

RESPONSE OF DATE PALM "Seewy cv." GROWN IN NEW RECLAIMED LAND TO ORGANIC AND INORGANIC NITROGEN SOURCES

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ABSTRACT

This investigation was carried out during 2006/2007 and 2007/2008 seasons to study the effects of organic fertilization either alone or combined with inorganic nitrogen fertilizer on growth, fruit set %, fruit characters, yield and leaf mineral content of date palm "Seewy cv." grown in sandy loamy soil. Organic manure was applied at 0.0, 25, 50, 75 and 100% of the recommended dose of nitrogen fertilization (1300g/ palm/year) combined with inorganic nitrogen (ammonium nitrate 33.5% N) at 100, 75, 50, 25 and 0.0%, respectively.

The obtained results showed that application of organic nitrogen alone or combined with inorganic nitrogen significantly increased pinnae area and leaf area but decreased leaf length and new leaf number per palm. Organic nitrogen increased fruit set percentage in the second season. Bunch number, bunch weight and yield per palm increased with increasing organic nitrogen level from 50% to 100% of whole nitrogen dose/palm. Organic manure increased fruit weight, fruit size, dry matter percentage, total sugars, reducing sugars and total soluble solids. Total acidity and tannis were decreased by application of organic nitrogen. Results also revealed that organic manure increased N, P, K, Mg, Ca, Fe, Zn and Mn in pinnae content.

Finally, it is concluded that replacing 75% of nitrogen requirements for Seewy date palms grown in sandy loamy soil by organic manure added once at winter season was very useful in improving growth nutritional status of palms. In addition, this treatments gave high yield with good fruit quality as well as minimize the production cost and environment pollution which occurred by chemical fertilizers.

Key word: organic fertilization - inorganic fertilization – growth - fruit set- yield and fruit quality - date palms - sandy soil

INTRODUCTION

Date palm (*Phoenix dactylifera*, L.) is an important fruit crop in the old lands as well as in the new reclaimed regions of Egypt. The number of fruitful female palms in 2007 attained 12.039 million palms produced 1.314 million tons dates. In Fayoum Governorate the number of fruitful female palms were 599254 produced 52934 tons dates, from which "Seewy" cv. were 24892 palms produced 2608.54 tons dates (according to **Annals of Agricultural Economics, A.R.E., 2007**).

The nutritional value of dates for human being is high. Dates are rich in many minerals such as potassium and calcium and contain a moderate amounts of copper, magnesium, phosphorus and sulphur (**Nixon and Carpenter, 1978**) as well as some vitamins (**Yousif et al., 1982**). Also, many parts of date palm tree are useful for feeding livestock and animal or mixed with other forage fodder crops (**Nour and Tag El-Din 1993**).

The recent investigations demonstrated that the different sources of organic and inorganic nitrogen fertilizers caused a significant increase concerning tree growth and yield of date palms (**Melouk et al., 1999a and Melouk, 1999b**). Application of organic manure minimizes the loss of nutrients by leaching (**Balba, 1973**) and considered as an important source of essential nutrients for plant growth (**Yagodin,**

1984). Also, the addition of organic manure to soil not only increased the organic matter but also raised the available phosphorus and exchangeable potassium, calcium and magnesium content (Bhangoo *et. al.* 1988). Applying a constant amount of nitrogen (1350 gm/palm/year) from different forms of organic or/and inorganic nitrogen fertilizers to Zaghoul and Samany date palm cultivars showed that, in general, Zaghoul pinnae contained higher concentrations of P, Fe and Zn and lower concentrations of N and Ca as compared with those of Samany cultivar. Also, fruits of Zaghoul cultivar contained higher content of N, Mg, Zn and Mn and lower content of P, K, Ca, Fe and Cu than those of Samany cultivar. Fertilizing with urea or ammonium nitrate increased pinnae and fruit content of nitrogen while some organic manure alone or combined with artificial fertilizers decreased it in pinnae and fruits. Additionally, chicken manure alone increased P concentration in pinnae and K concentration in fruits and decreased fruit content of Fe. The correlation coefficients within pinnae mineral content were positive between Zn in one side and K (in both cultivars), Ca and P in Zaghoul cultivar in the other side (Attalla *et. al.*, 2003).

