

# Effect Of Foliar Spraying With Organic Nutrients And Ascorbic Acid On Some Chemical Characteristics Of The Leaves And Fruits Of The Fruitful Date Palm *Phoenix Dactylifera L.* Barhi Cultivar

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## Abstract

This study was conducted in one of the private orchards affiliated to Basra Governorate - Al-Haritha District - Al-Mashab area during the 2020 growing season, with the aim of the effect of foliar spraying with organic nutrients and ascorbic acid and their interactions on some chemical properties of the leaves and fruits of the fruitful date palm variety Barhi. The experiment was carried out according to a Randomized Complete Blocks Design (RCBD) with three replications, where the first factor was the organic nutrients Unigreen at three concentrations (0, 2, 4) ml l<sup>-1</sup>, and Reef algastar at three concentrations (0,500, 1000) mg l<sup>-1</sup> Ascorbic acid in three concentrations (0, 500, 1000) mg liter<sup>-1</sup> for three sprays per season (before the emergence of pollen, after the appearance of the pollen and in the curry stage).The results of the study showed a significant superiority in the treatment of ascorbic spray with a concentration of 1000 mg L<sup>-1</sup> and the organic nutrients Unigreen and Reef algastar at a concentration (4 ml L<sup>-1</sup>, 1000 mg L<sup>-1</sup>) respectively in the total chlorophyll content of leaves reached (26.83, 25.19, 26.66 )mg 100g<sup>-1</sup> respectively, and the leaves content of the amino acid proline amounted to (17,807, 18.181, 18.598)% respectively, and the percentage of membrane stability index was (93.77, 94.68, 95.26)% respectively, while the comparison treatment recorded the highest percentage in The water content amounted to (63.262, 67,873, 65,669)% respectively, and the concentration of 500 mg l<sup>-1</sup> for ascorbic acid with the concentration of the two nutrients above, the highest percentage in the dry matter amounted to (37,676, 38.986, 40.37)% respectively.

**Keywords:** organic nutrients, ascorbic acid, chemical characteristics, fruitful date palm, *Phoenix dactylifera L.*

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## 1-Introduction

The date palm trees (*Phoenix dactylifera L.*) belong to the family Arecaceae, which includes about 200 genera and 2600 species, and which is one of the oldest plant families in the world. One of the alternative methods of ground fertilization is to add nutrients by spraying on the leaves, as it was used on fruit trees, especially those with a deep root system, to ensure that the elements reach the places of food processing in the leaves quickly compared to ground fertilization (Al-Naimi, 2000). Foliar spraying with antioxidants such as ascorbic acid is one of the preventive methods that aim to stimulate the defense system in plant cells and increase their ability to withstand environmental changes. Genetic factors control the variety, climatic factors and the level of agricultural service in the setting and growth of date palm fruits and their ability to early or delay in ripening (Shabana et al., 2006). In a study conducted by Khalaf (2003) on the date palm of the Barhi variety, its results indicate that the water content of the Barhi fruits was high at the beginning of the fruit set, then the fruits witnessed a rapid increase in water content that continued until

the end of the Al-Kamri stage. It decreased more at the wet stage until it reached its lowest value at the date stage. The study of Al-Tamimi (2020) also indicated when studying it by adding Disper Osmotic fertilizer with irrigation water at a concentration of  $2 \text{ gm}^{-1}$ , which led to a significant decrease in the leaf content of proline, as it reached ( $0.502$  and  $0.803 \text{ mg g}^{-1}$ ) compared to the comparison treatment and for the two seasons of the study. The membrane stability index is used as an indication of the integrity of the cellular membranes when the plant is exposed to stress, which in turn depends on measuring the electrical conductivity of the aqueous extract of the plant tissues, and the low value of this indicator indicates a greater damage to the membranes (Howladar, 2014). Therefore, the current study aims to enhance the physiological performance of the fruitful tissue date palm trees of the Barhi variety, newly planted in Basra Governorate, by using some organic nutrients and ascorbic acid, through which we hope to raise the efficiency of the trees and improve some chemical properties of the leaves and fruits.

