# INFLUENCE OF SOME ORGANIC FERTILIZERS ON DATE PALM CV. BARHI

## 1. VEGETATIVE GROWTH

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## ABSTRACT

**This experiment was carried out at 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 addition of both organic fertilizers and amino acids and seaweed extract in some vegetative traits (number of leaves, the circumference of the trunk and offshoots number) and leaves content (chlorophyll , dry weight and Proline) 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 each experimental unit.The following are the main findings, The effect of chitosan spraying significantly increase the vegetative properties of the offshoots , the concentration 5 ml.$l^{-1}$significant increases the number of weakness, trunk circumference and offshoots number, with 13.3 tinea, 31.9 cm, 3.09 offshoot sequentially. Spray 8ml.$L^{-1}$($S_2$)of seaweed extract was significantly superior than control treatment and gave leaf chlorophyll content of 31.88 mg.$g^{-1}$, leaf dry weight of 48.90 %. While the lowest results were in the control treatment, except the leaves proline content.**

**Part of Ph.D. Dissertation of the first author.**
**Key words: chitosan, Seaweed extract, Barhi cultivar, Vegetative growth, Organic fertilizers.**



# تأثير الأسمدة العضوية على نخيل التمر صنف برحي 1. النمو الخضري

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## 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 بعض الصفات الخضرية (الزيادة في طول السعفة ومحيط الجذع و عدد الفسائل ) ومحتوى الاوراق (الكلوروفيل والمادة الجافة والبرولين) 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 او 2) كغم.فسيلة$^{-1}$و (3او 6) مل.لتر$^{-1}$ و ( 4 او 8) مل.لتر$^{-1}$ بالتتابع. نفذت تجربة عاملية ضمن تصميم القطاعات العشوائية الكاملة RCBD وبخمسة مكررات وبواقع فسيلة واحدة للوحدة التجريبية. أثر الرش بالكاتيوسان معنويا في الصفات الخضرية للفسائل اذ أعطى التركيز5 مل.لتر$^{-1}$ زيادة معنوية في كل من عدد السعف، ومحيط الجذع وعدد الفسائل اذ بلغت 13.3سعفة، 31.9 سم، 3.09 فسيلة بالتتابع ، اثر رش مستخلص الطحالب بالمستوى 8 مل.لتر$^{-1}$ بأعطاء اعلى محتوى للأوراق من الكلوروفيل بلغ 31.88 ملغم.غم$^{-1}$ و اعلى وزن جاف بلغ 48.90 %، في حين كانت معاملة المقارنة الأدنى في هذه الصفات لكنها الأعلى في محتوى اوراقها من البرولين.**

**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 belonging to the family Arecaceae. Date palm is one of the oldest trees known to humans, dating more than 4000 years BC and was cared for by the Babylonians and Assyrians (15, 25). The acreage of date palm in the world reached about 1353159 ha, with production of 8460443 tons (13).The main producing countries are Egypt, Iran, Algeria, Saudi Arabia, United Arab Emirates (13).The estimated number of date palm trees in Iraq, including approximately 14892000 tree, produces up to 602350 tons, and the average production per tree about 63.7 kg, Baghdad was the first province to produce in Iraq (9). Some researches has shown in the past two decades that the addition of organic fertilizers and amino acids could be different stimulate biological processes and enhance the plant's resistance or tolerance of kinds 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 resistance stresses such as salinity, drought, high and low temperatures, and pathological injury (10). 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). Balaket and Al-Himidawi **(**7) Mentioned that the humic organic acids treatments caused a significant increases in the leaves content of total chlorophyll , carbohydrates and total protein also caused significantly decreases in the leaves content of proline amino acid compared with the control treatment in his study on Barhee date palm trees. Al-Hamadani (3) Fount that the treatment humic acid and K-Humate produced the highest leaf length, leaflet length, leaves contents of chlorophyll, in Khastawi date palm trees. The extracts organic maters 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 ( 18, 27). Algae extract or seaweed extracts containing many nutrients, some growth regulators, polyamines and vitamins applied to improve nutritional status, vegetative growth. some researchers (6) (24) mentioned that the treatment of Sakkoti and Bartemuda date palm trees with seaweed extract showed highest number of pinnae per leaf, length, width and area of pinnae and leaf, number of spines.leaf$^{-1}$ and spine length relatively to the control treatment. Al-Rawi et al (5) reported that seaweed extract increased the vegetative growth characteristics and chlorophyll content of the leaves of peach trees. The aim of this study was to evaluate "Barhi" date palm cultivar characters under using organic fertilizers chitosan and seaweed extract.

