

Response of Saeidy Date Palms Grown Under New Valley Conditions to Spraying Salicylic Acid and Seaweed Extract

Faissal F., Ahmed ¹, Ali H. Ali ¹ and Abbas S. Abdalla ² and Emad M. E. Shazly ²

¹ Hort. Dept. Fac. of Agric. Minia Univ. Egypt.

² Tropical Fruits Dept. Hort. Res. Institute ARC, Giza, Egypt

faissalfadel@yahoo.com

Abstract: This study was conducted during 2013 and 2014 seasons to examine the effect of single and combined applications of salicylic acid at 0.0 to 0.2 % and seaweed extract at 0.0 to 4 % on growth, palm nutritional status, flowering, fruit setting, yield and fruit quality of Saeidy date palms grown under New Valley environmental conditions. The selected palms received four sprays from each biostimulant. Treating the palms four times with salicylic acid at 0.05 to 0.2% and / or seaweed extract at 1 to 4 % was very effective in improving growth characters, palm nutritional status, flowering, fruit setting, yield and fruit quality over the check treatment. The promotion was materially associated with increasing concentrations. Meaningless promotion on these characters was observed with increasing concentrations of salicylic acid from 0.1 to 0.2% and seaweed extract from 2 to 4%. The best results with regard to yield and fruit quality of Saeidy date palms grown under New Valley conditions were obtained due to spraying the palms four times with a mixture of 0.1% salicylic acid plus 2 % seaweed extract.

[Faissal F, Ahmed, Ali H Ali, Abbas S Abdalla and Emad M E Shazly. **Response of Saeidy Date Palms Grown Under New Valley Conditions to Spraying Salicylic Acid and Seaweed Extract.** *Stem Cell* 2015;6(3):12-19]. (ISSN 1545-4570). <http://www.sciencepub.net>. 3

Keywords: Salicylic acid, seaweed extract, Saeidy date palms, growth, flowering, yield, fruit quality

1. Introduction

Low yield of Saeidy date palms grown under sandy soil is considered a major problem faces growers. Finding out recent techniques for promoting yield without caused any pollution in our environment is an important tasks for pomologists. Investigation on compounds capable for reducing the sensitivity of fruit crops to all stresses and at the same time to unfavourable conditions are of great importance from the practical point of view. Salicylic acid plays an important role in increasing the and enhancing withstanding of fruit crops to biotic and abiotic stresses, photosynthesis, nutrient and water uptake, plant pigments and all cell division (Hayat and Ahmed, 2007 and Huijsduijnen, 2009). The application of seaweed extract which contains most nutrients, organic compounds, enzymes, vitamins antioxidants, amino acids and natural hormones is fast becoming an accepted practice. It increases yield quantitatively and quantitatively in various fruit crops (Soliman *et al.*, 2000 and Spinelli *et al.*, 2010).

Previous studies showed that using salicylic acid (Ragab, 2004; Eshmawy, 2010, Ahmed, 2011, Ahmed, 2014 and Ahmed *et al.*, 2014b, Abd El-Megeed, 2015 and Ahmed *et al.*, 2015) and seaweed extract (Zodape, 2001 ; Gobara, 2004; Khan *et al.*, 2009; Ahmed *et al.*, 2014c. Ahmed *et al.*, 2014a and Abd El-aaty, 2015) were very effective in enhancing growth, nutritional status, yield and fruit quality in different date palm cvs.

The target of this study was testing the effect of different concentrations of salicylic acid and seaweed extract on fruiting of Saeidy date palms grown under New Valley environmental conditions.

2. Material and Methods

This study was conducted during 2013 and 2014 seasons in a private date palm orchard situated at village El Dakhla district New Valley Governorate 48 years old Saeidy date palm (semi- dry date palm cv.) These palms produced through conventional propagation by offshoots as well as characterized by regular bearing. The selected palms are uniform in vigour healthy, good physical conditions, free from insects, diseases and damages. They planted at 6 x6 meters apart (116 palms/ feddan). The selected palms were irrigated with well water (600 ppm) through surface irrigation system. The texture of the soil is sandy clay.

Hand pollination of all the selected palms was achieved by inserting five fresh male strands into the center of one female spathe using the same source of pollens (Saeidy date palms males) to avoid residues of metaxenia. Pollination was carried out throughout two days after female spathes cracking at the day time of afternoon Number of bunches per palm was adjusted to ten bunches and leaf bunch ratio was maintained at 8: 1.

Physical and chemical properties of the experimental soil at 0.0- 90 cm depth are presented in Table (1) according to the procedure Carter(1993).

Table (1): Analysis of the tested soil

Characters	Values
Practical size distribution	
Clay %	7.5
Silt %	11.0
Sand %	81.5
Texture	Sandy
pH (1: 2.5 extract)	8.80
E.C. (1: 2.5 extract) mmhos / 1 cm / 25°C	0.75
Organic matter %	1.2
Total CaCO ₃	20
Available macronutrients (ppm)	
N	22.0
P	3.3
K	80.0
Ca	71.0
Mg	5.0
DPTA extractable available micronutrients (ppm)	
Zn	2.1
Fe	1.8
Mn	0.9
Cu	0.7

All the selected palms received the common horticultural practices that are already applied in the orchard except those dealing with foliar application of salicylic acid and seaweed extract.

This study included two factors (A & B). The first factor (A) comprised from four concentrations of salicylic acid namely a1) 0.0, a2) 0.05 %, a3) 0.1 and a4) 0.2%. The second factor (B) contained four concentrations of seaweed extract namely b1) 0.0, b2) 1%, b3) 2% and b4) 4%). Therefore, this experiment included sixteen treatments from single and combined applications of salicylic acid and seaweed extract. Salicylic acid solutions were adjusted to pH 6.0 by using IN sodium hydroxide and the assigned amounts of salicylic acid were solubilized in few drops of Ethyl alcohol before application. Salicylic acid and seaweed extract (Aligifert compound form) were sprayed four times during each growing season. The times of application were before hand pollination (1st week of Feb.), just after fruit setting (2nd week of Mar.) and at one month intervals (2nd week of Apr. and May). Triton B as a wetting agent was added to all salicylic acid and seaweed extract solutions at 0.05 %. The untreated palms received water containing triton B. All the selected palms received solutions of salicylic acid and seaweed extract till runoff (20 L / palm). Table (2) shows the analysis of seaweed extract according to **James (1994)**.

