

Response of Saidu Date Palms to Some Inorganic, Organic and Biofertilization As Well As Some Antioxidant Treatments

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Abstract: During 2012 and 2013 seasons, Saidu date palms received N as 40 to 100% inorganic plus 10 to 30 % farmyard manure and Biogen as well as vitamins A & K and salicylic acid each at 250 ppm. Growth characters, plant pigments, N, P, K, Mg, Fe, Zn, Mn and Cu, yield, fruit quality, nitrite and nitrate in the juice in response to these treatments were investigated. Using the suitable N via 60 to 80% inorganic N plus 10 to 20% organic N and Biogen was accompanied with improving yield and bunch weight relative to using N completely via inorganic N or when inorganic N was added at percentages lower than 60%. Spraying vitamins A & K and salicylic acid each at 25.0 ppm caused a great promotion on growth and fruiting relative to the check treatment. Using vitamins A was superior than using vitamin K in this respect. Spraying salicylic acid at 250 ppm was preferable than using any vitamins in this connection. The best findings were recorded on the palms that fertilized with N as 60% inorganic N + 20% farmyard manure enriched with 20% Biogen. Supplying Saidu date palms with N (1000 g N / palm/ year) via 60% inorganic + 80 kg farmyard manure / palm / year+ 200 g Biogen / palm / year besides spraying salicylic acid at 250 ppm four times is responsible for improving yield and fruit quality.

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1. Introduction

Nowadays, using organic and biofertilization as a partial replacement of mineral N fertilizers, vitamins and salicylic acid are very effective in improving yield and fruit quality of different fruit crops. This is attributed to the important role of organic and biofertilizers on enhancing soil fertility, availability of nutrients, N fixation and natural hormones (Kanniyan, 2002). Vitamins and salicylic acid are responsible for avoiding the plants from all stresses, and reactive oxygen species and enhancing cell divisions and the biosynthesis of all organic foods (Oretili, 1987, Ding *et al.*, 2001 and Hayat and Ahmed, 2007).

Organic and biofertilization were found by many authors as an important partial replacement of mineral N fertilizers for reducing pollution and improving yield and fruit quality of fruit crops especially date palm cvs (Mohamed and Ragab, 2004; Mohamed and Gobara, 2004; Mansour *et al.*, 2004; Al- Wasfy and El- Khawaga, 2008; El- Salhy, 2008; Morsi, 2009; Ibrahiem- Zenib, 2010; Ahmed *et al.*, 2011; Ahmed- Samah, 2011 and Ahmed *et al.*, 2014a and 2014b). An obvious promotion on fruiting of date palm cvs was attributed to using vitamins (Ragab, 2004; Sayed *et al.*, 2011; Ahmed *et al.*, 2011; Ahmed *et al.*, 2013b; Hassan, 2014 and Hassan- Huda, 2014) and

salicylic acid (Eshmawy, 2010; Ahmed, 2011; Abd El- Megeed, 2015 and Ahmed *et al.*, 2015).

The target of this study was examining the effect of organic and biofertilization, vitamins A & K and salicylic acid on fruiting of El- Saidu date palms grown under New Valley environmental conditions.

2. Material and Methods

This study was conducted during 2012 and 2013 seasons in a private date palm orchard situated at El-Farafrah Oasis New Valley Governorate on 40 years old Saidu date palms as (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 are planted at 7 x7 meters apart (85 palms/ feddan). The selected palms were irrigated with well water through surface irrigation system. The texture of the soil is sandy.

Hand pollination of all the selected palms was achieved by inserting five fresh male strands into the center of one female spathe according (Hussein *et al.*, 1987) to using the same source of pollens (Saidu date palms males) to avoid residues of metaxenia (according to Dammas, 1998). The pollen grains viability was tested before carrying out pollination with

acetocarmine staining. according to **Moreira and Gurgel (1944)**. Pollination was carried out throughout two days after female spathes cracking at the day time of afternoon according to **Omar (2007)**. Every bunch was bagged after pollination by white paper bags which were tied at the ends using a piece of cotton for aeration. The bags were shaken lightly to ensure pollens distribution and they were removed after one month (**Musa, 1981**). Number of bunches per palm was adjusted to ten bunches and leaf bunch ratio was maintained at 8 : 1 (according to **Omar, 2007**).

Physical and chemical properties of the experimental soil at 0.0- 90 cm depth are presented in Table (1) according to the procedure of **Cottenieet al., (1982)**.

Table (1): Analysis of the tested soil:

Characters	Values
Practical size distribution	
Sand %	7.5
Silt %	11.0
Clay %	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
EDTA extractable available micronutrients (ppm)	
Zn	2.1
Fe	1.8
Mn	0.9
Cu	0.7

All the selected Saidu date palms received common horticultural practices as usually applied in the orchard.

This experiment included sixteen treatments from two factors (A & B). The first factor (A) consisted from the following inorganic, organic and biofertilizer treatments:

a₁) Using the suitable N (1000 g N palm/ year) as 100 % inorganic N (2985.1 g ammonium nitrate / palm/ year).

a₃) Using the suitable N as 80% inorganic N (2388.1 g ammonium nitrate / palm / year) + 10% organic N (40 kg F.Y.M., 0.25 % N / palm / year) + 10% biofertilizer (100 g Biogen / palm/ year).

a₃) Using the suitable N as 60% inorganic N (1791.1 g ammonium nitrate / palm / year) + 20% organic N (80 kg F.Y.M., 0.25 % N / palm / year) + 20% biofertilizer (200 g Biogen / palm/ year).

a₄) Using the suitable N as 40% inorganic N (1194.0 g ammonium nitrate / palm / year) + 30% organic N (300 kg F.Y.M./ palm / year) + 30% biofertilizer (300 g Biogen / palm/ year).

