

Effect of Partial Replacement of Inorganic N Fertilizer Partially By Using EM, Compost Tea and Humic Acid on Fruiting of Sakkoti Date Palms

Faissal F. Ahmed¹; Ahmed M.M.A. Akl¹; Emad A.H. El- Mamlouk² and Hamdy H.M. Saied

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

² Central Lab. For Organic Agric. Giza, Egypt

Hamdi200052005@yahoo.com

Abstract: The possibility of replacing 25 to 75% of chemical N fertilizer in Sakkoti date palm orchard partially by using EM, compost tea and humic acid each at 100 to 300 ml/ palm/ year was investigated during 2012 and 2013 seasons. Results revealed that using N via 50 to 75% besides inorganic N + 10% organic N + EM as well as compost tea or humic acid each at 100 to 200 ml/ palm/ year was very effective in stimulating the total surface area per plant, fruit retention%, yield, bunch weight as well as physical and chemical characteristics of all the fruits, relatively to using N via inorganic N form alone at 25 to 100% or when inorganic N was applied at percentages lower than 50% . The promotion was associated with using EM, compost tea and humic acid, in descending order. Using N at 25% inorganic N with or without EM, compost tea or humic acid considerably caused an adverse effects on growth and fruiting of the palms. The best results with regard to yield and fruit quality of Sakkoti date palms were obtained as a result of using N as 50% inorganic N + 10% organic N (40 kg F.Y.M)+ 200 ml/ EM / palm/ year. Nitrite and nitrate in the pulp were greatly decreased.

[Faissal F. Ahmed; Ahmed M.M.A. Akl; Emad A.H. El- Mamlou and Hamdy H.M. Saied. **Effect of Partial Replacement of Inorganic N Fertilizer Partially By Using EM, Compost Tea and Humic Acid on Fruiting of Sakkoti Date Palms.** *Stem Cell* 2014;5(2):40-51] (ISSN 1545-4570). <http://www.sciencepub.net/stem>. 5

Keywords: Sakkoti date palms; EM, compost tea, humic acid and productivity.

1.Introduction

Organic farming in agriculture is a unique production management system which promotes and enhances agro-eco system of health including biodiversity, biological cycles and soil biological activity. It has been systematically followed on a large scale in the developed countries including Egypt. (Dahama, 1999).

Using organic and biofertilization besides mineral N instead of using mineral N alone (Ibrahiem Zenib , 2010; Souna- Faiza- Faiza *et al.*, 2010; Roshdy , 2010; Saied, 2011; Mahfouz, 2011; Saad *et al.*, 2011 and Faraag, 2013), application of EM (Formowitz *et al.*, 2007; Ahmed- Samah, 2011; Roshdy *et al.*, 2011; and Refaai and Ahmed, 2013) and humic acid (Abd El- Naby, 2000 ; Osman, 2003 , Dantas *et al.*, 2007; El- Shenawi *et al.*, 2008, Fayed, 2010, Abbas *et al.*, 2013 and El- Khawaga, 2013) was accompanied with stimulating growth characters, nutrients in the leaves, yield as well as physical and chemical characteristics of the fruits.

This study was conducted to assess the different effects of using the suitable N at different sources (namely inorganic, organic and bioforms) and proportions as well as application of EM and humic acid on some vegetative growth characters, leaf chemical composition, yield, physical and chemical characters of the fruits of Sakkoti data palm. Nitrite and nitrate content of the pulp in response to application of N at different sources and proportions

as well as application of compost tea, EM and humic acid were also investigated.

2.Material and Methods

This study was conducted in the public experimental orchard of Kom Ombo Research Station, Hort. Res. Instit., Agric. Res. Center Kom Ombo district, Aswan Governorate during two consecutive seasons of 2012 and 2013 which 39 offshoots derived Sakkoti dry date palms were selected for achieving this study. The selected palms were planted at 7 x7 meters apart. The texture of the tested soil is silty clay.

The selected palms were at the same age and uniform in vigour. These palms were 22-years old at the start of this study, good physical conditions and free from insects, damages and diseases. The selected palms were irrigated through surface irrigation system. Pruning was perform to maintain leaf bunch ratio at 8: 1 (according to Sayed, 2002).

The number of female spathes per palm was adjusted to 10 spathes. Pollination was achieved by inserting five male strands into the female bunch using known high activity pollen source throughout 2-3 days after female spathe cracking.

Every bunch was bagged after inserting the male strands by paper bags (according to Hussien *et al.*, 1993 and Dammas, 1998). Before carrying out hand pollination, pollen grains viability and pollen germination were determined (Al- Tahir and Asif, 1983).

Each selected palm received the common horticultural practices that are already applied in the orchard except those dealing with inorganic, organic and biofertilization of N as well as using EM and humic acid.

