	0.088	0.261
	Berhi		
7	Hababek	0.107	0.333
8	Jemri	0.093	0.321
9	Khalal	0.097	0.329
10	Rutab	0.098	0.287
11	Tamer(date)	0.099	0.291
	LSD5%	0.037 NS	0.189 NS

Figure (2) : calcium and magnesium content of the fruits of in different stages of ripping

Fig (3) fruits content of Ca & N in different stages of growth



Trace element content:The highest Zn recorded in early stage of growth and fortunately slightly decrease in ripping period in both Berhi and Bream, as for Fe record lesser reading but stay at human need. (tab.3) (fig4) **Fe in Bream** higher in Berhi.Mn, however had higher value recorded in tamur period in the Bream than Berhi, Cu recorded the lowest value in the fruit dates in the Bream. (tab.3) (fig5).

	Bream	Cumg / kg	Znmg / kg	Mnmg / kg	Femg / kg
1	Hababek	5	15.5	7.59	0.087
2	Jemri	6.32	14.3	11.2	0.078
3	Khalal	6.9	14.8	13	0.076
4	Rutab	4.31	9.95	9.37	0.075
5	Tamer(date)	4.2	9.98	10.1	0.072
	Berhi				
7	Hababek	5.55	15.8	6.89	0.077
8	Jemri	5.86	15.3	7.21	0.07
9	Khalal	5.94	15.1	7.35	0.068
10	Rutab	4.54	12.2	7.02	0.65
11	Tamer(date)	4.45	12.5	7.09	0.067
	LSD5%	1.427 *	2.507 *	2.317 *	0.0223 *

The relationship between Mn& Zn and B:

In (Fig: 4) shown the movement of the three elements in dates, it noted from that the B movement in all period of growth in Bream reduce the percentage of Zn & Mn, while not the same in Berhi, (fig5) the relationship between Cu& B turn to be inverse relation, where the data content of Cu decrease by B increase. but Fe keep the same level. Hence the indirect effect of B Which effect the content of Ca, Mg and this affects the

fruit content of Mn&Zn [12] a strong inter-element association between boron and most of other element Boron content in dates.

Table (3) content of the fruits of the micro elements in different stages of maturity mg/ kg

Figure (4): Relationship between the content of boron, zinc and manganese

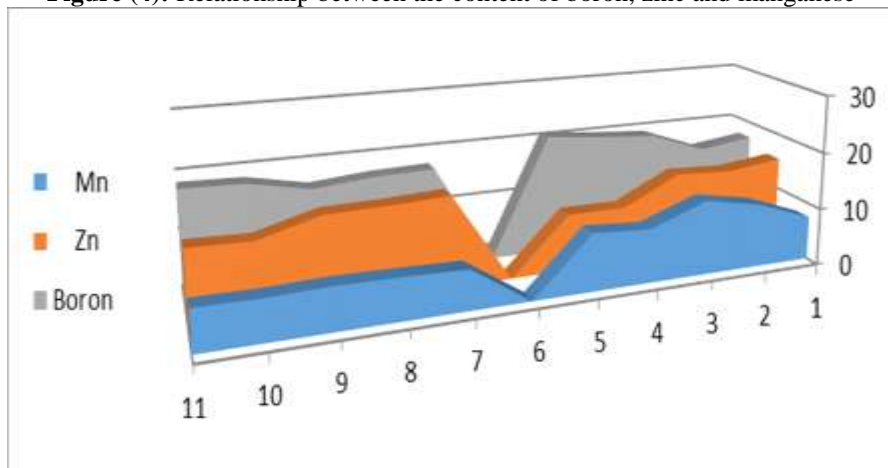
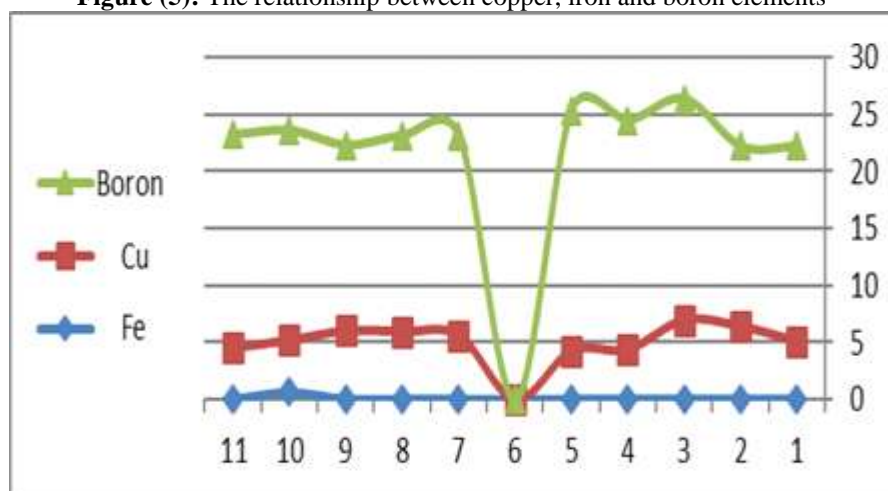