## 2- Materials and methods

A factorial experiment was carried out according to a randomized complete block design (RCBD) with three replications in Basra Governorate - Al-Haritha District - Al-Mashab area during the growing season (2020), 81 trees were selected from the tissue date palm cultivar Al-Barhi on the basis of symmetry in the strength of vegetative growth, and they are 6 years old. They are planted on lines with planting dimensions ( $10 \times 10 \text{ m}$ ) and are irrigated from the Al-Mashab River and receive the same service operations. Spraying the foliage of palm trees in the three sectors with organic nutrients (Unigreen and Reef algastar) and ascorbic acid three sprays per season. The nutrient solutions under study were prepared and the foliage of palm trees was sprayed with the following concentrations:

1- Reef algastar in three concentrations ( $0, 500, 1000 \text{ mg per liter}^{-1}$ ).

2- Unigreen with three concentrations ( $0, 2, 4 \text{ ml liter}^{-1}$ ).

3-Ascorbic acid in three concentrations ( $0, 500, 1000 \text{ mg per liter}^{-1}$ ).

The diffuse substance 20Tween (0.1%) was added to the prepared solutions in order to reduce the surface tension of the water and facilitate the adhesion of the substance to the leaves. As for the comparison treatment, it was prepared from water and the diffuse substance only. The spraying process was carried out in the early morning on the shoots until full wetness, using a large agricultural sprinkler with a capacity of 100 liters. The fruit samples were taken at the stage of physiological maturity (Khallal) to be used in the subsequent experimental measurement.

## 3-Study indicators

### 3-1:Chemical characteristics of date palm leaves in the khalal stage

Total chlorophyll tincture in the leaf

The total chlorophyll pigment was estimated in the paper samples taken from the fully formed leaflets located in the middle of the leaf (the frond) in the khalal stage, as 1 gm of fresh leaf samples was taken and the total chlorophyll pigment was extracted from them using acetone at a concentration of 80%. Then the dyes were estimated in a UV-Visible Spectrophotometer at the two wavelengths (645 and 663) nanometers, and the dye concentration was calculated according to the following equation:

$$\text{Total chlorophyll pigment (mg L}^{-1}\text{)} = \text{O.D}(663) \times 8.02 + \text{O.D}(645) \times 20.2$$

Where O.D is the device reading

The results were then converted to units (mg 100 g fresh weight).

#### Determination of leaf content of proline

Proline acid was estimated in the leaves according to the method described in (1955, Troll and Lindesely) by taking 0.2 g of dry, ground substance and adding 5 ml of ethyl alcohol at a concentration of 95%. The extract was placed in a centrifuge, then the clear part was taken and evaporated until complete dryness and 2 ml was added. From the distilled water to the remaining part, a centrifugation process was carried out and the clear part was taken. The absorbed light was read at a wavelength of 520 nm using a spectrophotometer, then the proline content of the leaves was estimated based on a standard curve in which the amino acid proline was used, as in Figure (1). The results were expressed in units of micrograms  $\text{g}^{-1}$  dry matter, and the amount of proline in the samples was calculated according to the following equation:

$$\text{Proline content of the sample } (\mu\text{g g}^{-1}) = \frac{\text{Reading from the curve}}{\text{sample weight}} \times \text{dilution}$$