Table (2): Analysis of seaweed extract (according to James, 1994).

Character	Values
Moisture %	6.0
O.M. %	45- 60
Inorganic matter %	45- 60
Protein %	6- 8
Carbohydrates %	5- 50
Aliginic acid %	10- 20
Mannitol %	4- 7
Total N %	1.0- 1.5
P %	0.02- 0.09
K %	1.0- 1.2
Ca %	0.2- 1.5
S %	3- 9
Mg %	0.5- 0.9
Cu (ppm)	1.0- 6.0
Fe (ppm)	50-200
Mn (ppm)	5- 12
Zn (ppm)	10- 100
B (ppm)	20- 100
Mo (ppm)	1- 5
Cytokinins %	0.02
IAA %	0.03
ABA %	0.01

Randomized complete block design in split plot arrangement was followed. The four concentrations of salicylic acid occupied the main plots. The four concentrations of seaweed extract ranked the subplots.

During both seasons, the following measurements were recorded:

1- Vegetative growth characters namely number of new leaves / palm, number of pinnae / leaf and area of pinnae and leaf (**Ahmed and Morsy, 1999**).

2- Leaf pigments namely chlorophyll a & b, total chlorophylls and total carotenoids (as mg / 100 g F.W.) (**Moran, 1949; Von- Wettstein, 1957 and Hiscox and Isralstan, 1979**).

3- Leaf content of N, P, K and Mg (as %) and Zn, Fe, Mn and Cu (as ppm) (**Summer, 1985, Jones et al., 1991 and Carter, 1993**).

4- Flowering and fruit setting characters namely strand length (cm.), number of strands / spathe, number of flowers and fruits per strand, initial fruit setting % and fruit retention %.

5- Yield / palm (kg.) and bunch weight (kg.) (**Fageria et al., 2000**).

6- Some physical characters of the fruits namely weight (g.) height (cm.) and diameter (cm.) of fruit, percentages of seeds and pulp & pulp / seed.

7- Some chemical characteristics of the fruits namely T.S.S. %, total, reducing and non reducing sugars (**A.O.A.C., 2000**), total acidity % (as g malic

acid / 100 g pulp, **A.O.A.C., 2000**) and total soluble tannins % (**Balbaa, 1981**).

Statistical analysis was done using new L.S.D. test at 5% for carrying out all differentiations among different treatment means (**Mead *et al.*, 1993**).

3. Results and Discussion

1- Growth characters:

Treating Saeidy date palms four times with salicylic acid at 0.05 to 0.2 % and / or seaweed extract at 1 to 4 % significantly enhanced all growth characters namely number of new leaves/ palm, number of pinnae/ leaf as well as area of pinnae and leaf over the check treating. There was a gradual and significant stimulation on these growth characters with increasing concentrations of salicylic acid from 0.0 to 0.1% and seaweed extract from 0.0 to 2%. Increasing concentrations of salicylic acid from 0.1 to 0.2% and seaweed extract from 2 to 4 % had no significant stimulation on these growth characters. The maximum values were recorded on the palms that received 0.2 % salicylic acid plus 4% seaweed extract. The untreated palms produced the minimum values. These results were true during both seasons.

The promoting effect of salicylic acid on cell division, the biosynthesis of plant pigments, photosynthesis and nutrient uptake could explain the present results (**Hayat and Ahmed, 2007** and **Von-Huijsduijnen, 2009**).

The promoting effect of salicylic acid on growth characters was supported by the results of **Ragab (2004)**, **Eshmawy (2010)**, **Ahmed (2011)** and **Ahmed *et al.*, (2014b)**.

The higher content of seaweed extract form essential nutrients, vitamins, antioxidants, amino acids and natural hormones could explain the present results (**James, 1994**).

The results with regarding to the stimulating effect of seaweed extract on growth characters are in harmony with those obtained by **Zodape (2001)**; **Gobara (2004)** and **Khan *et al.*, (2009)**.

2- Leaf chemical composition:

It is clear from the data in Tables (5, 6 & 7) that leaf pigments namely chlorophylls a & b, total chlorophylls, total carotenoids as well as nutrients namely N, P, K, Mg, Zn, Fe, Mn and Cu were significantly promoted owing to spraying the palms with salicylic acid at 0.05 to 0.2% and/ or seaweed extract at 1 to 4 % comparing to the check treatment. The promotion on these plant pigments and nutrients in the leaves significantly was associated with increasing concentrations of salicylic acid and seaweed extract. No significant stimulation on these pigments and nutrients was observed with increasing concentrations of salicylic acid from 0.1 to 0.2% and seaweed extract from 2 to 4 %. Using both

biostimulants together at the higher concentrations gave the maximum values. The untreated palms produced the minimum values. These results were true during both seasons.

The positive action of salicylic acid on uptake and translocation of nutrients and the biosynthesis of pigments surely reflected on enhanced pigments and nutrients in the leaves (**Hayat and Ahmed, 2007**).

These results are in agreement with those obtained by **Abd El- Megeed (2015)**.

The higher content of seaweed extract form nutrients and amino acids which resulted in great promotion on the biosynthesis of pigments explain the present results (**James, 1994** and **Soliman *et al.*, 2008**).

These results are in concordance with those obtained by **Abd El- aaty, (2005)**.

3- Flowering and fruit setting traits:

It is clear from the data in Tables (8 & 9) that treating Saeidy date palms four times with salicylic acid at 0.05 to 0.2% and/ or seaweed extract at 1 to 4% significantly enhanced strand length, number of strands/ spathe and number of flowers and fruits per strand, initial fruit setting % and fruit retention% over the check treatment. The promotion on these flowering and fruit setting characters significantly was related to increasing concentrations of both salicylic acid and seaweed extract. In all cases, no significant differences were observed on these characters among the higher two concentrations of each biostimulant. The highest values were recorded on the palms that received four sprays of a mixture of 0.2 % salicylic acid plus 4% seaweed extract. The untreated palms produced the minimum values. These results were true during both seasons.

