EFFECT OF SPRAYING WITH POLLEN EXTRACT AND BIO-FERTILIZER (Oligo green) IN SOME CHEMICAL, PHYSICAL AND PRODUCTIVE TRAITS OF DATE PALM FRUITS (*Phoenix dactylifera* L.) AI-SHOITHI CULTIVAR

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ABSTRACT

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This study was conducted during the growing season 2016 on date palm trees (Phoenix dactylifera L.) Al-Shoithi cultivar, with 20 years age which cultivated at Akd Palms station belonging to General Palm Organization, Ministry of agriculture at Al-Bada in Al-Shatrah district north center of Dhi Qar province. The major principles from this study are to know the effect of foliar spraying by pollen extract (10, 20 gm.L⁻¹) and Oligo green (100, 200 mg.L⁻¹) as well as control treatment, also to know the effect of number of spraying times (once spraying, twice spraying) on some of Al-Shoithi date fruits. The first spraying was conducted during the first three weeks after pollination (hand pollination, 15/4/2015), the second spraying was conducted six weeks after pollination (mid-Kimri stage). The results showed that the foliar spraying by pollen extract, with concentration of (20 g.L⁻¹) led to a significant increase in all the qualitative traits of the fruits, including reducing Sugars, concentration of the mineral elements (nitrogen, phosphorus, potassium), the percentage of fruits and the weight of brunch in the Khalal and rutab stages. The results also showed that the treatment with a concentration of (200 mg.L⁻¹) of Oligo green fertilizer (which was not significantly different from the pollen extract treatment at a concentration of 20 g L⁻¹ in most of the studied traits) had a significant effect compared to the control treatment in all studied traits. It was also observed that the twice spraying treatment was significantly excelled by giving it the highest increase in the fruit content [from reducing Sugars (nitrogen and phosphorus) in the rutab stage and potassium in Khalal stage]. The effect of the interactions was significantly greater in the studied traits: the interaction (20 g.L⁻¹ pollen extract + twice spraying) was significantly excelled in the reducing Sugars, concentration of the mineral elements (nitrogen, phosphorus, potassium), the percentage of mature fruits and the weight of bunches.

Keyword: Foliar nutrition, pollen extract , Date palm. *Research paper from MSc thesis for third author

تأثير الرش بمستخلص حبوب اللقاح والسماد الحيوي Oligo green في بعض الصفات الكيميائية والفيزيائية والثير الرش بمستخلص حبوب اللقاح والسماد الحيوي Phoenix dactyliferaL صنف الشويثي

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الملخص

أجريت هذه الدراسة خلال موسم النمو 2016 على أشجار نخيل التمر. Phoenix dactylifera L صنف الشويثي بعمر عشرين سنة مزروعة في محطة نخيل أكد التابعة للهيئة العامة للنخيل في وزارة الزراعة في منطقة البدعة بقضاء الشطرة شمال مركز محافظة ذي قار. لمعرفة تأثير الرش الورقي بمستخلص حبوب اللقاح (10، 20) غم. لتر⁻¹ والرش بسماد 2019 *Oligo green مركز محافظة ذي قار. لمعرفة تأثير الر*ش الورقي بمستخلص حبوب اللقاح (10، 20) غم. لتر⁻¹ والرش بسماد *Oligo green مركز محافظة ذي قار. لمعرفة تأثير الر*ش الورقي بمستخلص حبوب اللقاح (10، 20) غم. لتر⁻¹ والرش بسماد *Oligo green مركز محافظة ذي قار. لمعرفة تأثير الر*ش الورقي بمستخلص حبوب اللقاح (10، 20) غم. لتر⁻¹ والرش بسماد *Oligo green الفويية وركان 200) ملغم. لتر⁻¹ والر*ش المعات النوعية لثمار نحيل التمر صنف الشويثي. تم أجراء الرشة الأولى بعد ثلاثة اسابيع من التلقيح (اليدوي 2015/4/15) والرشة الثانية بعد ستة المار نخيل التمر صنف الشويثي. تم أجراء الرشة الأولى بعد ثلاثة اسابيع من التلقيح (اليدوي 2015/4/15) والرشة الثانية بعد ستة راسابيع من التلقيح (منتصف مرحلة الجمري). بينت النتائج أن الرش الورقي بمستخلص حبوب اللقاح تركيز 20 غم لتر⁻¹ أدى إلى السابيع من التلقيح (اليدوي 2015/4/15) والرشة الثانية بعد ستة زيادة معنوية في جميع الصفات النوعية (البيع من التلقيح اليدوي 2015/4/15) والرشة الثانية بعد ستة راسابيع من التلقيح (اليدوي 2015/4/16) والرشة الثانية بعد ستة ريادة معنوية في جميع الصفات النوعية المار ومنها السكريات المختزلة وتركيز العناصر المعدنية (نتروجين ، فسفور ، بوتاسيوم) والنسبة المئوية للثمار ووزن العذق في مرحلتي الخلال والرطب. وأظهرت النتائج أيضا أن المعاملة بالتركيز 200 ملغم. لتر⁻¹ من والنسبة المئوية للثمار ووزن العذق في مرحلتي الخلال والرطب. وأظهرت النتائج أيضا المعاملة بالتركيز من المعاملة بالتركيز 200 ملغم. المعاملة بالتركيز 200 ملغم. التر⁻¹ من والنسبة المئوية للثمار ووزن العذق في مرحلتي الخلال والرطب. وأظهرت النتائج أيضا أن المعاملة بالتركيز 200 ملغم. التر⁻¹ من ملغم الميال ملغمان المنوية الماموس حلوب العام وليم المعاملة بتركيز 20 غم. وألهرت أن الرما الموليم وليما الماموس حليما ملغما الماموس حليم الميام وليما مالموما الماموم حلمماني ولنغم. مالموم ملغمم الموما ملغم. مالموما م

