

EFFECT OF ALGAE EXTRACT AND YEAST ON FRUITING OF ZAGHLOUL DATE PALMS

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ABSTRACT

The effect of spraying Algae extract or yeast at 0.0, 0.025, 0.050, 0.1, 0.2 or 0.4 % on leaf area and its content of N, yield as well as physical and chemical characters of fruits in Zaghloul date palms was studied during 2001, 2002 and 2003 seasons. Palms received four sprays on March, April, May, and June.

Results showed that foliar application of Algae extract or yeast each at 0.025 to 0.4 % considerably improved the leaf area and its content of N yield and fruit quality compared to non – application. Spraying algae extract was superior than yeast in this connection. The promotion on yield and fruit was associated with increasing concentrations. Using concentration above 0.1 % had a slight promotion on leaf area and its content of N, yield and fruit quality.

With regard to yield and fruit quality of Zaghloul date palms, the best result were obtained due to spraying the palms four times with Algae extract at 0.1 %.

INTRODUCTION

The use of biofertilizers particularly yeast and algae exudates is suggested to be one possibility to restore the natural conditions. Mechanisms used by microbes to stimulate plant growth include biofertilization (increasing the supply of mineral nutrients to the plant), biological control (elimination of the plant enemies including microbial pathogens, insects and weeds) and direct plant growth promotion by delivering plant growth hormones to the plants (Lugtenberg *et al.*, 1991). Biofertilization techniques using Algae extract are recommended for enhancing growth through producing amino acids and peptides, isopentenyladenine- like substances, vitamin B12, Biotin and GA₃ (Strick *et al.*, 1997 and Adam, 1999). Yeast contains 44.4 % proteins, 7.1 %N, vitamins B, cytokinins and about eighteen amino acids (Dunn, 1952 and Abou Zaid , 1984). Therefore, it is not surprising for obtaining definite recommendation for Algae extract and yeast for Zaghloul date palms. Previous studies emphasized the beneficial effects of yeast on growth and fruiting of fruit crops (Dunn, 1952 Abou-Zaid, 1984; Subba- Rao, 1984; Hegab, *et al.*, 1997; Ahmed, 2001 and Abd El- Moniem-Eman *et al.*, 2003).

Growth and fruiting of fruit crops were greatly enhanced due to application of biofertilizer particularly Algae extract (Lugtenberg *et al.*, 1991, Abd El- Mouden , 1994, Haggag, *et al.*, 1995; Acosta *et al.*, 1995, Strick, *et al.*, 1997; Ragab, 1999; Noval *et al.*, 1997; Cheshiyan *et al.*, 1999; Adam, 1999; Kannaiyan, 2000 , Kamel , 2002 and Hegab and Sharaway, 2004).

This study aimed to throw some light on the effect of Algae extract and yeast at various concentrations on growth and fruiting of Zaghloul date palms.

MATERIALS AND METHODS

This study was initiated on 36 female of Zaghloul date palms during 2001, 2002 and 2003 seasons. Palms were about 20 years old, grown in a silty clay soil (Table 1) and planted at seven meter apart in a private orchard situated at Matay district, Minia Governorate . Pollination was achieved at one day after female inflorescences cracking by using pollen grains from the same male palms in the three seasons. All the selected palms received almost similar agricultural practices which used in the orchard including N, P and K fertilization.

