INFLUENCE OF ORGANIC FERTILIZER ON DATE PALM CV. BARHI 2. LEAVES MINERAL CONTENT

F. H. Taha **M. R. Abood**
Instructor **Prof.**
Fadiyya al ghaib@yahoo.com
Dept. Of Hort. and Landscape- Coll. of Agric. – University of Baghdad

ABSTRACT

This experiment was carried out in a private palm farm located in Great Musayib enacted / Babylon province on Barhi dates palm trees *Phoenix dactylifera* L. cultivar to determine the effect of spraying of chitosan and soil additives for both organic fertilizers and amino acids and seaweed extract in some leaves mineral content (nitrogen, phosphor, potassium, iron, manganese and zinc) by spraying the chitosan at concentrations of 5 ml. l^{-1} and 10 ml.L^{-1} and the addition of both organic fertilizer and amino acids and seaweed extract at concentrations (1, 2) kg.tree $^{-1}$ and (3 , 6) ml . L^{-1} and (4, 8) ml l^{-1} respectively. Each treatment replicated five times with a factorial experiment using RCBD, one date palm for experimental unit.The following are the main findings, The effect of chitosan spray significantly in the leaves mineral content as the concentration gave at10 ml.L^{-1} (C_2) significantly increased leaves N content of 1.07 %, leaves K content of 1.28 % and leaves zinc content of 22.99 mg.kg^{-1} dry weight. That spray at levels 8ml.L^{-1}(S_2) significantly superiority of the control treatment and gave the highest leaves K content of 1.40 % and leaves Mn content of 1.233 mg.kg^{-1} dry weight, amino acid at 6 ml. L^{-1}(A_2) treatment gave the highest leaves N content of 1.14 %, leaves P content of 0.180 %, leaves Fe content of 178.6 mg.kg^{-1} dry weight,. While the lowest results in the control treatment.

Key words: chitosan, seaweed extract, barhi cultivar, leaf mineral content, organic fertilizers.

تأثير الأسمدة العضوية على نخيل التمر صنف برحي 2. محتوى الأوراق من العناصر

فادية هشام طه* **مؤيد رجب عبود**
مدرس **أستاذ**
Fadiyya al ghaib@yahoo.com
قسم البستنة وهندسة الحدائق – كلية الزراعة – جامعة بغداد

المستخلص

اجريت هذه التجربة في مزرعة نخيل خاصة تقع في مشروع المسيب الكبير/ محافظة بابل على فسائل نخيل التمر *Phoenix dactylifera* L. صنف برحي لمعرفة تأثير الرش بالكاتيوسان والاضافات الارضية لكل من السماد العضوي المصنع والاحماض الامينية ومستخلص الطحالب البحرية في محتوى الأوراق من (النتروجين، الفسفور، البوتاسيوم، الحديد، المنغنيز والزنك) وذلك برش الكاتيوسان بتركيزين 5 مل .لتر$^{-1}$ و 10 مل.لتر$^{-1}$ ، و اضافة كلا من السماد العضوي والاحماض الامينية و مستخلص الطحالب البحرية بالتراكيز (1، 2) كغم.فسيلة$^{-1}$و (3، 6) مل.لتر$^{-1}$ و (4، 8) مل.لتر$^{-1}$ بالتتابع . نفذت تجربة عاملية ضمن تصميم القطاعات العشوائية الكاملة RCBD وبخمسة مكررات وبواقع فسيلة واحدة للوحدة التجريبية .وفيما يأتي اهم النتائج التي تم التوصل اليها ، أثر الرش بالكاتيوسان معنويا في الصفات الخضرية للفسائل اذ أعطى التركيز10 مل.لتر$^{-1}$ زيادة معنوية في كل من محتوى الأوراق من النتروجين اذ بلغ 1.07% ، و محتوى البوتاسيوم وبلغ 1.28 % ومحتوى الأوراق من الزنك اذ بلغ 22.99 ملغم.كغم$^{-1}$ وزن جاف ، اثر رش مستخلص الطحالب بالمستوى 8 مل.لتر$^{-1}$ بأعطاء اعلى محتوى للأوراق من البوتاسيوم بلغ 1.40 % و محتوى الأوراق من المنغنيز بلغ 1.233 ملغم.كغم$^{-1}$ وزن جاف، الأحماض الأمينية بمستوى 6 مل.لتر$^{-1}$ اعطت اعلى محتوى للأوراق من النتروجين بلغ 1.14 % و الفسفور بلغ 0.180 % والحديد اذ بلغ 178.6 ملغم.كغم$^{-1}$ وزن في حين كانت معاملة المقارنة الأدنى في هذه الصفات.

الكلمات المفتاحية: كاتيوسان، مستخلص الطحالب، الصنف برحي، النمو الخضري، الساد العضوي .

البحث مستل من أطروحة دكتوراه للباحث الأول.

