Iraqi Journal of Market Research and Consumer Protection
(2026) 18(1): 15-23.
DOI:
Mansour & Al-Dahan

المجلة العراقية لبحوث السوق
وحماية المستهلك

THE IMPACT OF BENZYL ADENINE, ORGANIC FERTILIZERS, AND THINNING ON THE YIELD PROPERTIES OF DATE PALM CV. MEJHOUL

Hisham, A. Mansour[1*], Moayed, R. A. Al-Dahan[2]

[1]Researcher, Department of Horticulture and Landscape Gardening, College of Agricultural Engineering Sciences, University of Baghdad, Iraq. hisham.abd2205p@coagri.uobaghdad.edu.iq

[2]Professor, Department of Horticulture and Landscape Gardening, College of Agricultural Engineering Sciences, University of Baghdad, Iraq. moayad.rajab@coagri.uobaghdad.edu.iq

Received 25/ 3/ 2024, Accepted 28/ 5/ 2024, Published 31/ 3/ 2026

ABSTRACT

This study was conducted at the Rashidiya Date Palm Station, one of the projects of the Horticulture Department/Ministry of Agriculture in Iraq for the 2023 season. This study was aimed to know the effect of benzyl adenine, adding organic fertilizers, and thinning on the yield properties of date palm Cv. Mejhoul. The experiment included three factors. The first factor was the benzyl adenine (B) spray with three concentrations (0, 100, 150 mgL-1). The second factor involved adding humic acid with seaweed extract (HS) to the soil at three levels (0, 1 kg humic acid + 150 g seaweed extract, 2 kg humic acid + 300 g seaweed extract). The third factor was thinning (T) the flower clusters at two levels (without thinning, removing 10 cm from the tips of the flowering clusters with the removal of the central area for branching). The results showed that the T1 B2 F2 treatment had a significant effect on most of the study indicators, such as the average weight, size, length, and diameter of the fruit, average stalk weight, and total yield, with values reaching 36.68 g, 42.00 cm3, 6.66 cm, 3.36 cm, 8.063 kg, and 40.31 kg, respectively, compared to the measurement treatment.

Key words: Cytokinin, fertilization, fruit quality, improving productivity, Arecaceae.

تأثير البنزل أدينين والأسمدة العضوية والخف في صفات الحاصل لنخيل التمر صنف مجهول.

هشام عبد منصور[1]، مؤيد رجب عبود[2]

[1]باحث، قسم البستنة وهندسة الحدائق، كلية علوم الهندسة الزراعية، جامعة بغداد، بغداد. العراق hisham.abd2205p@coagri.uobaghdad.edu.iq.

[2]استاذ، قسم البستنة وهندسة الحدائق، كلية علوم الهندسة الزراعية، جامعة بغداد، بغداد. العراق moayad.rajab@coagri.uobaghdad.edu.iq.

الخلاصة

نفذت هذه الدراسة في محطة نخيل الراشدية احدى مشاريع دائرة البستنة / وزارة الزراعة العراقية للموسم 2023 والتي هدفت الى معرفة تأثير الرش بمنظم النمو البنزل ادنين واضافة الأسمدة العضوية والخف في صفات الحاصل لنخيل التمر صنف مجهول تضمنت التجربة ثلاث عوامل الأول الرش بالبنزل ادنين B بثلاث تراكيز وهي (0 ، 100 ، 150 ملغم. لتر-1) والعامل الثاني هو إضافة حامض الهيومك مع مستخلص الطحالب البحرية HS الى التربة وبثلاث مستويات وهي (0 ، 1 كغم حامض الهيومك + 150 غم مستخلص الطحالب البحرية ، 2 كغم حامض الهيومك + 300 غم مستخلص الطحالب البحرية) والعامل الثالث هو اجراء عملية الخف T للشماريخ الزهرية بمستويين (من دون خف ، إزالة 10 سم من أطراف الشماريخ الزهرية مع إزالة المنطقة المركزية للتفرع) أظهرت النتائج ان المعاملة T1 B2 F2 قد اثرت معنويا

[*] **This article is taken from the doctoral dissertation of the first researcher.**

في اغلب مؤشرات الدراسة مثل معدل وزن وحجم وطول وقطر الثمرة ومعدل وزن العذق والحاصل الكلي وبنسب بلغت 36.68 غم، 42.00 سم^3، 6.66 سم، 3.36 سم، 8.063 كغم، 40.31 كغم على التوالي مقارنة بمعاملة القياس.