The second factor (B) comprised from the following four treatments from vitamins A & B & salicylic acid:

b₁) Untreated palms.

b₂) Spraying vitamin A at 250 ppm.

b₃) Spraying vitamin K at 250 ppm.

b₄) Spraying salicylic acid at 250 ppm.

Each treatment was replicated three times, one palm per each. Ammonium nitrate (33.5 %N) as a source of inorganic N was divided into three equal batches and applied at the first week of March, May and July. It was broadcast around each palm 20 cm far from palm trunk. Farmyard manure (Table 2) enriched with Biogen added at the last week of Jan. in two trenches (25 m deep 1.0 m long and 25 cm wide) at both sides of trees row.

Table (2): Analysis of the tested farmyard manure

Parameter	Values
Cubic meter weight (kg.)	650.0
Moisture %	35.0
O.M.%	24.0
pH (1: 10)	8.70
EC (mmhos cm ⁻¹ / 25°C).	5.70
C/N	17.5
Total N %	0.25
Total P %	0.32
Total K %	0.92
Total Ca %	1.83
Total Mg %	1.00
Total Fe (ppm)	14900
Total Mn(ppm)	500
Total Zn (ppm)	55

Each ml of Biogen contains 10⁶ cells. Vitamins A & K was solubilized in few drops of ethyl alcohol before application. Salicylic acid solution was adjusted to pH 6.0 by using 1.0 N sodium hydroxide and was solubilized in few drops of ethyl alcohol. These antioxidants were sprayed four times started at the first week of March and at 45 day intervals. Triton B as wetting agent was used to all sprayed solutions at 0.5%. Spraying was done till runoff.

Randomized complete block design in split plot arrangement was followed. The four inorganic, organic

and biofertilization treatments occupied the main plots. The four antioxidants treatments ranked the subplots.

During both seasons, the following parameters were recorded:

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

2- Plant pigments namely chlorophylls a & b, total chlorophylls, and total carotenoids as mg / 100 g F.W. (**Von -Wettstein, 1957 and Hiscox and Israelstam, 1979**).

3- Nutrients namely N, P, K and Mg (as percentages) and Zn, Fe, Mn and Cu (as ppm) in the leaves (**Peach and Tracey, 1968; Cottenieet al., 1982 and Summer, 1985**).

4- Yield (kg.) and bunch weight (kg.)

5- Fruit quality characteristics namely fruit weight (g.), dimensions (length and width in cm.), percentages of pulp and seeds, pulp/seed, T.S.S. %, total and reducing sugars (**Lane and Eynon, 1965 and A.O.A.C., 2000**), total acidity % as g malic acid / 100 g pulp (**A.O.A.C., 2000**), total soluble tannins (**Balbaa, 1981**), total crude fibre % (**A.O.A.C., 2000**) as well as nitrate and nitrite in the juice as ppm (**Ridnour- Lisa et al., 2000**).

Statistical analysis was done and treatment means were compared using new L.S.D. test at 5% (**Mead et al., 1993**).

3. Results

1-Growth characters:

Data in Tables (3 & 4) clearly show that using the suitable N (1000 g / palm / year) through 60 to 80% inorganic N + 10 to 20 organic and biofertilizers significantly stimulated all growth characters namely number of green leaves/ palm, number of pinnae / leaf, pinnae area and leaf area comparing with using N as 100% inorganic or when inorganic N was applied at 40% with 30% inorganic and biofertilizers. Using N completely via inorganic N was significantly superior than using N as 40% inorganic plus 30% organic and biofertilizers in enhancing these growth characters. The maximum values were recorded on the palms that received N as 60% inorganic N + 20% organic + 20 % N biofertilizer.

Foliar application of vitamins A and K and salicylic acid each at 250 ppm significantly stimulated all growth characters rather than non- application. Using vitamin A was superior to using vitamin K in this respect. Using salicylic acid significantly stimulated these growth characters than using both vitamins.

Combined application of inorganic N as 60% in organic N 20% organic N + biofertilizer at 20% of the suitable N plus spraying salicylic acid four times at 250

ppm gave the maximum values of these growth characters. These results were true during both seasons.

2- Plant pigments:

It is clear from the data in Tables (5 & 6) that using N as 60 to 80 % inorganic N plus 10 to 30% organic and bioforms of N significantly enhanced chlorophylls a & b, total chlorophylls and total carotenoids relative to using N as 100% inorganic alone. The promotion on these plant pigments was significantly associated with reducing percentages of inorganic N from 100 to 60% and at the same times increasing percentages of organic manure from 10 to 20% and biofertilizer from 10 to 20 %. The maximum values were presented on the palms that received N as 60% inorganic + 20% organic and biofertilizers.

Spraying vitamins A &K and salicylic acid each at 250 ppm significantly enhanced chlorophylls a & b, total chlorophylls and total carotenoids comparing with the check treatments. The maximum values were presented on the palms that received salicylic acid via foliage followed by spraying vitamin A.

The maximum values were recorded on the palms that received N as 60 % inorganic + 20 % as organic N + 20 % as biofertilizer plus spraying salicylic acid at 250 ppm. These results were true during both seasons.

3- Nutrients in the leaves:

Data in Tables (7 to 10) obviously reveal that using N as 60 to 80% inorganic N plus 10 to 20 % organic and biofertilizers significantly enhanced N % in the leaves over the application of N completely via inorganic N or when inorganic N was added as inorganic N at 40% with the application of organic and biofertilization. However, Nutrients namely P, K, Mg, Zn, Fe, Mn and Cu in the leaves were significantly increased with using N as 40 to 80% inorganic N plus 10 to 30 % organic and biofertilization rather than application of N completely via inorganic N form. The promotion on these nutrients was significantly depended on reducing percentages of inorganic N from 100 to 40 % as well as organic and biofertilizer percentages from 0.0 to 30%.

