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EFFECT OF POULTRY MANURE AND NITROGEN BIO-FERTILIZER (NITROBEN) ON GROWTH, YIELD AND CHEMICAL CONTENTS OF SQUASH PLANTS

[37]

El-Bassiony[1], A.M.; Z.F. Fawzy[1] and S.A. Saleh[2]
1. Vegetable Research Department, National Research Centre, Dokki, Cairo, Egypt.
2. Horticulture Technology Department, National Research Centre, Dokki, Cairo, Egypt

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ABSTRACT

Two field experiments were carried out during the two successive seasons of 2005 and 2006 at Banha (Qalubia Governorate) to study the effect of three rates of poultry manures (50, 75 and 100 N unit/fed.) and the biofertilizer nitrogen (nitroben) on growth, yield, quality and chemical composition of squash. Obtained data showed that using 100 N unit/fed. from poultry manure gave the highest vegetative growth characters, yield and quality. Application 100 N unit/fed. from poultry manure also increased the nitrogen percentage and heavy metals in squash tissues. In addition, using nitroben biofertilizer gave the highest vegetative growth characters, yield, quality and nitrogen percentage. On the contrary, nitroben biofertilizer reduced the heavy metals in squash tissues

INTRODUCTION

Squash (*Cucurbita pepo*) is an important vegetable crop cultivated in Egypt for local market. Poultry manure has high percentages of N, P, K and microelements, which directly improve growth and yield of squash plant. Besides, it is a natural substrate for saprophytic microorganisms and provides nutrition to plants indirectly through the activation of soil microorganisms. In addition, organic fertilization is very important for providing the plants with their nutritional requirements without having any undesirable impacts on the environment. **Al-Afifi *et al* (1991)** found that organic manure enhanced growth and yield of squash plants. **Nirmala and Vadivel (1999)** showed that organic manure and biofertilizer gave the highest number of leaves per plant , dry matter production and fruit yield of cucumber plants. In addition, the best quality of cucumber fruits was obtained with organic manure **(Kucinskas and Karbauskiene, 2000). Abdel-Mouty and Ali (2000)** indicated that using the highest rate of chicken manure (30 m^3) increased plant growth (plant length, number of leaves per plant, fresh and dry weight of leaves and shoots), yield and quality (fruit weight, length and diameter) in squash plants.

The bio-fertilizer has great amounts of symbiotic and non-symbiotic bacteria, which are responsible for fixation of N by atmosphere. Using biofertilizer increased vegetative growth characters **(Awad & Khalil, 2003 and Abdallah *et al* 2004** in cucumber plants), increasing yield and quality **(Wang, 1998; Abd-El-Hafez & Shehata, 2001; Yu-Zhan Dong & Song and Su Yao, 2003)** in cucumber plants). Moreover, biofertilizer enhanced dry weight and element uptake in cucumber plants **(Deokar and Sawant, 2002)** and increased nutrient contents in squash plants **(Awad and Khalil, 2003)**.

The aim of this work was to study the effect of three rates of poultry manure and nitroben biofertilizer on growth, yield, quality and chemical composition of squash plants.

MATERIAL AND METHODS

Two field experiments were carried out during the two successive seasons of 2005 and 2006 at Banha (Qalubia Governorate) to investigate the effect of three rates of poultry manures (50, 75 and 100 N unit/fed.) and nitroben biofertilizer at rates

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of 0 and 500 gm per feddan on growth, yield, quality and chemical composition of squash plants local cv. Mabroka.

The biofertilizer nitroben was produced by General Organization for Agriculture Equaliztion Fund. The recommended dose for squash plant is 100 N unit/fed. Squash seeds were sown in the second week of April in 2005 and 2006 seasons, at distances of 40 cm between hills.

The physical and chemical properties of the experimental soil and poultry manure are presented in **Table (1)**.

Table 1. Chemical analyses of the experimental soil and poultry manure.