## MATERIALS AND METHODS

This experiment was carried out at a private palm farm located in Great Musayyib enacted / Babylon province by use Barhi dates palm trees *Phoenix dactylifera* L. cultivar to determine the effect of spraying of chitosan and addition of both organic fertilizers and amino acids and seaweed extract in some vegetative traits. Chitosan was sprayed at concentrations of 0 ($C_0$) 5 ml. l$^{-1}$ ($C_1$) and 10 ml.L $^{-1}$ ($C_2$) while addition of both organic fertilizer and amino acids and seaweed extract were 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 with control treatment ($T_0$). Each treatment replicated five times with a factorial experiment within RCBD, one date palm for each experimental unit.The number of offshoots used was 105 offshoots. The following characters were determined: Number of new leaves : according to the following equation: New papers = leaves number at the end of the experiment – leaves number at the beginning of the experiment Trunk circumference (cm) = The circumference of the trunk at the end of the experiment - the circumference of the trunk at the beginning of the experiment

1- Offshoot number: The number of offshoot formed at the end of the experiment was calculated

2- Leaf chlorophyll contents ($mg.g^{-1}$ fresh weight): Representative fresh leaf sample at middle part of shoots were taken in the first week of June and used for analysis of chlorophyll were calorimetrically according to (19).

3- Leaf dry (%): Various leaves were taken from the sapling was weighing then drained at 70 $^{0}$ then dividing weight after drying on weight before drying× 100.

4- Leaves proline content: Determination of proline according to Bates et al., (8).

The results were analyzed by analysis of variance (11). The means were compared using L.S.D 0.05.

## RESULTS AND DISCUSSIONS

**Effects of organic fertilizers on leaves number, trunk circumference and offshoots number**:

Table 1 show the leaves number, trunk circumference and offshoots number. The data cleared that, chitosan spray at 5 ml. $L^{-1}$ significantly increased leaves number to 13.3, trunk circumference to 31.9 cm and the highest average of offshoot number to 3.09, while the control treatment produced the lowest results for these studied traits. Table 1 also showed that the addition of organic fertilizers had a significant effect on these studied traits. The sprayed seaweed extract at levels $4ml.L^{-1}$ significantly superiority of the control treatment and produced the highest leaves number of 14.6, amino acid at 3 ml. $L^{-1}$ treatment gave the highest increased in trunk circumference of 38.3 and the highest offshoot number of 3.56, while the control treatment gave the lowest results for these studied traits. The interaction between chitosan sprays and organic fertilizers significantly affected in all studied characters. Improvement of the characteristics of vegetative growth when sprayed with chitosan may due to increased in leaves mineral content and this increase is due also its content of amino acids and vitamins, which reflects the speed of absorption of nitrogen from the leaves (14), These results have been agreed with the results found by Al-marsomi (4) when spraying the Ashrasi olive seedlings. Organic matter in both Doferm and chitosan contributes to the provision of raw materials and energy units that promote the physiological processes within the plant, which positively reflect the construction of new tissues and thus improve the vegetative growth of the seedlings (22). The results of Table 1 showed that the addition of algae extract to offshoots was significantly increase in (0.05) its effect on the number of leaves formed. This may be due to its content of essential nutrients such as nitrogen, phosphorus, potassium, amino acids and organic compounds affecting the plant's activities (23). Thus, increasing their uptake by the plant which positively reflects increased in vegetative growth. The cause of the increase in some vegetative growth may be due to the inclusion of seaweed extract on the nutrients that lead to increased metabolic activities of the plant, including the necessary potassium in the activation of chlorophyll important enzymes in the process of photosynthesis and the formation of sugars, proteins and energy compounds, all of which increase the growth and size Which eventually leads to an increase in vegetative growth (20).The results in Table 1 shows significant differentiation in the trunk circumference and the number of offshoots formed by the addition of amino acids because they reduce the water voltage and thus increase the cell's ability to withdraw water and dissolved nutrients and thus increase the vegetative growth (26). These findings were agreed with Ahmed et al (6) who found that when palm trees were sprayed with some amino acids, they also improved the vegetative growth of olive trees (16).