Foliar application of vitamins A & K as well as salicylic acid each at 250 ppm significantly was followed by enhancing all nutrients (N, P, K, Mg, Zn, Fe, Mn and Cu) in the leaves over the control treatment. The best material was salicylic acid followed by vitamin A and vitamin K.

Supplying the palms with N as 40 % inorganic + organic and biofertilization at 30% each plus spraying salicylic acid at 250 ppm gave the maximum values of all nutrients except N. These results were true during both seasons.

4- Yield / palm and bunch weight:

Data in Table (11) clearly show that supplying the palms with N as 60 to 80% inorganic N plus 10 to 20% organic and biofertilizers significantly improved yield/

palm and bunch weight rather than application of N completely via inorganic N or when percentages of inorganic N applied reached 40%. A significant reduction on the yield and bunch weight was observed with using N as 40% inorganic plus 30% organic and biofertilization comparing with using the other N management. The best N management was the application of N as 60% inorganic + 20% organic N +20 % bioform.

Spraying the palms with vitamins A & K or salicylic acid each at 250 ppm was very effective in improving yield and bunch weight over the check treatment. The best results were attributed to using vitamin K, vitamin A and salicylic acid, in ascending order.

Amending Saidu date palms with N as 60% inorganic N + 20% organic N + 20% bioform plus spraying salicylic acid at 250 ppm gave the maximum yield (96.0 and 99.0 kg) and bunch weight (9.6 kg and 9.9kg) during both seasons, respectively. Palms received N as 100% inorganic without the application of any biostimulants (vitamins or salicylic acid) had the minimum values.

5- Quality of the fruits:

Data in Tables (12 to 18) clearly indicate that using N as 40 to 80 % inorganic N plus 10 to 30% organic N and bioform significantly was very effective

in improving fruit quality in terms of increasing fruit weight and dimensions (length & width), pulp %, pulp/seed, T.S.S. %, total and reducing sugars and decreasing seeds %, total acidity %, total soluble tannins, total crude fibre %, nitrate and nitrite in the juice comparing with using N completely via inorganic form alone. The promotion on fruit quality was significantly associated with reducing percentages of inorganic N from 100 to 40% and at the same time increasing the percentages of organic and biofertilization from 0.0 to 30%.

Foliar application of vitamins A & K as well as salicylic acid each at 250 ppm significantly improved both physical and chemical characteristics of the fruits in terms of increasing fruit weight and dimensions, T.S.S., pulp %, pulp / seed, total and reducing sugars and decreasing seeds %, total acidity%, total soluble tannins%, total crude fibre%, nitrate and nitrite (ppm) in the juice comparing with the control treatment. Using vitamin K, vitamin A and salicylic acid at 250 ppm, in ascending order was very effective in enhancing fruit quality.

The best results with regard to fruit quality were obtained due to supplying Saidu date palms with N as 40 % inorganic N + 30% organic N + 30 % bioform of N plus spraying salicylic acid at 250 ppm. These results were true during both seasons.

Table (3): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the number of green leaves/ palm and number of pinnae per leaf of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Number of green leaves / palm									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vi. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	17.1	19.2	18.2	21.2	19.0	16.1	18.4	17.3	18.5	17.6
a ₂ 80 % inorganic + 10 organic + 10% bio.	19.3	21.5	20.4	22.6	21.0	18.2	20.4	19.4	21.5	19.9
a ₃ 60 % inorganic + 20 organic + 20% bio.	20.5	22.6	21.5	23.7	22.1	19.6	21.8	20.7	23.0	21.3
a ₄ 30 % inorganic + 30 organic + 30% bio.	15.2	17.6	16.5	18.7	17.0	15.1	17.4	16.2	18.7	16.9
Mean (B)	18.0	20.2	19.2	22.0		17.3	19.5	18.4	20.4	
New L.S.D. at 5%	A		B		AB	A		B		AB
	1.2		1.0		2.0	1.0		1.0		2.0
Character	Number of pinnae per leaf									
a ₁ 100% inorganic N	183.9	190.0	187.0	193.0	188.5	184.0	190.0	187.0	193.0	188.5
a ₂ 80 % inorganic + 10 organic + 10% bio.	186.7	193.0	190.0	196.0	191.4	187.0	193.0	190.0	196.0	192.0
a ₃ 60 % inorganic + 20 organic + 20% bio.	191.0	197.0	194.0	200.0	195.5	190.0	196.0	193.0	199.0	195.0
a ₄ 30 % inorganic + 30 organic + 30% bio.	181.0	187.0	184.0	190.0	185.5	182.0	188.0	185.0	191.0	187.0
Mean (B)	186.0	191.8	188.8	194.8		185.8	191.8	188.8	194.8	
New L.S.D. at 5%	A		B		AB	A		B		AB
	2.0		1.9		3.8	1.9		2.0		4.0