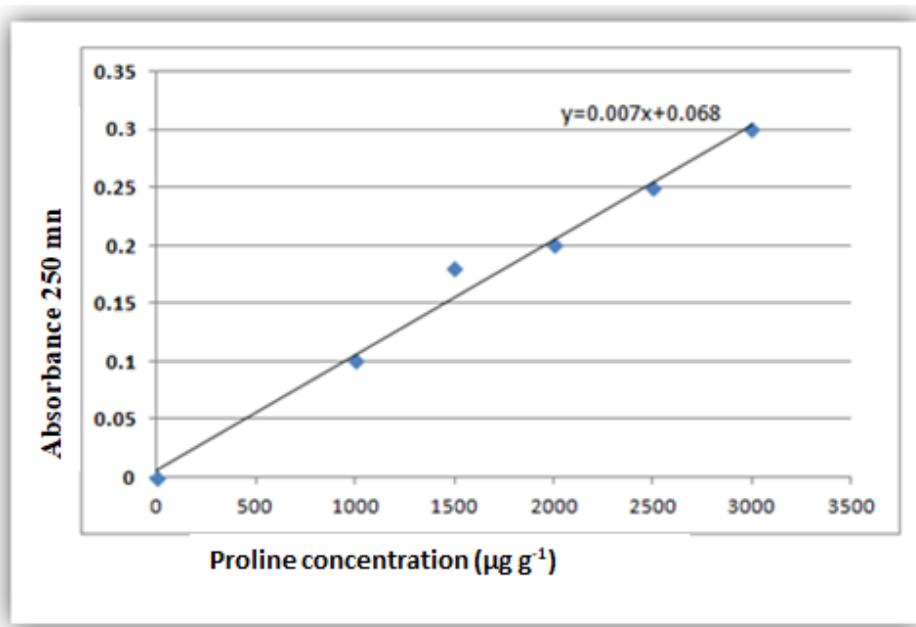


Figure (1) Standard curve of the amino proline

#### Membrane stability index) MSI (Membrane Stability Index

The stability index of the films in the leaves was calculated by mixing 0.25 g of leaves cut into very small pieces with 10 ml of distilled water and then left for 24 hours on a rotating vibrator, then the electrical conductivity was measured as the first reading was considered, then the mixture was placed in an oven at

temperature of  $^{\circ}$  90 C for two hours, then the samples were cooled at a temperature of  $^{\circ}$  25 C, and a second reading of the electrical conductivity was taken and the second reading was considered, and the stability index of the films was calculated through the following equation .

$$\text{Film stability index} = 1 - \left( \frac{\text{first reading}}{\text{second reading}} \times 100 \right)$$

So depending on ( Lutts et al.,1996)

### 3 - 2 : Chemical characteristics of fruits in the khala stage

#### Water content and dry matter

The water content and dry matter of the flesh were estimated for 10 weighed fruits in the khala stage and dried in an electric vacuum oven. Vacuum Oven At a temperature of  $^{\circ}$  70 C  $^{\circ}$  for 48 hours and until the weight is stable, the percentage of water content and dry matter of the fruits was calculated as follows :

$$\text{The sample weight soft} / \text{sample dry weight}$$

$$\text{Water content (\%)} = \frac{\text{soft sample weight}}{\text{dry weight of the sample}} \times 100$$

$$\text{Dry matter (\%)} = \frac{\text{soft sample weight}}{\text{dry weight of the sample}} \times 100$$

#### 3-3 :Statistical Analysis

The experiment was designed according to the design of full random sectors) RCBD (And the experiment is a factorial with three factors, the first factor represents levels of the organic nutrient Reef algastar In three concentrations (0 , 500 ,1000 ) mg liter $^{-1}$  and the second factor represents three levels of treatment with the organic nutrient Unigreen In three concentrations (0 , 2 , 4) ml liter $^{-1}$  and the third factor represents three levels of ascorbic acid with three concentrations (0 , 500 ,1000 ) mg liter $^{-1}$ . As the number of replicates for each treatment is 3 replicates ) palms ,( so the total of palm trees in the experiment is 81 palm trees . The results of the studied traits were analyzed using the prepared statistical program , And compared to the averages of all transactions , according to test less significant rate difference) RLSD (and at a probability level of ) %5 Al-Rawi and Khalaf Allah.(1980 ).

### 4 - Results and discussion

#### 4-1 :Some Chemical properties of date palm leaves

##### Total chlorophyll pigment in the leaf

The results of Table (1) showed a significant superiority in the leaves content of total chlorophyll pigment, as spraying treatment with ascorbic acid at a concentration of 1000 mg L $^{-1}$  and the organic nutrients