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INTRODUCTION

Date palms (*Phoenix dactylifera* L.) are native to family Arecaceae. This is of economic importance to the millions of people in the Middle East because they are a major tributary of the tributaries of the economy. Palm date is one of the oldest trees known to humans, dating back more than 4000 years BC and was cared for by the Babylonians and Assyrians (14, 22). The acreage of date palm in the world reached about 1353159 hectare, with production of 8460443 tons (13).The main producing countries are Egypt then Iran, Algeria, Saudi Arabia, United Arab Emirates (13).The estimated number of Date palm trees in Iraq, including nearly 14892000 tree produces up to 602350 tons, and the average production per tree about 63.7 kg, Baghdad was the first province to produce (6). Chitosan has an important role in regulating respiration, reducing the amount of water lost in the process of transpiration, as well as using it to fertilize plants and reduce the use of chemical pesticides due to its effective role in increasing the resistance of plant tissues to diseases and insects (2). Abdel-Mawgoud et al., (1) demonstrated the possibility of using chitosan in improving growth, increase leaf mineral content and increasing plant production. (23) found that the addition of Nano-Chitosan at levels of 2.5 and 5 ml-1. In addition to the control treatment to mango trees, the addition of the 5 ml.L^{-1} level resulted in a significant increase in the content leaves of nitrogen, potassium and zinc. In a study conducted by El-Kenawy (10) on Thompson seedless grapes, it was sprayed with chitosan (500 ppm) and found that this spray resulted in a significant increase in the content of leaves of nitrogen and potassium. A lot of research has shown in the past two decades that the addition of organic fertilizers and amino acids can be used to stimulate biological processes and enhance the plant's self-resistance or tolerance of various types of stress, A range of these products are currently active as Biostimulators, organic materials free of chemicals or growth regulators that have become common applications in sustainable agriculture as they increase the plant's ability to withstand stresses such as salinity, drought, high and low temperatures, and pathological injury (8). The addition of organic fertilizer reduces the loss of nutrients by washing, and is a major source of the essential elements of plant growth as well as increases its available to absorb from the plant (12). In a study carried out by Diab (9), the addition of organic manure alone or in combination with bio-fertilizers or chemical fertilizers to the Sewy palm cultivars found that this organic addition resulted in a significant increase in leaves nitrogen and potassium content. (20) found that the addition of 20 m^3 .$feddan^{-1}$ from organic fertilizer to Zaghloul palm trees resulted in a significant increase in leaf content of nitrogen, phosphorus, potassium, iron, manganese and zinc. The use of marine algae extract has received a lot of attention because of the growing interest in the environment and the emphasis on clean agriculture. These extracts are non-toxic to the user and are environmentally friendly and leave no residues on the plant and soil. Among the organic sources used in agricultural production, partly as a chemical fertilizer or complementary to it as it works to improve and increase fertilizer efficiency and thus contribute to lower production costs (16, 24). Algae extract or seaweed extracts containing Many nutrients, some growth regulators, polyamines and vitamins applied to improve nutritional status, vegetative growth (21). (3) Mentioned that the treatment of Sakkoti and Bartemuda date palm trees with seaweed extract showed highest leaves nitrogen, phosphor, potassium and magnesium content relatively to the control treatment. The target of this study was to find out the effect of organic fertilizer and chitosan on leaves mineral content of "Barhi" date palm cultivar.

MATERIALS AND METHODS

This experiment was carried out in a private palm farm located in Great Musayyib enacted / Babylon province on Barhi dates palm trees *Phoenix dactylifera* L. cultivar to determine the effect of spraying of chitosan and soil additives for both organic fertilizers and amino acids and seaweed extract in some vegetative traits by spraying the chitosan at concentrations of 0 (C_0) 5 ml. l^{-1} (C_1) and 10 ml.L^{-1} (C_2) and the addition of both organic fertilizer and amino acids and seaweed extract at concentrations 1 kg.$tree^{-1}$ (O_1) and 2 kg.tree

$^{-1}$ (O_2) , amino acid at 3 ml . L $^{-1}$(A_1), 6 ml. L $^{-1}$(A_2) and seaweed extract at 4 ml. L $^{-1}$(S_1), 8 ml. L $^{-1}$(S_2) respectively and control treatment (T_0). Each treatment replicated five times with a factorial experiment using RCBD, one date palm for experimental unit.The number of offshoots used was 105 offshoots. The following parameters were determined:

Leaf mineral content: Leaf samples were collected for chemical analysis at the 1st week of September. Each sample consisted of 10 leaves / tree. Leaves were washed several times with tap water, rinsed with distilled water, and then dried at 70 c^0 until a constant weight, ground and digested according (7). Nitrogen was estimated by semi-micro kieldahl method of (19). Phosphorus was determined by the method outlined by (15). Potassium was determined using atomic absorption spectrophotometer "Perkin Elmer 1100B" after samples digested according to (7).Iron, Manganese and Zinc were determined as ppm using atomic absorption according to (5). The obtained results were subjected to analysis of variance according to (11) using L.S.D 0.05 for comparing differences between various treatment means.