Characters	2005		2006	
	Soil	Poultry manure	Soil	Poultry manure
PH	7.85	7.77	7.89	7.62
E.c (m.mohs)	1.55	1.05	1.46	1.07
Nitrogen %	0.15	2.64	0.22	2.36
Phosphorus %	0.06	1.65	0.10	1.32
Potassium %	0.14	2.17	0.11	2.09
Fe ppm	5844	2744	5133	2610
Zn ppm	378	284	366	301
Mn ppm	892	343	765	310
Cu ppm	40	1.5	37	1.4
Pb ppm	41.5	110	39.5	108

The design of the experiment was split-plot with four replicates, where the poultry manure rates were distributed in the main plots and the bio-fertilizer treatments were arranged in the sub-plots. The plot area was 11.2 m^2 included 4 ridges, each with 70 cm width and 4.0 m long. The surface irrigation system was used in this experiment. The normal agricultural treatments of the growing squash were practiced as usually followed in the commercial production of squash. Poultry manure was added before sowing and the nitroben biofertilizer was added under the plants, at 15 days after sowing.

Data recorded

Samples of four plants were taken at 60 days after sowing and the plant length, number of leaves, stem diameter and fresh weight of leaves, stems and roots were recorded.

Samples of leaves, stems, roots and friuts were oven dried at 70°C, then fine grounded and wet digested. Total nitrogen concentration in the tissues of plant roots, stems, leaves and fruits were determined according to the methods described by **Jackson (1958)**. The Fe, Zn, Mn, Cu and Pb contents were determined in dry roots, stems, leaves and fruits using Atomic Absorption Spectrophotometer, according to **Jackson (1967)**.

Squash fruits were harvested twice every week. At harvest time, the fruit length, diameter and weight, and total weight of fruits in each experimental plot were recorded and the total yield was accounted. All the obtained data were subjected to statistical analysis of variance according to the procedure outlined by **Gomez and Gomez (1984)**.

RESULTS AND DISCUSSION

Vegetative growth characteristics

Effect of poultry manure

Data in **Table (2)** show clearly that increasing poultry manure rate increased vegetative growth characters (plant length, leaf number, fresh and dry weight of roots, stems and leaves). The highest vegetative growth characters were recorded by 100 N unit poultry manure. Meanwhile, the lowest vegetative growth characters were recorded by 50 N unit poultry manure. These results were true in the two seasons of study. In addition, the stem diameter was not significantly affected by different poultry manure rates. Similar results were reported by **Nirmala & Vadivel (1999) and Al-Afifi *et al* 1991.**

Effect of nitrogen biofertilizer (nitroben)

As shown in **Table (2)**, using biofertilizer increased significantly the vegetative growth characters (plant length, leaf number, fresh and dry weight of roots, stems and leaves) except for the stem diameter in both seasons. These findings were true in both seasons of study. These results are coincided with those reported by **Yu-Zhan Dong & Song-Su Yao (2003); Awad & Khalil (2003) and Abdallah *et al* (2004).**

Table 2. Effect of poultry manure and nitrogen biofertilizer (Nitroben) zon vegetative growth characters of squash plants in 2005 and 2006 seasons