Table (1): Mechanical, physical and chemical analysis of the tested orchard soil:

Characters	Values
Practical size distribution:	
Sand %	10.60
Clay %	31.40
Silt %	58.00
Texture grade	Silty clay
pH (1:2.5 extract)	8.00
E.C (1: 2.5 extract) (mmhos/ 1 cm)	0.91
Organic matter %	2.09
CaCO ₃ %	1.22
Macronutrients values	
Total N %	0.11
P(ppm, Olsen method)	20.00
K (ppm, ammonium acetate)	419.00
Mg (ppm)	79.00
S (ppm)	6.90
B(hot water extractable)	0.27
ETA extractable (ppm)	
Zn	1.31
Fe	11.00
Mn	10.18
Cu	1.60

This experiment included the following thirteen treatments:

- 1- Application of the suitable N (1000 g/ palm/ year) as 100% inorganic source (2985.0 g ammonium nitrate / palm/ year).
- 2- Application of the suitable N through 75% inorganic source (2239 g ammonium nitrate / palm/ year).
- 3- Application of the suitable N through 75% inorganic source (2239 g ammonium nitrate / palm/ year) + 10% organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 100 ml/ EM / palm/ year).
- 4- Application of the suitable N through 75% inorganic source (2239 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 100 ml compost tea (palm/ year).
- 5- Application of the suitable N through 75% inorganic source (2239 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 100 humic acid (400 ml/ humita 25% palm/ year).
- 6- Application of the suitable N through 50% inorganic source (1493 g ammonium nitrate / palm/ year) alone.
- 7- Application of the suitable N through 50% inorganic source (1493 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N)+ 200 ml EM / palm/ year.
- 8- Application of the suitable N through 50% inorganic source (1493 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 200 ml compost tea (palm/ year).
- 9- Application of the suitable N through 50% inorganic source (1493 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N)+ 200 ml humic acid (800 ml Humita 25% / palm/ year).
- 10- Application of the suitable N through 25% inorganic source (746 g ammonium nitrate / palm/ year) alone.
- 11- Application of the suitable N through 25% inorganic source (746 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 300 ml EM / palm/ year.
- 12- Application of the suitable N through 25% inorganic source (746 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N)+ 300 ml compost tea (palm/ year).
- 13- Application of the suitable N through 25% inorganic source (746 g ammonium nitrate / palm/ year) + 10 % organic N (40 kg. F.Y.M./ palm/ year, 0.25 % N) + 300 ml humic acid (1200 ml / palm/ year).

Each treatment was replicated three times one Sakkoti date palm per each. Inorganic N source in the source of ammonium nitrate was applied. It was splitted into three equal batches and applied at the first week of March, May and July for the two consecutive seasons. Organic N fertilizer namely farmyard manure (0.25 % N, 1.0 % K₂O and 0.55 P₂O₅) was added once at the first week of Jan during 2012 and 2013 seasons. Compost tea (Table 2) at 100-300 ml/ palm was added once at the first week of March(growth start stage). The fresh EM (each ml contains 10⁷ bacterial cells) at 100 to 300 ml/ palm/ year) was also added once at the first week of March. Humic acid in the form of Humita 25(25% humic acid) at 100 to 300 ml/ palm/ year (i.e. 400 , 800, 1200 ml humita 25))was added once at the growth start (1st week of March (Table 3). All palms received N at fixed rate namely 1000 g. N / palm / year (Saied, 2011). Tea compost was prepared by weighing 10 kg compost + 750 g. molase + 10.0g sodium chloride + 55.0 g magnesium sulphate per 100 liters water and left stand for three days. Then, the

mixture was continuously agitated and was used in the fourth day (according to **Ryan 2003**). Randomized complete block design was followed.

Table (2): Analysis of Compost Tea

Parameters	Values
pH	8.57
Ec (ds/m)	7.42
Total N ppm	227.0
Total P ppm	23.0
Total K ppm	16.0
Total Ca ppm	14.0
Total Mg ppm	7.0
Total Fe ppm	132.0
Total Mn ppm	23.0
Total Zn ppm	15.0
Total Cu ppm	17.0

Table (3) : Analysis of Humite 25 %

Parameters	Values
Humic acid	25.0
N %	1.0
P ₂ O ₅ %	4.0
K ₂ O %	6.0
Chelated Fe (ppm)	2400.0
Chelated Zn (ppm)	1200.0
Chelated MN (ppm)	600.0
Chelated Cu (ppm)	200.0
Chelated B (ppm)	150.0
Chelated Mo (ppm)	15.0
Falvic acid %	4.0
Humic acids %	10.0
Amino acids %	10.0
Denisty acids %	1.2
pH	7.0

During both seasons, total surface area of palm (**Ahmed and Morsy, 1999**), leaf content of N, P and K (according to **Summer, 1985** and **Wilde et al., 1985**), fruit retention %, yield / palm (kg.), bunch weight (kg.), fruit weight (g.), T.S.S. %, total, reducing and non- reducing sugars %, total acidity % as malic acid, crude fibre % (**A.O.A.C., 2000**), soluble tannins % (**Balbaa, 1981**), nitrite and nitrate (as ppm) (**Ridnour – Lisa et al., 2000**).

Statistical analysis was done using new L.D.S. at 5% for differentiate among various treatment means (according to **Mead et al., 1993**).