Table (1): Analysis of the tested soil

Sand % :	22.0
Silt % :	39.3
Clay % :	38.7
Texture :	Silty clay
pH(1:2.5 extract) :	8.1
E.C. (1: 2.5 extract) :	0.74
O.M. % :	1.49
CaCO ₃ % :	1.81
N % :	0.09
P (ppm, olsen) :	8.9
K (ppm ammonium acetate) :	511

This experiment included two factors. The first factor (A) consisted from the application of Algae extract and yeast via leaves. The second one (B) comprised from six concentrations of each biofertilizer namely 0.0, 0.025, 0.050, 0.1, 0.2, and 0.4 % . The selected palms received four sprays from each biofertilizer on the first week of March , April , May and June. Yeast solutions were carefully prepared immediately before application Egyptian Treacle (as a source of sugars, minerals and vitamins) at 0.3 % was added to yeast solutions for activating the reproduction of yeast. The definite amount was dissolved in warm water (38°C). Spraying was established till run off (7 L./ palm). The experiment included twelve treatments, each treatment replicated three times one palm, replicate Types and concentrations of biofertilizers occupied the main and the subplots, respectively. The design of this experiment was completely randomized block in split- plot arrangement.

Four mature leaves (Fronds) around fruiting zone (each embracing a bunch) were chosen on each palm . Four pinnae were taken from the middle part of each leaf on the first week of July for measuring leaf area according to Ahmed and Morsy (1999). Pinna area (cm)² was multiplied by number of pinnae /leaf for calculating the leaf area (m²). Percentage of N (on dry weight basis) was determined (according to Wilde *et al.*, 1985).

Yield expressed in weight (kg) per palm was recorded at harvesting date (first week of Sept). Then, the average weight of bunch (kg) was calculated.

A representative sample (50 fruits) was picked randomly from the yield of each palm to determine fruit weight (g), pulp/ seed ratio, total soluble solids, total and reducing sugars % (AOAC., 1985), total acidity % (as g

malic acid / 100 g pulp) (AOAC, 1985), soluble tannins (Balbaa, 1981) and Crude fibers % (AOAC, 1985).

All the obtained data were tabulated and subjected to analyzed of variance (ANOVA) according to the methodes described by Steel and Torrie (1982) using new LSD. test to initiate the differences among treatment means.

RESULTS AND DISCUSSION

1-Leaf area and its content of N:

It is evident from the data in Tables 2 and 3 that biofertilization with Algae was significantly preferable in stimulating the leaf area and its content of N than using yeast in the three seasons of study.

Biofertilization with Algae and yeast at 0.025 to 0.40 % significantly improved the leaf area and its content of N rather than unbiofertilization. There was a gradual promotion on leaf area and its content of N with increasing concentrations of Algae and yeast. However, insignificant differences were observed when both biofertilizers were applied at concentrations higher than 0.1 % . Therefore, using Algae or yeast in date palm orchard supposed that did not exceed 0.1 % concentration. The maximum values were detected on palms received four sprays of Algae extract at 0.4 % . The untreated palms had the minimum values. These results were true in the three seasons.

These results are in agreement with those obtained by Dunn (1952) Hegab *et al.*, (1997) and Ahmed (2001) who worked on yeast and Hegab and Sharawy (2004) who worked on Algae extract.

2-Bunch weight and Yield / Palm:

Bunch weight and yield / palm were significantly varied according to the type of biofertilizers applied. They were significantly maximized in palms biofertilized with Algae extract via leaves compared to using yeast.

Varying concentrations of Algae extract and yeast had an announced differences on bunch weight and yield per palm of Zaghloul date palms. There was a gradual promotion on bunch weight and yield/ palm with increasing concentrations of each biofertilizer applied via leaves from 0.0 to 0.4 % . Significant differences were observed between all concentrations except between using concentrations higher than 0.1 % .

With regard to yield/ palm, the best results were recorded due to spraying Algae extract four times at 0.1 % , since there was a slight promotion on the yield as a result of using concentrations higher than 0.1 % . Under such promising treatment yield reached 84.0, 94.0 and 90.0 kg per palm in the three seasons, respectively. Palms did not receive any biofertilizer had the minimum values. These results were true in 2001, 2002 and 2003 seasons. (Tables 4 and 5).

These results were nearly the same with those obtained on different fruit varieties by Hegab *et al.*, (1997); Ahmed (2001) and Abd El – Moniem - Eman *et al.*, (2003) on yeast and Abd El- Moumen (1994) , Haggag, *et al.*, (1995) and Hegab and Sharawy (2004) on Algae extract.