Figure (5): The relationship between copper, iron and boron elements



Fruits B content:

The table below shows the fruits B content, in different stage of ripening, the data shows the significant difference B in both dates, these value result of soil absorption then plant up take which increase by B [13], this explain the uptake of other element and development of morphology and chemical characters of dates (Rutab& Tamer) [14].

Bream	Boron
Hababek	17.1
Jemri	15.8
Khalal	19.4
Rutab	20.1
Tamer(date)	21.1
Berhi	
Hababek	17.5
Jemri	17.2
Khalal	16.3
Rutab	18.4
Tamer(date)	18.7
5% LSD	2.428 *

Also note the value of Boron in the stage of hababuk- (both type) -show the same value, but its consumption during growth is different, and depend on many processes that develop the quality and the chemical content of each type, also see the difference in ripping fruit content, higher in Bream than Berhi, this explain that Bream higher in chemical compound than Berhi but remains within acceptable limit this result agrees with [15].

Figure (6), the movement of boron in different stage

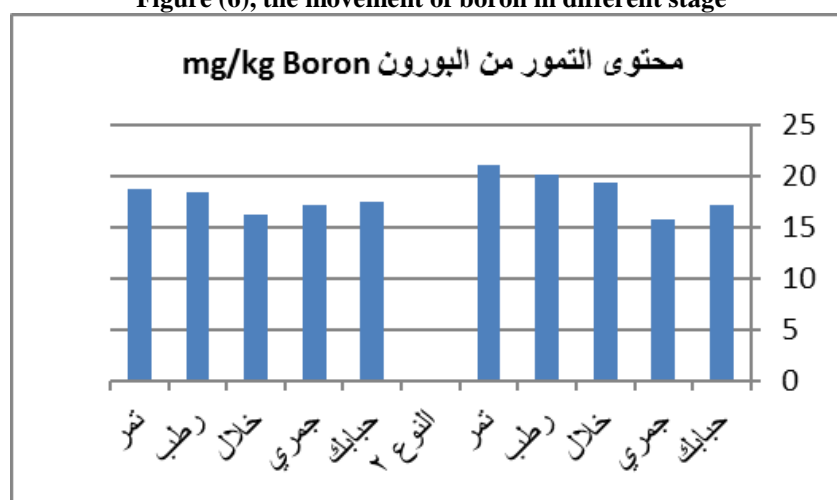


Table (4): Boron content in different stages of Ripping

Ca/B Ratio in dates during ripening period

The table (5) show that Ca/B ratio decrease during ripening growth for both kind of dates but in compared with two type of dates ,the Ca/B ratio of Bream lesser than Berhi , this explain the movement and adsorption of elements higher in Bream than Berhi , these result agree with [16] which indicate that calcium has modifying effect of boron adsorption on the concentration of other plant nutrients, Ca/B ratio must keeping in view in greater details to test the general question as to whether Ca/B ratio has an association with plant content of nutrient [17] , the interrelationship occurs both in soil and plant ,a number of investigators have shown that the pathological symptoms produced in plants by boron deficiency are remarkably similar to those produced by calcium deficiency under like experimental conditions [18],[19].

Table (5): B, Ca & Ca/B Ratio in dates during ripening period

	Growth stage	Boron	Ca%	Ca/B Ratio
1	Bream Hababek	17.1	0.318	186
2	Jemri	15.8	0.311	197
3	Khalal	19.4	0.326	168
4	Berhi Rutab	20.1	0.256	127
5	Tamer(date)	21.1	0.261	123
6	Hababek	17.5	0.333	190
7	Jemri	17.2	0.321	186
8	Khalal	16.3	0.329	202
9	Rutab	18.4	0.287	156
10	Tamer(date)	18.7	0.291	156
	LSD5%	2.428 *	0.189 NS	

IV. Conclusion

Dates are the food of the poor man and the rich alike, if the important of dates is known to many people, many of them don't know the importance of boron in their health, the purpose of this study is to enhance the importance of dates and to clarify the importance of boron and improve the quality of dates in terms of containing the nutrient and the role played by boron in the movement of these elements to be a semi complete food especially for poor man .If allowed to choose, the research resulted bream is more balanced than Berhi but still depends on consumer taste.