Applied organic manure treatments resulted in positive variations in the parameters of vegetative growth number of annual new leaves and the increase in palm height of the studied date palm (Seewy cv.) as well as in fruit weight, size and dry matter, total sugars, reducing sugars and yield (Aziz Nagat, 2007). Replacing 60-80% of nitrogen requirement for Zaghoul date palm by organic manure improved growth and nutritional statuses of palm as well as yield and dates quality and reduced the environmental pollution problems (El-Wasfy and El-Khawaga, 2008).

The goal of the present investigation was to study the effect of organic, inorganic nitrogen sources and the combinations between them on the vegetative growth, flower set, average mineral content of pinnae and fruit quality of "Seewy" date palms at the end of Khalal stage (harvest date).

MATERIALS AND METHODS

This investigation was under taken during 2006/2007 and 2007/2008 growing seasons on 12 years old "Seewy" date palm to study the effect of inorganic and organic nitrogen fertilizers (Ammonium nitrate 33.5% N and chicken manure). The palm trees were uniform as possible in growth and vigor, and subjected to the same cultural practices commonly adopted in the orchard and irrigated by Nile water as flood irrigation. The trees were planted at 6×6 m apart and grown on a loamy sand soil (new reclaimed lands) at the experimental farm of the Fac. of Agric. at Demo, Fayoum, Egypt.

Other horticultural management such as irrigation, pruning, artificial pollination (pollen grains were taken from only one male palm tree) in the first and second seasons and pest control was carried out as usual. The physical and chemical characteristics of the soil and chemical analysis of organic fertilizer (chicken manure) are shown in Tables (1 & 2).

The treatments were applied in complete randomized design. Three palms were assigned for each treatment and one palm was considered as one replicate.

Phosphorus and potassium fertilizers were applied in the form of calcium super phosphate (37.5% P₂O₅) and potassium sulphate (48% K₂SO₄) for all treatments at the rates of 0.85 and 0.9 kg /tree /year, respectively.

The experiment included five treatments representing various levels of nitrogen fertilization (inorganic and organic). All palm trees were under the same recommended N level of 1300 g/palm/year as shown in Table (3).

The treatments were as follows.

- 1- Nitrogen 100% mineral (control)
- 2- Nitrogen 75% mineral + 25% organic

3- Nitrogen 50% mineral + 50% organic

4- Nitrogen 25% mineral + 75% organic

5- Nitrogen 100 % organic

Table (1) Physical and chemical characteristics of the soil.

Depth	Physical characteristics									
	Particle size distribution				Texture	Bulk density g/cm ³	Organic mater %	Soil moisture constant %		
	Coarse sand%	Fine sand %	Silt %	Clay %				F. C	W.P	A.W
0-30	55.14	28.99	8.21	7.66	Loamy Sand	1.35	0.79	17.9	7.12	10.78
30-60	51.85	29.48	9.40	9.27		1.40	0.70	20.5	8.80	11.67
chemical characteristics										
	Soluble cations (meq/L)				pH	ECe (dS/m)	Soluble anions (meq/l)			
	Ca ⁺⁺	Mg ⁺⁺	Na ⁺	K ⁺			Cl ⁻	Hco ₃ ⁻	So ₄ ⁻	
0-30	16.56	15.42	11.63	1.29	7.50	4.49	7.87	2.70	35.24	
30-60	10.27	10.91	4.99	0.65	7.45	2.63	3.59	2.83	20.40	

Table (2) chemical analysis of organic fertilizer (chicken manure)

Organic fertilizers	O.M %	C/N ratio	C %	Macro elements					Micro elements		
				N %	P% %	K %	Ca %	Mg %	Fe ppm	Zn ppm	Mn ppm
Chicken manure	35.47	5.43	20.6	3.8	0.16	2.1	0.17	0.49	842.40	506.70	213.14

Ammonium nitrate (33.5% N) as a source of inorganic nitrogen was applied and added at three equal doses at the 1th March, 1th May and 1th July of each season.

At the last week of December, organic manure was applied (chicken manure, 3.8% N), Table (2) in holes with 70 Cm. diameter and 70 Cm. depth at a distance of 70 Cm. from the palm trunk on one side in the first season and on the opposite side in the second season (Hussein and Hussein, 1983).

The present investigation was carried out to study the effect of organic and inorganic or combined nitrogen sources on the vegetative growth, flower set average mineral content of pinnae and fruit quality of "Seewy" date palms at the end of Khalal stage (harvest date).