Table (2): Effect of Algae extract and yeast on the leaf area (cm²) of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001						2002						2003					
	a ₁ Algae			a ₂ yeast			a ₁ Algae			a ₂ yeast			a ₁ Algae			a ₂ yeast		
	Mean (B)			Mean (B)			Mean (B)			Mean (B)			Mean (B)			Mean (B)		
b ₁ 0.00%	1.61	1.60	1.61	1.59	1.56	1.58	1.61	1.61	1.61	1.58	1.56	1.61	1.61	1.61	1.61	1.61	1.61	1.61
b ₂ 0.025%	1.95	1.80	1.88	1.42	1.76	2.84	1.90	1.90	1.90	1.76	2.84	1.90	1.90	1.90	1.76	1.76	1.83	1.83
b ₃ 0.050%	2.20	1.96	2.08	2.09	1.97	2.03	2.05	2.05	2.05	1.97	2.03	2.05	2.05	1.92	1.92	1.99	1.99	
b ₄ 0.100%	2.36	2.21	2.29	2.31	2.18	2.25	2.20	2.20	2.20	2.18	2.25	2.20	2.20	2.11	2.11	2.16	2.16	
b ₅ 0.20%	2.38	2.24	2.31	2.33	2.20	2.27	2.20	2.20	2.20	2.20	2.27	2.20	2.20	2.11	2.11	2.16	2.16	
b ₆ 0.40%	2.40	2.26	2.33	2.36	2.21	2.29	2.21	2.21	2.21	2.21	2.29	2.21	2.21	2.12	2.12	2.17	2.17	
Mean (A)	2.15	2.01	2.08	2.10	1.98	2.03	2.03	2.03	2.03	1.98	2.03	2.03	2.03	1.94	1.94	2.03	2.03	
New L.S.D. at 5%	A	B	AB	A	B	AB	A	AB	AB	B	AB	A	A	B	B	A	B	AB
	0.11	0.15	0.21	0.10	0.14	0.20	0.09	0.09	0.09	0.14	0.20	0.09	0.09	0.12	0.12	0.09	0.12	0.17

Table (3): Effect of Algae extract and yeast on the percentage of N in the leaves of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001						2002						2003					
	a ₁ Algae			a ₂ yeast			a ₁ Algae			a ₂ yeast			a ₁ Algae			a ₂ yeast		
	Mean (B)			Mean (B)			Mean (B)			Mean (B)			Mean (B)			Mean (B)		
b ₁ 0.00%	1.10	1.09	1.10	1.13	1.12	1.13	1.12	1.12	1.12	1.12	1.13	1.12	1.12	1.10	1.10	1.11	1.11	
b ₂ 0.025%	1.27	1.19	1.23	1.35	1.25	1.30	1.32	1.32	1.32	1.25	1.30	1.32	1.32	1.22	1.22	1.27	1.27	
b ₃ 0.050%	1.37	1.30	1.34	1.46	1.36	1.41	1.42	1.42	1.41	1.36	1.41	1.42	1.42	1.35	1.35	1.39	1.39	
b ₄ 0.100%	1.50	1.40	1.45	1.57	1.47	1.52	1.50	1.50	1.47	1.47	1.52	1.50	1.50	1.46	1.46	1.48	1.48	
b ₅ 0.20%	1.52	1.41	1.47	1.58	1.48	1.53	1.51	1.51	1.48	1.48	1.53	1.51	1.51	1.48	1.48	1.50	1.50	
b ₆ 0.40%	1.53	1.41	1.47	1.59	1.48	1.54	1.52	1.52	1.48	1.48	1.54	1.52	1.52	1.49	1.49	1.51	1.51	
Mean (A)	1.38	1.30	1.36	1.45	1.36	1.40	1.40	1.40	1.36	1.36	1.40	1.40	1.40	1.35	1.35	1.40	1.40	
New L.S.D. at 5%	A	B	AB	A	B	AB	A	AB	AB	B	AB	A	A	B	B	A	B	AB
	0.05	0.09	0.13	0.06	0.10	0.14	0.05	0.05	0.05	0.10	0.14	0.05	0.05	0.11	0.11	0.05	0.11	0.16