**Table 1. Effects of organic fertilizers on leaves number, trunk circumference and offshoots number of date palm cv. Barhi**

| Chitosan | Fertilizers | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $T_0$ | $O_1$ | $O_2$ | $A_1$ | $A_2$ | $S_1$ | $S_2$ | mean |
| | | | | leaves number | | | | |
| $C_0$ | 7.8 | 12.6 | 11.8 | 13.6 | 12.4 | 15.2 | 12.4 | 12.3 |
| $C_1$ | 12.2 | 14.2 | 13.6 | 13.2 | 13.6 | 14.2 | 12.2 | 13.3 |
| $C_2$ | 8.0 | 13.6 | 15.2 | 10.4 | 11.6 | 14.4 | 12.4 | 12.2 |
| Mean | 9.3 | 13.5 | 13.5 | 12.4 | 12.5 | 14.6 | 12.3 | |
| L.S.D | Chitosan | | Fertilizers | | Interaction | | | |
| 5% | 0.88 | | 1.34 | | 2.33 | | | |
| | | | | trunk circumference (cm) | | | | |
| $C_0$ | 21.8 | 26.4 | 36.4 | 34.0 | 34.0 | 34.4 | 23.4 | 30.1 |
| $C_1$ | 22.8 | 32.6 | 27.8 | 44.4 | 30.2 | 30.6 | 35.2 | 31.9 |
| $C_2$ | 23.4 | 38.4 | 30.8 | 36.4 | 26.4 | 31.6 | 31.0 | 31.1 |
| Mean | 22.7 | 32.5 | 31.7 | 38.3 | 30.2 | 32.2 | 29.9 | |
| L.S.D | Chitosan | | Fertilizers | | Interaction | | | |
| 5% | 1.13 | | 1.37 | | 2.99 | | | |
| | | | | Offshoot number | | | | |
| $C_0$ | 1.66 | 3.00 | 4.66 | 4.33 | 3.33 | 2.66 | 2.00 | 2.95 |
| $C_1$ | 3.33 | 4.33 | 2.00 | 4.67 | 2.33 | 3.00 | 3.00 | 3.09 |
| $C_2$ | 3.33 | 3.33 | 2.33 | 2.67 | 3.00 | 3.00 | 3.33 | 2.99 |
| Mean | 2.77 | 3.55 | 3.00 | 3.56 | 2.89 | 2.89 | 2.78 | |
| L.S.D | Chitosan | | Fertilizers | | Interaction | | | |
| 5% | 0.13 | | 0.20 | | 0.34 | | | |