The essential roles of both salicylic acid and seaweed extract on enhancing growth, photosynthesis and plant pigments surely reflected on enhancing flowering and fruit setting.

These results regarding the effect of salicylic acid on promoting flowering and fruit setting are in harmony with those obtained by **Ahmed (2014)**, **Ahmed *et al.*, (2014b)** and **Abd El- Megeed (2015)**.

The results of **Khan *et al.*, (2009)** and **Abd El-aaty (2015)** confirmed the beneficial effects of seaweed extract on flowering and fruit setting.

4- Yield/ palm and bunch weight

Data in Table (9) clearly show that yield per palm and bunch weight of Saeidy date palms were significantly improved in response to spraying the palms four times with salicylic acid at 0.05 to 0.2% and / or seaweed extract at 1 to 4 %, There was a gradual and significant promotion on the yield and bunch weight with increasing concentrations of both biostimulants.

Meaningless promotion on the yield and bunch weight was observed when concentrations of salicylic acid was increased from 0.1 to 0.2% as well as of seaweed extract from 2 to 4 %. Therefore, from economical point of view using 0.1 of salicylic acid and 2% of seaweed extract are suggested. Using a mixture of salicylic acid at 0.1% and seaweed extract at 2% gave the best results with regard to the yield. Under such promised treatment, yield per palm reached 109.0 and 112.0 kg during both seasons, respectively. The untreated palms produced 65.0 and 67.0 kg at the same seasons, respectively. The percentages of increase on the yield due to using the previous recommended treatment above the check treatment reached 67.7 and 67.1 % during both seasons, respectively. These results were true during 2013 and 2014 seasons.

The previous promoting effect of both salicylic acid and seaweed extract on palm nutritional status, flowering and fruit setting surely reflected on improving the bunch weight and yield per palm.

These results regarding the effect of salicylic acid on promoting the yield and bunch weight are in harmony with those obtained by **Ragab (2004)**, **Eshmawy (2010)** and **Ahmed *et al.*, (2015)**.

These results regarding the promoting effect of seaweed extract on the yield and bunch weight are in the same line with those obtained by **Gobara (2004)**, **Ahmed *et al.*, (2014a)** and **Ahmed (2015)**.

4- Fruit quality:

Data in Tables (10 to 12) obviously reveal that spraying Saeidy date palms four times with salicylic acid at 0.05 to 0.2% and / or seaweed extract at 1 to 4 % significantly was very effective in enhancing fruit quality in terms of increasing weight, height and diameter of fruit, pulp % and pulp / seed and decreasing seeds %, total acidity % and total soluble tannins % over the check treatment. The promotion on fruit quality significantly was associated with increasing concentrations of each biostimulant. Significant differences on fruit quality parameters were observed between all concentrations of salicylic acid and seaweed extract except between the higher two concentrations of each. Therefore, the best treatment from economical point of view was the application of a mixture of 0.1 % salicylic acid and 2% seaweed extract. Unfavourable effects on fruit quality were attributed to non- application of the two biostimulants. Similar results were announced during both seasons.

The promoting effect of both salicylic acid and seaweed extract on the biosynthesis of pigments as well as synthesis and translocation of sugars surely reflected on enhancing maturity and fruit quality (**Hayat and Ahmed, 2007** and **Soliman *et al.*, 2008**).

The results of salicylic acid (**Ragab 2004** and **Abd El- Megeed, 2015**) and seaweed extract application (**Khan *et al.*, 2009** and **Abd El-aaty, 2015**) confirmed the present results.

Table (3): Effect of single and combined applications of Salicylic acid and seaweed extraction on some vegetative growth characters of Saeidy date palms during 2013 and 2014 seasons.

Character	Number of green leaves / palm					Number of pinnae per leaf				
	2013					2014				
salicylic acid concentrations % (A)	Seaweed extract concentrations (B) %									
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	16.0	18.0	20.0	20.7	18.7	16.0	18.3	21.5	21.3	19.2
a ₂ SA at 0.05%	18.0	21.0	23.0	22.3	21.3	18.0	21.3	23.7	24.0	21.8
a ₃ SA at 0.1%	20.0	23.0	25.0	25.3	23.3	21.0	23.3	25.3	25.6	23.8
a ₄ SA at 0.2%	20.6	23.3	25.7	26.0	23.9	21.3	23.6	25.6	26.0	24.1
Mean (B)	18.7	21.3	23.4	23.8		19.1	21.6	23.4	24.22	
New L.S.D. at 5%	A	B	AB			A	B	AB		
	1.1	1.1	2.2			1.0	1.0	2.0		
Character	Pinnae area (cm ²)					Leaf area (cm ²)				
a ₁ SA at 0.0%	141.0	146.0	151.0	152.0	147.5	139.0	144.3	148.0	149.0	145.1
a ₂ SA at 0.05%	144.0	152.0	160.0	161.0	154.3	142.0	149.0	155.0	156.0	150.5
a ₃ SA at 0.1%	148.0	160.0	166.0	169.0	160.3	146.0	155.0	161.0	161.6	155.9
a ₄ SA at 0.2%	149.0	161.0	167.0	167.3	161.1	146.6	155.5	161.5	162.0	156.4
Mean (B)	145.5	154.8	161.0	162.3		143.4	151.0	156.3	157.2	
New L.S.D. at 5%	A	B	AB			A	B	AB		
	1.4	1.6	3.2			1.4	1.4	2.8		
Character	Pinnae area (cm ²)					Leaf area (cm ²)				
a ₁ SA at 0.0%	2.5	2.6	2.8	2.8	2.7	2.5	2.6	2.7	2.6	2.7
a ₂ SA at 0.05%	2.6	2.8	3.0	3.0	2.9	2.6	2.8	2.9	2.9	2.8
a ₃ SA at 0.1%	2.7	3.0	3.2	3.2	3.0	2.7	2.9	3.1	3.2	3.0
a ₄ SA at 0.2%	2.7	3.0	3.2	3.2	3.0	2.7	3.0	3.1	3.2	3.0
Mean (B)	2.6	2.9	3.1	3.1		2.6	2.8	3.1	3.0	
New L.S.D. at 5%	A	B	AB			A	B	AB		
	0.2	0.2	0.4			0.2	0.2	0.4		

Table (4): Effect of single and combined applications of Salicylic acid and seaweed extraction on some leaf pigments (mg/ 100 g F.W.) of Saeidy date palms during 2013 and 2014 seasons.