المدروسة) تأثيراً معنوياً قياساً بمعاملة المقارنة في جميع الصفات المدروسة. أيضاً لوحظ تفوق محتوى المعاملة برشتين معنوياً في إعطاء أعلى زيادة في محتوى الثمار (من السكريات المختزلة النتروجين والفسفور في مرحلة الرطب والبوتاسيوم في مرحلة الخلال) معنوياً في إعطاء أعلى زيادة في المعدل. وقد كان للتداخلات تأثيراً واضحاً في الصفات المدروسة إذ تفوق التداخل (20 غم. لتر⁻¹ مستخلص حبوب لقاح + رشتين) معنوياً في السكريات المختزلة، تركيز العناصر المعدنية (نتروجين، فسفور ، بوتاسيوم) , النسبة المئوية للثمار الناضحة ووزن العذق.

الكلمات الدالة: التغذية الورقية, مستخلص حبوب اللقاح, نخيل التمر البحث مستل من رسالة ماجستير للباحث الثالث

1. INTRODUCTION

The date palm (*Phoenix dactylifera* L.) belongs to Arecaceae family, which has about 220 genus and 2600 species. The dates palm trees originated in Mesopotamia and from there spread to the Arabian Peninsula, North Africa and the Middle East about 5000 years ago. The historical city of Ur, which is located in the province of Dhi Qar is considered as a main area for palm cultivation where it was found in many Sumerian inscriptions Which indicates the presence of palms in that period. Palm dates were sacred to the Sumerians, Babylonians and Assyrians because of their importance of living, economic and food. Palm dates are considered the first tree in Iraq (4). As they are mentioned in the heavenly books. It is mentioned in the Holy Quran in twenty-one verses (1). The date palm (Al-Shoithi cultivar) is a rare type of date palm that is cultivated in the southern regions of Iraq, specifically in the provinces of Dhi Qar and Basra. It is of late maturity cultivars. It is characterized by good quality with the fruits of their large size, elongated and their spindle shape with a slightly sweet taste and with little astringent, It is characterized by its yellow fruit. As well as a sweet taste with a good flavor and high nutritional value, and fruits in the dates stage has a thin crust adherent to meat and eaten fruits in the date and rutab stages (2). Research in the field of nutrition requires a large degree of awareness of the growth stages and development of the plant, which involves knowing of the critical stages and their requirements of nutrient elements in order to provide the right time and quantity required to maximize the use of the best balanced production and good quality. It has a clear effect on the increase in date and quantity yield. The nutrition process is essential for date palm as it provides the plant elements that have a main and necessary role

in the system of many enzymes that enter the respiration process, including peroxidase, cytochrome catalase, oxidase and its participation in these compounds is particularly important in the processes of oxidation as the importance of some of the transmission of electrons in interactions Oxidation, so the importance of some of them is the transfer of electrons in the reactions of oxidation and reduction, which is one of the important roles in cellular metabolism and has important role in preserving an the Chlorophyll inside the plant and the representation of nuclear acids and Chloroplast (12). The use of nutrients achieve many benefits when used as a rebalancing and revitalization of the plant's vital processes, increasing yield productivity and high quality of fruits. Feeding fertilizer is an important technique that fills a large part of the fertilizer needs and provides a large amount of energy consuming in production (30, 20). The pollen is an organic nutrient source, in addition, it is the basis in the process of growth and development of fruit, As it provides and stimulates the fruit on the formation of plant hormones necessary for growth (13). In addition, the pollen has high nutritional and medical benefits because it consists of 10-12% water, 35% sugar, 5% fat, 35% protein and a large proportion of fatty acids, vitamins and minerals such as Calcium, iron and magnesium (15, 6). The palm pollen extract has been shown to play a positive role in stimulating plant tissue growth in tissue culture.

Therefore, the study aims to:

1- Knowing the response of date palm (Al-Shoithi cultivar) of foliar spraying, different concentrations of pollen extract and Oligo Green fertilizer (O.G).

2 - Estimation the effect of the spraying times number in some qualitative and productive traits of date palm (Al-Shoithi cultivar). 3- Estimation the effect of the interaction between the concentrations of pollen extract and animal manure and the number of spraying times in some qualitative and productive traits of date palm.

2. MATERIALS AND METHODS

This study was conducted during the growing season 2016 at Akd Palms station belonging to General Palm Organization, Ministry of agriculture at Al-Bada in Al-Shatrah district north center of Dhi Qar province. A 30 palm trees (Phoenix dactylifera L.) Al-Shoithi cultivar were selected on the basis of similarity in the strength of vegetative growth and the absence of disease. At the age of 20 years cultivated in the loamy soil and the dimensions of cultivating 8×8 m, The usual agricultural service operations were conducted by irrigation, organic fertilization, irrigation and weeding.