3. Results and Discussion

1-Total surface area of palm:

It is clear from the data in Table (4) that application of the suitable N (1000 g N / palm/ year) through 50 to 75% inorganic N besides F.Y.M. and any one of EM, compost tea and humic acid each at 100 to 200 ml/ palm/ year significantly was followed by stimulating the total surface area of palm comparing to using inorganic N at 25 to 100 without organic and biofertilization or when inorganic N was applied at percentage lower than 50% even with the application of F.Y.M., EM, compost tea or humic acid each at 300 ml/ palm/ year. A significant reduction on the leaf area per palm was observed when inorganic N fertilizer percentages were lowered than 50% of the suitable N even with the application of F.Y.M. and any one of the three biostimulants. Reducing percentages of inorganic N fertilizer from 100 to 50% and increasing the levels of EM, compost tea and humic acid from 0.0 to 200 ml/ plant/ year significantly was accompanied with a gradual stimulation on such growth character. The promotion on the leaf area of the whole palm was significantly associated with using EM₁, compost tea or humic acid, in descending order. The maximum values of total surface area of palm (301, 233 and 317 m²) during the three seasons, respectively were recorded on the palms that receive N as 50% inorganic + 10% organic N. + E.M. at 200 ml, palm/ year. The lowest values (166, 172.0 and 177 (m²) were recorded on the palms that fertilized with N via 25% inorganic + unfertilization with F.Y.M. as well as E.M, compost tea and humic acid during 2012 and 2013 seasons, respectively, These results were true during the two investigated seasons.

2- Percentages of N, P and K in the leaves:

It is evident from the data in Tables (4 & 5) that N in the leaves was significantly enhanced in the palms treated with N completely via inorganic form in relative to the other N management treatments. Using EM with inorganic N + 10% organic N. was significantly favourable than using compost tea or humic acid in enhancing N in the leaves. The maximum values of N was recorded on the palms that fertilized with N completely via inorganic form. Both P and K in the leaves were significantly enhanced in response to application of N through inorganic N at 25 to 75% + 10 % organic N. + any one of the three biostimulants (EM, compost tea or humic acid) relatively to using N completely via inorganic N. Using EM at 100 to 300 ml / palm / year surpassed the application of both compost tea and humic acid in this respect. The promotion on such two elements (P and K) was significantly associated with reducing percentages of inorganic N from 100 to 25% and at the same time increasing the levels of EM, compost tea and humic acid from 100 to 300 ml/ palm/ year. The maximum values of P (0.30 and 0.31 %) and K

(1.77 and 2.00 %) during the two seasons, respectively were observed on the palms that fertilized with N via 25% inorganic + 10% organic N. + EM at 300 ml/ palm/ year. Treating the palms with N as 100 % inorganic N gave the lowered values of *P* (0.12 and 0.12%) and *K* (1.09 and 1.11 %) during both seasons, respectively. These results were true during both seasons.

3- Fruit retention %, yield per palm and bunch weight:

Data listed in Tables (5 & 6) reveal that fertilizing of the palms with N via 50 to 75 % inorganic + 10 % organic N besides EM, compost tea or humic acid each at 100 to 200 ml/ palm/ year significantly was responsible for promoting fruit retention %, yield per palm and bunch weight comparing with using inorganic N alone or when inorganic N was applied at percentages lower than 50% even with the application of 10% organic N. and any one of the three biostimulants each at 300 ml/ palm/ year. Application of EM, compost tea and humic acid besides inorganic and organic fertilization, in descending order was significantly favourable in enhancing fruit retention %, yield per palm and bunch weight. A significant reduction on these parameters was noticed with reducing inorganic N percentages from 50 to 25% even with using organic and biofertilization. Supplying Sakkoti date palms with N via 50% inorganic N + 10 % organic N. + EM at 200 ml/ palm/ year gave the maximum fruit retention (49.9

and 41.1 %), yield per palm (126.0 and 127 kg) and bunch weight (12.6 and 127. kg) during both seasons, respectively. The minimum values of fruit retention (29.9 and 30.1 %), yield per palm (81.0 and 83.0 kg) and bunch weight (8.1 and 8.3 kg) were observed on the palms that fertilized with N via 25% inorganic alone. These results were tree during both seasons.

4- Fruit quality:

It is obvious from the data in Tables (6 to 9) that fruit quality of Sakkoti date palms was significantly improved with using N via inorganic at 25% to 75% + 10 % organic N. besides EM, compost tea and humic acid each at 10 to 300 ml/ palm/ year relatively to using N via 25 to 100% inorganic without organic and biofertilization in terms of increasing fruit weight , T.S.S. % , total , reducing and non reducing sugars % and decreasing total acidity %, total soluble tannins %, fibre crude %, nitrite and nitrate in the pulp . The promotion on fruit quality was significantly associated with decreasing the percentages of inorganic N from 100 to 25% and at the same time increasing the levels of EM, compost tea and humic acid from 0.0 to 300 ml/ palm/ year. Using EM was significantly favourable than application of compost tea and humic acid in this respect. The best results were recorded on the palms that treated with N via 25% inorganic + 10% organic N. + EM at 300 ml/ palm/ year. Treating the palms with N via 100 % inorganic gave unfavourable effects on fruit quality. These results were true during both seasons.