Unigreen and Reef algastar with two concentrations ( $4 \text{ ml L}^{-1}$ ,  $1000 \text{ mg L}^{-1}$ ) were significantly superior. On the rest of the treatments in this trait, it recorded the highest content of (26.83, 25.19, 26.66)  $\text{mg 100 g}^{-1}$ , respectively, while the comparison treatment gave the lowest content of (20.77, 22.70, 20.74)  $\text{mg 100 g}^{-1}$ , respectively. As for the binary interaction, the results indicate significant differences. The treatment of ascorbic acid with a concentration of  $1000 \text{ mg L}^{-1}$  with the organic nutrient Unigreen recorded a concentration of  $4 \text{ ml L}^{-1}$  with the highest content of  $29.22 \text{ mg 100 g}^{-1}$ , while the comparison treatment recorded the lowest content. It was  $17.91 \text{ mg 100 g}^{-1}$ . The interaction between the treatment of ascorbic acid with a concentration of  $1000 \text{ mg L}^{-1}$  and the organic nutrient Reef algastar at a concentration of  $1000 \text{ mg L}^{-1}$  was significant in this trait, as it gave the highest content of  $29.43 \text{ mg 100 g}^{-1}$ , while the comparison treatment recorded the lowest content of  $18.04 \text{ mg 100 g}^{-1}$ . As for the binary interaction between Unigreen  $4\text{ml L}^{-1}$  with Reef algastar  $1000\text{mg L}^{-1}$ , the highest content in this trait was  $28.76 \text{ mg 100g}^{-1}$  compared to the control treatment which recorded the lowest content  $19.98\text{mg 100g}^{-1}$ .

The results of the triple interaction effect showed a significant superiority in this trait, as the treatment (ascorbic acid  $1000 \text{ mg L}^{-1}$  + Unigreen organic nutrient  $0 \text{ ml L}^{-1}$  + Reef algastar  $1000 \text{ mg L}^{-1}$ ) was superior in giving the highest content of  $32.09 \text{ mg 100 g}^{-1}$  compared with the control treatment which recorded the lowest content of  $14.78 \text{ mg 100 g}^{-1}$ .

#### **The leaves content of the amino acid proline**

Table (2) shows the effect of foliar spraying with organic nutrients Unigreen And Reef algastar And ascorbic acid and the interaction between them in the leaves content of the amino acid proline, as the treatment of spraying with ascorbic acid at a concentration of  $1000 \text{ mg l}^{-1}$  and the organic nutrients outperformed Unigreen And Reef algastar The two concentrations ( $4\text{ml L}^{-1}$  ,  $1000 \text{ mg L}^{-1}$ ) were significant over the rest of the treatments in this trait and recorded the highest content of  $17.807$  ,  $18.181$  ,  $18.598$  ( $\mu\text{g g}^{-1}$  respectively, while the comparison treatment recorded the lowest content of( $17.306$  , $17.050$ ,  $16.564$  )  $\mu\text{g g}^{-1}$  respectively . As for the bilateral interaction between the treatment of ascorbic acid with a concentration of  $1000 \text{ mg l}^{-1}$  with the organic nutrient Unigreen The concentration of  $4 \text{ ml L}^{-1}$  recorded the highest content of  $18.988 \mu\text{g g}^{-1}$  , while the treatment of ascorbic acid recorded a concentration of  $500 \text{ mg L}^{-1}$  with the organic nutrient .Unigreen The concentration of  $2 \text{ ml L}^{-1}$  the lowest content in the leaves was  $16.618 \mu\text{g g}^{-1}$  compared to the comparison treatment, which increased by a record content of  $16.938 \mu\text{g g}^{-1}$ . Also, the dual interaction between the treatment of ascorbic acid with a concentration of  $1000 \text{ mg L}^{-1}$  with the organic nutrient Reef algastar at a concentration of  $1000 \text{ mg L}^{-1}$  recorded a significant superiority in this trait, as it gave the highest proline content of  $19.113 \mu\text{g g}^{-1}$  compared to the treatment of ascorbic acid with a concentration of  $500 \text{ mg L}^{-1}$  with The organic nutrient Reef algastar with a concentration of  $0 \text{ mg L}^{-1}$  that gave a minimum content of  $16.294 \mu\text{g g}^{-1}$ .

The same table also shows a significant superiority of the binary interaction between Unigreen  $4 \text{ ml L}^{-1}$  with the Reef algastar  $1000 \text{ mg L}^{-1}$  with the highest proline content of  $20.363 \mu\text{g g}^{-1}$  compared to the control treatment which recorded the lowest content  $16.108 \mu\text{g g}^{-1}$ . As for the triple interaction between the treatment (ascorbic acid  $1000 \text{ mg L}^{-1}$  + Unigreen organic nutrient  $4 \text{ ml L}^{-1}$  + Reef algastar  $1000 \text{ mg L}^{-1}$ ) it recorded the highest content of  $22.290 \mu\text{g g}^{-1}$  compared to the rest The treatments and the comparison treatment recorded the lowest content of  $15.583 \mu\text{g g}^{-1}$ .