RESULTS AND DISCUSSIONS

Effects of organic fertilizers on leaves mineral content: Data concerning the effect of treatments on leaves mineral content are listed in Tables (1 and 2). The data cleared that, chitosan spray at10 ml.L $^{-1}$ (C_2) significantly increased leaves nitrogen content of 1.07 %, leaves phosphor content of 0.158%, leaves potassium content of 1.28 %, leaves iron content of 171.1 mg.kg^{-1} dry weight, leaves manganese content of 1.232 mg.kg^{-1} dry weight and leaves zinc content of 22.99 mg.kg^{-1} dry weight, while the control treatment gave the lowest results for these studied traits. A table (1 and 2) also shows that the addition of organic fertilizers has a significant effect on these studied traits. The sprayed seaweed extract at levels 8 ml. L $^{-1}$(S_2) significantly superiority of the control treatment and gave the highest leaves potassium content of 1.40 % and leaves manganese content of 1.233 mg.kg^{-1} dry weight, amino acid at 6 ml. L $^{-1}$(A_2) treatment gave the highest

Table 1. Effects of organic fertilizers on increase in leaves N, P and K content of date palm cv. Barhi

Chitosan	Fertilizers							
	T_0	O_1	O_2	A_1	A_2	S_1	S_2	mean
				N (%)				
C_0	0.73	0.84	0.75	0.92	0.99	0.86	0.88	0.85
C_1	0.80	0.89	0.94	1.02	1.11	0.92	0.96	0.95
C_2	0.85	0.97	1.03	1.21	1.33	1.00	1.13	1.07
mean	0.79	0.90	0.91	1.05	1.14	0.93	0.99	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	0.09		0.14		0.24			
				P (%)				
C_0	0.104	0.137	0.144	0.168	0.172	0.122	0.134	0.140
C_1	0.112	0.143	0.149	0.166	0.179	0.130	0.141	0.146
C_2	0.118	0.146	0.155	0.173	0.188	0.160	0.164	0.158
mean	0.111	0.142	0.149	0.169	0.180	0.137	0.146	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	0.07		0.11		0.19			
				K (%)				
C_0	0.90	0.94	0.94	1.05	1.09	1.13	1.15	1.03
C_1	0.93	0.99	1.02	1.14	1.17	1.30	1.45	1.14
C_2	0.99	1.11	1.13	1.30	1.32	1.52	1.59	1.28
mean	0.94	1.01	1.03	1.16	1.19	1.32	1.40	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	0.12		0.18		0.30			

leaves N content of 1.14 %, leaves P content of 0.180 %, leaves Fe content of 178.6 mg.kg^{-1} dry weight, leaves Zn content of 24.81 mg.kg^{-1} dry weight, while the control treatment gave the lowest results for these studied traits.The interaction between chitosan sprays and adds organic fertilizers significantly affected in all studied minerals. That the improvement in the leaves minerals content when sprayed with chitosan is due to the containment of amino acids and vitamins, which reflects the speed of absorption of nitrogen and other elements from the leaves (4), These results have been agreed with the findings of the (23) on mango trees. The results of Tables (1 and 2) showed that the addition of algae extract to offshoots was significant in the leaves minerals content. This may be due to its content of essential nutrients such as nitrogen, phosphorus, potassium, amino acids and organic compounds affecting the plant's vital activities (18) thus increasing their uptake by the plant which positively reflects the increased leaves mineral content.

Table 2. Effects of organic fertilizers on Leaves Fe, Mn and Zn content of date palm cv. Barhi

Chitosan	Fertilizers							
	T_0	O_1	O_2	A_1	A_2	S_1	S_2	mean
	Fe (mg.kg^{-1} dry weight)							
C_0	146.7	149.9	155.6	161.6	170.0	160.5	163.7	158.3
C_1	150.6	155.8	155.0	167.8	179.5	166.3	172.2	163.9
C_2	155.6	161.2	165.3	174.7	186.4	174.0	180.4	171.1
Mean	151.0	155.6	158.6	168.0	178.6	166.9	172.1	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	6.23		9.52		16.48			
	Mn (mg.kg^{-1} dry weight)							
C_0	1.169	1.173	1.177	1.174	1.182	1.184	1.189	1.178
C_1	1.177	1.183	1.184	1.188	1.186	1.193	1.197	1.187
C_2	1.185	1.190	1.199	1.212	1.134	1.289	1.312	1.232
Mean	1.177	1.182	1.187	1.191	1.201	1.222	1.233	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	0.015		0.023		0.040			
	Zn (mg.kg^{-1} dry weight)							
C_0	17.23	16.65	17.88	22.32	23.76	21.09	21.89	20.12
C_1	20.22	21.19	23.12	24.11	25.00	21.37	21.27	22.33
C_2	19.45	21.78	23.00	24.43	25.76	22.32	24.19	22.99
Mean	18.97	19.87	21.33	23.62	24.81	21.59	22.45	
L.S.D5%	Chitosan		Fertilizers		Interaction			
	0.85		1.30		2.25			

That the spraying of amino acids has caused an increase in the absorption of elements by the plant and thus increase the content of the leaves of the elements and agrees this result with (17).

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