Treatments		Plant length (cm)	Leaf number/ plant	Stem diameter (cm)	Fresh weight (g)			Dry weight (g)		
					Leaves	Stems	Roots	Leaves	Stems	Roots
Poultry manure					First season					
50N unit		52.45	26.50	1.90	519.40	71.82	10.35	8.01	4.71	1.67
75 N unit		54.25	29.50	2.00	545.63	77.98	16.10	8.32	5.66	2.30
100 N unit		56.00	31.50	1.90	717.19	98.61	17.40	8.78	7.32	2.35
L.S.D		0.85	1.05	NS	63.15	23.18	3.14	NS	0.78	0.13
Nitroben										
0 (Check)		48.73	27.00	1.93	553.89	69.20	12.81	8.00	5.52	1.99
500 g/fed.		59.73	31.33	1.93	634.25	96.41	16.42	8.73	6.27	2.22
L.S.D		6.93	2.34	NS	52.35	22.15	2.25	0.32	0.22	NS
Interaction										
50N	0 (Check)	47.20	26.00	1.70	464.40	64.34	8.37	7.22	4.44	1.60
unit	500 g/fed.	57.70	27.00	2.10	574.40	79.30	12.33	8.79	4.98	1.73
75N	0 (Check)	50.00	26.00	2.20	475.65	60.02	14.55	8.20	5.64	2.14
unit	500 g/fed.	58.50	33.00	1.80	615.60	95.94	17.64	8.43	5.68	2.46
100N	0 (Check)	49.00	29.00	1.90	721.63	83.23	15.50	8.57	6.48	2.24
unit	500 g/fed.	63.00	34.00	1.90	712.75	113.99	19.30	8.98	8.15	2.46
L.S.D		4.50	1.23	NS	112.50	25.77	NS	NS	NS	NS
Poultry manure					Second season					
50N unit		50.00	20.50	2.00	369.66	73.20	9.88	7.91	5.52	1.34
75N unit		53.75	24.00	2.55	442.78	79.86	13.23	8.99	5.94	1.81
100N unit		57.50	25.00	2.15	679.04	91.60	16.98	9.43	7.73	2.38
L.S.D		2.24	1.55	NS	66.58	9.03	2.17	1.05	0.32	0.36
Nitroben										
0 (Check)		51.00	21.33	2.33	479.84	75.56	12.22	8.64	6.10	1.79
500 g/fed.		56.50	25.00	2.13	514.48	87.54	14.50	8.91	6.69	1.88
L.S.D		3.05	2.43	NS	25.22	6.45	1.5	0.12	0.26	0.05
Interaction										
50 N	0 (Check)	49.00	20.00	1.70	364.11	61.73	9.73	7.83	5.14	1.32
unit	500 g/fed.	51.00	21.00	2.30	375.21	84.66	10.03	7.99	5.90	1.35
75 N	0 (Check)	50.00	21.00	3.00	389.20	77.28	12.40	8.78	5.85	1.77
unit	500 g/fed	57.50	27.00	2.10	496.35	82.43	14.05	9.19	6.03	1.84
100N	0 (Check)	54.00	23.00	2.30	686.21	87.66	14.53	9.31	7.30	2.29
unit	500 g/fed.	61.00	27.00	2.00	671.87	95.53	19.43	9.55	8.15	2.46
L.S.D		6.14	1.65	NS	126.15	3.33	5.06	1.13	1.37	NS

Effect of the interaction

The obtained data revealed that the interaction between poultry manure and biofertilizer **(Table 2)** significantly affected plant length, leaf number and fresh weight of stems and leaves in the first season. In addition, except for stem diameter and root dry weight, all tested growth characters were significantly affected in the second season. The highest values for plant height, leaf number and fresh weight of stems and leaves were recorded with 100 and 75 N unit combined with the biofertilizer in the two seasons of study. The heaviest dry weight of leaves was recorded with 75 and 100 N unit poultry manure with or without the biofertilizer in the second season. On the contrary,

the lowest values of all vegetative growth characters were recorded by 50 N unit poultry manure without biofertilizer in the first season and second seasons.

Total yield and quality

Effect of poultry manure

As presented in **Table (3),** there were significant differences in the total yield and quality, among the different rates of poultry manure in the two seasons of study except for fruit diameter which failed to reach the 5% level of significance in the two seasons. The highest total yield and quality of squash fruits were produced by 100 N unit poultry manure treatment in the two seasons. On the contrary, the lowest total yield and quality of squash fruits plants were produced by 50 N unit poultry manure in the two seasons. These findings held good in both experimental seasons. The results are in accordance with those obtained by **Nirmala & Vadivel (1999); Al-Afifi *et al* (1991); Kucinskas & Karbauskiene (2000); Abdel-Mouty & Ali (2000) and Shi-Jiping *et al* (2003).**

Effect of biofertilizer (Nitroben)