Table (3):The amount of nitrogen in inorganic and organic sources used in this investigation

No.	Fertilization treatment	Amount fertilization				Total nitrogen per palm (g)
		Mineral nitrogen		Organic nitrogen		
		Amount/ palm (kg)	Net N/ palm (g)	Amount/ palm (kg)	Net N/ palm (g)	
T ₁	N 100% mineral (Control)	3.88	1300	0.0	0.0	1300
T ₂	N 75% m+25% organic	2.91	975	8.55	325	1300
T ₃	N 50%+ N50% organic	1.94	650	17.1	650	1300
T ₄	N 25%+ N75% organic	0.97	325	25.65	975	1300
T ₅	N 100 % Organic	0	0	34.21	1300	1300

1-Vegetative growth:

Average number of newly growing leaves was counted at the end of each season. Five mature leaves around fruiting zone were chosen on each palm to determine leaf length (m), number of pinnae, number of spines. Ten pinnae were taken from the

middle part of each leaf to determine pinnae area according to Shabana and Antoun (1980) using the following equation:

$$\text{Pinna area (cm}^2\text{)} = \text{Length} \times \text{maximum width} \times 0.84$$

The whole leaf area (m²) was obtained from multiplying the pinnae area by the number of pinnae/leaf.

2- Fruit set %

The number of set fruits per strand was counted using 10 randomly strands per spathe of each palm after thirty days from pollination.

The percentage of fruit set for each spathe was counted using the following equation as cited from Abd El- Rawy (2001).

$$\text{Fruit set \%} = \frac{\text{Av. number of set fruits per strand}}{\text{Av. number of set fruit per strand} + \text{Av. number of flower scars}}$$

The average fruit set % of each palm was calculated.

3- Fruit characters:

Samples of 90 fruits per palm were collected randomly at harvest to determine the physical properties of the fruits. Fruit weight (gm), fruit size (cm³), dry matter (%) and flesh percentage were determined and the average of each property was calculated.

4- Chemical characteristics of fruits:

Dry matter percentage, total sugars, reducing sugars, (g/100g dry wt.), total soluble solids (T.S.S.), and acidity content of the juice were determined according to the methods outlined in the (A.O.A.C. (1990).

5- Tannins content:

The official method described by Winton & Winton (1958) was used. Indigo carmine solution was the indicator and titration was carried out using 0.1N of potassium permanganate. Tannins content was calculated as gm. tannins per 100 gm. fresh weight according to the following equation: 1 ml. oxalic acid (0.1N) = 0.00416 gm. tannins.

6- Yield

All bunches of each palm in both seasons were harvested at full colour stage (khalal). The harvested bunches of each palm were weighed to determine the yield (kg) / palm.

7- Leaf mineral content:

To determine leaf mineral content (N, P, K, Ca, Mg, Fe, Zn and Mn), twenty five pinnae (as a sample) from each replicate were collected at mid-November of both seasons as described by (Rizk, 1987). Total nitrogen was determined colorimetrically according to (Evanhuis, 1976), whereas potassium was determined by Flamephotometer. Phosphorus, calcium, magnesium, iron, zinc and manganese were determined by Perkin Elmer Atomic Absorption Spectrophotometer No. 305B. The concentrations of N, P, K, Ca and Mg were expressed as percent, while Fe, Zn and Mn were expressed as parts per million (on dry weight basis).

The proper statistical analysis randomized complete block design was carried out according to the methods outlined by Snedecor and Cochran (1980) using L.S.D. test for distinguishing treatment means.

RESULTS AND DISCUSSION

1- Effect of fertilization treatments on vegetative growth

The effects of organic and inorganic fertilization on some vegetative growth characters of "Seewy" date palms during 2006/2007 and 2007/2008 seasons are shown in Table (4). Data indicated that treatments of 25% mineral nitrogen + 75% organic nitrogen (T₄) and 100% organic nitrogen (T₅) significantly decreased new leaf number per palm in the second season. Also, significant decreases of leaf length and pinnae number were observed when applied treatments of combined inorganic and organic nitrogen (T₂, T₃, T₄ and T₅) in the two successive seasons. Contrarily, significant increases in pinnae area and leaf area were obtained by treatments (T₂, T₃, T₄ and T₅) compared with the control (100% inorganic nitrogen) in the two seasons. Such findings concerning using organic-N fertilizer may be mainly attributed to its positive action on increasing the activity of microflora, water holding capacity, soil acidity, soil humus content and the availability of most macro and micro nutrients. Moreover, they can provide most nutrients to palms along the whole growth season. Such improving and stimulation lead to enhancing the biosynthesis of organic foods and cell division (Nijjar, 1985).