Table (4): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the pinnae area and leaf area of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Pinnae area (cm) ²									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	142.3	147.0	145.0	150.0	146.1	143.3	150.0	147.0	152.2	148.1
a ₂ 80 % inorganic + 10 organic + 10% bio.	145.0	150.0	148.0	152.0	148.7	146.0	151.0	148.5	153.3	149.7
a ₃ 60 % inorganic + 20 organic + 20% bio.	147.0	152.3	150.0	155.0	151.1	148.0	153.0	150.0	155.0	151.5
a ₄ 30 % inorganic + 30 organic + 30% bio.	140.0	144.0	142.0	146.8	143.2	141.2	147.0	144.0	150.0	145.5
Mean (B)	143.6	148.3	146.2	151.0		144.6	150.2	147.4	152.6	
New L.S.D. at 5%	A		B		AB	A		B		AB
	1.7	1.5		3.0		1.5	1.4		2.8	
Character	Leaf area (cm) ²									
a ₁ 100% inorganic N	2.62	2.79	2.71	2.90	2.75	2.64	2.85	2.75	2.94	2.79
a ₂ 80 % inorganic + 10 organic + 10% bio.	2.71	2.90	2.81	2.98	2.85	2.73	2.91	2.82	3.00	2.86
a ₃ 60 % inorganic + 20 organic + 20% bio.	2.81	3.00	2.91	3.10	2.95	2.81	3.00	2.90	3.08	2.95
a ₄ 30 % inorganic + 30 organic + 30% bio.	2.53	2.69	2.61	2.79	2.65	2.57	2.76	2.66	2.87	2.71
Mean (B)	2.70	2.80	2.76	2.90		2.68		2.80	3.97	
New L.S.D. at 5%	A		B		AB	A		B		AB
	0.09	0.08		0.16		0.07	0.08		0.16	

Table (5): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on chlorophylls a and b in the leaves of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Chlorophyll a (mg/ 100 g F.W.)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	6.2	7.3	6.3	7.5	6.8	6.4	8.6	7.5	9.7	8.1
a ₂ 80 % inorganic + 10 organic + 10% bio.	7.3	9.5	8.5	10.6	9.0	7.7	9.9	8.8	11.1	9.4
a ₃ 60 % inorganic + 20 organic + 20% bio.	8.5	10.6	9.5	11.7	10.1	8.7	10.9	9.8	12.0	10.4
a ₄ 30 % inorganic + 30 organic + 30% bio.	5.2	6.4	5.3	7.6	6.1	5.4	6.0	5.7	6.9	6.0
Mean (B)	6.8	6.2	7.4	9.4		7.1	8.9	8.0	10.0	
New L.S.D. at 5%	A		B		AB	A		B		AB
	0.9	0.9		1.8		1.0	1.0		2.0	
Character	Chlorophyll b (mg/ 100 g F.W.)									
a ₁ 100% inorganic N	3.3	5.0	4.1	6.0	4.6	3.2	5.0	4.1	5.9	4.6
a ₂ 80 % inorganic + 10 organic + 10% bio.	4.5	6.5	5.5	7.5	6.0	4.4	6.3	5.2	7.4	5.8
a ₃ 60 % inorganic + 20 organic + 20% bio.	5.5	7.4	6.4	8.4	6.9	5.5	7.2	6.2	8.2	6.8
a ₄ 30 % inorganic + 30 organic + 30% bio.	2.3	3.9	3.0	5.0	3.6	2.1	3.9	3.0	5.0	3.5
Mean (B)	3.9	5.7	4.8	6.7		3.8	5.6	4.6	6.6	
New L.S.D. at 5%	A		B		AB	A		B		AB
	0.8	0.7		1.4		0.8	0.8		1.6	

Table (6): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the total chlorophylls and carotenoids in the leaves of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Total chlorophylls (mg/ 100 g F.W.)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	9.5	12.3	10.4	13.5	11.4	9.6	13.6	11.6	15.6	12.6
a ₂ 80 % inorganic + 10 organic + 10% bio.	11.8	16.0	14.0	18.1	15.0	12.1	16.2	14.0	18.5	15.2
a ₃ 60 % inorganic + 20 organic + 20% bio.	14.0	18.0	15.9	20.1	17.0	14.2	18.1	16.0	20.2	17.1
a ₄ 30 % inorganic + 30 organic + 30% bio.	7.5	10.1	9.6	12.6	9.6	7.5	9.9	8.7	11.9	9.5
Mean (B)	10.7	14.1	12.2	16.1		10.9	14.5	12.6	16.6	
New L.S.D. at 5%	A 0.9	B 0.9	AB 1.8			A 1.0	B 1.0	AB 2.0		
Character	Total carotenoides(mg/ 100 g F.W.)									
a ₁ 100% inorganic N	2.5	4.0	3.2	4.7	3.6	2.5	4.0	3.2	4.8	3.6
a ₂ 80 % inorganic + 10 organic + 10% bio.	3.1	4.5	3.8	5.1	4.1	3.1	4.7	4.0	5.5	4.3
a ₃ 60 % inorganic + 20 organic + 20% bio.	4.1	5.7	5.0	6.6	5.4	4.0	5.3	4.7	6.0	5.0
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.9	3.1	2.5	3.7	2.8	2.0	3.2	2.6	3.7	2.9
Mean (B)	2.9	4.3	3.6	5.0		2.9	4.3	3.6	5.0	
New L.S.D. at 5%	A 0.5	B 0.6	AB 1.2			A 0.5	B 0.5	AB 1.0		

Table (7): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentages of N and K in the leaves of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Leaf N %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	1.71	1.87	1.80	1.95	1.83	1.72	1.86	1.79	1.92	1.82
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.81	1.98	1.90	2.05	1.94	1.80	1.94	1.87	2.01	1.90
a ₃ 60 % inorganic + 20 organic + 20% bio.	1.90	2.05	1.97	2.12	2.01	1.88	2.02	1.95	2.10	1.99
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.61	1.76	1.69	1.82	1.72	1.66	1.80	1.73	1.88	1.77
Mean (B)	1.75	1.91	1.84	1.98		1.76	1.90	1.83	1.98	
New L.S.D. at 5%	A 0.05	B 0.06	AB 0.12			A 0.06	B 0.06	AB 0.12		
Character	Leaf P %									
a ₁ 100% inorganic N	0.21	0.27	0.24	0.30	0.25	0.19	0.25	0.22	0.28	0.24
a ₂ 80 % inorganic + 10 organic + 10% bio.	0.24	0.30	0.27	0.33	0.28	0.22	0.28	0.25	0.31	0.27
a ₃ 60 % inorganic + 20 organic + 20% bio.	0.29	0.37	0.33	0.40	0.35	0.25	0.36	0.33	0.40	0.34
a ₄ 30 % inorganic + 30 organic + 30% bio.	0.33	0.40	0.37	0.43	0.39	0.28	0.39	0.41	0.47	0.37
Mean (B)	0.27	0.33	0.30	0.36		0.23	0.32	0.29	0.34	
New L.S.D. at 5%	A 0.03	B 0.02	AB 0.04			A 0.02	B 0.03	AB 0.06		