Character	Chlorophyll a (mg / 100 g F.W.)										Chlorophyll b (mg / 100 g F.W.)									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₀	b ₁	b ₂	b ₄	Mean (A)	b ₀	b ₁	b ₂	b ₄	Mean (A)	B ₀	b ₁	b ₂	b ₄	Mean (A)	B ₀	b ₁	b ₂	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	6.1	7.7	9.2	9.3	8.1	5.9	7.9	10.0	101	8.5	1.9	3.0	4.1	4.2	3.5	2.1	3.4	4.6	4.7	3.7
a ₂ SA at 0.05%	7.3	9.2	10.5	10.6	9.4	7.1	10.0	11.3	11.6	10.0	2.9	4.1	5.1	5.2	4.3	3.1	4.7	5.8	6.0	4.9
a ₃ SA at 0.1%	8.5	10.5	11.9	12.0	10.7	8.4	11.3	12.5	12.6	11.3	4.1	5.2	1.3	6.6	5.6	4.3	6.0	6.9	7.0	6.1
a ₄ SA at 0.2%	8.6	10.6	12.0	12.1	10.8	8.5	11.4	12.5	13.0	11.4	4.2	5.3	6.4	6.7	5.7	4.4	6.1	7.0	7.1	6.2
Mean (B)	7.6	9.5	10.9	11.0		7.5	10.2	11.6	11.9		3.3	4.4	5.5	5.7		3.5	5.1	6.1	6.2	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			0.9	0.9	1.8			0.7	0.8	1.6			0.8	0.8	1.6		

Character	Total Chlorophylls (mg / 100 g F.W.)										Total carotenoids (mg / 100 g F.W.)									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₀	b ₁	b ₂	b ₄	Mean (A)	b ₀	b ₁	b ₂	b ₄	Mean (A)	B ₀	b ₁	b ₂	b ₄	Mean (A)	B ₀	b ₁	b ₂	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	8.0	10.7	13.3	13.5	11.4	8.0	11.3	14.6	14.6	12.2	2.1	2.9	3.8	4.0	3.2	2.0	2.6	3.3	3.4	2.6
a ₂ SA at 0.05%	10.2	13.3	15.6	15.6	13.7	10.2	14.7	17.1	17.6	14.9	2.8	3.6	4.9	5.0	4.1	2.6	3.3	4.1	4.2	3.6
a ₃ SA at 0.1%	12.6	15.7	18.2	18.6	16.3	12.7	17.3	19.4	19.6	17.3	3.6	4.9	5.7	5.8	5.0	3.2	4.1	5.1	5.2	4.4
a ₄ SA at 0.2%	12.8	15.9	18.4	18.6	16.5	12.9	17.5	19.5	20.1	17.5	3.7	5.0	5.8	5.9	5.1	3.3	4.2	5.2	2.3	4.5
Mean (B)	10.9	13.9	16.4	16.7		11.0	15.2	17.7	18.1		3.1	4.1	5.1	5.2		2.8	3.6	4.4	4.5	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			1.0	1.0	2.0			0.5	0.5	1.0			0.4	0.5	1.0		

Table (5): Effect of single and combined applications of Salicylic acid and seaweed extraction on the content of N, P, K and Mg (as %) of Saeidy date palms during 2013 and 2014 seasons.

Character	Leaf N %										Leaf K %									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	1.16	1.71	1.82	1.83	1.74	1.71	1.81	1.91	1.92	1.84	1.16	1.25	1.35	1.36	1.28	1.19	1.27	1.37	1.38	1.30
a ₂ SA at 0.05%	1.69	1.84	1.95	1.97	1.86	1.80	1.90	1.99	2.00	1.92	1.22	1.35	1.45	1.47	1.37	1.25	1.37	1.48	1.49	1.40
a ₃ SA at 0.1%	1.75	1.97	2.06	2.07	1.96	1.85	1.99	2.07	2.09	2.00	1.30	1.46	1.56	1.57	1.47	1.32	1.47	1.56	1.57	1.48
a ₄ SA at 0.2%	1.77	1.96	2.07	2.09	1.98	1.86	2.00	2.06	2.10	2.01	1.31	1.47	1.57	1.59	1.49	1.33	1.49	1.57	1.58	1.50
Mean (B)	1.71	1.88	1.98	1.99		1.81	1.93	2.01	2.03		1.25	1.38	1.48	1.50		1.27	1.40	1.50	1.51	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.05	0.06	0.12			0.06	0.06	0.12			0.04	0.05	0.10			0.05	0.05	0.10		

Character	Leaf P %										Leaf Mg %									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	0.18	0.21	0.24	0.25	0.22	0.19	0.23	0.26	0.27	0.24	0.50	0.57	0.64	0.65	0.59	0.55	0.61	0.67	0.68	0.63
a ₂ SA at 0.05%	0.21	0.25	0.28	0.29	0.26	0.22	0.26	0.29	0.30	0.27	0.55	0.65	0.71	0.72	0.66	0.60	0.67	0.72	0.73	0.68
a ₃ SA at 0.1%	0.24	0.29	0.32	0.33	0.30	0.25	0.29	0.33	0.34	0.30	0.59	0.72	0.75	0.76	0.71	0.65	0.73	0.80	0.81	0.75
a ₄ SA at 0.2%	0.25	0.30	0.33	0.34	0.31	0.26	0.30	0.34	0.35	0.31	0.60	0.73	0.76	0.77	0.72	0.66	0.74	0.81	0.82	0.76
Mean (B)	0.22	0.26	0.29	0.30		0.23	0.27	0.31	0.32		0.56	0.67	0.72	0.73		0.62	0.69	0.75	0.81	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.02	0.02	0.04			0.02	0.02	0.04			0.03	0.04	0.08			0.03	0.03	0.06		

Table (6): Effect of single and combined applications of Salicylic acid and seaweed extraction on the leaf content of Zn, Fe, Mn and Cu (as ppm) of Saeidy date palms during 2013 and 2014 seasons.