These results are in agreement with those obtained by Ghafoor and Gopan (1988), Abdel-Hamed and Ragab (2004), Mohamed and Gobara (2004), Mansour *et al.* (2004), Diab (2006). Aziz, Nagat (2007) who found that applying organic manure resulted in positive variations in the parameters of vegetative growth of "Seewy" date palm. Moreover, El-Wasfy and El-Khawaga (2008) reported positive vegetative growth response of Zaghoul date palm cultivar to the annual application of organic fertilizers.

Table (4): Effect of inorganic and organic fertilization treatments on the vegetative growth of date palm (Seewy cv.) in 2007 and 2008 seasons.

No.	Treatments	No. Leaf/palm year		Leaf length (cm.)		No. Pinnae /leaf		Pinnae area (cm. ²)		Leaf Area (m. ²)	
		2007	2008	2007	2008	2007	2008	2008	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	23.74	24.84	516.67	534.43	237.15	241.22	138.62	151.2	3.27	3.51
(T ₂)	75% mineral nitrogen + 25% organic nitrogen	22.63	23.83	493.066	506.74	225.55	233.69	156.73	175.99	3.71	3.97
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	22.05	24.30	480.156	485.95	232.40	231.47	167.49	184.39	3.82	4.25
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	22.41	22.84	486.92	497.97	227.40	240.45	178.65	181.5	3.77	4.29
(T ₅)	100 % organic nitrogen	22.24	21.13	480.336	487.79	221.51	233.32	181.35	179.35	4.12	3.95
	L.S.D 0.05	N.S	1.30	4.05	8.37	2.76	1.94	1.63	1.49	0.05	0.21

2- Effect of fertilization treatments on fruit set. %, bunch traits and yield:

Data in Table (5) showed that fruit set % significantly increased by fertilization treatment of 50% mineral nitrogen + 50% organic nitrogen (T₃), 25% mineral nitrogen + 75% organic nitrogen (T₄) and 100% organic nitrogen (T₅) in the second season. Meanwhile, results of the first season showed no significant differences between the effect of all treatments in this respect. (T₅) and (T₄) recorded high percent of fruit set (92.94 % and 93.32) in the second season.

A significant promotion on bunch number, bunch weight and yield per palm occurred with increasing organic nitrogen level from 50% to 100% (T₃ to T₅)

compared to nitrogen application of 100% inorganic (T1) and 75% inorganic + 25% organic (T2) in the two successive seasons 2007 and 2008 respectively (Table 5).

Fertilization of "Seewy" date palm by 25% mineral nitrogen + 75% organic nitrogen (T4) recorded the best results for bunch number (13.30 & 13.65), bunch weight (9.29 kg & 9.35 kg) and yield (122.32 kg & 127.65 kg) per palm.

The increase in yield per palm could be attributed to the effect of organic manure on increasing the bunch number and bunch weight during the two studied seasons. In addition, the improving effect of organic manure on bunch number per palm and bunch weight could be also attributed to its vital role in improving vegetative growth of palm and nutritional status which encourage the cell division and the development of meristematic tissues and consequently improving the number of inflorescences borne (Miller *et al.*, 1990).

These results are in harmony with those obtained by Hussein *et al.* (1992), Shahein *et al.* (2003), Attalla *et al.*, (2003) on Zaghoul and Samany cultivars. El-Assar (2005) who found that yield of Zaghoul and Samany date palms seemed to be higher as a result of fertilizing with organic-N source either alone or combined with the artificial nitrogen sources. El-Wasfy and El-Khawaga (2008) reported that increasing the organic nitrogen level substantially from 12.5% to 75% of the recommended nitrogen rate was followed by a gradually improving yield and fruit quality of Zaghoul date palm growing in sandy soil.

Table (5): Effect of inorganic and organic fertilization treatments on fruit set% and yield components of date palm (Seewy cv.) in 2007 and 2008 seasons.