Study parameters

1- Spraying with Oligo Green fertilizer (100, 200 mg.L⁻¹) and spraying with pollen extract (10, 20 g.L⁻¹), as well as control treatment (0 mg.L⁻¹) Distilled water.

2- The number of sprays / palm (once spraying, twice spraying), the first spraying was conducted after three weeks of pollination (mid- hababok stage), the second spraying after six weeks of pollination (mid-Kimri stage) For the brunch fruit of the selected date palm trees for the study.

3- The trees were manually pollinated using green Gannami pollen on 10/4/2017 with the number of inflorescences were unified, with seven inflorescences per each tree of selected date palm tree. The leaves were unified for all palm trees, with eight leaves for each inflorescences.

Preparation of nutritious solution for pollen extract

Fruit samples were collected by taking 25 fruit randomly from each palm (replicate) during the two stages of Khalal (16 weeks after after pollination) and rutab (22 weeks pollination). The pollen was collected from palm trees (green Gannami cultivar) cultivated at Akd Palms station belonging to General Palm Organization, Ministry of agriculture at Al-Bada in Al-Shatrah district north center of Dhi Qar province, which its chemical composition illustrates in Table (3). The aqueous extract of the pollen was prepared at a concentration of $(10, 20 \text{ g.L}^{-1})$. The water was boiled and the pollen was put in it, then cooled and left for 24 hours to ensure complete extraction. The solution was leached with gauze to be ready to be used for spraying, The brunch fruit was sprayed (once spraying) after three weeks the pollination and the second after six weeks of pollination.

Property	Value	Unit	
рН	7.75	1:1	
Electrical conductivity (E.C.)	17	ds.m ⁻¹	
CaCO ₃	24.43	%	
The exchange capacity of positive ions	14.4	Cmol ⁺ .kg ⁻¹	
Organic matter	0.345	%	
Total nitrogen	1.1	g.kg ⁻¹	
Soil separates			
Sand	40.81		
Silt	38.61	%	
Clay	20.58		
Soil texture	loamy		

Table 1: Some chemical and physical properties of the orchard soil of the study

Table 2: C	bemical	Composition	of Oligo	Green Fertilizer
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Element	Mg	В	Со	Cu	Fe	Mn	Mo	Zn
Concentration %	3	0.5	0.02	1	5	2	0.05	2

Table 5. Chemical Composition of Oreen Gamann Fonen								
Element	Ν	Р	K	Fe	Cu	Mn	Zn	В
Concentration %	4.09	1.36	3.94	0.082	0.064	0.062	0.46	0.037

The qualitative traits of date palm fruits **1- Reducing Sugars (%)**

Reducing Sugars were estimated in fruits meat during the Khalal and rutab stages using Lane and Eynon method by taking 0.5 g of dried fruit meat at a temperature of 65°C. A 50 ml of distilled water was added and heated at 70 $^\circ$ C for 30 minutes using a water bath to extract the Sugars. The filtration process was then performed and then the Clarification process was performed and the Sugars were estimated from the Leachate solution by titration with a solution mixture according to the following equation:

Reducing Sugars (%) =

g of carbohydrates (from the table equivalent of reading the Burette) ised least significant difference (R.L.S.D)

titrations ×100

2 - Concentration of mineral elements in fruits

The concentration of mineral elements (nitrogen, phosphorus and potassium) in date palm fruits (Al-Shoithi cultivar) was estimated in the Khalal and rutab stages at Department of Soil Science and Water Resources. Plant digestion was carried out in the laboratories of the Department of Horticulture and Landscape Gardening, College of Agriculture, University of Basra. The following steps were followed to digest the plant samples according to method of (23).

Concentration of nitrogen (%)

The nitrogen element in plant samples (fruits and pollen grains) digested by a micro-Kjeldahl was estimated using the method described by (32).

Concentration of phosphorus (%)

Phosphorus was estimated in the plant samples (fruits and pollen), which digested by the Ascorbic acid method and described in Page et al. (1982). After adjusting the acidity of the mixture solution and using the Spectrophotometer, with wavelength of 700 nm to estimate potassium, Potassium is estimated in plant samples (fruits and pollen) digested using the JEN WAYPFP 7 type Flame photometer by (32).

Productive traits of dates palm 1) Percentage of mature fruits

The percentage of mature fruits was calculated by taking 10 spikes randomly from each tree and each treatment during Khalal and rutab stages and calculated as follows:

Percentage of mature fruits = number of mature fruits (rutab) × 100

Total fruits number 2) Average weight of the brunch (kg)

The average weight of brunch for each palm was calculated by dividing the total weight of each palm per its brunches number.

The data used in the study were statistically analyzed and the averages were tested using a

method to determine the effect of the two nutrition factors and the number of spraying times in the studied traits. The pollen extract was added in three concentrations (0, 10, 20 g.L⁻¹) and Oligo Green fertilizer with three concentrations $(0, 100, 200 \text{ mg.L}^{-1})$. The experiment was conducted using a factorial experiment with Randomized Complete Block Design (R.C.B.D), with three sectors where the Palm represented one experimental unit (9).