Table (4): Effect of Algae extract and yeast on average bunch weight of Zaghoul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00%	9.5	9.2	9.4	8.7	8.6	8.7	8.9	8.8	8.9
b ₂ 0.025%	14.3	12.2	13.3	14.5	11.6	13.1	13.0	11.0	12.0
b ₃ 0.050%	16.8	14.7	15.8	17.8	14.8	16.3	15.2	13.3	14.3
b ₄ 0.100%	20.0	17.9	19.0	20.7	17.8	19.3	18.3	16.8	17.1
b ₅ 0.20%	20.1	18.0	19.1	20.8	18.0	19.4	18.4	17.0	17.2
b ₆ 0.40%	20.2	18.0	19.0	20.9	18.1	19.5	18.5	17.1	17.3
Mean (A)	16.8	15.0	AB	17.2	14.8	AB	15.4	14.0	AB
New L.S.D. at 5%	A	B	AB	A	B	AB	A	B	AB
%	1.7	2.3	3.2	2.1	2.5	3.5	1.3	2.0	2.8

Table (5): Effect of Algae extract and yeast on the yield per palm (kg) of Zaghoul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
B ₁ 0.00%	69.2	69.1	69.2	71.0	70.0	70.5	72.0	71.5	71.8
B ₂ 0.025%	77.0	72.3	74.7	80.0	75.0	77.5	80.0	76.0	78.0
B ₃ 0.050%	80.0	75.9	78.0	84.0	79.9	82.0	85.0	80.0	82.5
B ₄ 0.100%	84.0	79.0	81.5	94.0	89.0	91.5	90.0	86.0	88.0
B ₅ 0.20%	84.0	79.5	81.8	94.5	90.0	92.3	91.0	87.0	89.0
B ₆ 0.40%	84.0	79.9	82.0	95.0	90.0	92.5	91.5	87.5	89.5
Mean (A)	79.7	76.0	AB	86.4	82.3	AB	84.9	81.3	AB
New L.S.D. at 5%	A	B	AB	A	B	AB	A	B	AB
%	2.4	3.0	4.2	2.5	3.3	4.7	2.5	3.5	4.9

3- Physical and chemical characters of the fruits:

It is clear from the data in Tables (6 to 13) that biofertilizing Algae extract via leaves was preferable than using yeast in improving physical and chemical properties of the fruits in terms of increasing average fruit weight, pulp/ seed ratio, total soluble solids %, total and reducing sugars % and in decreasing total acidity %, soluble tannins % and crude fibers %. Significant differences were observed on such parameters among Algae extract and yeast in 2001, 2002 and 2003 seasons.

Spraying the two biofertilizers namely Algae extract and yeast at 0.025 % to 0.4 % significantly improved fruit quality than unspraying. The promotion was associated with increasing concentrations of each biofertilizer. Meaningless differences on such characters were detected at concentrations higher than 0.1 % . Therefore, it is suggested to spray such two biofertilizer at concentrations did not exceed 0.1 %.

With regard to fruit quality of Zaghloul date palms the best results were obtained due to spraying Algae extract four times at 0.1 %. Unfavourable effects on fruit quality were detected on untreated palms. These results were true in the three seasons.

These results are in agreement with those obtained on different fruit varieties by Hegab *et al.*, (1997); Ahmed (2001) and Abd El- Moniem – Eman *et al.*, (2003) on yeast and Hegab and Sharawy (2004) on Algae extract.