No.	Treatments	Fruit set.%		Bunch No./Palm		Bunch weight (Kg)		Yield/Palm (Kg)	
		2007	2008	2007	2008	2007	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	90.45	88.10	11.40	11.57	7.75	7.95	88.35	92.07
(T ₂)	75% mineral nitrogen + 25% organic nitrogen	89.13	87.42	11.24	11.79	8.09	8.22	99.12	104.11
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	88.35	91.00	12.85	12.99	8.72	9.1	112.11	118.25
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	89.47	92.94	13.3	13.65	9.29	9.35	122.32	127.65
(T ₅)	100 % organic nitrogen	90.50	93.32	12.7	12.78	9.26	9.20	120.24	125.11
	L.S.D 0.05	N.S	2.28	0.39	0.44	0.85	0.98	12.11	13.00

3- Effect of fertilization treatments on some fruit physical characteristics

Data in Table (6) indicated that supplying "Seewy" date palms with 25%, 50%, 75% and 100% organic nitrogen gave significant increase in fruit weight in 2006/2007 and 2007/2008 seasons compared with 100% inorganic nitrogen application (control).

All fertilization treatments had no significant effect on fruit size on the first season (2007), however, in the second season (2008) it increased when a mixture organic and inorganic nitrogen were used.

Data in Table (6) also shows that using 25% inorganic-N-plus 75% organic-N (T4) gave the best fruit dry matter.

Contrary, all fertilization treatments had no significant effect on flesh percentage in two successive seasons.

These results are in accordance with those obtained by Shahein *et al.* (2003), Abdel-Hamed and Ragab (2004), Mohamed and Gobara (2004), Mansour *et al.* (2004), El-Assar (2005), Diab (2006) and El-Wasfy and El-Khawaga (2008) who

reported that increasing the organic nitrogen level substantially from 60 to 100% of the recommended nitrogen rate was followed by a gradually improving of fruit quality

4- Effect of fertilization treatments on some chemical fruit qualities:

It can be concluded from data in Table (7) that using organic nitrogen either alone or in combination with an inorganic nitrogen source was significantly effective in improving fruit quality of Seewy dates in terms of increasing total sugars, reducing sugars and total soluble solids (TSS), but on the other hand, it decreased the total acidity % and tannis % compared to using inorganic nitrogen alone.

These findings may be related to the effect of organic-N on activating the synthesis of total carbohydrates and proteins which enhances cell division and enlargement leading to increase date weight and size as well as, hasten its maturation.

Such obtained results are in line with those of *Shahein et al. (2003)*, *Abdel-Hamed and Ragab (2004)*, *Mohamed and Gobara (2004)*, *Mansour et al. 2004*, *El-Assar (2005)*, *Diab (2006)* and *Aziz, Nagat (2007)* on Seewy date palm, *El-Wasfy and El-Khawaga (2008)* on "Zaghloul" date palm, who reported that increasing organic nitrogen level substantially from 60% to 100% of recommended nitrogen rate was followed by a gradual improving of fruit quality.

Table (6): Effect of inorganic and organic fertilization treatments on some fruit physical characteristics of date palm (Seewy cv.) in 2007 and 2008 seasons.

No.	Treatments	Fruit weight (g)		Fruit size (cm ³)		Dry matter%		Flesh (%)	
		2007	2008	2007	2008	2007	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	13.29	14.88	11.14	11.62	19.95	21.60	90.01	90.08
(T ₂)	75% mineral nitrogen + 25% organic nitrogen	15.70	15.55	11.52	12.82	23.86	24.86	90.15	90.64
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	16.54	16.95	11.65	13.04	24.56	25.95	90.83	90.89
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	17.85	18.34	11.95	13.69	25.54	26.12	90.88	90.91
(T ₅)	100 % organic nitrogen	16.55	17.64	12.42	14.27	25.33	26.81	91.02	91.99
	L.S.D 0.05	1.01	0.55	n.s.	1.10	2.46	2.11	n.s.	n.s.

Table (7): Effect of different fertilization treatments on some fruit chemical constituents of date palm (Seewy cv.) in 2007 and 2008 seasons.