Data presented in **Table (3)** indicated that using the biofertilizer increased significantly the total yield and quality of squash fruits except for fruit diameter in both seasons. The highest total yield with the biofertilizer was 8.92 and 8.83 ton per feddan in the first and second seasons, respectively, compared with 8.5 and 8.23 ton per feddan without the application with the biofertilizer in the first and second seasons, respectively. Similar reports were recorded by **Wang (1998) and Abd-El-Hafez & Shehata (2001).**

Effect of the interaction

The interaction between poultry manure levels and biofertilizer had significant effects on fruit yield, fruit length and average fruit weight but fruit diameter failed to reach the 5% level of significance in the two seasons. The highest total yield was recorded by 100 N unit poultry manure with biofertilizer in the first season and 100 or 75 N unit poultry manure with biofertilizer in the second season. The best quality, i.e., fruit length and average fruit weight, were recorded by 75 N unit poultry manure with biofertilizer and 100 N unit poultry manure with or without biofertilizer. These results held good in the two experimental seasons. On the contrary, the lowest total yield and quality of squash fruits were recorded with 50 N unit poultry manure without the biofertilizer in the two seasons.

Table 3. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on yield and quality of squash plants in 2005 and 2006 seasons

Treatments	Total yield (ton/fed)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Total yield (ton/fed)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)
	2005				2006			
Poultry manure								
50N unit	8.48	12.29	3.19	114.38	8.24	12.74	3.37	124.05
75 N unit	8.60	13.40	3.19	132.24	8.79	13.01	3.40	141.17
100 N unit	8.92	13.79	3.30	136.26	8.83	13.31	3.44	145.36
L.S.D	0.11	0.26	NS	2.29	0.31	0.09	NS	3.22
Nitroben								
0 (Check)	8.50	13.08	3.20	125.32	8.32	12.90	3.37	133.01
500 g/fed.	8.83	13.24	3.26	129.92	8.92	13.14	3.43	140.70
L.S.D	0.24	0.12	NS	2.29	0.14	0.07	NS	5.67
Interaction								
50 N 0(Check)	8.43	12.22	3.15	112.52	8.13	12.66	3.36	121.42
unit 500g/fed	8.52	12.36	3.23	116.23	8.35	12.82	3.38	126.67
75 N 0 Check)	8.67	13.38	3.18	128.12	8.25	12.78	3.35	135.12
unit 500g/fed	8.53	13.42	3.20	136.35	9.32	13.24	3.44	147.22
100 N 0(Check)	8.41	13.64	3.26	135.33	8.57	13.27	3.41	142.50
unit 500g/fed	9.43	13.93	3.34	137.18	9.08	13.35	3.46	148.22
L.S.D	0.12	0.45	NS	3.05	0.25	0.13	NS	5.23

Chemical composition

Effect of poultry manure

Data in **Tables (4, 5, 6, 7, 8 and 9)** showed the effect of poultry manure on N, Fe, Zn, Mn, Cu and Pb in roots, stems, leaves and fruits. Generally, increasing poultry manure from 50 N unit unit to 100 N unit increased significantly N, Fe, Zn, Mn, Cu and Pb in roots, stems, leaves and fruits of squash plants except for Cu in roots in the second season which failed to reach the 5% level of significance. The lowest values of the above elements were recorded with 50 N units poultry manure in the two seasons. We can notice that the lowest values of N, Fe and Mn were found in fruits than in roots, stems and leaves. While, the lowest values of Zn, Cu and Pb were recorded in stems and fruits than in roots and leaves. These results were true in the two seasons of study. The obtained results are in good agreement with that obtained by **Shehata (2001).**

Effect of biofertilizer

Data presented in **Table (4)** indicated that using biofertilizer increased significantly N percentage in roots, stems and leaves in the first season. On the other hand, N percentage in fruits in the first season and all plant tissues in the second season failed to reach the 5% level of significance.