3. RESULTS AND DISCUSSION **1-** Reducing Sugars (%)

Table (4) shows that the spraying of date palm tree (Al-Shoithi cultivar) with pollen extract and Oligo Green fertilizer significantly effect in the increasing the percentage of Sugars. The treatment of (20 g.L⁻¹ pollen extract) gave the highest increase in the average of reducing Al-Shoithi Sugars for fruits (45.755, 61.475%), respectively for the two stages of Khalal and rutab, followed by treatment (200 mg.L⁻¹ Oligo Green) where the percentage of sugars by (44.810, reducing 60.33%), respectively for the two stages of Khalal and rutab. This treatment is excelled the two treatments (10 g.L⁻¹ pollen and 100 mg.L⁻¹ Oligo Green), The lowest number of reducing sugars was achieved with the control treatment (39.185, 53.965 %), respectively for the two stages of Khalal and rutab, Which made it significantly different from all fertilizer

treatments under study. This may be due to the fact that spraying treatments with nutrition solutions have led to increase concentration of phosphorus in fruits as shown in Table (6), since phosphorus has a significant role in building carbohydrates, including starch and glucose, Phosphorus was also found to be involved in the construction of the Uridines Tri Phosphate (UTP) compound necessary to build sucrose and glucose (18). Awwad (16) also mentioned that phosphorus enters the structure of fructose, which is one of the sugars in the fruit. The results indicated in Table (4) that the number of spraying times of nutritious solutions (pollen extract and Oligo Green extract) significantly increased the

percentage of sugars in the fruit. The twice spraying treatment was significantly excelled by increasing the percentage of sugars (43.332, 59.464%). respectively, This may be due to increased fruit maturity as shown in Table (8). This was reflected in an increase in total sugar content in fruits. As for the effect of interaction between the levels of fertilizer and the number of spraying times, the nature of the interaction had a significant effect on the content of the fruits of reducing sugars, the treatment (20 g.L⁻¹ pollen + twice spraying) gave the highest percentage of reducing sugars (46.30, 62.24%) during the two stages of Khalal and rutab compared with other treatments under study as shown in Table (4).

Table 4: Effect of spraying with pollen extract and Oligo green fertilizer and their interactions in the	е
percentage of reducing sugar (%) in fruits	

Khalal stage						
Spraying treatments	Number of s	The average effect of				
	Once spraying Twice spraying		spraying treatments			
0	39.20	39.17	39.185			
10 g.L^{-1} pollen	42.94	42.38	42.660			
20 g.L^{-1} pollen	46.30	45.21	45.755			
100 mg.L ⁻¹ O.G. Fertilizer	44.84	40.84	42.84			
200 mg.L ⁻¹ O.G. Fertilizer	45.38	43.24	44.810			
Average effect of the number of spraying	43.332	43.332 41.968				
R.L.S.D for the effect of	R.L.S.D for the effect					
number of spraying	spraying treatment ar					
0.890	1.4	0.626				
	Rutak	o stage				
Spraying treatments	Number of s	Spraying treatments				
	Once spraying	Twice spraying				
0	55.30	52.63	53.965			
10 g.L^{-1} pollen	60.008	55.88	57.944			
20 g.L ⁻¹ pollen	62.24	60.71	61.475			
100 mg.L ⁻¹ O.G. Fertilizer	58.91	57.26	58.085			
200 mg.L ⁻¹ O.G. Fertilizer	60.86 59.74		60.300			
Average effect of the number of spraying	59.464	R.L.S.D for the effect of spraying treatment				
R.L.S.D for the effect of	R.L.S.D for the effect					
number of spraying	spraying treatment ar	nd number of spraying				
0.990	1.:	0.693				

2- Concentration of elements in fruits (K, P, N)

Table (5, 6, 7) indicate that the highest concentration of the necessary elements of (nitrogen phosphorus potassium) in the fruits was achieved with the fertilizer treatment (20 $g.L^{-1}$ pollen) which reached (1.3765, 0.25, 1.698 %), respectively at Khalal stage. In the rutab stage, the concentrations (1.090, 0.240, 1.1435), respectively compared to other treatments under study. It was also observed that all the adding fertilizer treatments have significantly affected in the increase the concentration of the elements (K, P, N) compared to the control treatment, which gave the lowest concentration of elements (K. P. N). where amounted to (1.090, 0.1215, 1.1435%), respectively at Khalal stage. In the rutab stage, it was (0.6815,0.0815, 0.2935%), respectively. This may be due to the fact that the spraying of date palm trees with the nutritious solution of the pollen extract and the Oligo Green Fertilizer has increased the Osmotic pressure of the fruit cells, Which increased the absorption of water and nutrient elements into the treated fruits and thus increased concentration of necessary elements (N, P, K) in fruits (7, 10). Table (5, 6, 7) shows that the concentration of nutrient elements (K, P, N) in fruits decreased as fruit growth stages progressed from Khalal stage to rutab stage. This may be due to the fact that in the early stages of the fruit age, the absorption rate of nutrients is higher than the growth rate leading to the accumulation of nutrient elements. In the advanced stages of growth, the growth rate is faster than the nutrient absorption rate. which reduces the concentration of these nutrients (31). Al-Tamimi (5) and Al-Bazouni (3) found that the concentration of nitrogen, phosphorus and potassium in date palm fruits (khasab and Hillawi cultivars) has decreased with the development of stages of fruit growth from Khalal stage to rutab stage. This results agree with the results of our current study. Table (5, 6, 7) show that there was a significant effect on the number of spraying times in the concentration of some of the elements under study. The treatment of twice spraying has excelled in the increase the concentration of