Table (8): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentages of K and Mg in the leaves of Sady date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Leaf K %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	1.41	1.52	1.46	1.58	1.49	1.45	1.57	1.51	1.66	1.55
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.46	1.60	1.52	1.66	1.56	1.50	1.62	1.56	1.70	1.60
a ₃ 60 % inorganic + 20 organic + 20% bio.	1.51	1.63	1.57	1.70	1.60	1.56	1.69	1.62	1.75	1.66
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.57	1.72	1.65	1.84	1.70	1.62	1.75	1.68	1.85	1.73
Mean (B)	1.49	1.62	1.55	1.70		1.53	1.66	1.59	1.74	
New L.S.D. at 5%	A B		AB			A B		AB		
	0.04	0.05		0.10		0.05	0.05		0.10	
Character	Leaf Mg %									
a ₁ 100% inorganic N	0.55	0.70	0.62	0.77	0.66	0.56	0.68	0.62	0.75	0.65
a ₂ 80 % inorganic + 10 organic + 10% bio.	0.62	0.75	0.68	0.82	0.72	0.61	0.74	0.67	0.80	0.71
a ₃ 60 % inorganic + 20 organic + 20% bio.	0.69	0.82	0.75	0.90	0.79	0.66	0.78	0.72	0.85	0.75
a ₄ 30 % inorganic + 30 organic + 30% bio.	0.75	0.86	0.80	0.96	0.84	0.71	0.84	0.77	0.90	0.81
Mean (B)	0.65	0.78	0.71	0.86		0.64	0.76	0.70	0.83	
New L.S.D. at 5%	A B		AB			A B		AB		
	0.05	0.06		0.12		0.05	0.05		0.10	

Table (9): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the leaf content of Fe and Zn (as ppm) of Sady date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Leaf Fe (ppm)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	55.3	59.2	57.1	61.2	58.2	56.3	60.0	58.4	62.9	59.4
a ₂ 80 % inorganic + 10 organic + 10% bio.	57.7	63.0	60.3	65.0	61.5	58.4	63.0	61.0	65.0	61.8
a ₃ 60 % inorganic + 20 organic + 20% bio.	59.9	65.0	63.0	68.0	64.0	60.0	64.3	62.3	66.3	63.3
a ₄ 30 % inorganic + 30 organic + 30% bio.	62.2	67.3	63.9	69.3	65.7	62.2	66.3	64.1	68.9	65.4
Mean (B)	58.8	63.6	61.1	65.9		59.2	63.4	61.4	65.8	
New L.S.D. at 5%	A B		AB			A B		AB		
	1.1	1.1		2.2		0.9	1.0		2.0	
Character	Leaf Zn (ppm)									
a ₁ 100% inorganic N	60.0	64.3	62.0	67.1	63.3	61.7	65.0	63.8	67.1	64.4
a ₂ 80 % inorganic + 10 organic + 10% bio.	62.7	67.1	65.0	69.2	66.0	63.9	68.3	66.1	71.1	67.3
a ₃ 60 % inorganic + 20 organic + 20% bio.	65.0	69.3	67.3	71.9	68.4	66.9	71.0	68.3	73.1	69.8
a ₄ 30 % inorganic + 30 organic + 30% bio.	67.7	71.9	69.9	73.3	70.7	69.3	75.0	71.9	77.1	73.3
Mean (B)	63.8	68.1	66.0	70.4		65.4	69.8	67.5	72.1	
New L.S.D. at 5%	A B		AB			A B		AB		
	1.2	1.3		2.6		1.3	1.4		2.8	

Table (10): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the leaf content of Mn and Cu as (ppm) of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Leaf Mn (ppm)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	57.3	60.9	58.5	63.3	60.0	59.1	64.0	62.0	66.1	62.8
a ₂ 80 % inorganic + 10 organic + 10% bio.	59.1	62.9	61.1	65.0	62.0	61.7	65.7	63.3	68.3	64.8
a ₃ 60 % inorganic + 20 organic + 20% bio.	61.4	66.3	64.5	69.0	65.3	64.5	69.9	67.3	72.3	68.5
a ₄ 30 % inorganic + 30 organic + 30% bio.	63.2	69.3	66.0	71.9	67.6	66.6	71.9	69.3	74.3	70.5
Mean (B)	60.3	64.9	62.5	67.3		63.0	67.9	65.5	70.3	
New L.S.D. at 5%	A 1.0		B 1.2		AB 2.4	A 1.0		B 1.3		AB 2.6
Character	Leaf Cu (ppm)									
a ₁ 100% inorganic N	1.5	2.9	2.1	2.9	2.4	1.7	2.6	2.2	3.0	2.4
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.9	3.1	2.9	4.6	3.1	1.9	3.1	2.6	4.0	2.4
a ₃ 60 % inorganic + 20 organic + 20% bio.	2.3	3.5	3.0	4.9	3.4	2.3	3.6	3.0	4.4	3.3
a ₄ 30 % inorganic + 30 organic + 30% bio.	3.0	4.6	4.0	5.5	4.3	2.6	4.6	4.0	5.9	4.3
Mean (B)	2.2	3.5	3.0	4.5		2.1	3.5	3.0	4.3	
New L.S.D. at 5%	A 0.3		B 0.2		AB 0.4	A 0.2		B 0.3		AB 0.6