Character	Leaf Zn (ppm)										Leaf Fe (ppm)									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	41.0	44.0	46.5	47.0	44.6	40.3	43.0	45.0	45.3	43.4	37.2	51.0	53.0	53.6	48.7	37.3	40.0	42.0	42.6	40.5
a ₂ SA at 0.05%	43.0	47.0	49.5	50.0	47.4	42.0	45.0	47.0	47.6	45.4	49.0	54.0	56.0	56.3	53.8	79.0	42.3	44.0	44.3	42.4
a ₃ SA at 0.1%	44.9	50.0	53.0	53.3	50.3	43.8	47.0	49.0	49.6	47.4	51.0	56.0	59.0	59.7	56.4	41.0	44.0	46.0	46.6	44.4
a ₄ SA at 0.2%	45.0	50.1	53.2	53.5	50.5	44.0	47.6	49.3	49.7	47.7	51.6	56.3	59.3	60.0	56.8	41.6	44.3	46.3	46.7	44.7
Mean (B)	43.5	47.8	50.6	51.0		42.5	45.7	47.6	48.1		47.2	54.3	56.8	57.4		39.7	42.7	44.6	45.1	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.5	1.4	2.8			1.5	1.5	3.0			1.2	1.1	2.2			1.0	1.0	2.0		

Character	Leaf Mn (ppm)										Leaf Cu (ppm)									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %										Seaweed extract concentrations (B) %									
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	33.3	36.3	38.2	38.5	36.6	32.9	35.0	37.0	37.6	35.6	1.11	1.29	1.40	1.41	1.30	1.05	1.18	1.30	1.31	1.21
a ₂ SA at 0.05%	35.0	38.3	41.3	41.6	39.1	34.2	37.3	39.0	39.3	37.5	1.21	1.40	1.51	1.52	1.41	1.16	1.30	1.40	1.41	1.32
a ₃ SA at 0.1%	37.0	41.9	44.0	44.3	41.8	36.0	38.9	41.0	41.3	39.3	1.33	1.51	1.62	1.63	1.52	1.27	1.40	1.50	1.51	1.42
a ₄ SA at 0.2%	37.6	42.0	44.3	44.6	42.1	36.3	39.0	41.3	41.5	39.5	1.34	1.52	1.63	1.64	1.53	1.28	1.41	1.51	1.52	1.43
Mean (B)	35.7	39.6	42.0	42.3		34.9	37.6	39.6	39.9		1.35	1.43	1.54	1.55		1.19	1.32	1.45	1.44	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			1.0	1.0	2.0			0.05	0.05	0.10			0.04	0.05	0.10		

Table (7): Effect of single and combined applications of Salicylic acid and seaweed extraction on strand length, number of strands per spathe, number of flowers/ strand and number of fruits / strands of Saeidy date palms during 2013 and 2014 seasons.

Character	Strand length (cm)										Number of strands / spathe									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	28.1	31.0	33.0	33.6	31.4	29.0	32.3	35.0	35.8	32.9	59.0	64.0	67.9	68.0	64.7	61.0	66.0	70.0	70.7	66.9
a ₂ SA at 0.05%	30.0	33.0	36.0	36.6	33.9	31.7	36.0	38.0	38.1	36.0	62.3	69.0	73.0	73.3	69.4	64.0	70.0	76.0	76.3	71.6
a ₃ SA at 0.1%	31.9	37.0	39.9	40.0	37.2	33.9	39.0	43.0	43.3	39.8	66.0	74.0	79.0	79.6	74.7	67.0	76.0	82.9	83.0	77.2
a ₄ SA at 0.2%	32.0	37.3	40.0	40.1	37.4	34.0	39.1	43.4	43.5	40.0	66.3	74.6	79.6	80.0	75.1	67.9	76.3	83.0	83.3	77.6
Mean (B)	30.5	34.6	37.2	37.6		32.2	36.6	39.9	40.1		63.4	70.4	74.9	75.2		65.0	72.1	78.0	78.3	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			1.0	1.0	2.0			2.1	2.1	4.2			2.0	2.1	4.2		

74Character	Number of flowers / strand					Number of fruits / strand														
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
76.0a SA at 0.0%	40.0	43.0	45.0	45.6	43.4	39.0	41.9	44.0	44.0	42.2	25.0	28.0	30.0	30.6	28.4	26.0	29.0	31.0	31.3	29.3
a ₂ SA at 0.05%	42.6	46.0	48.0	48.1	46.2	41.6	44.9	47.0	47.3	45.2	27.0	31.0	32.9	33.0	31.0	28.0	32.0	34.0	34.6	32.2
a ₃ SA at 0.1%	44.0	48.0	50.6	51.0	49.4	43.9	47.0	51.0	51.3	48.3	29.0	33.0	36.0	36.3	33.6	30.0	34.3	36.3	36.6	34.3
a ₄ SA at 0.2%	44.3	48.3	51.0	51.2	48.7	44.0	47.3	51.1	51.5	48.5	29.3	33.3	36.3	36.5	33.9	30.6	34.4	36.6	36.9	34.6
Mean (B)	42.7	46.3	48.7	49.0		42.1	45.3	48.3	48.5		27.6	31.3	33.8	34.1		28.7	32.4	34.5	34.9	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			1.1	1.1	2.2			0.9	1.0	2.0			1.0	1.0	2.0		

Table (8): Effect of single and combined applications of Salicylic acid and seaweed extraction on the percentages of initial fruit setting and fruit retention, yield, palm and bunch weight of Saeidy date palms during 2013 and 2014 seasons.