the nutrient elements (K, P, N) where the average of their concentration reached (1.242, 1.5234 %), respectively compared to the average of its concentration with the once spraying treatment (1.1612, 1.3872 %). respectively in the Khalal stage. In the rutab stage, the concentrations of elements with the twice spraving treatment reached (1.0092, 0.1786), respectively for the nitrogen and phosphorus elements compared to their concentration with the once spraying treatment (0.762, 0.1254%) respectively, while there is no significant effect for the number of spray times in the increase K element in rutab stage. This may be due to the fact that the spraying of Al-Shoithi palm trees at a rate of two after three and six weeks has led to a good nutritional status of the plant and has led to compensating the shortage of nutrients as a result of its consumption during The process of flowering and fruit set which led to the activation of photosynthesis and respiration and thus increase the maturity of fruits and reduce the moisture content in the fruits, This is reflected in the concentration of certain nutrients under study (K, P, N). Table (5, 6, 7) show the interaction effect between the levels of fertilizer and the number of spraving times in the concentration of elements (N, P, K). The treatment (20 g.L⁻¹ pollen + twice spraying) excelled by giving it the highest has concentration of nitrogen (1.410%) in fruits during the Khalal stage. In the rutab stage, the interaction treatments gave a significant effect on the increased concentration of nitrogen compared to the control treatment. This may be due to the fact that the Khalal stage is a physically unstable stage. As for phosphorus, the results showed that the interaction treatments showed a significant effect on the increase in the concentration of phosphorus in the fruit compared to the control treatment and the highest concentration achieved with the treatment (20 g.L⁻¹ pollen + twice spraying) reaching (0.250, 0.283%), respectively for the two Khalal and rutab stages. The results showed that potassium was similar to the behavior of nitrogen in the significant increase with the interaction treatments compared to the control treatment, the treatment (20 g.L⁻¹) pollen + twice spraying) has excelled by

giving it the highest concentration of potassium (1,813, 1.210%), respectively during the two stage of Khalal and rutab compared to other interaction treatments and the control treatment that gave the lowest concentration of potassium in date palm fruits (Al-Shoithi). This may be due to the compatibility of fertilizer levels with the number of spraying times in the establishment of a balanced nutritional status of the plant which led to increased nutrient elements (K, P, N) in fruits, which is one of the most important elements necessary for the plant as the reduction of nitrogen causes the weakness of the production of protein and all organic compounds necessary for plant. Phosphorus has a significant role in photosynthesis reactions. Potassium is used in many physiological functions, and its lack leads to weak plant resistance to drought and disease (22, 28).

Table 5: Effect of spraying with pollen extract and Oligo green fertilizer and their interactions in the
Fruit content of nitrogen (%)

Khalal stage						
Spraving treatments	Number of s	The average effect of				
	Once spraying	Twice spraying	spraying treatments			
0	1.110	1.070	1.090			
10 g.L ⁻¹ pollen	1.230	1.120	1.175			
20 g.L^{-1} pollen	1410	1.343	1.3765			
100 mg.L ⁻¹ O.G. Fertilizer	1.183	1.170	1.1765			
200 mg.L ⁻¹ O.G. Fertilizer	1.277	1.103	1.190			
Average effect of the	1 242	1 1612	R.L.S.D for the effect of			
number of spraying	1.242	1.1012	spraying treatment			
R.L.S.D for the effect of	R.L.S.D for the e	ffect of interaction				
number of spraying	between spra					
0.0950	0.1	.261	0.0727			
	Rutal	o stage				
Spraying treatments	Number of s	praying times	Spraying treatments			
	Once spraying	Twice spraying				
0	0.823	0.540	0.6815			
10 g.L^{-1} pollen	1.053	0.867	0.9600			
20 g.L^{-1} pollen	1.133	1.133 1.047				
100 mg.L ⁻¹ O.G. Fertilizer	0.990 0.833		0.9115			
200 mg.L ⁻¹ O.G. Fertilizer	1.047 1.023		1.035			
Average effect of the	1 0002 0 762		R.L.S.D for the effect of			
number of spraying	1.0092 0.762		spraying treatment			
R.L.S.D for the effect of	R.L.S.D for the effect of interaction					
number of spraying	between spra	ying treatment				
0.1506	0.2	0.0953				

1- Percentage of mature fruits (%)

Table (8) indicates that the spraying of the date palm trees (Al-Shoithi cultivar) with different levels of nutritious solution of the pollen extract and the Oligo Green fertilizer gave a significant increase in the percentage of mature fruits. The two fertilizer treatment (20 g.L⁻¹ pollen) and (200 mg.L⁻¹ Oligo Green)

gave the highest significant increase in the percentage of maturity (67.285 and 61.820), respectively compared to the control treatment, which gave the lowest percentage of fruit maturity (50.725%) compared to other treatments under study. This may be due to the role of the necessary elements in the pollen extract and bio-fertilizer ,