Table (11): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the bunch weight and yield per palm of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Bunch weight (kg.)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	6.5	6.9	6.7	7.2	6.8	6.6	7.3	6.9	7.6	7.1
a ₂ 80 % inorganic + 10 organic + 10% bio.	7.3	8.0	7.6	8.4	7.8	7.0	7.8	7.4	8.1	7.6
a ₃ 60 % inorganic + 20 organic + 20% bio.	8.8	9.4	9.1	9.6	9.2	8.9	9.6	9.3	9.9	9.4
a ₄ 30 % inorganic + 30 organic + 30% bio.	6.1	6.8	6.5	7.0	6.6	6.3	6.9	6.6	7.2	6.8
Mean (B)	7.2	7.8	7.5	8.1		7.2	7.9	7.6	8.2	
New L.S.D. at 5%	A 0.3		B 0.3		AB 0.6	A 0.3		B 0.3		AB 0.6
Character	Yield / palm (kg.)									
a ₁ 100% inorganic N	65.0	69.0	67.0	72.0	68.3	66.0	73.0	69.0	76.0	71.0
a ₂ 80 % inorganic + 10 organic + 10% bio.	73.0	80.0	76.0	84.0	78.3	70.0	78.0	74.0	81.0	75.8
a ₃ 60 % inorganic + 20 organic + 20% bio.	88.0	94.0	91.0	96.0	92.3	89.0	96.0	93.0	99.0	94.3
a ₄ 30 % inorganic + 30 organic + 30% bio.	61.0	68.0	65.0	70.0	66.0	63.0	69.0	66.0	72.0	67.5
Mean (B)	71.8	77.8	74.8	80.5		72.0	79.0	75.5	82.0	
New L.S.D. at 5%	A 1.0		B 0.9		AB 1.8	A 1.0		B 1.0		AB 2.0

Table (12): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the fruit weight and length of Sady date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Fruit weight (g.)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	9.70	10.30	10.00	11.00	10.25	9.77	10.37	10.09	10.48	10.18
a ₂ 80 % inorganic + 10 organic + 10% bio.	9.95	10.60	10.30	10.91	10.44	10.02	10.67	10.38	10.79	10.47
a ₃ 60 % inorganic + 20 organic + 20% bio.	10.20	10.81	10.50	11.11	10.66	10.28	10.88	10.57	10.91	10.66
a ₄ 30 % inorganic + 30 organic + 30% bio.	10.51	11.19	10.86	11.50	11.02	10.58	11.26	10.93	11.37	11.04
Mean (B)	10.09	10.73	10.42	11.13		10.16	10.80	10.49	10.89	
New L.S.D. at 5%	A 0.21	B 0.22	AB 0.44			A 0.22	B 0.22	AB 0.44		
Character	Fruit length (cm.)									
a ₁ 100% inorganic N	3.45	3.70	3.56	3.81	3.63	3.52	3.77	3.63	3.88	3.70
a ₂ 80 % inorganic + 10 organic + 10% bio.	3.47	3.77	3.57	3.89	3.68	3.54	3.84	3.64	3.96	3.75
a ₃ 60 % inorganic + 20 organic + 20% bio.	3.59	3.87	3.67	3.99	3.78	3.66	3.94	3.74	4.06	3.85
a ₄ 30 % inorganic + 30 organic + 30% bio.	3.71	3.91	3.81	4.11	3.89	3.78	3.98	3.88	4.20	3.96
Mean (B)	3.56	3.81	3.65	3.95		3.63	3.88	3.72	4.03	
New L.S.D. at 5%	A 0.11	B 0.10	AB 0.20			A 0.10	B 0.10	AB 0.20		

Table (13): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the fruit diameter and percentage of pulp of Sady date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Fruit width (cm)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	2.35	2.51	2.44	2.88	2.55	2.41	2.57	2.48	2.66	2.53
a ₂ 80 % inorganic + 10 organic + 10% bio.	2.42	2.57	2.50	2.66	2.54	2.47	2.64	2.55	2.74	2.60
a ₃ 60 % inorganic + 20 organic + 20% bio.	2.50	2.69	2.59	2.75	2.63	2.51	2.71	2.57	2.81	2.65
a ₄ 30 % inorganic + 30 organic + 30% bio.	2.57	2.74	2.66	2.85	2.71	2.61	2.81	2.71	2.91	2.76
Mean (B)	2.46	2.63	2.55	2.79		2.50	2.68	2.58	2.78	
New L.S.D. at 5%	A 0.05	B 0.06	AB 0.12			A 0.05	B 0.05	AB 0.10		
Character	Pulp %									
a ₁ 100% inorganic N	84.3	86.4	85.4	87.5	85.9	85.0	87.4	86.3	88.5	86.8
a ₂ 80 % inorganic + 10 organic + 10% bio.	85.9	88.0	86.9	89.0	87.5	86.3	88.5	87.4	89.5	87.9
a ₃ 60 % inorganic + 20 organic + 20% bio.	86.9	88.9	87.9	90.0	88.4	87.4	89.9	88.5	91.0	89.2
a ₄ 30 % inorganic + 30 organic + 30% bio.	88.3	91.0	89.9	92.2	90.4	88.5	91.2	90.0	92.3	90.5
Mean (B)	86.4	88.6	87.5	89.7		87.8	89.3	88.1	90.3	
New L.S.D. at 5%	A 0.9	B 1.0	AB 2.0			A 1.0	B 1.0	AB 2.0		