Table (4): Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on Total surface area of palm (m²), Leaf N and P (as %) of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Total surface area of palm (m ²)		Leaf N %		Leaf P %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	209	217	2.40	2.43	0.12	0.12
2- Using N as 75% inorganic N alone	220	232	2.09	1.99	0.14	0.15
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	250	256	2.33	2.25	0.18	0.19
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	240	246	2.25	2.16	0.17	0.18
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	229	236	2.18	2.08	0.16	0.17
6- Using N as 50 % inorganic N alone	260	266	1.80	1.75	0.20	0.21
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	301	293	2.00	1.88	0.24	0.25
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	286	287	1.93	1.80	0.23	0.24
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	270	276	1.86	1.73	0.22	0.23
10- Using N as 25 % inorganic N alone	166	172	1.50	1.47	0.25	0.26
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	192	200	1.73	1.68	0.30	0.31
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	182	189	1.65	1.61	0.28	0.29
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	173	179	1.57	1.54	0.26	0.27
New L.S.D. at 5%	8.1	7.9	0.06	0.07	0.02	0.02

Table (5) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the leaf K,(as %) Fruit retention % and yield per palm (kg.) of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Leaf K %		Fruit retention %		Yield per palm (kg.)	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	1.09	1.11	34.3	34.5	101.0	102.0
2- Using N as 75% inorganic N alone	1.16	1.18	35.5	35.5	106.0	107.0
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	1.34	1.36	38.0	38.3	115.0	115.0
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	1.28	1.30	36.9	37.0	114.0	115.0
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	1.23	1.25	36.0	36.1	110.0	111.0
6- Using N as 50 % inorganic N alone	1.41	1.43	39.0	39.2	119.0	120.0
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	1.56	1.59	40.9	41.1	126.0	127.0
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	1.51	1.54	40.1	40.1	125.0	126.0
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	1.46	1.49	39.5	39.6	121.0	125.0
10- Using N as 25 % inorganic N alone	1.61	1.64	29.9	30.1	81.0	83.0
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	1.77	2.00	33.1	33.1	95.0	97.0
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	1.72	1.75	32.0	32.1	90.0	92.0
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	1.66	1.69	31.0	31.2	85.0	87.0
New L.S.D. at 5%	0.05	0.04	0.5	0.5	0.9	1.0

Table (6) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on bunch weight (kg.), fruit weight (g.) and T.S.S. % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Bunch weight (kg.)		Fruit weight (g.)		T.S.S. %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	10.1	10.2	9.36	9.40	68.0	68.2
2- Using N as 75% inorganic N alone	10.6	10.7	9.35	9.38	68.7	69.0
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	11.5	11.5	9.81	9.85	70.4	70.5
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	11.4	11.5	9.65	9.71	70.0	70.0
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	11.0	11.1	9.50	9.55	69.3	69.5
6- Using N as 50 % inorganic N alone	11.9	12.0	9.20	9.25	70.5	70.6
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	12.6	12.7	10.25	10.30	72.0	72.1
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	12.5	12.6	10.12	10.17	71.6	71.7
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	12.1	12.5	10.00	10.05	71.0	71.0
10- Using N as 25 % inorganic N alone	8.1	8.3	9.07	9.12	73.0	73.3
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	9.5	9.7	10.80	10.85	75.0	75.3
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	9.0	9.2	10.65	10.70	74.5	74.6
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	8.5	8.7	10.41	10.47	74.0	74.1
New L.S.D. at 5%	0.4	0.5	0.12	0.11	0.4	0.5

Table (7) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the total sugars %, reducing sugars % and non- reducing sugars % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Total sugars %		Reducing sugars %		Non- reducing sugars %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	61.9	62.0	12.2	12.2	49.7	49.8
2- Using N as 75% inorganic N alone	62.5	62.7	12.6	12.5	49.9	50.2
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	64.5	64.7	13.6	13.7	50.9	51.0
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	63.7	64.0	13.2	13.3	50.5	50.7
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	63.1	63.2	12.9	13.0	50.2	50.2
6- Using N as 50 % inorganic N alone	65.5	65.7	14.0	14.0	51.5	51.7
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	67.5	67.7	15.0	15.1	52.5	52.6
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	66.7	66.9	14.6	14.6	52.1	52.3
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	66.1	66.3	14.3	14.5	51.8	51.8
10- Using N as 25 % inorganic N alone	68.5	68.7	15.3	15.3	53.2	53.4
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	70.7	71.0	15.9	16.0	54.8	55.0
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	70.0	70.5	15.7	15.8	54.3	54.7
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	69.3	69.5	15.4	15.5	53.9	54.0
New L.S.D. at 5%	0.3	0.3	0.3	0.3	0.4	0.4