No.	Treatments	Total sugars % (g/100g) D.W		Reducing sugars % (g/100 g) D.W		Acidity %		TSS %		Tannins (%) F.W	
		2007	2008	2007	2008	2007	2007	2008	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	35.24	37.11	24.58	24.51	0.041	0.046	41.5	47.7	0.5	0.6
(T ₂)	75% mineral nitrogen + 25% organic nitrogen	37.58	38.81	25.12	25.05	0.032	0.039	45.3	48.8	0.4	0.4
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	38.99	39.01	26.65	26.77	0.031	0.035	47	48.1	0.3	0.3
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	40.84	40.22	26.75	27.01	0.028	0.029	48.5	49.6	0.2	0.2
(T ₅)	100 % organic nitrogen	40.89	40.29	26.98	27.54	0.026	0.027	49	49.9	0.2	0.2
	L.S.D 0.05	2.46	2.11	1.56	1.60	0.002	0.002	0.64	0.81	0.1	0.1

5- Effect of fertilization treatments on pinnae macro and micro nutrients:

As for the effect of different organic and inorganic fertilization treatments on pinnae mineral content, results in Tables (8 and 9) indicated that using organic manure alone or combined with artificial fertilizer (ammonium nitrate) in 2007 and 2008 seasons, respectively had a significant effect on pinnae nitrogen, phosphorus, potassium and magnesium content than that of the most fertilized trees with ammonium nitrate alone.

These results are in agreement with those of **Abdel-Hamed and Ragab (2004)** on Seewy date palm, **El-Wasfy and El-Khawaga (2008)** on Zaghoul date palm cv. who studied the effect of different fertilization treatments on pinna nitrogen, phosphorus, potassium and magnesium content. They found that these minerals were significantly higher in case of chicken manure fertilization alone or combined with ammonium nitrate in both seasons.

Regarding the effect of fertilization treatments on pinnae calcium content, it was detected that using chicken manure alone or combined with 25% mineral nitrogen in the second season (2007/2008) had a significant higher pinnae content compared with the control (100% mineral nitrogen). However, in the first season 2006/2007, there were no significant differences in this concern.

Table (8): Effect of different fertilization treatments on pinnae content of macronutrient percentage (on dry weight basis) of Seewy date palms in 2007 and 2008 seasons.

No	Treatments	N%		P%		K%		Ca%		Mg%	
		2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	1.60	1.42	0.137	0.141	0.866	0.821	1.10	1.22	0.546	0.542
(T ₂)	75% mineral nitrogen+ 25% organic nitrogen	1.71	1.59	0.141	0.148	0.956	1.08	1.11	1.25	0.559	0.562
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	1.69	1.65	0.142	0.150	1.11	1.10	1.12	1.29	0.560	0.565
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	1.67	1.71	0.145	0.154	1.18	1.16	1.12	1.31	0.563	0.566
(T ₅)	100 % organic nitrogen	1.65	1.66	0.160	0.162	1.22	1.19	1.12	1.35	0.563	0.541
	L.S.D 0.05	0.03	0.04	0.003	0.004	0.006	0.009	N.S	0.02	0.004	0.005

As for pinnae iron content, there was a significant increase as a result of applying chicken manure plus ammonium nitrate (T₃, T₄ and T₅ in 2006/2007 and 2007/2008 seasons (Table 9). The obtained results are in agreement with those of **(Ismail, 1999)** on Hayany date palm cultivar, **Abd El-Naby et al., (2000)** on Maghrabi banana. They found that adding a organic combination of organic and inorganic fertilizers produced fruits with higher content of iron. Concerning zinc, **Attalla et al. (2003)** on Zaghoul and Samany cultivars

Concluded that, pinnae content of zinc was significantly higher in case of using chicken manure alone or combined with ammonium nitrate treatments in 2006/2007 and 2007/2008, respectively, than that in case of inorganic nitrogen fertilization alone (ammonium nitrate treatment).

The palm trees fertilized with chicken manure alone or plus ammonium nitrate had a significant higher pinnae manganese content in 2008 as compared with ammonium nitrate alone. These findings are partially in harmony with those of **Sourour et al. (1998)**, **Abdel-Nasser and Harhash (2001)** and **Attalla et al., (2003)**. They found

that the highest values of pinnae zinc and manganese content always come from adding organic plus inorganic nitrogen sources.

Table (9): Effect of different fertilization treatments on pinnae content of micronutrient (ppm) (on dry weight basis) of date palm (Seewy cv.) in 2007 and 2008 seasons.