The beneficial of yeast and Algae extract on supplying the palms with their requirement from organic foods and vitamins and their own from natural hormones could explain their previous positive action. They also play an important role as substances including some antioxidants.

As a conclusion, it is suggested to improve yield and fruit quality of Zaghloul date palms with using four sprays of Algae extract at 0.1 %.

Table (6): Effect of Algae extract and yeast on average fruit weight (g) of Zaghoul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00%	16.4	16.2	16.3	17.0	16.9	16.95	17.3	17.1	17.2
b ₂ 0.025%	18.6	17.3	18.0	18.5	17.9	18.20	19.5	18.3	18.9
b ₃ 0.050%	19.3	18.5	18.9	19.5	19.0	19.70	20.6	19.5	20.1
b ₄ 0.100%	19.9	19.5	19.7	20.6	19.9	20.25	21.7	20.6	21.2
b ₅ 0.20%	20.0	19.6	19.8	20.7	20.0	20.35	21.7	20.7	21.2
b ₆ 0.40%	20.1	19.7	19.9	20.8	20.1	20.45	21.8	20.8	21.3
Mean (A)	19.1	18.5	19.0	19.5	19.0	19.5	20.4	19.5	21.3
New L.S.D. at 5%	A 0.5	B 0.7	AB 1.0	A 0.4	B 0.6	AB 0.8	A 0.4	B 0.5	AB 0.7

Table (7): Effect of Algae extract and yeast on the pulp/ seed ratio of Zaghoul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00%	6.13	6.11	6.12	6.16	6.13	6.15	6.14	6.11	6.13
b ₂ 0.025%	6.40	6.27	6.34	6.44	6.33	6.39	6.60	6.36	6.48
b ₃ 0.050%	6.80	6.40	6.60	6.77	6.53	6.65	6.85	6.60	6.73
b ₄ 0.100%	7.20	7.00	7.10	7.11	6.77	6.94	7.19	6.82	7.01
b ₅ 0.20%	7.21	7.02	7.12	7.12	6.79	6.96	7.20	6.84	7.02
b ₆ 0.40%	7.22	7.04	7.13	7.13	6.80	6.97	7.21	6.85	7.03
Mean (A)	6.83	6.64	6.79	6.79	6.56	6.86	6.86	6.60	6.86
New L.S.D. at 5%	A 0.08	B 0.11	AB 0.16	A 0.10	B 0.11	AB 0.16	A 0.11	B 0.12	AB 0.17

Table (8): Effect of Algae extract and yeast on percentage of total soluble solids in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00%	24.4	24.1	24.3	24.0	24.0	24.0	24.4	24.2	24.3
b ₂ 0.025%	25.3	24.7	25.0	26.0	25.0	25.5	26.3	25.3	25.8
b ₃ 0.050%	27.2	25.2	26.2	27.1	25.6	26.4	27.5	25.8	26.4
b ₄ 0.100%	27.8	26.0	26.9	27.9	26.3	27.1	28.4	26.9	27.7
b ₅ 0.20%	27.9	26.0	27.0	28.0	26.4	27.2	28.4	27.0	27.7
b ₆ 0.40%	28.0	26.1	27.1	28.0	26.4	27.2	28.5	27.0	27.8
Mean (A)	26.8	25.4	26.8	26.8	25.6	26.2	27.3	26.0	26.8
New L.S.D. at 5%	A	B	AB	A	B	AB	A	B	AB
	0.3	0.5	0.7	0.2	0.3	0.4	0.3	0.4	0.6