Table (14): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentage of seeds and pulp / seed of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Seeds %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	15.7	13.6	14.6	12.5	14.1	15.0	12.6	13.7	11.5	13.2
a ₂ 80 % inorganic + 10 organic + 10% bio.	14.1	12.0	13.1	11.0	12.5	13.7	11.5	12.6	10.5	12.1
a ₃ 60 % inorganic + 20 organic + 20% bio.	13.1	11.1	12.1	10.0	11.6	12.6	10.1	11.5	9.0	10.8
a ₄ 30 % inorganic + 30 organic + 30% bio.	11.7	9.0	10.1	7.8	9.7	11.5	8.8	10.0	7.7	9.5
Mean (B)	13.7	11.4	12.5	10.4		13.2	10.7	12.0	9.7	
New L.S.D. at 5%	A 0.9	B 1.0	AB 2.0			A 1.0	B 1.0	AB 2.0		
Character	Pulp / seed									
a ₁ 100% inorganic N	5.4	6.4	5.8	7.0	6.1	5.7	6.9	6.3	7.7	6.6
a ₂ 80 % inorganic + 10 organic + 10% bio.	6.1	7.3	6.6	8.1	7.0	6.3	7.7	6.9	8.5	6.6
a ₃ 60 % inorganic + 20 organic + 20% bio.	6.6	8.0	7.3	9.0	7.7	6.9	8.9	7.7	10.1	8.4
a ₄ 30 % inorganic + 30 organic + 30% bio.	7.5	10.1	8.9	11.8	9.6	7.7	10.4	9.0	12.0	9.8
Mean (B)	6.4	7.9	7.9	9.0		6.7	8.5	7.5	9.6	8.1
New L.S.D. at 5%	A 0.7	B 0.8	AB 1.6			A 0.9	B 0.9	AB 1.8		

Table (15): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentages of T.S.S and total sugars in the fruits of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	T.S.S. %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	68.3	71.5	70.0	73.0	70.7	69.0	72.2	70.7	73.8	71.4
a ₂ 80 % inorganic + 10 organic + 10% bio.	69.3	71.7	70.5	73.3	71.2	70.0	72.5	71.2	74.0	72.0
a ₃ 60 % inorganic + 20 organic + 20% bio.	71.2	73.5	72.5	75.0	73.1	72.0	74.5	73.2	75.9	73.9
a ₄ 30 % inorganic + 30 organic + 30% bio.	73.3	76.0	74.8	77.5	75.4	74.0	76.7	75.5	78.3	76.1
Mean (B)	70.5	73.2	72.0	74.7		71.3	74.0	72.7	75.5	
New L.S.D. at 5%	A 0.9	B 0.9	AB 1.8			A 1.0	B 1.0	AB 2.0		
Character	Total sugars %									
a ₁ 100% inorganic N	60.0	63.0	61.5	64.5	62.3	60.5	64.0	62.5	66.0	63.3
a ₂ 80 % inorganic + 10 organic + 10% bio.	61.5	64.5	63.0	66.0	63.8	61.9	65.9	64.0	68.0	65.0
a ₃ 60 % inorganic + 20 organic + 20% bio.	62.8	65.5	63.9	67.0	64.8	63.9	68.3	66.0	70.2	67.1
a ₄ 30 % inorganic + 30 organic + 30% bio.	64.0	68.0	66.0	69.9	67.0	66.0	70.0	68.0	71.2	68.8
Mean (B)	62.1	65.3	63.6	66.9		63.1	67.1	65.1	68.9	
New L.S.D. at 5%	A 1.0	B 1.0	AB 2.0			A 1.0	B 1.0	AB 2.0		

Table (16): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentages of reducing sugars and total acidity in the fruits of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Reducing sugars %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	63.0	64.2	63.7	65.0	64.0	63.7	64.9	64.5	65.7	64.7
a ₂ 80 % inorganic + 10 organic + 10% bio.	63.5	66.0	65.0	66.5	65.3	64.3	66.7	65.7	67.2	66.0
a ₃ 60 % inorganic + 20 organic + 20% bio.	64.1	67.1	66.0	68.5	66.4	64.8	67.9	66.7	69.2	67.2
a ₄ 30 % inorganic + 30 organic + 30% bio.	64.6	69.0	67.5	70.0	67.8	65.3	69.7	68.5	71.2	68.7
Mean (B)	63.8	66.6	65.6	67.5		64.5	67.3	66.4	68.3	
New L.S.D. at 5%	A 0.3	B 0.3	AB 0.6			A 0.3	B 0.3	AB 0.6		
Character	Total acidity %									
a ₁ 100% inorganic N	0.393	0.349	0.369	0.311	0.356	0.390	0.356	0.366	0.318	0.358
a ₂ 80 % inorganic + 10 organic + 10% bio.	0.371	0.320	0.351	0.299	0.335	0.378	0.327	0.358	0.306	0.342
a ₃ 60 % inorganic + 20 organic + 20% bio.	0.348	0.300	0.320	0.281	0.312	0.355	0.307	0.327	0.288	0.319
a ₄ 30 % inorganic + 30 organic + 30% bio.	0.320	0.271	0.299	0.251	0.285	0.327	0.278	0.306	0.288	0.300
Mean (B)	0.358	0.310	0.335	0.286		0.363	0.317	0.340	0.300	
New L.S.D. at 5%	A 0.019	B 0.018	AB 0.036			A 0.020	B 0.020	AB 0.040		