	Khala	l stage	
Spraying treatments	Number of s	The average effect of	
	Once spraying Twice spraying		spraying treatments
0	0.133	0.110	0.1215
10 g.L^{-1} pollen	0.157	0.127	0.142
20 g.L^{-1} pollen	0.250	0.250	0.250
100 mg.L ⁻¹ O.G. Fertilizer	0.200	0.170	0.185
200 mg.L ⁻¹ O.G. Fertilizer	0.203	0.187	0.195
Average effect of the number of spraying	0.1886	R.L.S.D for the effect of spraying treatment	
R.L.S.D for the effect of	R.L.S.D for the effect		
number of spraying	spraying treatment ar		
0.0633	0.0	0.0428	
	Rutak	o stage	
Spraying treatments	Number of s	Spraying treatments	
	Once spraying	Twice spraying	
0	0.090	0.073	0.0815
10 g.L^{-1} pollen	0.167	0.093	0.1300
20 g.L^{-1} pollen	0.283	0.197	0.2400
100 mg.L ⁻¹ O.G. Fertilizer	0.113 0.107		0.1100
200 mg.L ⁻¹ O.G. Fertilizer	0.240 0.157		0.1985
Average effect of the number of spraying	0.1786	R.L.S.D for the effect of spraying treatment	
R.L.S.D for the effect of	R.L.S.D for the effect		
number of spraying	spraying treatment ar	nd number of spraying	
0.0815	0.1	0.0151	

Table 6: Effect of	f spraying w	ith pollen e	extract and	Oligo	green t	fertilizer	and their	interaction	s in the
Fruit content of P	hosphorus (%	%)							

as these elements play an important role in the construction of ADP, ATP, DNA and DNA. They also plays a role in the synthesis of NADP and NAD enzyme, which play a key role in many vital processes such as photolysis and respiration, which makes the fruits mature faster than untreated fruits whose maturation is delayed and their percentage of maturity is reduced due to the lack of necessary elements (11, 18). The number of spraying times for Al-Shoithi palm trees with pollen extract and the Oligo Green fertilizer did not have significant effect in the increase the percentage of mature fruits as shown in Table (8). The twice spraying treatment has excelled in the increase the percentage of maturity (60.540%)compared to the once spraying treatment (57.188%). This may be due to the number of spraying times are necessary to compensate for the lack of necessary nutrient elements resulting from the fruits set and its growth which was positively reflected in the increased maturity of fruits (8, 30). The interaction between the spraying treatments and the number of spraying times has significant effect in the increase the average of fruits maturity as shown in Table (8) where the percentage of fruit maturity gradually increased with the concentration of the used treatments and the number of spraying times. The treatment of the mixture (20 g L^{-1} pollen + twice spraying) gave the highest significant increase in the percentage of mature fruits (68.41%), Which did not differ significantly from the two

treatments (20 g, L^{-1} pollen + once spraying), which reached the percentage of maturity (66.16%) compared to other interaction treatments and control treatment, which gave the lowest average of fruits maturity (48.00, 53.45%), respectively for once or twice spraying. This may be due to the fact that the spraying treatment (pollen extract and Oligo Green fertilizer) compatible with the number of spraying times in increasing the Osmotic pressure for the fruit cells as a result of the absorption of nutrient elements added to them, leading to increased absorption of water and nutrients into the fruit, which encouraged their increased maturity.

Table 7: Effect of spraying with pollen extract and Oligo green fertilizer and their interactions in the

 Fruit content of Potassium (%)

Khalal stage						
Spraying treatments	The average effect of					
	Once spraying	Twice spraying	spraying treatments			
0	1.147	1.140	1.1435			
10 g.L^{-1} pollen	1.443	1.283	1.363			
20 g.L ⁻¹ pollen	1.813	1.583	1.698			
100 mg.L ⁻¹ O.G. Fertilizer	1.477	1.360	1.4185			
200 mg.L ⁻¹ O.G. Fertilizer	1.737	1.570	1.6535			
Average effect of the number of spraying	1.5234	R.L.S.D for the effect of spraying treatment				
R.L.S.D for the effect of	R.L.S.D for the effect					
number of spraying	spraying treatment ar					
0.1233	0.1	0.0780				
	Rutal	o stage				
Spraying treatments	Spraying treatments					
	Once spraying					
0	0.637	0.550	0.2935			
10 g.L^{-1} pollen	0.923	0.773	0.848			
20 g.L^{-1} pollen	1.210	1.077	1.1435			
100 mg.L ⁻¹ O.G. Fertilizer	0.790 0.727		0.7585			
200 mg.L ⁻¹ O.G. Fertilizer	1.057 0.923		0.990			
Average effect of the number of spraying	0.9234 0.810		R.L.S.D for the effect of spraying treatment			
R.L.S.D for the effect of	R.L.S.D for the effect	of interaction between				
number of spraying	spraying treatment ar					
1,70	1 0 0					

2- The average weight of brunch (kg)

Table (9) shows that the spray with the nutritious solution of the pollen extract and the Oligo Green fertilizer had a significant effect on the increase the weight of the brunch compared to the control treatment. The treatment (20 g.L⁻¹) showed a significant increase in the weight of the brunch (7.48 kg) followed by the treatment (200 mg.L⁻¹ Oligo

Green) in the effect of increasing the average weight of the brunch (6.700 kg), which did not differ significantly from the treatment (10 g.L⁻¹) which gave an average weight of the brunch (6.25 kg) followed by the treatment (100 mg L⁻¹ Oligo Green) in the increase the average weight of the brunch (6.00 kg). This may be due to the role of pollen extract ingredients and Oligo Green fertilizers as shown in Table (2, 3), their important role in all vital plant processes such as photosynthesis and cell division, resulting in increased weight and size of fruits and thus increased weight of the brunch. Table (9) shows that the number of spraying times has no significant effect on the increase in the weight of the brunch.