الكلمات المفتاحية: السايتوكاينين، التسميد، جودة الثمار، تحسين الانتاجية، العائلة النخيلية.

INTORDUCTION

The date palm (*Phoenix dactylifera* L.) One of the monoecious trees belonging to the Arecaceae family and is one of the most important plants in this family **(Elmeer *et al*., 2019; Jubeir *et al*., 2023).** Which includes about 200 genera and more 2500 species **(Khaleel *et al*., 2019).** Date palm trees are an evergreen perennial flowering plant and considered one of the earliest cultivated crops in the Middle East **(Abdul-Hamid *et al*., 2020; Khierallah *et al*, 2017).** Economically, it plays a crucial role for millions in the Middle East, serving as a primary source of livelihood. With a history spanning over 4000 years BC, the date palm stands as one of the earliest trees recognized by humanity. Its cultivation traces back to ancient civilizations such as the Babylonians and Assyrians. **(Taha & Abood,2018)**. date palm cultivar is one of the most important varieties that appeared in Morocco in the Tafilalet region and was exported to the rest of the world **(Mansour & Khalil, 2019).** The Mejhoul date palm is characterized by its large brown fruits, with thick, moist flesh and an excellent taste. This variety is considered one of the commercially desired date varieties in the global market, not only for being the most expensive but also for being a high-calorie food rich in sugars, a good source of nutrients and vitamins. Additionally, it is cholesterol-free, low in fat, rich in antioxidants, and contains high levels of potassium and phosphorus. Furthermore, its fruits are easy to preserve and do not require the addition of preservatives **(Zaid & Wahbe, 2022)**. Growth regulators are of great importance in plant life, as the processes of growth and development take place under the control of hormones produced within the plant **(Joody, 2014).** Cytokinin's are key stimulators and regulators of cell division, The effects of cytokinin's in plants manifest through several mechanisms, they stimulate the biosynthesis of chlorophyll, regulate nutrient distribution, and contribute to overall plant growth and development. Additionally, cytokinin's enhance the plant's response to biological and abiotic stresses, delaying aging **(Vashi, 2023)**. Organic fertilization is considered the cornerstone for increasing the productivity of agricultural lands and reducing environmental pollution resulting from the excessive use of chemical fertilizers. Organic matter has a direct impact on the natural, chemical, and biological properties of the soil. It is responsible for the soil's exchange capacity, as well as its influence on soil acidity, regulatory ability, fertility, and supplying plants with essential nutrients and One of the most important uses of organic fertilizer is that it is used as an environmentally friendly fertilizer. It is usually available in the

market and is cheap, in addition to its beneficial effect on soil properties. **(Saleem & Joody, 2015; Shakir & Abood, 2023).** Sustainable agriculture based on organic agriculture is an important goal in the world, as many countries are working seriously towards this type of agricultural systems and moving away from traditional agriculture that relies on chemicals, which is the main cause of environmental pollution, Plant growth and development and improving its productivity are usually controlled through several factors, including adding fertilizers because of its important, major and important role in regulating plant growth and development and improving the characteristics of fruits, which is reflected positively in increasing the productivity and income of the farmer. **(Al-Hadethi, *et al*;2020; Khalil, 2023)** It is biodegradable and non-toxic to the user through them biological nature. No residues are left to Plant and soil. It is also considered as a Organic source used in agricultural production. It is a partial alternative to chemical fertilizers or a supplement to it, contributing to reducing Production costs **(Jubeir & Ahmed, 2019).** Marine algae used, to enhance plant growth, increase nutrient availability, improve vegetative growth, enhance the development of root hairs and secondary roots, and promote the growth and development of fruits. This is due to their content of plant hormones, especially cytokinin's, and amino acids. **(Mukherjee & Patel, 2020)**. Fruit thinning is considered a crucial operation for date palm trees, especially Mejhoul variety, as it significantly affects the yield and improves fruit quality. Moreover, it regulates the annual production of date palms, reduces the alternate fruit bearing, accelerates ripening, and minimizes tree stress hormonally and nutritionally. Economic thinning methods are also essential for improving the productivity of date palms, especially in arid regions **(Radwan *et al*., 2022)**.