Table (17): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the percentages of total soluble tannins and total fibre crude in the fruits of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Total soluble tannins %									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	1.20	1.05	1.11	1.00	1.09	1.25	1.11	1.16	1.05	1.14
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.15	1.05	1.10	1.00	1.08	1.18	1.10	1.14	1.04	1.12
a ₃ 60 % inorganic + 20 organic + 20% bio.	1.10	1.00	1.05	0.95	1.03	1.14	1.05	1.10	1.00	1.07
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.05	0.91	1.00	0.86	0.96	1.10	1.00	1.05	0.89	1.01
Mean (B)	1.13	1.00	1.07	0.95		1.17	1.07	1.11	1.00	
New L.S.D. at 5%	A 0.03	B 0.03	AB 0.06			A 0.02	B 0.03	AB 0.6		
Character	Total fibre crude %									
a ₁ 100% inorganic N	1.33	1.25	1.29	1.20	1.27	1.39	1.25	1.30	1.20	1.29
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.27	1.14	1.20	1.10	1.18	1.30	1.08	1.20	1.00	1.13
a ₃ 60 % inorganic + 20 organic + 20% bio.	1.20	1.05	1.10	1.00	1.09	1.20	1.00	1.10	0.95	1.06
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.17	1.05	1.10	1.00	1.08	1.10	1.00	1.05	0.80	0.99
Mean (B)	1.24	1.12	1.17	1.08		1.25	1.08	1.16	0.99	
New L.S.D. at 5%	A 0.03	B 0.03	AB 0.06			A 0.03	B 0.03	AB 0.06		

Table (18): Effect of inorganic, organic and biofertilization as well as some antioxidant treatments on the nitrate and nitrite in the juice of Saidu date palms during 2012& 2013 seasons.

Inorganic, organic and biofertilizer treatments (A)	Nitrate in the juice (ppm)									
	2012					2013				
	Some antioxidant treatments (B)									
	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)	b ₁ Untreated	b ₂ Vit. A	b ₃ Vit. K	b ₄ Salicylic acid	Mean (A)
a ₁ 100% inorganic N	3.12	2.60	2.80	2.40	2.73	3.00	2.48	2.68	2.28	2.61
a ₂ 80 % inorganic + 10 organic + 10% bio.	2.80	2.40	2.60	2.10	2.48	2.68	2.28	2.48	1.98	2.36
a ₃ 60 % inorganic + 20 organic + 20% bio.	2.60	2.10	2.40	1.80	2.23	2.48	1.98	2.28	1.68	2.11
a ₄ 30 % inorganic + 30 organic + 30% bio.	2.40	1.80	2.10	1.62	1.98	2.28	1.68	1.98	1.50	1.86
Mean (B)	2.73	2.23	2.48	1.98		2.61	2.11	2.36	1.86	
New L.S.D. at 5%	A	B	AB			A	B	AB		
	0.11	0.12	0.24			0.11	0.10	0.20		
Character	Nitrite in the juice (ppm)									
a ₁ 100% inorganic N	1.82	1.58	1.70	1.40	1.63	1.85	1.48	1.60	1.30	1.56
a ₂ 80 % inorganic + 10 organic + 10% bio.	1.70	1.40	1.56	1.25	1.48	1.60	1.30	1.46	1.15	1.38
a ₃ 60 % inorganic + 20 organic + 20% bio.	1.58	1.20	1.38	1.11	1.32	1.48	1.10	1.28	1.01	1.22
a ₄ 30 % inorganic + 30 organic + 30% bio.	1.32	1.00	1.11	0.92	1.09	1.22	0.90	1.00	0.79	0.98
Mean (B)	1.61	1.30	1.44	1.17		1.54	1.20	1.34	1.06	
New L.S.D. at 5%	A	B	AB			A	B	AB		
	0.09	0.10	0.20			0.10	0.10	0.20		

4. Discussion:

The promoting effect of organic and biofertilization of N on fruiting of Saidu date palms might be attributed to their positive action on reducing soil pH, soil salinity and soil erosion as well as enhancing soil fertility via increasing soil aggregation, water retention, organic matter, enzymes such as nitrogenase, N fixation, activity of microorganisms, natural hormones, vitamins B, antibiotics, root development and the availability of most nutrients (Nijjar, 1985 and Kannaiyan, 2002).

The beneficial effect of vitamins on reducing the reactive oxygen species and all stresses around the palms as well as enhancing cell division, the biosynthesis of hormones and plant pigments (Oretili, 1987) could explain the present results.

The beneficial effects of salicylic acid on fruiting of Saidu date palms might be attributed to its essential role on enhancing the tolerance of plants to biotic and abiotic stresses as well as lowering the level of oxidative stress in plants which acts as a hardening process, improving the antioxidative capacity of the plant and helping to induce the synthesis of protective compounds such as polymines, enhancing photosynthesis as well as uptake and transport of nutrients and the resistance of plants to pathogens (Ding *et al.*, 2001 and Hayat and Ahmed, 2007).

These results regarding the promoting effect of organic and biofertilization on growth, yield and fruit quality of Saidu date palms are in agreement with those

obtained by Mohamed and Ragab (2004); Mohamed and Gobara (2004); Mansour *et al.*, (2004) Al-Wasfy and El- Khawaga, (2008); El- Salhy, (2008); Morsi, 2009; Ibrahiem- Zenib, (2010); Ahmed *et al.*, (2011); Ahmed –Samah and Ahmed *et al.*, (2014a) and (2014b).

The promoting effect of vitamins on growth and fruiting of Saidu date palms are in harmony with those obtained by Ragab (2004); Sayed *et al.*, (2011); Ahmed *et al.*, (2011); Ahmed *et al.*, (2013b); Hassan (2014) and Hassan- Huda (2014).

The results of Eshmawy (2010); Ahmed (2011); Abd El- Megeed (2015) and Ahmed *et al.*, (2015) emphasized the beneficial effects of using salicylic acid on fruiting of different date palm cvs.

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