The application of nitroben biofertilizer reduced significantly Fe in roots, stems and leaves whereas, Fe in fruits was not affected by the biofertilizer in the two seasons of study **(Table 5)**. However, the biofertilizer had a significant effect on zinc only in stems in the first season, roots and stems in the second season **(Table 6)**. In addition, Mn in roots in the first season and leaves in both seasons were affected significantly by biofertilizer **(Table 7)**. Data in **Table (8)** showed that the effect of the biofertilizer on Cu was significant only in leaves in the first season while Cu in the other tissues of squash plant failed to

Table 4. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on N% in roots, stems, leaves and fruits of squash plants in 2005 and 2006 seasons

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Levels of poultry manure								
50 N unit	2.15	1.96	1.99	1.74	1.92	1.88	1.83	1.68
75 N unit	2.21	2.04	2.08	1.77	2.05	1.91	1.89	1.76
100 N unit	2.31	2.21	2.24	1.86	2.14	2.04	2.06	1.92
L.S.D	0.13	0.15	0.09	0.08	0.15	0.09	0.11	0.09
Nitroben								
0 (Check)	2.18	2.02	2.06	1.76	2.00	1.91	1.90	1.73
500 g/fed.	2.26	2.11	2.14	1.81	2.07	1.97	1.95	1.83
L.S.D	0.06	0.04	0.06	NS	NS	NS	NS	NS
Interaction								
50 N 0 (Check)	2.11	1.92	1.97	1.72	1.96	1.85	1.83	1.64
unit 500 g/fed.	2.19	2.00	2.00	1.75	1.88	1.91	1.82	1.71
75 N 0 (Check)	2.16	1.98	2.05	1.75	1.98	1.89	1.85	1.69
unit 500 g/fed.	2.26	2.09	2.11	1.79	2.12	1.92	1.92	1.83
100 N 0 (Check)	2.28	2.17	2.16	1.82	2.06	1.99	2.01	1.87
unit 500 g/fed.	2.33	2.24	2.31	1.90	2.21	2.08	2.11	1.96
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

Table 5. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on Fe (p.p.m) in roots, stems, leaves and fruits of squash plants in 2005 and 2006 seasons.

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Poultry manure								
50N unit	1634	1415	1226	1126	1682	1421	1028	897
75 N unit	1782	1530	1488	1302	1729	1605	1369	1195
100 N unit	1922	1796	1605	1376	1928	1733	1705	1309
L.S.D	117	82	46	88	33	109	166	106
Nitroben								
0 (Check)	1856	1619	1465	1315	1820	1603	1489	1143
500 g/fed.	1703	1542	1415	1221	1740	1570	1245	1124
L.S.D	34	22	47	NS	37	28	91	NS
Interaction								
50 N 0 (Check)	1755	1486	1224	1139	1740	1468	965	788
unit 500 g/fed.	1514	1345	1228	1113	1625	1375	1091	1006
75 N 0 (Check)	1838	1509	1544	1369	1811	1623	1692	1284
unit 500 g/fed.	1726	1551	1432	1235	1648	1587	1046	1107
100 N 0 (Check)	1975	1862	1626	1437	1909	1719	1810	1357
unit 500 g/fed.	1870	1730	1585	1315	1947	1748	1599	1261
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

Table 6. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on Zn (ppm) in roots, stems. leaves and fruits of squash plants in 2005 and 2006 seasons.

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Poultry manure								
50N unit	57.28	71.65	85.55	79.78	78.33	76.88	57.35	61.88
75 N unit	73.78	79.60	100.03	84.28	81.75	102.93	85.50	71.28
100 N unit	103.33	123.85	103.18	91.73	102.73	117.28	108.80	100.40
L.S.D	10.13	3.58	13.15	3.67	6.5	1.05	16.7	8.87
Nitroben								
0 (Check)	78.08	97.20	97.77	85.63	92.90	101.62	84.17	80.00
500 g/fed.	78.17	86.20	94.73	84.88	82.30	96.43	83.60	75.70
L.S.D	NS	3.24	NS	NS	5.66	2.34	NS	NS
Interaction								
50 N 0 (Check)	58.30	84.00	88.70	78.25	79.50	80.65	53.75	64.65
unit 500 g/fed.	56.25	59.30	82.40	81.30	77.15	73.10	60.95	59.10
75 N 0 (Check)	76.05	86.55	108.50	84.90	86.00	104.15	82.30	71.65
unit 500 g/fed.	71.50	72.65	91.55	83.65	77.50	101.70	88.70	70.90
100N 0 (Check)	99.90	121.05	96.10	93.75	113.20	120.05	116.45	103.70
unit 500 g/fed.	106.75	126.65	110.25	89.70	92.25	114.50	101.15	97.10
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

Table 7. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on Mn (p.p.m) in roots, stems, leaves and fruits of squash plants in 2005 and 2006 seasons.