Table (8): Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the percentages of total acidity %, crude fibre % and soluble tannins % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Total acidity %		Crude fibre %		Soluble tannins %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	0.381	0.383	1.97	1.98	0.68	0.69
2- Using N as 75% inorganic N alone	0.360	0.362	1.94	1.95	0.65	0.65
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	0.300	0.302	1.81	1.82	0.57	0.56
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	0.319	0.320	1.85	1.86	0.60	0.60
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	0.339	0.341	1.90	1.91	0.63	0.64
6- Using N as 50 % inorganic N alone	0.280	0.281	1.77	1.78	0.55	0.55
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	0.239	0.241	1.60	1.60	0.47	0.47
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	0.240	0.241	1.65	1.66	0.50	0.50
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	0.260	0.262	1.71	1.71	0.53	0.54
10- Using N as 25 % inorganic N alone	0.230	0.230	1.50	1.50	0.44	0.45
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	0.202	0.205	1.30	1.30	0.37	0.37
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	0.206	0.209	1.37	1.38	0.40	0.40
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	0.210	0.212	1.45	1.46	0.42	0.43
New L.S.D. at 5%	0.020	0.018	0.02	0.02	0.02	0.02

Table (9) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on nitrite and nitrate (ppm) in the pulp of Sakkoti date palms during 2012, 2013 and 2014 seasons.

Treatment	Character	Nitrite (ppm)		Nitrate (ppm)	
		2012	2013	2012	2013
1- Using N as 100% inorganic N alone		4.99	5.00	7.11	7.21
2- Using N as 75% inorganic N alone		4.78	4.80	7.00	7.10
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm		4.11	4.12	6.88	6.98
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm		4.36	4.37	6.52	6.62
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm		4.56	4.57	6.76	6.86
6- Using N as 50 % inorganic N alone		3.90	3.91	6.77	6.78
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm		3.30	3.31	5.60	5.71
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm		3.50	3.52	6.00	6.11
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm		3.70	3.71	6.40	6.50
10- Using N as 25 % inorganic N alone		3.17	3.17	5.00	5.11
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm		2.48	2.50	3.11	3.22
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm		2.70	2.71	3.80	3.91
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm		2.92	2.92	4.11	4.21
New L.S.D. at 5%		0.20	0.18	0.11	0.09

Table (4) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on Total surface area of palm (m²), Leaf N and P (as %) of Sakkoti date palms during 2012 and 2013 seasons.

Treatment	Character	Total surface area of palm (m ²)		Leaf N %		Leaf P %	
		2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone		209	217	2.40	2.43	0.12	0.12
2- Using N as 75% inorganic N alone		220	232	2.09	1.99	0.14	0.15
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm		250	256	2.33	2.25	0.18	0.19
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm		240	246	2.25	2.16	0.17	0.18
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm		229	236	2.18	2.08	0.16	0.17
6- Using N as 50 % inorganic N alone		260	266	1.80	1.75	0.20	0.21
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm		301	293	2.00	1.88	0.24	0.25
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm		286	287	1.93	1.80	0.23	0.24
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm		270	276	1.86	1.73	0.22	0.23
10- Using N as 25 % inorganic N alone		166	172	1.50	1.47	0.25	0.26
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm		192	200	1.73	1.68	0.30	0.31
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm		182	189	1.65	1.61	0.28	0.29
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm		173	179	1.57	1.54	0.26	0.27
New L.S.D. at 5%		8.1	7.9	0.06	0.07	0.02	0.02

Table (5) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the leaf K,(as %) Fruit retention % and yield per palm (kg.) of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Leaf K %		Fruit retention %		Yield per palm (kg.)	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	1.09	1.11	34.3	34.5	101.0	102.0
2- Using N as 75% inorganic N alone	1.16	1.18	35.5	35.5	106.0	107.0
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	1.34	1.36	38.0	38.3	115.0	115.0
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	1.28	1.30	36.9	37.0	114.0	115.0
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	1.23	1.25	36.0	36.1	110.0	111.0
6- Using N as 50 % inorganic N alone	1.41	1.43	39.0	39.2	119.0	120.0
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	1.56	1.59	40.9	41.1	126.0	127.0
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	1.51	1.54	40.1	40.1	125.0	126.0
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	1.46	1.49	39.5	39.6	121.0	125.0
10- Using N as 25 % inorganic N alone	1.61	1.64	29.9	30.1	81.0	83.0
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	1.77	2.00	33.1	33.1	95.0	97.0
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	1.72	1.75	32.0	32.1	90.0	92.0
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	1.66	1.69	31.0	31.2	85.0	87.0
New L.S.D. at 5%	0.05	0.04	0.5	0.5	0.9	1.0