#### **Film stability index in leaves**

The results shown in Table (3) indicated that the treatments of ascorbic acid with a concentration of  $1000 \text{ mg L}^{-1}$  and the organic nutrients Unigreen and Reef algastar with two concentrations ( $4 \text{ ml L}^{-1}$ ,  $1000 \text{ mg L}^{-1}$ )

were significantly superior to the rest of the treatments in this trait, and the highest value was recorded (93.77, 94.68, 95.26) %, respectively, compared to the comparison treatment, which recorded a decrease of (90.11, 90.57, 87.91) %, respectively. The dual interaction between the treatment of ascorbic acid concentration (1000, 500) mg L<sup>-1</sup> with the organic nutrient Unigreen The concentration of 4 ml L<sup>-1</sup> recorded the highest value of (95.87, 95.86)%, respectively, compared to the comparison treatment, which recorded the lowest value of 86.44%. Also, the bilateral interaction between the treatment of ascorbic acid with a concentration of 1000 mg L<sup>-1</sup> with the organic nutrient Reef algastar at a concentration of 1000 mg L<sup>-1</sup>, it recorded the highest significant superiority of 96.45% compared to the comparison treatment that recorded the lowest value of 81.64%, and the bilateral interaction between Unigreen with a concentration of 4 ml L<sup>-1</sup> with the treatment of Reef algastar with a concentration of 1000 mg L<sup>-1</sup> gave the highest superiority of 95.85% compared to the control treatment that recorded the lowest value of 84.19% (Table 3).The table also indicates that there were significant differences at the triple interaction, as the treatment (ascorbic acid 1000 mg L<sup>-1</sup> + Unigreen organic nutrient 4 ml L<sup>-1</sup> + Reef algastar 1000 mg L<sup>-1</sup>) outperformed by giving the highest value in the stability index The membranes reached 97.10% compared to the comparison treatment, which recorded the lowest values, which amounted to 71.76%. The results indicate that foliar spraying with organic nutrients and ascorbic acid had a positive effect on the content of leaves from total chlorophyll pigment, amino acid proline and membrane stability index of date palm cultivar Barhi. The chlorophyll molecule is prevented from demolition and prolonging its life, in addition to the external treatment with ascorbic acid, which has an effective role as an antioxidant cofactor as well as regulating metabolic processes and mitigating the harmful effects of stress by increasing the photosynthetic pigments and increasing the efficiency of the photosynthesis process (Dolatabadian et al., 2010), and that the plant's obtaining the necessary nutrients in the right quantity makes it capable of forming chlorophyll pigment by stimulating the formation and development of chloroplasts where chlorophyll is made , The amino acid proline is one of the most important antioxidants, as it works to harvest and scavenge free radicals from plant tissues, which leads to the stability and vitality of protein and cytoplasmic membranes and not affecting them under stress conditions (Saqr, 2011). Agree The results of this study are with those reached by Elmira and Yassin (2010) in their study on date palm plants of the cultivar Barhi.

**Table (1) Effect of foliar spraying with organic nutrients and ascorbic acid and the interaction between them on the content of leaves of total chlorophyll pigment(mg 100 g<sup>-1</sup>) of date palm cultivar Barhi.**

Season 2020					
Ascorbic acid mg liter <sup>-1</sup>	Unigreen ml liter <sup>-1</sup>	Reef algastar mg liter <sup>-1</sup>			interaction Ascorbic acid mg L <sup>-1</sup> and Unigreen ml liter <sup>-1</sup>
		0	500	1000	
0	0	14.78	19.04	19.90	17.91
	2	20.65	21.97	22.80	21.81
	4	18.68	23.19	25.90	22.59
500	0	20.41	22.56	24.26	22.41
	2	19.68	24.70	29.10	24.49
	4	18.68	22.86	29.70	23.75
1000	0	24.73	26.57	32.09	27.80
	2	22.32	22.54	25.54	23.47
	4	26.76	30.23	30.67	29.22