No.	Treatments	Fe (ppm)		Zn (ppm)		Mn (ppm)	
		2007	2008	2007	2008	2007	2008
(T ₁)	100% mineral nitrogen (Control)	95	97	66.66	74.11	65	66
(T ₂)	75% mineral nitrogen + 25% organic nitrogen	96	98	67.89	75.55	64	68
(T ₃)	50% mineral nitrogen + 50% organic nitrogen	98	100	68.16	76.88	64	68
(T ₄)	25 % mineral nitrogen + 75% organic nitrogen	99	103	69.24	76.98	65	69
(T ₅)	100 % organic nitrogen	101	108	73.43	78.65	65	68
	L.S.D 0.05	2.64	2.15	1.16	1.12	1.88	1.88

Finally, it is concluded that replacing 75% of nitrogen requirements for Seewy date palms growing in sandy loamy soil by organic manure in form of chicken manure added once at the winter was very useful in improving growth nutritional status of palms. In addition, it gave high yield with good fruit quality as well as minimizing the production costs and environment pollution which could be occurred by chemical fertilizers.

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استجابة نخيل البلح السيوى النامى فى الأراضى حديثة الاستصلاح للتسميد العضوى والمعدنى
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أجرى هذا البحث خلال موسمى ٢٠٠٦/٢٠٠٧ & ٢٠٠٧/٢٠٠٨ على أشجار نخيل البلح السيوى عمرها ١٢ عاما ونامية فى أرض رملية طميية حديثة الأستصلاح بمزرعة التجارب بكلية الزراعة بالفيوم - مصر بهدف دراسة تأثير التسميد العضوى إما منفردا أو مخلوطا مع التسميد بالنيتروجين المعدنى على النمو الخضرى ونسبة عقد الثمار وخصائص الثمار والمحصول ومحتوى الأوراق من العناصر الغذائية الكبرى والصغرى. سمدت الأشجار بالتسميد النيتروجينى حسب التوصيات (١٣٠٠ جرام/نخلة/سنة) كالآتى:

١- ١٠٠% فى صورة معدنية.

٢- ٢٥% فى صورة معدنية + ٧٥% فى صورة عضوية.

٣- ٥٠% فى صورة معدنية + ٥٠% فى صورة عضوية.

٤- ٢٥% فى صورة معدنية + ٧٥% فى صورة عضوية.

٥- ١٠٠% فى صورة عضوية.

وقد أستخدم سماد نترات الأمونيوم ٣٣,٥% نيتروجين كسماد معدنى وسماد الكنكوت كسماد عضوى وقد أظهرت النتائج ما يلى:

- أدى استخدام التسميد العضوى مع المعدنى الى تحسين النمو الخضرى حيث زادت مساحة الورقة والورقة بينما حدث نقص فى طول الورقة وعدد الأوراق الجديدة التى تنتجها النخلة فى السنة.
- سبب استخدام النيتروجين فى صورة عضوية منفردة أو مخلوطا مع النيتروجين المعدنى الى زيادة فى كل من النيتروجين والفسفور والبوتاسيوم والمغنسيوم والكالسيوم والحديد والزنك والمنجنيز بالورقات وبالتالي حدث تحسن فى الحالة الغذائية للأشجار مقارنة بإضافة الجرعة كاملة فى صورة معدنية.
- استخدام التسميد العضوى منفردا أو مخلوطا مع النيتروجين المعدنى كان له تأثير فى زيادة نسبة عقد الثمار وعدد السوبات ووزنها وزيادة محصول النخلة وحجم ووزن الثمرة ونسبة المادة الجافة مقارنة بإضافة الجرعة الموصى بها فى صورة نيتروجين معدنى فقط.

- أدى إضافة النيتروجين العضوى منفردا أو مخلوطا مع النيتروجين المعدنى الى زيادة السكريات الكلية والمختزلة والمواد الصلبة الذائبة بينما سبب إنخفاضا فى نسبة الحموضة الكلية والتانينات فى الثمار.
 - أعطت معاملة التسميد بمعدل (٧٥% عضوى + ٢٥% معدنى) أحسن النتائج بالنسبة للنمو الخضرى والمحصول وخصائص الثمار والحالة الغذائية للأشجار.
- وقد أظهرت نتائج هذه الدراسة أنه يمكن التوصية بإضافة ٧٥% من كمية النيتروجين التى تحتاجها شجرة النخيل السيوى النامية فى الأراضى الرملية حديثة الأستصلاح عن طريق التسميد العضوى حيث يودى الى تحسين نمو الأشجار وزيادة كمية المحصول وجودة الثمار بالإضافة الى تقليل تكاليف التسميد ومشاكل التلوث البيئى الناتجة عن استخدام الأسمدة الكيماوية.