Table (6) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on bunch weight (kg.), fruit weight (g.) and T.S.S. % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Bunch weight (kg.)		Fruit weight (g.)		T.S.S. %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	10.1	10.2	9.36	9.40	68.0	68.2
2- Using N as 75% inorganic N alone	10.6	10.7	9.35	9.38	68.7	69.0
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	11.5	11.5	9.81	9.85	70.4	70.5
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	11.4	11.5	9.65	9.71	70.0	70.0
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	11.0	11.1	9.50	9.55	69.3	69.5
6- Using N as 50 % inorganic N alone	11.9	12.0	9.20	9.25	70.5	70.6
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	12.6	12.7	10.25	10.30	72.0	72.1
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	12.5	12.6	10.12	10.17	71.6	71.7
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	12.1	12.5	10.00	10.05	71.0	71.0
10- Using N as 25 % inorganic N alone	8.1	8.3	9.07	9.12	73.0	73.3
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	9.5	9.7	10.80	10.85	75.0	75.3
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	9.0	9.2	10.65	10.70	74.5	74.6
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	8.5	8.7	10.41	10.47	74.0	74.1
New L.S.D. at 5%	0.4	0.5	0.12	0.11	0.4	0.5

Table (7) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the total sugars %, reducing sugars % and non- reducing sugars % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Total sugars %		Reducing sugars %		Non- reducing sugars %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	61.9	62.0	12.2	12.2	49.7	49.8
2- Using N as 75% inorganic N alone	62.5	62.7	12.6	12.5	49.9	50.2
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	64.5	64.7	13.6	13.7	50.9	51.0
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	63.7	64.0	13.2	13.3	50.5	50.7
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	63.1	63.2	12.9	13.0	50.2	50.2
6- Using N as 50 % inorganic N alone	65.5	65.7	14.0	14.0	51.5	51.7
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	67.5	67.7	15.0	15.1	52.5	52.6
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	66.7	66.9	14.6	14.6	52.1	52.3
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	66.1	66.3	14.3	14.5	51.8	51.8
10- Using N as 25 % inorganic N alone	68.5	68.7	15.3	15.3	53.2	53.4
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	70.7	71.0	15.9	16.0	54.8	55.0
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	70.0	70.5	15.7	15.8	54.3	54.7
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	69.3	69.5	15.4	15.5	53.9	54.0
New L.S.D. at 5%	0.3	0.3	0.3	0.3	0.4	0.4

Table (8) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on the percentages of total acidity %, crude fibre % and soluble tannins % in the fruits of Sakkoti date palms during 2012 and 2013 seasons.

Character Treatment	Total acidity %		Crude fibre %		Soluble tannins %	
	2012	2013	2012	2013	2012	2013
1- Using N as 100% inorganic N alone	0.381	0.383	1.97	1.98	0.68	0.69
2- Using N as 75% inorganic N alone	0.360	0.362	1.94	1.95	0.65	0.65
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm	0.300	0.302	1.81	1.82	0.57	0.56
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm	0.319	0.320	1.85	1.86	0.60	0.60
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm	0.339	0.341	1.90	1.91	0.63	0.64
6- Using N as 50 % inorganic N alone	0.280	0.281	1.77	1.78	0.55	0.55
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm	0.239	0.241	1.60	1.60	0.47	0.47
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm	0.240	0.241	1.65	1.66	0.50	0.50
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm	0.260	0.262	1.71	1.71	0.53	0.54
10- Using N as 25 % inorganic N alone	0.230	0.230	1.50	1.50	0.44	0.45
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm	0.202	0.205	1.30	1.30	0.37	0.37
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm	0.206	0.209	1.37	1.38	0.40	0.40
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm	0.210	0.212	1.45	1.46	0.42	0.43
New L.S.D. at 5%	0.020	0.018	0.02	0.02	0.02	0.02

Table (9) : Influence of replacing inorganic N fertilizer partially by application of EM₁, compost Tea and Humic acid on nitrite and nitrate (ppm) in the pulp of Sakkoti date palms during 2012, 2013 and 2014 seasons.

Treatment	Character	Nitrite (ppm)		Nitrate (ppm)	
		2012	2013	2012	2013
1- Using N as 100% inorganic N alone		4.99	5.00	7.11	7.21
2- Using N as 75% inorganic N alone		4.78	4.80	7.00	7.10
3- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml EM ₁ / palm		4.11	4.12	6.88	6.98
4- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml compost tea / palm		4.36	4.37	6.52	6.62
5- Using N as 75% inorganic N + 10% organic N (F.Y.M.) + 100 ml Humic acid / palm		4.56	4.57	6.76	6.86
6- Using N as 50 % inorganic N alone		3.90	3.91	6.77	6.78
7- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml EM ₁ / palm		3.30	3.31	5.60	5.71
8- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml compost tea / palm		3.50	3.52	6.00	6.11
9- Using N as 50 % inorganic N + 10% organic N (F.Y.M.) + 200 ml Humic acid / palm		3.70	3.71	6.40	6.50
10- Using N as 25 % inorganic N alone		3.17	3.17	5.00	5.11
11- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml EM ₁ / palm		2.48	2.50	3.11	3.22
12- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml compost tea / palm		2.70	2.71	3.80	3.91
13- Using N as 25 % inorganic N + 10% organic N (F.Y.M.) + 300 ml Humic acid / palm		2.92	2.92	4.11	4.21
New L.S.D. at 5%		0.20	0.18	0.11	0.09

4. Discussion

The previous positive action of EM, organic manures and humic acid on growth and fruiting of Sakkoti promoting date palms was mainly attributed to the essential roles of EM (Effective microorganisms), organic fertilizers and humic acid in reducing the problems of salinity, soil pH, leaching process and soil erosion and enhancing the production of growth promoting substances i.e. IAA, GA₃ and cytokinins, root development, nutrients availability and uptake, soil organic matter, microbial activity, soil aggregation and aeration, permeability of soil, water holding capacity, nutrient transport, photosynthesis process fixation of N, antibiotics biosynthesis, water use efficiency, vitamins B, solubility of most nutrients, soil workability and resistant to drought (Wani and Lee, 1995; Vercesi, 2000 and Chen *et al.*, 2004).