Character	Initial fruit setting %										Fruit retention %									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	41.0	45.0	47.0	47.3	45.0	41.6	44.0	46.0	46.3	44.5	35.0	39.0	41.9	42.0	39.5	36.0	38.0	40.0	40.6	38.7
a ₂ SA at 0.05%	44.0	47.0	49.0	49.1	47.3	43.9	46.9	49.0	49.3	47.3	37.0	42.9	45.0	45.3	42.6	37.9	40.9	44.0	44.3	41.8
a ₃ SA at 0.1%	46.0	49.0	52.0	52.3	49.9	46.1	49.4	52.0	52.3	50.0	40.0	44.9	46.9	47.0	44.7	40.0	45.0	48.0	48.3	45.3
a ₄ SA at 0.2%	47.0	49.1	52.3	52.4	50.2	46.3	49.5	52.5	52.4	50.2	40.6	45.0	47.0	47.3	45.0	40.3	45.3	45.6	48.5	45.0
Mean (B)	44.5	47.5	50.1	50.3		44.5	47.5	49.9	50.1		38.2	43.0	45.2	45.4		38.6	42.3	45.2	45.4	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.9	2.0	1.0			2.0	2.0	4.0			1.5	1.4	2.8			1.4	1.4	2.8		

Character	Yield/ palm (kg.)					Bunch weight 9g.)														
	2013					2014					2013					2014				
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	65.0	72.0	80.0	82.0	74.8	67.0	75.0	84.0	85.0	77.8	6.5	7.2	8.0	8.2	7.5	6.7	7.5	8.4	8.5	7.8
a ₂ SA at 0.05%	72.0	80.0	95.0	97.0	86.0	74.0	86.0	96.0	97.0	88.3	7.2	8.0	9.5	9.7	8.6	7.4	8.6	9.6	9.7	8.8
a ₃ SA at 0.1%	80.0	96.0	109.0	110.0	98.8	83.0	96.0	112.0	112.0	100.8	8.0	9.6	10.9	11.0	9.9	8.3	9.6	11.2	11.2	10.1
a ₄ SA at 0.2%	81.0	97.0	110.0	110.0	99.5	84.0	97.0	112.0	113.0	101.5	8.1	9.7	11.0	11.0	10.0	8.4	9.7	11.2	11.3	10.2
Mean (B)	74.5	86.3	98.5	99.8		77.0	88.5	101.0	101.8		7.5	8.6	9.9	10.0		7.7	8.9	10.1	10.2	
New L.S.D. at 5%	B	B	AB			A	B	AB			A	B	AB			A	B	AB		
	3.0	2.5	5.0			2.5	2.5	5.0			0.6	0.6	1.2			0.5	0.5	1.0		

Table (9): Effect of single and combined applications of Salicylic acid and seaweed extraction on some physical characters of Saeidy date palms during 2013 and 2014 seasons.

Character	Fruit weight (g.)										Fruit height (cm.)									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	9.67	9.97	10.40	10.42	10.12	9.80	10.10	10.40	10.41	10.17	3.12	3.25	3.35	3.36	3.27	3.20	3.33	3.44	3.45	3.36
a ₂ SA at 0.05%	9.91	10.40	10.64	10.66	10.40	10.05	10.41	10.66	10.67	10.45	3.23	3.36	3.49	3.50	3.40	3.31	3.45	3.55	3.56	3.47
a ₃ SA at 0.1%	10.21	10.64	11.0	11.05	10.72	10.36	10.66	11.33	11.36	10.93	3.33	3.50	3.95	3.97	3.69	3.41	3.55	3.99	4.00	3.74
a ₄ SA at 0.2%	10.22	10.66	11.05	11.06	10.75	10.40	10.70	11.35	11.39	10.90	3.35	3.52	3.99	4.0	3.71	3.43	3.56	4.01	4.03	3.76
Mean (B)	10.00	10.41	10.77	10.80		10.15	10.47	10.94	10.96		3.26	3.40	3.70	3.71		3.34	3.46	3.74	3.76	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.18	0.17	0.34			0.15	0.15	0.30			0.11	0.11	0.22			0.10	0.10	0.20		

Character	Fruit diameter (cm.)										Pulp %									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	2.33	2.41	2.48	2.49	2.42	2.36	2.44	2.51	2.53	2.46	82.0	84.0	85.5	86.0	84.4	82.6	84.1	86.0	86.3	84.8
a ₂ SA at 0.05%	2.40	2.49	2.59	2.60	2.52	2.44	2.51	2.62	2.63	2.55	83.5	86.0	88.0	88.6	86.5	84.1	86.9	89.0	89.3	78.3
a ₃ SA at 0.1%	2.46	2.49	2.59	2.60	2.52	2.44	2.51	2.62	2.63	2.55	83.5	86.0	88.0	88.6	86.5	84.1	86.9	89.0	89.3	78.3
a ₄ SA at 0.2%	2.47	2.62	2.75	2.77	2.65	2.51	2.66	2.78	2.79	2.68	85.2	88.3	90.3	90.5	88.58	85.8	89.3	91.3	91.3	90.2
Mean (B)	2.42	2.53	2.64	2.66		2.45	2.57	2.66	2.68		83.9	86.6	88.5	88.4		84.5	87.3	89.3	89.5	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.05	0.06	0.12			0.05	0.05	0.10			0.9	1.0	2.0			1.0	1.0	2.0		

Table (10): Effect of single and combined applications of Salicylic acid and seaweed extraction on physical and chemical characteristics of the fruits of Saeidy date palms during 2013 and 2014 seasons.