(0.05)LSD	2.668				1.540
Average Reef algastar mg liter <sup>-1</sup>		20.74	23.74	26.66	Average Ascorbic Acid mg liter <sup>-1</sup>
(0.05)LSD	0.889				0.889
interaction with Ascorbic acid mg liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	18.04	21.40	22.87	20.77
	500	19.59	23.37	27.69	23.55
	1000	24.61	26.45	29.43	26.83
(0.05)LSD	1.540				Average Unigreen ml liter <sup>-1</sup>
interaction Unigreen ml liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	19.98	22.72	25.42	22.70
	2	20.88	23.07	25.81	23.26
	4	21.37	25.43	28.76	25.19
(0.05)LSD	1.540				0.889

**Table (2) The effect of foliar spraying with organic nutrients and ascorbic acid and the interaction between them on the proportion of proline amino acid in the leaf ( $\mu\text{g g}^{-1}$ ) of date palm cultivar Barhi.**

Season 2020					
Ascorbic acid mg liter <sup>-1</sup>	Unigreen ml liter <sup>-1</sup>	Reef algastar mg liter <sup>-1</sup>			interaction Ascorbic acid mg L <sup>-1</sup> and Unigreen ml liter <sup>-1</sup>
		0	500	1000	
0	0	15.583	17.570	17.660	16.938
	2	17.340	17.640	18.980	17.987
	4	16.240	17.210	17.530	16.993
500	0	15.670	17.950	18.170	17.263
	2	16.293	17.130	16.430	16.618
	4	16.920	17.497	21.270	18.562
1000	0	17.070	16.770	17.010	16.950
	2	16.780	17.630	18.040	17.483
	4	17.183	17.490	22.290	18.988
(0.05)LSD	0.7458				0.4306
Average Reef algastar mg liter <sup>-1</sup>		16.564	17.432	18.598	Average Ascorbic Acid mg liter <sup>-1</sup>
(0.05)LSD	0.2486				0.2486
interaction with Ascorbic acid mg liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	16.388	17.473	18.057	17.306
	500	16.294	17.526	18.623	17.481
	1000	17.011	17.297	19.113	17.807
(0.05)LSD	0.4306				Average Unigreen ml liter <sup>-1</sup>
interaction Unigreen	0	16.108	17.430	17.613	17.050

ml liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	2	16.804	17.467	17.817	17.363
	4	16.781	17.399	20.363	18.181
(0.05)LSD		0.4306			0.2486

**Table (3) Effect of foliar spraying with organic nutrients and ascorbic acid and the interaction between them on the percentage of membrane stability in the leaf (%) of date palm cultivar Barhi.**

Season 2020					
Ascorbic acid mg liter <sup>-1</sup>	Unigreen ml liter <sup>-1</sup>	Reef algastar mg liter <sup>-1</sup>			Ascorbic acid interaction mg L <sup>-1</sup> and Unigreen ml liter <sup>-1</sup>
		0	500	1000	
0	0	71.76	93.74	93.82	86.44
	2	83.13	95.02	96.54	91.57
	4	90.03	92.91	94.00	92.32
500	0	90.91	91.51	93.10	91.87
	2	91.00	91.82	94.06	92.29
	4	95.11	96.02	96.46	95.86
1000	0	89.90	94.67	95.69	93.42
	2	84.65	94.82	96.54	92.01
	4	94.67	95.84	97.10	95.87
LSD(0.05)		3.489			2.015
Average Reef algastar mg liter <sup>-1</sup>		87.91	94.04	95.26	Average Ascorbic Acid mg liter <sup>-1</sup>
LSD(0.05)		1.163			1.163
interaction with Ascorbic acid mg liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	81.64	93.89	94.79	90.11
	500	92.34	93.12	94.54	93.33
	1000	89.74	95.11	96.45	93.77
LSD(0.05)		2.015			Average Unigreen liter <sup>-1</sup> ml
interaction Unigreen ml liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	84.19	93.31	94.20	90.57
	2	86.26	93.89	95.71	91.95
	4	93.27	94.92	95.85	94.68
LSD(0.05)		2.015			1.163