Reference

- [1]. Ibrahim Abdul Basit Odeh: palm cultivation and date production in Iraq 2013.
- [2]. H. Nielsen Forrest: Boron in human and animal nutrition, Plant and Soil 1997 Volume 193, Issue 1–2, pp 199–208
- [3]. M. Elleuch, S. Besbes, O. Roiseux, C. Blecker, N.E. Drira, and H. Attia, Date flesh: Chemical composition and characteristics of the dietary fibre. Food Chemistry. 111, 2013 (3):676-68228.
- [4]. A. Moneim E. Sulieman, A. Itmad. AbdElhafise ,Awad M. Abdelrahim : Comparative Study on Five Sudanese Date (Phoenix dactylifera L.) Fruit Cultivars. Food and Nutrition Science, 2012 (3) 1245-1251.
- [5]. A. T. Shaker,: Effect of the use of boron spray at different levels and dates in the growth, yield and quality of the genotypes of sunflower. Iraq cultivation index 2011, Volume 39 Issue 3:16-24.
- [6]. Shuker, Mahdi Mohammad Hassan : Direct Consumption of Dates and Their Products in Baghdad Governorate, research presented at a seminar organized by the Ministry of Commerce, Trade Training Center, 1987, April 25-26, Baghdad
- [7]. Mohamed Hussein Aziz : Nitrogen and boron fertilization and its relationship to proline synthesis and resistance to dry maize crop Diala, Jour 2009, Volume, 37, pp: 12-19
- [8]. Praveen K. Vayalil : Date fruit (Phoenix dactylifera Linn) an emerging Medicinal Food, Food Science 2012 ,(52): 249-271
- [9]. Mohammed, Hussein Aziz: Philosophical Responses Associated with Drought Resistance, New Horizons, 2008, Issue 14, pp. 14-24
- [10]. Tariq, M. and C. J. B. Mott : Effect of applied Calcium –Boron Ratio on the accumulation of nutrient –elements by Radish (Raphanussativus L.), Journal of Agricultural and Biological Science 2007, Vol 2 No 2 PPI-10
- [11]. Pillay, A.E., Williams, J. R., El Mardi, Hassan, S .M, Al-Hamdi. A. : Boron and the alternate-bearing phenomenon in the date palm (Phoenix dactylifera). Journal of Arid Environments, 2005 Vol 62(2) 199-20.
- [12]. Atef Ibrahim and Mohamed Nazif, 2004 Palm Dates, sponsorship and production in Arab world 2004 published by MushatAlmaarif.
- [13]. Fayaz Ali, Amjed, Ali, Hameed Gul, Muhammad Sharif, AroojSadiq, Ansaar Ahmed, Arif Ulla, Amanulla Mahar, Shahmir Ali Kalhoro: Effect of Boron Soil Application on nutrients Efficiency in Tobacco Leaf, American Journal of Plant Science, 2015 (6) 1391-1400
- [14]. Al Mousawi, Mona Turki & Issa, Bahaa Nizam Production and marketing dates in Iraq reality and ambition Specialized Symposium 2006, Market Research and Consumer Protection Center.
- [15]. Al-Shahib, Walid & Marshall, J. Richard : The fruit of the date palm: its possible use as the best food for the future? International Journal of Food Science and Nutrition, 2003, Volume 54, Number 4, pp 247-259.
- [16]. Henrique Coutinho Junqueira Franco, José Lavres Junior, Adilson de Oliveira Junior, Gean Carlos Silva Matias, Cleusa Pereira Cabral & Eurípedes Malavolta: Optimum Ratio Of Calcium And Boron in The Nutrient Solution or in Castor Bean Shoot for Fruit Yield and Seed Oil Content. Journal of Plant Nutrition, 2012 Volume 35, - Issue 3 pp: 413-427
- [17]. Drake, Mack. Dale h. Sieling, D.H. Scarseth, G.D.: Calcium-boron ratio as an important factor in controlling the boron starvation of plants, Journal of the American Society of Agronomy, 1941
- [18]. Al-Mawla, Ra'ad Mohsen Matar : The Effect of Boron on the Growth and Production of Cotton Crops, Iraq Agricultural Science, 1991 Vol. 22, No. 1, pp. 114-121
- [19]. Trabzuni, Dina M, Seif Eldien B. Ahmed, Hamza M. Abu-Tarboush : Chemical Composition , Minerals and Antioxidants of Heart of Date Palm from three Saudi Cultivars Food and Nutrition Science .2014, (5) 1379-1386

Jabrah Ahmed Ankush. "Effect of Date Content of Boron on Movement of Nutrient During Repining Stage." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS), vol. 10, no. 8, 2017, pp. 07–12.