Study Objective: Achieving sustainable development and providing a more diverse food system and healthier lifestyle through its role in enhancing the qualitative and quantitative characteristics of an of date palm fruits Cv. Mejhoul.

MATERIALS AND METHODS

The orchard was prepared, and various agricultural practices were carried out, including pruning, because cutting dry leaves is important because it prevents the farmer from climbing the palm trunk to carry out agricultural operations such as the pollination process, thinning and harvesting operations **(Abbood *et al*., 2018).** Other service operations have also been implemented such as irrigation, fertilization, removing weeds, and cleaning the palm trees in preparation for the pollination season. A new electronic Wireless pollination system (handheld), manufactured in Turkey, was used for the first time in Iraq to extract pollen grains and conduct pollination operations, proving its effectiveness in several countries worldwide. After pollination, the female flower clusters were bagged, providing various benefits such as increasing the fruit set, especially in seasons with temperature drops, rainfall, and

windy conditions during the pollination process. These bags were removed 15 days after pollination **(Ibrahim & abdullwahab, 2019)**. In mid-May, control measures were implemented against the red palm weevil and dubas bug, followed by dust mite control in mid-June. The research will span one agricultural season starting from April 2023, focusing on date palm trees of cv Mejhoul variety. The selected trees for the study will be strong, uniform in size and age, preferably 10 years old, planted in rows with a spacing of 10 meters between each tree and 10 meters between rows.

Experimental Design: The research was conducted using the Randomized Complete Block Design (RCBD) as an experimental design with three factors (three concentrations of Benzyl adenine × three levels of organic fertilizer, including humic acid + seaweed extract × two methods of thinning). The number of treatments was 18, with three replicates for each treatment, making a total of 54 experimental units. Each experimental unit consisted of a single palm tree, and pollination was carried out using the Green Gannamy cultivar. The results will be analyzed using the GenStat program with LSD test at a significance level of 0.05 **(Al-Mohammadi & Al-Mohammadi, 2012)**.

Study Factors:

First: Using three concentrations of benzyl adenine with symbols B:

a. Without addition, symbolized as B0.

b. Spray with B at a concentration of 100 mg per liter^{-1} and symbolized as B1.

c. Spray with B at a concentration of 150 mg per liter^{-1} and symbolized as B2.

The spraying process was carried out in two periods, the first after three weeks from the pollination date, and the second at the beginning of the khalal stage **(Al-Tamimi, 2016).**

Second: Adding humic acid with seaweed extract to the soil at three levels as follows:

a. Without addition (control treatment) symbolized as HS0.

b. Addition of (1 kg humic acid + 150 g seaweed extract) symbolized as HS1.

c. Addition of (2 kg humic acid + 300 g seaweed extract) symbolized as HS2.

Humic acid with seaweed extract was added in three installments, the first on 1/4, the second on 1/5, and the third on 1/6 for the first season of 2023.

Third: Thinning at two levels as follows:

a. Without thinning (control treatment) symbolized as T0.

b. Removing 10 cm from the ends of the blossom spikes, including the removal of the central branching area, symbolized as T1.

Study Indicators:

Average fruit weight (g), Average fruit volume (cm^3), Average fruit length (mm), Average fruit diameter (mm), Average bunch weight (kg), Total plant yield (kg).

RESULTS AND DISCUSSION

1. The average fruit weight (g): The results of the above table showed statistically significant differences in increasing the average fruit weight when treated with the benzyl adenine growth regulator, organic fertilizers, and thinning. Treatment T1 B2 F2 gave the highest fruit weight rate of 36.68 g, which did not differ significantly from treatment T1 B2 F1, which gave 35.20 g. In contrast, treatment T0 B0 F0 yielded the lowest value at 17.20 g.
2. The average fruit volume (cm3): The results of the statistical analysis indicated significant differences in increasing the average fruit volume. The benzal spray treatment, along with the addition of organic fertilizers and thinning (T1 B2 F2), yielded the highest fruit volume with a measurement of 42.00 cm3. In contrast, treatment T0 B0 F0 gave the lowest values, reaching 15.00 cm3.
3. The average fruit length (cm): The results of the table (1) indicated significant differences among treatments in increasing the average fruit length. The benzyl spraying treatment and addition of organic fertilizers and thinning (T1 B2 F2) recorded the highest fruit length with a measurement of 6.66 cm compared to the control treatment (T0 B0 F0), which yielded the lowest value of 4.06 cm.
4. Fruit Diameter (cm): The table (1) data above indicates significant differences in the fruit diameter increase. Treatment with benzyl adenine spray, organic fertilizer addition, and thinning (T1 B2 F2) resulted in the highest fruit diameter with a measurement of 3.36 cm. In contrast, the control treatment (T0 B0 F0) yielded the lowest diameter at 2.49 cm, although it did not differ significantly from treatments T1 B1 F0, T1 B1 F1, T1 B1 F2, T1 B2 F0, and T1 B2 F1.
5. The average weight of the bunch (kg): The table (1) indicates that there are significant in increase in bunch weight, as the treatment (T1 B2 F2) gave the highest rate of 8.063 kg compared to the control treatment
6. Total yield rate of the palm (kg): The results indicated that there a significant increase in the total yield rate of the tree, as the treatment (T1 B2 F2) gave the highest rate of 41.31 kg compared to the control treatment.