Previous studies showed that using all sources of N (Ibrahiem – Zenib 2010, Souna- Faiza *et al.*, 2010; Roshdy 2010; Saied, 2011; Mahfouz 2011; Saad *et al.*, 2011 and Faraag, 2013 and EM Ahmed-Samah 2011; Roshdy *et al.*, 2011 and Refaai and Ahmed 2013 and humic acid Dantas *et al.*, 2007; Fayed, 2010; El- Khawaga, 2013; Abbas *et al.*, 2013 and Haggag- Laila *et al.*, 2013) was very effective in improving growth, yield as well as physical and chemical characteristics of the fruits.

Conclusion:

Supplying Sakkoti date palms with the suitable N (1000 g M / palm/ year) via 50 % inorganic + 10 % organic N + EM at 200 ml / palm/ year is suggested to be beneficial for promoting yield and fruit quality, replacing 50 % of the mineral N fertilizer and reducing pollution of fruits with nitrite and nitrate .

References

- Abbas, T.; Ahmed, S.; Ashraf, M. ; Shaid, M.A.; Yasin, M.; Balal, R.M.; Pervez, M.A. and Abbas- Sumaira. (2013): Effect of humic acid application at different growth stages of kinnow mandarin (*Citrus reticulata* blanco) on the basis of physio-biochemical and reproductive responses. *Academia, J. of Bio.* 1(1): 14-20.
- Abd El- Naby, S. K. M. (2000): Effect of banana compost as organic manure on growth, nutritional status, yield and fruit quality of Maghrabi banana. *Assiut J. of Agric. Sci.*, (3): 101-114.
- Ahmed, F. F. and Morsy, M. H. (1999): A new method for measuring leaf area in different fruit crops. *Minia J. of Agric. Res. & Develop.* Vol. (19) pp. 97-105.
- Ahmed- Samah, O. O. (2011): Effect of yeast and effective microorganisms (EM) application on yield and fruit characteristics of Bartamuda date palm under Aswan climatic conditions. M.