Table (9): Effect of Algae extract and yeast on percentage of total sugars in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00%	20.3	20.2	20.3	21.0	20.5	20.8	21.2	21.0	21.10
b ₂ 0.025%	21.2	20.7	21.0	21.9	21.0	21.5	22.0	21.6	21.8
b ₃ 0.050%	22.0	21.2	21.6	22.5	21.5	22.0	22.7	22.2	22.5
b ₄ 0.100%	22.9	21.9	22.4	23.3	22.3	22.8	23.5	22.9	23.2
b ₅ 0.20%	23.0	22.0	22.5	23.4	22.4	22.9	23.5	23.0	23.3
b ₆ 0.40%	23.1	22.1	22.6	23.5	22.4	23.0	23.6	23.0	23.3
Mean (A)	22.1	21.4	22.6	22.6	21.7	22.1	22.8	22.3	22.3
New L.S.D. at 5%	A	B	AB	A	B	AB	A	B	AB
	0.2	0.3	0.4	0.3	0.4	0.6	0.4	0.4	0.6

Table (10): Effect of Algae extract and yeast on percentage of non-reducing sugars in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001				2002				2003			
	a ₁ Algae		a ₂ yeast		a ₁ Algae		a ₂ yeast		a ₁ Algae		a ₂ yeast	
	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)
b ₁ 0.00 %	16.0	15.3	16.0	15.7	16.2	16.2	16.0	16.0	16.5	16.3	16.3	16.4
b ₂ 0.025 %	16.6	16.0	16.6	16.3	17.3	17.3	16.6	16.6	17.8	17.0	17.0	17.4
b ₃ 0.050 %	17.5	16.6	17.4	17.1	18.0	18.0	17.3	17.3	18.9	17.7	17.8	18.4
b ₄ 0.100 %	18.6	17.4	17.4	18.0	18.9	18.9	18.5	18.5	19.5	18.7	18.9	19.2
b ₅ 0.20 %	18.7	17.5	17.5	18.1	19.0	19.0	18.6	18.6	19.6	18.8	19.0	19.3
b ₆ 0.40 %	18.7	17.5	17.5	18.1	19.0	19.0	18.6	18.6	19.7	18.8	19.1	19.4
Mean (A)	17.7	16.7	16.7	17.6	18.1	18.1	17.6	17.6	18.7	18.0	18.0	18.0
New L.S.D. at 5 %	A	B	B	AB	A	A	B	B	A	AB	B	AB
	0.3	0.5	0.5	0.7	0.4	0.4	0.5	0.5	0.4	0.7	0.5	0.7

Table (11): Effect of Algae extract and yeast on percentage of total acidity in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001				2002				2003			
	a ₁ Algae		a ₂ yeast		a ₁ Algae		a ₂ yeast		a ₁ Algae		a ₂ yeast	
	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)	Mean (B)
b ₁ 0.00 %	0.190	0.195	0.160	0.193	0.199	0.199	0.201	0.200	0.205	0.211	0.211	0.208
b ₂ 0.025 %	0.145	0.160	0.145	0.153	0.161	0.161	0.181	0.171	0.174	0.195	0.195	0.185
b ₃ 0.050 %	0.130	0.145	0.145	0.138	0.141	0.141	0.161	0.151	0.160	0.175	0.175	0.168
b ₄ 0.100 %	0.118	0.130	0.130	0.125	0.119	0.119	0.142	0.128	0.129	0.151	0.151	0.140
b ₅ 0.20 %	0.117	0.130	0.130	0.123	0.118	0.118	0.141	0.130	0.125	0.150	0.150	0.138
b ₆ 0.40 %	0.116	0.130	0.130	0.123	0.116	0.116	0.140	0.128	0.125	0.147	0.147	0.136
Mean (A)	0.136	0.148	0.148	0.136	0.142	0.142	0.161	0.153	0.153	0.172	0.172	0.168
New L.S.D. at 5 %	A	B	B	AB	A	A	B	AB	A	B	B	AB
	0.011	0.017	0.017	0.024	0.010	0.010	0.015	0.021	0.009	0.013	0.013	0.021