The impact of the plant growth regulator, benzyl adenine, on increasing fruit weight, as well as increasing fruit size, diameter, length and the yield of palm tree, may be attributed to the role of cytokinin's in stimulating cell division, elongation, nutrient movement, and floral development. Cytokinin's also play a role in attracting and mobilizing nutrients to their accumulation centers, making the fruits focal points for nutrient mobilization, consequently increasing their weight and size **,** These findings align with the results of **Alshammari & Mohammed (2019)** who observed a significant increase in the weight and size of date palm fruits (Khodrawi and Makawi varieties) treated with the plant growth regulator benzyl adenine at a concentration of 100 mg/L, for the Khodrawi and Makawi varieties, respectively compared to the control treatment. The role of organic fertilizers in increasing

the rate of fruit weight and size may be attributed to their content of various nutrients such as nitrogen, phosphorus, potassium, boron, and iron, in addition to containing growth-promoting substances such as auxins, cytokinin's, amino acids, and antioxidants. These substances enhance plant nutrition, improve photosynthetic efficiency, increase nutrient absorption and availability, promote root growth, stimulate beneficial microorganisms in the soil, provide nutrient abundance, and enhance soil water retention, ultimately leading to improving the physical characteristics of the fruits **(Zamani *et al*., 2013**; **Al-Karawi & Al-Rawi., 2016).** These results are consistent with the findings of **Al-Hammood & Abd (2018)**, who reported a significant increase in the average weight of date palm fruits (Barhi and Halawi varieties) when using organic fertilizers (seaweed extracts). Additionally, there was an increase in the length and diameter of the fruits for both varieties. Thinning was found to have a significant effect on increasing fruit weight, size, length, and diameter. This may be attributed to the fact that thinning redistributes carbohydrate nutrients to fewer fruits, improves fruit ventilation, and reduces tree stress hormonally and nutritionally. This improvement enhances the flowering induction process and early flowering, resulting in increased fruit weight and size. These findings align with **Sallam (2023)** conclusion that thinning, through the removal of fruits by thinning and removing central shoot tips, led to a significant increase in the average fruit weight, diameter, and length, , compared to the control treatment. these results are also consistent with what was found by **Ghazzawy *et al*., (2019)** that the thinning process led to a significant increase in the average fruit weight, and fruit length, bunch weight and yield.

Table (1): Effect of Benzyl adenine, organic fertilizers and thinning on the yield properties of date palm Cv. Mejhoul.

Treatment	Fruit weight (g)	Fruit volume (cm^3)	Fruit length (cm)	Fruit diameter (cm)	Bunch weight (kg)	plant yield (kg)
T0 B0 F0	17.20	15.00	4.06	2.49	6.002	30.01
T0 B0 F1	22.72	18.00	4.59	2.72	5.948	29.74
T0 B0 F2	24.56	23.00	4.61	2.77	6.158	30.79
T0 B1 F0	25.41	23.00	4.75	2.79	6.302	31.51
T0 B1 F1	25.53	23.00	4.77	2.82	6.446	32.23
T0 B1 F2	25.53	23.33	4.78	2.87	6.563	32.81
T0 B2 F0	25.90	24.50	4.80	2.90	6.758	33.79