**4-2 :Some Chemical characteristics of fruits in the khalal stage****Water and dry matter content**

Table (4) shows significant differences in the percentage of the water content of the fruits, where the spray treatment with ascorbic acid at a concentration of 1000 mg L<sup>-1</sup> and the organic nutrients Unigreen and Reef algastar with two concentrations (4 ml L<sup>-1</sup>, 1000 mg L<sup>-1</sup>) respectively recorded the lowest water content. In

the fruit, it amounted to (62.843, 61.014, 59.622)%, respectively, compared to the comparison treatment, which recorded the highest percentage of this trait amounted to (63.262, 65.669, 66.976)%, respectively. As for the dual interaction between the treatment of ascorbic acid concentration 500 mg L<sup>-1</sup> with the organic nutrient Unigreen concentration 4 ml L<sup>-1</sup> recorded the lowest water content in the fruit reached 60,000% compared to the treatment of ascorbic acid concentration 500 mg L<sup>-1</sup> with the organic nutrient Unigreen concentration 0 ml L<sup>-1</sup>, which recorded the highest percentage of 66.413%, which was close to the comparison treatment which reached The interaction was 65.573%, while the bilateral interaction between the treatment of ascorbic acid (500 mg L<sup>-1</sup>) with the organic nutrient Reef algastar (1000 mg L<sup>-1</sup>) recorded the lowest percentage of 58.420% compared to the control treatment that recorded the highest percentage of 67.873%. Duo between feeders Unigreen concentration of 4 ml L<sup>-1</sup> with the treatment of the feeder Reef algastar concentration of 1000 mg L<sup>-1</sup> recorded the lowest percentages, reaching 58.923% compared to the comparison treatment, which recorded the highest percentage of 72.340%. The triple interaction between (Ascorbic acid 500 mg L<sup>-1</sup> + Unigreen organic nutrient 2 ml L<sup>-1</sup> + Organic nutrient Reef algastar 1000 mg L<sup>-1</sup>) recorded the lowest percentages in the water content of the fruit, reaching 57.160% compared to the treatment (Ascorbic acid). Concentration of 500 mg L<sup>-1</sup> + Unigreen Organic Nutrient 0 ml L<sup>-1</sup> + Organic Nutrient Reef algastar (0 mg L<sup>-1</sup>) which recorded the highest percentage of 74.250%, which was close to the comparison treatment, which recorded a percentage of 73.230%. In Table (5), significant differences were observed in the percentage of dry matter of fruits, as the spray treatment was recorded with ascorbic acid at a concentration of 500 mg L<sup>-1</sup> and the organic nutrients Unigreen and Reef algastar with two concentrations (4 ml L<sup>-1</sup>, 1000 mg L<sup>-1</sup>) respectively. The highest percentage amounted to (37,676, 38.986, 40.378)%, compared to the comparison treatment, which recorded the lowest percentage, which amounted to (36.738, 34.331, 33.024)%, respectively. As for the bilateral interaction between the treatment of ascorbic acid concentration 500 mg L<sup>-1</sup> with the organic nutrient Unigreen concentration 4 ml L<sup>-1</sup>, it recorded the highest percentage of 40.000% compared to the treatment of ascorbic acid concentration 500 mg L<sup>-1</sup> with the organic nutrient Unigreen concentration 0 ml L<sup>-1</sup>, which recorded The lowest percentage was 33.587 %, which was close to the comparison treatment, which amounted to 34.427 %. The bilateral interaction between the treatment of ascorbic acid (500 mg L<sup>-1</sup>) with the organic nutrient Reef algastar (1000 mg L<sup>-1</sup>) recorded the highest percentage of 41,580% compared to the comparison treatment that recorded the lowest percentage of 32.127 %. As for the bilateral interaction between Unigreen 4 ml L<sup>-1</sup> with the Reef algastar 1000 mg L<sup>-1</sup>, it recorded the highest percentage of 41.077% compared to the comparison treatment, which recorded the lowest percentages, which amounted to 27,660%.

The triple interaction between (ascorbic acid 500 mg L<sup>-1</sup> + Unigreen organic nutrient 2 ml L<sup>-1</sup> + Reef algastar 1000 mg L<sup>-1</sup>) gave the highest percentages in this trait, which amounted to 42,840%, compared to the treatment of ( Ascorbic acid 500 mg L<sup>-1</sup> + Unigreen organic nutrient 0 ml L<sup>-1</sup> + Organic Nutrient Reef algastar (0 mg L<sup>-1</sup>) which recorded the lowest percentage of 25.750%, which was close to the comparison treatment, which recorded a percentage of 26.770%. The decrease in the water content in the fruit in the treated trees compared with the comparison treatment of the study factors during the physiological growth of the fruits in the Khalal stage may be due to the speed of the vital processes associated with growth in the fruits of the treated trees than the fruits of the comparison trees, which need a longer period to complete all the chemical transformations in them. The study of Al-Akedi and Ahmed (1985) and Shabana et al. (2006) indicated the role of mineral elements in drawing water and nutrients to the fruit to meet its need of materials during its rapid growth to reach the stage of physiological maturity. These results agree with Sharif (2011) in his study on date palm cultivar Khadraoui. As for the increase in the dry matter content of the fruits during the khalal stage, it may be due to the substances contained in the nutrient components