**Effects of organic fertilizers on Leaves chlorophyll content, dry weight and proline content**:

Results in table (2) showed that spraying of chitosan and organic fertilizers and interaction between them are affected significantly on leaf chlorophyll content , leaf dry %. In the case of chitosan spray it was noted that the level 10 ml.L $^{-1}$ ($C_2$) it has gave the highest results in leaf chlorophyll content of 31.61 mg.g$^{-1}$, leaf dry weight of 48.81%, While the content of proline significantly decreased in this treatment, The control treatment was the highest in that, which was the lowest in the leaves chlorophyll content and leaves dry weight .Either when sprayed seaweed extracts findings in Table 2 that spray at levels 8ml.L$^{-1}$($S_2$) significantly superior to the control treatment and gave the leaf chlorophyll content of 31.88 mg.g$^{-1}$, leaf dry weight of 48.90 % . While the lowest results in the control treatment, which surpassed the rest of the treatments in the content of the leaves proline.

**Table 2. Effects of organic fertilizers on Leaves chlorophyll content, dry weight and proline content of date palm cv. Barhi**

| Chitosan | Fertilizers | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $T_0$ | $O_1$ | $O_2$ | $A_1$ | $A_2$ | $S_1$ | $S_2$ | mean |
| | Leaf chlorophyll contents (mg $100g^{-1}$ fresh weight) | | | | | | | |
| $C_0$ | 28.17 | 29.88 | 29.96 | 29.72 | 29.80 | 30.12 | 30.37 | 29.72 |
| $C_1$ | 28.90 | 29.66 | 30.16 | 30.34 | 31.04 | 31.56 | 31.90 | 30.51 |
| $C_2$ | 29.45 | 30.84 | 30.96 | 31.25 | 32.19 | 33.20 | 33.38 | 31.61 |
| Mean | 28.84 | 30.13 | 30.36 | 30.44 | 31.01 | 31.63 | 31.88 | |
| L.S.D 5% | Chitosan | | Fertilizers | | Interaction | | | |
| | 0.63 | | 0.96 | | 1.67 | | | |
| | Leaf dry weight | | | | | | | |
| $C_0$ | 39.82 | 48.62 | 49.47 | 47.14 | 46.94 | 47.97 | 48.01 | 46.85 |
| $C_1$ | 48.64 | 48.06 | 45.51 | 47.35 | 47.66 | 46.35 | 48.13 | 47.39 |
| $C_2$ | 47.90 | 48.08 | 47.94 | 47.88 | 50.20 | 49.11 | 50.55 | 48.81 |
| Mean | 45.45 | 48.25 | 47.64 | 47.46 | 48.27 | 47.81 | 48.90 | |
| L.S.D 5% | Chitosan | | Fertilizers | | Interaction | | | |
| | 1.17 | | 1.78 | | 3.10 | | | |
| | Leaves proline content (µg $g^{-1}$) | | | | | | | |
| $C_0$ | 0.524 | 0.500 | 0.472 | 0.312 | 0.297 | 0.369 | 0.329 | 0.400 |
| $C_1$ | 0.503 | 0.488 | 0.461 | 0.289 | 0.281 | 0.354 | 0.350 | 0.389 |
| $C_2$ | 0.477 | 0.462 | 0.423 | 0.280 | 0.267 | 0.342 | 0.336 | 0.370 |
| Mean | 0.501 | 0.483 | 0.452 | 0.294 | 0.282 | 0.355 | 0.388 | |
| L.S.D 5% | Chitosan | | Fertilizers | | Interaction | | | |
| | 0.021 | | 0.032 | | 0.056 | | | |

Gindia (14) attributed that increase in these characters by addition of seaweed extracts to their role in increasing the growth of the root mass by increasing the number of lateral branches, increasing nutrient uptake and increasing its percentage in dry matter. This result is consistent with (1) and (2) when spraying apricot trees with seaweed extract. As well as the contribution of chitosan in the production of some plant hormones responsible for growth by improving the performance of the total root, leading to increased absorption of mineral elements in the vicinity of roots (21). Chitosan spraying affects on increasing nitrogen and potassium which enhanced vegetative growth rates, causing increased absorption of nutrients by the roots (17) and thus increasing their accumulation in different plant tissues.

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