T0 B2 F1	25.83	25.83	4.86	2.92	6.918	34.59
T0 B2 F2	26.53	26.00	4.96	2.94	6.998	34.99
T1 B0 F0	28.76	28.50	5.05	3.01	7.161	35.80
T1 B0 F1	27.32	27.33	5.06	3.01	6.895	34.47
T1 B0 F2	30.68	32.00	5.38	3.08	7.796	38.98
T1 B1 F0	30.72	33.50	5.40	3.12	7.550	37.75
T1 B1 F1	31.07	35.50	5.44	3.14	7.554	37.77
T1 B1 F2	31.01	36.50	5.44	3.20	7.587	37.94
T1 B2 F0	34.77	38.50	5.79	3.22	7.421	37.10
T1 B2 F1	35.20	39.00	5.86	3.34	7.750	38.75
T1 B2 F2	36.68	42.00	6.66	3.36	8.063	40.31
L.S.D. 5%	**0.891**	**1.603**	**0.480**	**0.273**	**0.607**	**3.036**

CONCLUSIONS

The essential role of cytokinin in stimulating the growth and development of palm trees has been confirmed, as it affects the activation of cell division, tissue growth, and stimulates the biosynthesis of RNA. It acts as a sink that attracts mineral elements and nutrients such as sugars and amino acids to its locations, which enhances the characteristics of the yield and the quantity of fruits produced. Organic fertilizers play an important role in providing the nutrients that plants need for ideal and healthy growth, which promote tree growth and maintain the health of agricultural lands, which helps provide an ideal environment for plant growth and increased yields. Fruit thinning has a fundamental effect in increasing the size of fruits, improving their quality, organizing production, enhancing the efficiency of fruit production, and reducing the costs of harvesting, sorting, and packing. This contributes to increasing the quantity of marketable yield, which is sold at high prices, which increases income for farmers**.**

REFERENCES

1. Abbood, S. M., Abbood, M. R., & Jasim, A. A. (2018). Manufacturing and testing of date palm vibration motorized fronds cutter. *The Iraqi Journal of Agricultural Science*, 49(3), 367-371.
2. Abdul-Hamid, N.A., Mustaffer N.H, Maulidiani, M, Mediani, A, Ismail, I.S, Tham C.L, Shadid, K, & Abas, F. (2020). Quality evaluation of the physical properties,

phytochemicals, biological activities, and proximate analysis of nine Saudi date palm fruit varieties. *Journal of the Saudi Society of Agricultural Sciences* 19(2): 151-160.

3. Al-Hadethi, M. E., Taha, F. H., & Abbood, S. M. (2020). Effect of compost prepared from plant residues on olive transplants growth. International Journal of Agricultural and statistical sciences, 16(Supplement 1), 1385-1389.
4. Al-Hammood, F. M., & Abd, A. M. (2018). Role of marine algae extracts and nutrients in physical properties of date palm Phoenix dactylifera L Bream and Hallawii cvs. *Basrah Journal for Date Palm Research*, 17(1), 65-78.
5. Al-Karawi, H. N. R., & Al-Rawi, W. A. (2016). Effect Of Foliar Application of Organic Extract and Hamic Acid Application on Strawberry Production. *Iraqi Journal of Agricultural Sciences*, 47(3): 749-756.
6. Al-Mohammadi, S. M. & Al-Mohammadi, F. M. (2012). *Statistics And Experimental Design*. First edition. Osama Publishing and Distribution House, Oman. Page 376.
7. Al-Shammari, G.N. and Mohammed, A.H. (2019). Effect of number leaves, benzyl adenine spraying on characteristics date of palm phoenix dactylifera L. fruits cv Khidrawi and Mekkawy. *Arab Journal of science and Research publishing*, 2(3), pp.2522-3364.
8. AL-Tamimi, I. H. (2016). The effect of benzyl adenine on the productivity traits of two date palm cultivars (Zahdi and Sayir). *Jordanian Journal of Agricultural Sciences*. 12 (4): 1317-1324.
9. Elmeer, K., Mattat, I., Al-Malki, A., Al-Mamari, A. G., BoJulaia, K., Hamwieh, A., & Baum, M. (2019). Assessing genetic diversity of shishi date palm cultivars in saudi arabia and qatar using microsatellite markers. *International Journal of Horticultural Science and Technology*, 6(1), 1-9.
10. Ghazzawy, H. S., Alhajhoj, M. R., Sallam, A. A. M., & Munir, M. (2019). Impact of chemical thinning to improve fruit characteristics of date palm cultivar Khalas. *The Iraqi Journal of Agricultural Science*, 50(4), 1361-1368.
11. Ibrahim, A.O. & Abdul Wahab Z. (2019). *Date Palm Cultivation and Date Quality Between Environmental Factors, Service Programs, And Care*. Supported by the Khalifa International Award for Date Palm and Agricultural Innovation. United Arab Emirates. pp: 432.
12. Joody. A. T. (2014). Effect of Foliar Spray of GA3, Growmore and Medicated Water by Magnetic on Anna Apple Leaves content of Chlorophyll and N, P, K. *Euphrates Journal of Agriculture Science*, 6(2):35-43.
13. Jubeir, S. M., & Ahmed, W. A. (2019). Effect of nano fertilizers and application methods on vegetative growth and yield of date palm. *The Iraqi Journal of Agricultural Science*, 50(1), 267-274.
14. Jubeir, S. M., Jabbar, S. H., & Hassan, Z. A. (2023). Effect of duration and type of bagging on fruit characteristics of date palm cv. Khastawi. *Research on Crops*, 24(3), 523-526.