Table 8: Effect of spraying with pollen extract and Oligo green fertilizer and their interactions in the
percentage of mature fruits (%)

Spraying treatments	Number of spraying times		The average effect of
	Once spraying	Twice spraying	spraying treatments
0	53.42	48.00	50.725
10 g.L^{-1} pollen	57.17	52.93	55.050
20 g.L^{-1} pollen	68.41	66.16	67.285
100 mg.L⁻¹ O.G. Fertilizer	61.49	57.39	59.440
200 mg.L ⁻¹ O.G. Fertilizer	62.18	61.46	61.820
Average effect of the number of spraying	60.540	57.188	R.L.S.D for the effect of spraying treatment
R.L.S.D for the effect of	R.L.S.D for the effect of interaction between		
number of spraying	spraying treatment and number of spraying		
5.817	8.226		3.679

The correlation between the levels of fertilizer and the number of its spraying times on Al-Shoithi palm trees had a significant effect on the increase in the weight of the brunch as shown in Table (9). The two treatments (20 $g.L^{-1}$ pollen + twice spraying) and (20 $g.L^{-1}$ pollen + once spraying) has excelled by giving it the highest significant increase in the average weight of the brunch (7.650, 7.310 kg), respectively compared to the control treatment which gave the lowest average of the weight of the brunch (5.150, 5.350 kg). The results showed that all the other interaction treatments were significantly excelled than the weight of the brunch. This was due to the interaction between the two study levels (fertilization levels and number of spraying times). The spraying of the nutrients during the division and growth of the cells gave an increase in the average of Osmotic pressure which led to an increase in the absorption of water and other nutrients into the fruit cell, thereby increasing its average weight, which was reflected in an increase in the weight of the brunch of treated date palm with nutritious solutions.

Table 9: Effect of spraying with pollen extract and Oligo green fertilizer and their interactions in the average weight of the brunch (kg)

Spraying treatments	Number of spraying times		The average effect of
	Once spraying	Twice spraying	spraying treatments
0	5.350	5.150	5.250
10 g.L ⁻¹ pollen	6.750	5.750	6.250
20 g.L ⁻¹ pollen	7.650	7.310	7.480
100 mg.L ⁻¹ O.G. Fertilizer	6.250	5.750	6.00
200 mg.L ⁻¹ O.G. Fertilizer	6.650	6.750	6.700
Average effect of the number of spraying	6.530	6.142	R.L.S.D for the effect of spraying treatment
R.L.S.D for the effect of	R.L.S.D for the effect of interaction between		
number of spraying	spraying treatment and number of spraying		
0.515	0.738		0.389

4. CONCLUSION

We conclude from this study that the treatment of date palm trees with the pollen extract (20 $g.L^{-1}$) had a role in improving the qualitative and productive traits which did not differ significantly from the fertilizer treatment (200 $mg.L^{-1}$) of Oligo Green fertilizer. The twice spraying treatment (after six weeks of pollination) has significantly excelled on the once spraying treatment (after three weeks of pollination) in the productive traits of date palm (Al-Shoithi cultivar).

5. REFERENCES

1- Agha, Jawad Tanoun and Abdullah Murad Daoud (1991). Production of evergreen fruit trees . Part One, Dar Al-Kutub for printing and Publishing Corporation, Mosul: 465 pages.

2- Al-Ansari, Nada Abdel Majeed and Abbas Ahmed Saleh (2005). Photographs for the Iraqi cultivars of dates palm. Part I, Al-Azza Press, Baghdad, Iraq.

3- Al-Bazouni, Jassem Mohammad Damad Abboud (2015). Effect of fruits thinning and spraying with Galton fertilizer and their interaction in some qualitative and productive traits date palm (Phoenix dactylifera L.) Hillawi cultivar. Master Thesis, College of Agriculture, University of Basra, Iraq

4- Al-bakr, Abdul Jabbar (**1972**). Palm dates its past and present and new in its cultivation, its industry and trade. Al-Ani Press, Baghdad, Iraq.

5- Al-Tamimi, Ebtihaj H. H and Ruaa Hashim and Munther Khattab (2011). Effect of Chelating Iron and agricultural cultivars in the productive traits of date palm (Phoenix dactylifera L.) . The fifth scientific conference of Wasit University, 13-14.

6- Hamed, Faisal, Emad Al-Issa and Mohammed Batha (2012). Fruit production. Publications of Damascus University, College of Agricultural Engineering, Damascus University Press.

7- Haddad, Suhail and Rola Bayerley (2010). Fruit physiology (theoretical and practical). Al-Rawda Press, Damascus, Syria.