Character	Seeds %										Pulp/ seed									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	18.0	16.0	14.5	14.0	15.6	17.4	15.9	14.0	13.7	15.3	4.6	5.3	5.9	6.1	5.5	4.7	5.3	6.1	6.3	5.6
a ₂ SA at 0.05%	16.5	14.0	12.0	11.4	13.5	15.9	13.1	11.0	9.7	12.4	5.1	6.1	7.3	7.8	6.6	5.3	6.6	8.1	8.1	7.0
a ₃ SA at 0.1%	15.0	12.0	10.0	9.4	11.7	14.4	11.0	9.0	9.0	10.9	5.7	7.3	9.0	9.3	7.8	5.9	8.1	10.1	10.1	8.6
a ₄ SA at 0.2%	14.8	11.7	9.7	9.5	11.4	14.2	10.7	8.7	8.7	10.6	5.8	7.5	9.3	9.5	8.0	6.0	8.3	10.5	10.5	8.8
Mean (B)	16.1	13.4	11.6	11.2		15.5	12.7	10.7	10.3		5.3	6.6	7.9	8.2		5.5	7.1	8.7	8.8	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.9	0.9	1.8			1.0	1.0	2.0			0.4	0.4	0.8			0.4	0.4	0.8		

Character	T.S.S. %										Total sugars									
	2013					2014					2013					2014				
	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)	b ₁ 0.0	b ₂ 1%	b ₃ 2%	b ₄ 4%	Mean (A)
a ₁ SA at 0.0%	68.8	69.9	71.3	71.6	70.4	69.1	70.3	72.3	72.3	71.0	59.6	60.7	62.3	62.4	47.8	60.3	61.9	64.0	64.3	62.6
a ₂ SA at 0.05%	70.6	71.7	73.0	73.3	72.2	70.9	72.0	74.0	74.3	72.8	60.8	62.5	62.7	63.0	62.3	61.4	64.0	65.7	65.9	64.3
a ₃ SA at 0.1%	72.0	73.7	75.0	75.3	74.0	72.3	74.0	77.0	77.3	75.2	62.0	62.9	64.9	65.0	63.7	62.6	65.3	68.3	68.4	66.2
a ₄ SA at 0.2%	72.3	73.8	75.0	75.4	74.1	72.6	74.3	77.1	77.4	75.4	63.3	63.0	65.0	65.2	64.1	62.8	65.4	68.4	68.5	65.5
Mean (B)	70.5	72.3	73.6	73.9		71.2	72.7	75.1	75.3		61.5	62.3	63.7	63.9		61.8	64.2	66.6	66.9	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	1.0	1.0	2.0			1.0	1.0	2.0			0.7	0.8	1.6			0.8	0.8	1.6		

Table (11): Effect of single and combined applications of Salicylic acid and seaweed extraction on some chemical characteristics of Saeidy date palms during 2013 and 20-14 seasons.

Character	Reducing sugars %										Non-reducing sugars %									
	2013					2014					2013					2014				
	Seaweed extract concentrations (B) %																			
	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	25.0	26.0	27.0	27.3	26.3	25.4	26.3	28.0	28.3	2.7	34.6	34.7	35.3	35.1	34.9	34.9	35.6	36.0	36.0	35.6
a ₂ SA at 0.05%	25.7	27.0	28.0	28.3	27.3	26.1	28.0	29.0	29.3	28.1	35.1	35.5	34.7	34.7	35.0	35.3	36.0	36.7	36.6	36.2
a ₃ SA at 0.1%	26.4	28.0	30.0	30.3	28.7	26.9	29.0	31.0	31.3	29.6	35.6	34.9	34.9	34.7	35.0	35.7	36.3	37.3	37.1	36.6
a ₄ SA at 0.2%	26.5	28.3	30.3	30.5	28.9	27.0	29.3	31.3	31.4	29.8	36.8	34.7	34.7	34.7	35.2	35.8	36.1	37.1	34.1	35.8
Mean (B)	25.9	27.3	28.8	29.1		26.4	28.2	29.9	30.1		35.0	35.0	35.0	34.8		35.4	36.0	36.8	36.0	
New L.S.D. at 5%	A	B	AB			A	B	AB			NS	NS	NS			NS	NS	NS		
	0.6	0.6	1.2			0.5	0.5	1.0												

Character	Total acidity %										Total tannins %									
	2013					2014					2013					2014				
	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)	b ₁	b ₂	b ₃	b ₄	Mean (A)
	0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%		0.0	1%	2%	4%	
a ₁ SA at 0.0%	0.391	0.360	0.320	0.319	0.348	0.384	0.359	0.322	0.321	0.347	1.04	1.0	0.94	0.88	0.983	1.14	1.01	0.95	0.94	1.01
a ₂ SA at 0.05%	0.360	0.316	0.280	0.279	0.308	0.360	0.323	0.300	0.299	0.321	1.03	0.94	0.88	0.80	0.913	1.05	0.95	0.89	0.88	0.94
a ₃ SA at 0.1%	0.330	0.280	0.260	0.259	0.282	0.329	0.300	0.271	0.269	0.292	0.96	0.88	0.79	0.71	0.835	0.95	0.88	0.80	0.79	0.86
a ₄ SA at 0.2%	0.329	0.279	0.259	0.258	0.281	0.325	0.299	0.270	0.268	0.291	0.95	0.87	0.78	0.70	0.825	0.94	0.87	0.79	0.78	0.85
Mean (B)	0.353	0.308	0.280	0.279		0.350	0.320	0.291	0.289		1.01	0.92	0.85	0.77		1.02	0.93	0.86	0.85	
New L.S.D. at 5%	A	B	AB			A	B	AB			A	B	AB			A	B	AB		
	0.020	0.020	0.040			0.019	0.02	0.040			0.04	0.05	0.10			0.05	0.05	0.10		

Conclusion:

Carrying out four sprays before hand pollination (1st week of Feb.), just after fruit setting (2nd week of Mar.) and at one month intervals (2nd week of Apr. and May) with a mixture of 0.1 % salicylic acid plus 2% seaweed extract was suggested to promote yield and fruit quality of Saeidy date palms grown under New Valley conditions.