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Poultry manure								
50N unit	251.50	104.00	152.75	50.75	243.75	76.16	95.75	45.25
75 N unit	282.75	119.50	167.25	55.04	264.75	87.25	134.00	55.25
100 N unit	378.25	135.50	180.50	66.25	314.50	94.25	146.75	58.75
L.S.D	2.24	11.35	7.87	3.44	14.55	4.50	8.40	2.36
Nitroben								
0 (Check)	310.83	120.17	169.67	57.52	273.67	86.33	131.33	55.33
500 g/fed.	297.50	119.17	164.00	57.17	275.00	85.44	119.67	50.83
L.S.D	3.05	NS	1.58	NS	NS	NS	6.67	NS
Interaction								
50 N 0 (Check)	225.50	112.00	157.00	44.00	250.00	74.00	98.50	46.50
unit 500 g/fed.	277.50	96.00	148.50	57.50	237.50	78.32	93.00	44.00
75N 0 (Check)	352.50	112.00	166.50	59.07	247.50	92.00	140.50	56.00
unit 500 g/fed.	213.00	127.00	168.00	51.00	282.00	82.50	127.50	54.50
100N 0 (Check)	354.50	136.50	185.50	69.50	323.50	93.00	155.00	63.50
unit 500 g/fed.	402.00	134.50	175.50	63.00	305.50	95.50	138.50	54.00
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

Table 8. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on Cu (p.p.m) in roots, stems, leaves and fruits of squash plants in 2005 and 2006 seasons.

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Poultry manure								
50N unit	21.25	14.75	17.00	15.00	34.25	8.75	15.00	13.75
75 N unit	23.50	18.25	22.25	18.00	35.75	12.50	28.00	15.00
100 N unit	40.00	25.00	37.75	20.00	37.00	24.73	29.75	18.00
L.S.D	2.04	2.77	3.44	1.73	NS	1.57	1.52	0.76
Nitroben								
0 (Check)	29.00	19.17	29.00	17.67	37.50	15.33	24.33	16.17
500 g/fed.	27.50	19.50	22.33	17.67	33.83	15.32	24.17	15.00
L.S.D	NS	NS	6.92	NS	NS	NS	NS	NS
Interaction								
50 N 0 (Check)	23.50	17.00	18.50	16.50	38.00	9.00	14.50	12.00
unit 500 g/fed.	19.00	12.50	15.50	13.50	30.50	8.50	15.50	15.50
75 N 0 (Check)	29.50	17.00	25.00	16.00	36.00	16.00	26.00	13.50
unit 500 g/fed.	17.50	19.50	19.50	20.00	35.50	9.00	30.00	16.50
100 N 0 (Check)	34.00	23.50	43.50	20.50	38.50	21.00	32.50	23.00
unit 500 g/fed.	46.00	26.50	32.00	19.50	35.50	28.45	27.00	13.00
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

Table 9. Effect of poultry manure and nitrogen biofertilizer (Nitroben) on Pb (p.p.m) in roots, stems, leaves and fruits of squash plants in 2005 and 2006 seasons.