- Sc. Thesis, Fac. of Agric. Assiut Univ., Egypt
- Al-Tahir, O.A. and Asif, M.I. (1983):** Study of variation and date pollen material. Proc. of the 1th Symp. on the Date Palm in Saudi Arabia, King Faissal Univ. pp. 62-66.
- Association of Official Agricultural Chemists, (2000):** Official Methods of Analysis 17th ed. (A. O. A. C.) Benjamin Franklin Station, Washington D. E. U.S.A., pp. 490 – 510.
- Balhaa, S. I. (1981):** Chemistry of Drugs. Laboratory Manual. Cairo Univ. Chapter 6: 127-132.
- Chen, Y.; Magen, H. and Rio, J. (1994)** Humic substances originating from rapidly decomposing organic matter. Proc. Int. Meet. 6th Sep. 1992: 427- 443. (Chem. Abst. 121:229).
- Dahama, A. K. (1999):** Organic Farming for Sustainable Agriculture Agro, Botanica, Daryagun, New Delhi, India, P. 258.
- Dammas, M. O. (1998):** Fruit growth and receptivity of pistillate flowers pollination in two date palm cultivars (*Phoenix dactylifera* L.). M. Sc. Thesis, Fac. of Meteorology, Environment and Arid land Agri. King Abdel Aziz Univ., pp. 50 - 57.
- Dantas, B.F.; Pereira, M.S.; Ribeiro, L.D.; Irajnomala, J.L. ; Bassoi, L. (2007):** Effect of humic substances and weather conditions on leaf biochemical changes of fertigated guava tree, during orchard establishment. Rev. Bras. Frutic, Jaboticalal- sp. V. 29.n. 3 p. 632-638.
- El- Khawaga, A.S. (2013):** Effect of anti- salinity agents on growth and fruiting of different date palm cultivars. Asian Journal of Crop. Science Vol. 5 Issue 1 p. 65-80.
- El- Shenawi, M.R.; Ali, H.S. and Mohamed, B.A.F. (2008):** Response of Grandnain banana to humic acid potassium and magnesium fertilization. Alex. Sci. Exchange J., 29:244-251.
- Faraag, M.H.A. (2013):** Reducing the amount of chemical fertilization partially by using organic and biofertilization in Balady mandarin orchards. M. Sc. Fac. of Agric. Minia Univ. Egypt.
- Fayed, T.A. (2010):** Optimizing yield, fruit quality and nutrition status of Roghiani Olives grown in Libya using some organic extracts. J of Hort. Sci. Orna. Plantrs (2): 632-78.
- Formowitz, B.; Elango, F.; Okamoto, S.; Willer, T. and Buerert, A. (2007):** The role of effective microorganisms in the composting of banana (*Musa spp.*) residues. J. of Plant Nutrition and Soil Sci., 170: Issue 5 pp 649 – 656.
- Haggag- Laila, F. ; Shahin, M.F.M.; Afifi-Maha, Mahdy, H.A. and El- Hady- Eman, S.(2013):** Studies on the effect of vinase, amino acids and humic acid substances as soil applications on fruit quality and quantity of Aggizi olive trees. J. of Applied Sci Res. 9(3): 1635-1641.
- Hussein, F.; El- Kholy, M. H. and Abo Said Ahmed, T.A. (1993):** Organic-chemical constituents of some Egyptian dry date cultivars grown at Aswan. Zagazig J. Agric. Res. 20 (4): 1313-1321.
- Ibrahiem- Zenib, A. (2010):** Fertilization of date palm Amhat cv. grown in new reclaimed land by organic and inorganic nitrogen sources. The sixth Inter. Conf. of Sustain. Agric. and Develop. Fac. of Agric., Fayourn Univ. 27-29 Dec., 2010.
- Mahfouz, M. S. (2011):** Partial replacement of chemical fertilizers by some organic and biofertilizers in Williams banana plants under Minia region conditions. Ph. D. Thesis Fac. of Agric. Minia Univ. Egypt. Gyp
- Mead, R.; Currnow, R. N. and Harted, A. M. (1993):** Statistical Methods in Agricultural and Experimental Biology 2nd Ed. London pp. 10-44.
- Osman, S. M. (2003):** Effect of biofertilization on fruit physical and chemical properties of Zaghoul date palm. Annals Agric. Sci. Ain Shams Univ., Cairo, 48 (1): 297-305.
- Refaai, M.M. and Ahmed, F.F. (2013):** Using of Compost enriched with some microorganism strains as a partial replacement of mineral N fertilizers in Ewaise mango orchards. World Academy of Science. Engineering and Technology 1647-1666.
- Ridnour- Lisa, A.; Sim- Juliu, E.; Michael, A.H. David, A.W.; Sean, M.M.; Carry, R.B. and Douglas, R.S. (2000):** A spectrophotometric Methods for the Direct Detection and Quantitation of Nitrite oxide, Nitrite and Nitrate in cell culture Media. Analytical Biochemistry, 281, 233- 229.
- Roshdy, Kk-A. (2010):** Effect of organic and biofertilization as a partial substitute for inorganic fertilization on fruiting of Grandnaine banana plants. Minia J. of Agric. Res. & Develop. Vol. (30) No. 1 pp 51-66.
- Roshdy, Kh. A.; Abdalla, B. M. and El-Kafrawy, A. A. (2011):** Effect of EM on productivity of Taimour mango trees. Egypt J. of Appl. Sci. Vol. 26 No. 3 pp 128 – 139.
- Ryan, M. (2003):** Compost tea production, and Benefits Rodate Institut., U.S.A., A.P. 5-10.
- Saad, Ri I.; Roshdy, Kh. A. and Abd El- Migeed-Nagwa, A. (2011):** Response of Zaghoul date palms grown under new reclaimed lands to application of organic and biofertilizers. Alex. Exch. J. Vol. 31 No. 2 pp 121- 129.
- Saied, H.H.M. (2011):** Effect of inorganic, organic and biofertilization on growth, nutritional status,

- yield and fruit quality of Sakkoti date palms. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
- Sayed, E. F.A. (2002):** The productive capacity of Sewy date palms grown under New Valley conditions in response to leaves bunch ratio. M. Sc. Thesis Fac. of Agric. Minia Univ., Egypt.
- Souna- Faiza, S.; Chafi, A.; Charroune, K.; Himri-Imane, Bouakka, M. and Hakkou, A. (2010):** Effect of mycorrhiza and compost on the growth and the protection of date palm (*Phoenix dactylifera* L.) against Bayoud disease. Amer. Eurasian J. of Sustainable Agric. 4 (2): 260-267.
- Summer, M.E. (1985):** Diagnosis and Recommendation Integrated system (DRIS) as a guide to orchard fertilization. Hort. Abst. 55(8): 7502.
- Vercesi, A. (2000):** Soil and foliar applied fertilizers in organic viticulture. In formatore. Agrario. 56(6): 83-89, Italy.
- Wani, S. P. and Lee, K. K. (1995):** Microorganisms as biological inputs for sustainable agriculture in organic agriculture, theory and practices (ed.) P.K. Thampan, Peekay Tree Crops Development Foundation, Gandhi Nagar- Cochin 682 - 220, p. 36-67.
- Wilde, S. A.; Corey, R. B.; Layer, J. G. and Voigt, G. K. (1985):** Soil and Plant Analysis for Tree Culture. Oxford, and publishing Co., New Delhi, pp. 96-106.

5/12/2014