Table (12): Effect of Algae extract and yeast on percentage of soluble tannins in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00 %	0.24	0.25	0.25	0.24	0.27	0.26	0.20	0.22	0.21
b ₂ 0.025 %	0.20	0.20	0.20	0.20	0.22	0.21	0.13	0.17	0.15
b ₃ 0.050 %	0.10	0.15	0.13	0.17	0.20	0.19	0.10	0.13	0.12
b ₄ 0.100 %	0.08	0.10	0.09	0.14	0.17	0.16	0.07	0.09	0.08
b ₅ 0.20 %	0.07	0.09	0.08	0.11	0.16	0.14	0.07	0.09	0.08
b ₆ 0.40 %	0.07	0.09	0.08	0.10	0.15	0.13	0.07	0.09	0.08
Mean (A)	0.13	0.15		0.16	0.20		0.11	0.13	
New L.S.D. at 5 %	A	B	AB	A	B	AB	A	B	AB
	0.02	0.03	0.04	0.02	0.02	0.03	0.02	0.04	0.06

Table (13): Effect of Algae extract and yeast on percentage of crude fibres in the pulp of Zaghloul date palms during 2001, 2002 and 2003 seasons.

Biofertilizer concentrations (B)	2001			2002			2003		
	Biofertilizers (A)			Biofertilizers (A)			Biofertilizers (A)		
	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)	a ₁ Algae	a ₂ yeast	Mean (B)
b ₁ 0.00 %	0.47	0.49	0.48	0.48	0.51	0.50	0.52	0.55	0.54
b ₂ 0.025 %	0.37	0.42	0.40	0.32	0.37	0.35	0.36	0.42	0.39
b ₃ 0.050 %	0.32	0.37	0.35	0.25	0.32	0.29	0.30	0.36	0.33
b ₄ 0.100 %	0.26	0.30	0.28	0.20	0.27	0.24	0.24	0.30	0.27
b ₅ 0.20 %	0.25	0.29	0.27	0.20	0.26	0.23	0.22	0.29	0.26
b ₆ 0.40 %	0.25	0.28	0.27	0.20	0.25	0.23	0.22	0.28	0.25
Mean (A)	0.32	0.36		0.28	0.29		0.31	0.37	
New L.S.D. at 5 %	A	B	AB	A	B	AB	A	B	AB
	0.03	0.04	0.06	0.02	0.03	0.05	0.03	0.04	0.06

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تأثير مستخلص الطحالب والخميرة على الإثمار في نخيل البلح الزغلول
على عبد العزيز جبارة
قسم البستين - كلية الزراعة - جامعة المنيا

تم دراسة التأثير الإيجابي لرش مستخلص الطحالب أو الخميرة بتركيزات صفر ، ٠.٠٢٥ ، ٠.٠٥٠ ، ٠.١ ، ٠.٢ ، ٠.٤ % أربعة مرات في مارس ولبريل ومايو ويونيه على مساحة الورقة ومحتواها من النيتروجين ، المحصول ، الصفات الطبيعية والكيميائية لثمار البلح الزغلول خلال أعوام ٢٠٠١ ، ٢٠٠٢ ، ٢٠٠٣ .

ولقد أوضحت النتائج أن معاملات الرش بمستخلص الطحالب أو الخميرة كل بتركيز ٠.٠٢٥ % إلى ٠.٤ % تزيد بوضوح مساحة الورقة ومحتواها من النيتروجين والمحصول وصفات جودة الثمار مقارنة بعدم المعاملة وقد كان للرش بمستخلص الطحالب الأفضلية في هذا الصدد.

ولقد كانت الزيادة في المحصول وجودة الثمار مرتبطة بزيادة التركيزات ، وكان لاستخدام التركيزات الأعلى من ٠.١ % تأثير طفيف في زيادة مساحة الورقة ومحتواها من النيتروجين والمحصول وجودة الثمار.

وقد أمكن الحصول على أفضل لنتائج بزيادة المحصول وجودة الثمار عند الرش أربعة مرات بمستخلص الطحالب بتركيز ٠.١ %.