Treatments	Roots	Stems	Leaves	Fruits	Roots	Stems	Leaves	Fruits
	2005				2006			
Poultry manure								
50N unit	4.58	3.35	4.48	4.43	4.31	4.93	3.13	3.38
75 N unit	5.98	6.75	5.93	6.23	6.00	7.15	5.80	5.30
100 N unit	6.48	9.74	6.75	7.93	8.30	10.53	7.48	7.13
L.S.D	0.51	1.13	0.55	1.45	1.37	2.23	0.98	1.16
Nitroben								
0 (Check)	5.68	4.98	5.78	7.17	6.29	8.18	4.37	5.78
500 g/fed.	5.67	8.24	5.65	5.22	6.12	6.88	6.57	4.75
L.S.D	NS	NS	NS	NS	0.15	NS	NS	NS
Interaction								
50 N 0 (Check)	3.90	1.20	3.80	4.75	4.06	4.05	2.95	3.55
unit 500 g/fed.	5.25	5.50	5.15	4.10	4.55	5.80	3.30	3.20
75 N 0 (Check)	6.40	8.75	5.95	6.85	5.65	9.40	5.85	5.95
unit 500 g/fed.	5.55	4.75	5.90	5.60	6.35	4.90	5.75	4.65
100 N 0 (Check)	6.75	5.00	7.60	9.90	9.15	11.10	4.30	7.85
unit 500 g/fed.	6.20	14.47	5.90	5.95	7.45	9.95	10.65	6.40
L.S.D	NS	NS	NS	NS	NS	NS	NS	NS

reach the 5% level of significance. The effect of biofertilizer on Pb was significant only in roots in the second season. **(Table 9)**.

Generally, we can report that using biofertilizer reduced the heavy metals in the different squash plants tissues. The results are in accordance with those obtained by **Deokar and Sawant (2002) and Awad and Khalil (2003).**

Effect of the interaction

Data in **Tables (4, 5, 6, 7 and 8)** revealed that the interaction between different rates of poultry manure and nitroben biofertilizer had no significant effects on Fe, Zn, Mn, Cu and Pb in roots, stems, leaves and fruits in the two seasons of study. These results were true in the two seasons of study.

CONCLUSION

Using 100 N units from poultry manure with nitrogen biofertilizer gave the highest vegetative growth characters, yield and quality. In addition, using nitrogen biofertilizer increased nitrogen percentage and reduced the heavy metals in squash tissues.

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مجلة اتحاد الجامعات العربية
للعلـــــوم الزراعيـــــة
جامعة عين شمس ، القاهـــرة
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تأثير سماد الكتكوت وسماد النيتروبين الحيوى على النمو والمحصول والجودة والتركيب الكيميائى لنباتات الكوسة

[٣٧]

عبد المحسن محمود البسيونى[١] زكريا فؤاد فوزى[١] - سعيد عبد الحليم صالح[٢]

١. قسم بحوث الخضر- المركـز القومى للبحـوث- الدقـى- القاهـرة - مصـــــر

٢. قسم تكنولوجيا الحاصلات البستانية - المركز القومى للبحوث- الدقى- القاهرة- مصر

أجريت تجربتان حقليتان فى منطقة بنها (محافظة القليوبية) خلال الموسم الصيفي لعامي ٢٠٠٥ و٢٠٠٦ لدراسة تأثيرمعدلات مختلفة من سماد الكتكوت (٥٠، ٧٥، ١٠٠ وحدة نيتروجين للفدان) وإستخدام السماد الحيوى النيتروبين على النمو والمحصول والجودة والتركيب الكيميائى لنباتات الكوسة.

وقد اوضحت النتائج أن استخدام ١٠٠ وحدة نيتروجين للفدان سماد دواجن أعطت أعلى نمو خضـرى ومحصول وجودة نباتات الكوســة. كمـا أن استخدام ١٠٠ وحدة نيتروجين للفدان سماد دواجن أدى إلى زيادة نسبة النيتروجين والعناصر الثقيلة فـى جذور وسيقان وأوراق وثمار نباتات الكوســـة.

استخدام سماد النيتروبين الحيوى أعطى أعلى نمو خضرى ومحصول وجودة ونسبة النيتروجين كما أدى إلى تقليل العناصر الثقيلة فى جذور و سيقان و اوراق وثمار نباتات الكوسة.

تحكيم: ا.د إبراهيم إبراهيم العكش ا.د سيد محمود سنجر