15. Khaleel, S. A., Hussain, N. H., Salih, F. F., & Sharaef, M. H. (2019). Study of biochemical indicators for some varieties of palms at some point defects. *Plant Archives*, *19*(2), 3496-3500.
16. Khalil, N. H. (2023). The effect of organic fertilization on leaf mineral content of three citrus species. In IOP Conference Series: *Earth and Environmental Science* (Vol. 1158, No. 4, p. 042049). IOP Publishing.
17. Khierallah, H. S. M., Abood, M. R., & Al-Rawi, T. K. (2017). Sex identification of date palm by using DNA molecular markers. *The Iraqi Journal of Agricultural Science*, 48(5), 1197-1205.
18. Mansour, H. A., & Khalil, N. H. (2019). Effect Of Wounding and Iba on Rooting of Aerial and Ground Offshoots of Date Palm Phoenix Dactylifera L. Medjool Cultivar. *Plant Archives*, *19*(2), 685-689.
19. Mukherjee, A., & Patel, J. S. (2020). Seaweed extract: bio stimulator of plant defense and plant productivity. *International Journal of Environmental Science and Technology*, 17, 553-558.
20. Radwan, E., Diab, Y., & Ali, H. A. (2022). Effect of Pollination and Thinning Treatments on Fruiting of Some Date Palm Cultivars under New Valley Conditions. *Assiut Journal of Agricultural Sciences*, 53(3), 86-100.
21. Saleem, Q. T. S., & Joody, A. T. (2015). The Effect of Liquid Organic Fertilizer and Spray by Gibberellic Acid and Anti Transpiration (Stress Relief) In Some Vegetative Growth Characteristic of Apple Seedling Cv Anna. *Iraqi Journal of Agricultural Sciences*, 46(5) :784-792.
22. Sallam, A. A. M. (2023). Thinning Methods Effect on Yield and Fruit Quality of Date Palm Cv. Saqei. *Journal of Plant Production*, 14(2), 45-49.
23. Shakir, M. A., & Abood, M. R. (2023). Effect of Pollinator, Number of Pollination Times and Organic Fertilizer on Leaf Mineral Content and Yield of Barhi Date Palm. *In IOP Conference Series: Earth and Environmental Science* (1262, No. 4, p. 042039).
24. Taha, F. H., & Abood, M. R. (2018). Influence Of Organic Fertilizer on Date Palm Cv. Barhi 2. Leaves Mineral Content. *Iraqi Journal of Agricultural Sciences*, 49(3), 372-376.
25. Vashi, J. D. (2023). Plant Hormones-Natural Growth Regulators. *Journal of Experimental Agriculture International*, 45(11), 30-38.
26. Zaid, A.A., & Wahbi, A. (2022). *Cv Mejhoul Phoenix Dactylifera: Origin, Distribution, And Global Spread*." Khalifa International Date Palm Award for Date Palm and Agricultural Innovation. United Arab Emirates. pp: 275.
27. Zamani, S; S. Khorasaninejad & B. kashefi. (2013). The importance role of seaweeds of some characters of plant. *International Journal of Agriculture and Crop Sciences*. 5(16):1789-1793