used to stimulate the movement of the movement of dissolved organic and mineral food from the leaves and its accumulation in the fruits (Abu Zaid, 2000). Fruits with a high water content contain the substance Dry a few and vice versa (Burton, 1982).

**Table (4) Effect of foliar spraying with organic nutrients and ascorbic acid and the interaction between them on the percentage of water content in the fruit (%) of date palm cultivar Barhi**

Season 2020					
Ascorbic acid mg liter <sup>-1</sup>	Unigreen ml liter <sup>-1</sup>	Reef algastar mg liter <sup>-1</sup>			Ascorbic interaction acid mg L <sup>-1</sup> and Unigreen ml liter <sup>-1</sup>
		0	500	1000	
0	0	73.230	62.880	60.610	65.573
	2	65.370	62.660	60.500	62.832
	4	65.020	60.870	58.220	61.370
500	0	74.250	64.870	60.120	66.413
	2	65.040	59.480	57.160	60.560
	4	63.710	58.310	57.980	60.000
1000	0	69.540	63.860	61.660	65.020
	2	62.870	62.860	59.780	61.837
	4	63.750	60.700	60.570	61.673
(0.05)LSD		1.2021			0.6940
Average Reef algastar mg liter <sup>-1</sup>		66.976	61.832	59.622	Average Ascorbic Acid mg liter <sup>-1</sup>
(0.05)LSD		0.007			0.007
interaction with Ascorbic acid mg liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	67.873	62.137	59.777	63.262
	500	67.667	60.887	58.420	62.324
	1000	65.387	62.473	60.670	62.843
(0.05)LSD		0.6940			Average Unigreen ml liter <sup>-1</sup>
interaction Unigreen ml liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	72.340	63.870	60.797	65.669
	2	64.427	61.667	59.147	61.747
	4	64.160	59.960	58.923	61.014
(0.05)LSD		0.6940			0.007

**Table (5) Effect of foliar spraying with organic nutrients and ascorbic acid and the interaction between them on the percentage of dry matter in the fruit (%) of date palm cultivar Barhi.**

Season 2020			
Ascorbic acid mg liter <sup>-1</sup>	Unigreen ml liter <sup>-1</sup>	Reef algastar mg liter <sup>-1</sup>	interaction Ascorbic acid mg L <sup>-1</sup> and Unigreen

		0	500	1000	ml liter <sup>-1</sup>
0	0	26.770	37.120	39.390	34.427
	2	34.630	37.340	39.500	37.157
	4	34.980	39.130	41.780	38.630
500	0	25.750	35.130	39.880	33.587
	2	34.960	40.520	42.840	39.440
	4	36.290	41.690	42.020	40.000
1000	0	30.460	36.140	38.340	34.980
	2	37.130	37.140	40.220	38.163
	4	36.250	39.300	39.430	38.327
(0.05)LSD		1.2021			0.6940
Average Reef algastar mg liter <sup>-1</sup>		33.024	38.168	40.378	Average Ascorbic Acid mg liter <sup>-1</sup>
(0.05)LSD		0.4007			0.4007
interaction with Ascorbic acid mg liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	32.127	37.863	40.223	36.738
	500	32.333	39.113	41.580	37.676
	1000	34.613	37.527	39.330	37.157
(0.05)LSD		0.6940			Average Unigreen ml liter <sup>-1</sup>
interaction Unigreen ml liter <sup>-1</sup> and Reef algastar mg liter <sup>-1</sup>	0	27.660	36.130	39.203	34.331
	2	35.573	38.333	40.853	38.253
	4	35.840	40.040	41.077	38.986
(0.05)LSD		0.6940			0.4007

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