References

1. Abd El-aaty, M.S.H. (2015): Relation of fruiting in Sakkoti and Bartemoda date palms with spraying seaweed extract. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
2. Abd El- Megeed, M.M.H. (2015): Response of Sakkoti date palms to spraying salicylic acid under Aswan region conditions. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
3. Ahmed, E.F.S (2011): Response of Sakkoti date palms to foliar application of salicylic acid. Minia J. of Res. Dev. Vol. 21 (2): 305-316.
4. Ahmed, Y.M.A. (2014): Impact of spraying some antitranspirants on fruiting of Williams

bananas grown under Aswan region conditions. Stem Cell 5 (4): 34-39.

5. Ahmed, F. F. and Morsy, M. H. (1999): A new method for measuring leaf area in different fruit crops. Minia of Agric. Res. & Develop. Vol. (19) pp. 97-105.
6. Ahmed, F.F.; Mohamed, H.A.A and Gad El-Kareem, M.R. (2014a): The promotive effect of seaweed extract on fruiting of Zaghloul date palms grown under Minia region. 5th International Date Palm Conf, 16-18 Mar. Emirates Palace Abu Dhabi United Arab Emirates.
7. Ahmed, F.F.; Abdelaal, A.H.M.; El- Masry, S.E.M.A. and Farag, W.B.M.M. (2014b): Response of Superior grapevines to foliar application of some micronutrients, calcium, amino acids and salicylic acid. World Rural Observations. 6 (3); 57-64.
8. Ahmed, F.F.; Ibrahim, H.I.M.; Abada, M.A.M. and Osman, M.M.M. (2014c): Using plant extracts and chemical rest breakages for breaking bud dormancy and improving productivity of

- Superior grapevines growing under hot climates. World Rural Observations, Vol. (5): 100-110.
9. Ahmed, F.F.; Ibrahim, I.M. and Abd El- Megeed, M.M.H. (2015): Response of Sakkoti date palms to spraying salicylic acid. World Rural Observations. 1(1): 119-125.
 10. Association of Official Agricultural Chemists (A.O.A.C.) (2000): Official Methods of Analysis (A.O.A.C), 12th Ed., Benjamin Franklin Station, Washington D.C., U.S.A.pp.490-510.
 11. Balbaa, S. I. (1981): Chemistry of Drugs. Laboratory manual. Cairo Univ. Chapter 6: 127-132.
 12. Carter, M. R. (1993): Soil Sampling and Methods of Analysis. Canadian Soc. Soil Sci. Lewis Publishers, London, Tokyo, ISBN-10 0873718615.
 13. Eshmawy, E.M.S. (2010): Effect of some antioxidants and different pollination methods on fruiting of Sewy date palms. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
 14. Fageria, M. S.; R. S. Dhaka and M. Agrawal (2000): Maturity standards for date palm (*Phoenix dactylifera L.*) J. Appl. Hort.,2(2): 119-120.
 15. Gobara, A. A. (2004): Effect of Algae extract and yeast on fruiting of Zaghloul date palms. J. of Agric. Sci. Mansoura Univ., 29 (9): 5209 - 5220.
 16. Hayat, S. and Ahmad, A. (2007): Salicylic acid, A plant hormone chapter 9. Date, J.F., Capelli, N and Dan-Breusegem, the interplay between salicylic acid and reactive oxygen species during cell death in plants Springer p. 247-276.
 17. Hiscox, A. and Isralstam B. (1979): Method for the extraction of chlorophyll from leaf tissue without maceraton. Can. J. Bot. 57:1332-1334.
 18. James, B. (1994): Chapters from life. Ann. Rev. Physio. Plant. Mol. Biolog. 45: 1-23.
 19. Jones, J. R. B.; Wolf, B. and Mills, H. A. (1991): Plant Analysis Handbook, Micro- Macro publishing Inc., Georgia U.S.A. Chapter 7 pp. 45 - 88.
 20. Khan, W.; Ragirath, M. P; Subramanian, S.; Jithesh, M. N.; Rayorath, P.; Mark Hodges, D.; Critchley- James, A. T.; Craigie, J. S.; Nome, C. J. and Prithiviraj, B. (2009): Seaweed extracts as bioslimulants of plant growth and development. J. of Plant growth Regul. (28): 386-399.
 21. Mead, R.; Currnow, R. N. and Harted, A. M. (1993): Statistical Methods in Agricultural and Experimental Biology. 2nd Ed. Chapman and Hall, London pp. 10- 44.
 22. Moran, ER. (1949): Formula determination chlorophylls pigments extracts N- dimthyl formide. Plant Physiol. 69: 1376- 1381
 23. Ragab, M.A. (2004): Behavior of Zaghloul date palm to foliar application of some antioxidants. Minia J. of Agric. Res. & Develop 24 (4): 501-520.
 24. Soliman A. R. L; Hussein, M. H.; Dessoui, S. S. A. and Torky, Y. (2000): Production of phytohormones by some blue green algae used as soil inoculant for rice fields in Egypt. J. Union Arab Biol, Cairo, Vol. (88): physiology and algae. 83- 109.
 25. Spinelli, F.; Fiori, G.; Noferini, M.; Sprocatti, M.; and Costa, G. (2009): Perspectives on the use of a seaweed extract to moderate the negative effects of alternate bearing in apple trees. Journal of Hort. Sci. & Biot. (2009) p. 131- 137.
 26. Summer, M.E. (1985): Diagnosis and Recommendation Integrated system (DRIS) as a guide to orchard fertilization. Hort. Abst. 55(8): 7502.
 27. Van- Huijsduijnen, H. (2009): Induction by salicylic acid of pathogenesis- related proteins and resistance to Alfalfa Mosaic Virus infections in various plant species. <http://vir.Sgmjournals.Org/cgi/reprint/67/10/2135>.
 28. Von- Wettstein, D. V. C. (1957): Clatale und der Sumbmikro Skopisne Pormwechsel de Plastids. Experimental Cell Research, 12-427.
 29. Zodape, S.T. (2001): Seaweed as a biofertilizer. J. Sci. Indust. Res. 60: 378-382.

7/27/2015