8- Al-Douri, Ali and Adel Al-Rawi (2000). Fruit Production. Dar Al-Kutub for Printing & Publishing, University of Mosul, Iraq. **9- Al-Rawi, Khasha Mahmoud and Abdul-Aziz Khalaf Allah (2000).** Design and analysis of agricultural experiments. Dar Al-Kutub for Printing and Publishing, University of Mosul, Iraq, Second Revised Edition: 488.

10- Sharif, Hussein Jassim and Sami Jamil Nael (2012). Effect of some plant extracts and gibberellin in the falling of dates palm fruits (Phoenix dactylifera L.) Barhee cultivar and the improvement of their some traits. Damascus University Journal of Agricultural Sciences, 28 (1): 51-64.

11- Al-Sahaf, Fadel Hussein (1989). Applied Plant Nutrition. Ministry of Higher Education and Scientific Research, Higher Education Press, Mosul, Iraq.

12- Saqr, Moheb Taha (2010). Plant Physiology, First Edition, Mansoura University, Egypt

13- Abbas, Kazem Ibrahim (1995). Physiological Study of Metazinia in Date Palm Hillawi cultivar, Master Thesis, College of Agriculture, Basrah University, Iraq.

14- Abbas, Hamza Abbas Hamza (2016). Effect of some natural control factors prior to harvest and after improvement in the qualitative traits and potability of date palm fruits (Phoenix dactylifera L.). PhD thesis, College of Agriculture, University of Basrah.

15- Abdul, Abdul Kareem Mohammed, Aqeel Hadi Abdul Wahid and Abtaj Hanal Talal Tamimi (2007). Concentration of trace elements in three cultivars of date palm pollen. Basrah Journal of Agricultural Sciences, Volume 20, Issue 2, 2007

16- Awad, Kazem Mashhout (1987). Scientific tests of fertilizers and soil fertility. Basra University Press, University of Basra, Iraq.

17- Al-Nuaimi, Saadullah Najm (1999). Principles of Plant Nutrition. Ministry of Higher Education and Scientific Research, Dar Al-Kutub for Printing and Publishing, University of Mosul, Iraq.

18- Al-Nuaimi, Saadullah Najm Abdullah (2000). Principles of Plant Nutrition, Ministry of Higher Education and Scientific Research, Dar Al-Kutub for Printing and Publishing, University of Mosul, Iraq. **19- Asif, M. I.; Al-Taher, O.S. and Makk,Y. M. (1983).** Effect of some growth chemicals on fruit morphological characteristics of gur and khalas dates. Proceeding of the first symposium on the date palm in Saudi Arabia

20- Dinar, M.; A. A. Al-Khateeb, I. A. Al-Abdulhameed, A. K. Abuguliaand G. R. Abdalla (2012). Bunch thinning improves yield and fruit quality ofdate palm .Egypt Jappl.sei:17(11):228-238

21- El-Shibli, S., and Korelainen, H. (2009). Biodiversity of date palm (*Phoenix dactylifera* L.) in sudan : chemical, morphological andDNA polymorphism of selected cultivars. Plant Genet. Reseour. 7:194-203

22- Francesco, S.; Giovanni, F.; Massimo, N.; Mattia, S. and Guglielo, C. (2010). A novel type of seaweed extract as a natural alternative to the use of iron chelates in strawberry production. Scientia Horticulturae, 125 (3): 263-269.

23- Gresser, M. S. and Parsons, J. W. (1979). Sulphuric-perchloric acid digestion of plant material for the determination of nitrogen, phosphorus, potassium, calcium and magnesium. Acta. Chem. Acta., 109:4311-463.

24- Harhash, M. M. and Abdel-Nasser, G. (2010). Improving of fruit set, yield and fruit quality of Khalas tissue culture derived date

palm through bunches spraying with Potassium and Boron. Austra. J. APP. Sci., 4(9):4164-4172.

25- Hassan, H. M. M.; Ahmed, O. K.; El-Shemy, H. A. and Afify, A. S. (2008). Palm pollen extracts as plant growth substances for Banana tissue culture. World Journal of Agricultural Sciences, 4(4): 514-520

26- Hoopkin, W. G. and Muner, N. P. (2008). Introduction to plant physiology. 4th Edition, J. Wiley and sons, U.S.A. 526.

27- Kader, A. A. and Hussein, A. (2009). Harvesting and Postharest handing of dates. ICARDA, Aleppo, Syria. iv +15pp.

28- Kucpper, G. (2003). Foliar fertilization national sustainable agriculture information service. http/www.atra.ncat.org.

29- Krueger, R. (2007). Nutritional dynamics of date palm (*Phoenix dactylifera* L.) Acta. Horticulturae.

30- Khayyat, M.; Tafazoli, E.; Eshghi, S. and Rajaee, S. (2007). Effect of nitrogen, boron, potassium and zinc sprays on yield and fruit quality of date palm. American-Eurasian J. Agric. & Environ. Sci., 2 (3): 289-296.

31- Mengel, K. and Kirkby, E. A. (1982). Principle of plant nutrition Int. Potash Ins

32- Page, A. L.; Miller, P. H. and Keeney,
D. R. (1982). Methods of soil analysis. Part (2) 2nd ed. Wadison. Wiscon, India.