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EFFECT OF ORGANIC AND MINERAL NITROGEN FERTILIZERS COMBINATIONS ON DRY WEIGHT, MINERALS UPTAKE AND YIELD OF TOMATO GROWN IN SANDY SOIL

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ABSTRACT: This work was carried out during the two winter seasons of 1999- 2000 and 2000- 2001, at El-Khattara Experimental Farm, Fac. Agric., Zagazig University, to study the effect of four nitrogen levels, i.e., 60, 90, 120 and 150 kg N/fed. either as organic N or as mineral N or as combinations of them on dry weight, minerals uptake and yield of tomato under sandy soil conditions.

Fertilization of tomato plants with 120 and 150 kg N when applied as 50% FYM + 50% N ($20m^3$ + 60kgN and $25m^3$ + 75kg N/fed.) and 25% FYM + 75% N ($10m^3$ + 90kg N and 12.5 m^3 + 112.5 kg N/fed.), respectively, gave the highest yield of dry weight, total uptake of N, P and K by tomato plants and yield per plot and per feddan, expect that with 120 kg N (25% FYM + 75% N) in the 2nd season which gave relatively low yield.

Key words: tomato, farmyard manure (FYM), nitrogen, dry weight, minerals uptake, yield.

INTRODUCTION

Tomato (*Lycopersicon esculentum* , Mill.) is one of the major and most important vegetable crops in Egypt. Recently, a great attention has been directed towards using of the organic fertilizers (FYM), in order to reduce plant and soil contaminations and to improve the fertility of sandy soil.

Recently, under sandy soil conditions, using organic or mineral nitrogen fertilizer each alone, was not satisfactory to improve the productivity, and did not give the economic yield of tomatoes.

Under sandy soil conditions, increasing mineral nitrogen fertilizer from 100 or 120 to 138 kg

N / *fed* increased the dry weight, and yield of tomato (El-Beheidi *et al.*,1990; Merghany,1997; El-Robae, 2003). Increasing farmyard manure up to 40 m^3 / *fed* increased dry weight and yield of tomato (Fattahallah, 1992 a and b).

However, the combination between farmyard manure (FYM) and mineral nitrogen fertilizer has been found to increase tomato dry weight (Abd-Allah *et al.*, 2001), number of fruits / plant (Kumaran *et al.*, 1998), and total yield (Gianquinto and Borin, 1990; Trpevski *et al.*, 1992 ; Alexiev *et al.*, 1997; Duraisamy *et al.*, 1999 ; Youssef *et al.*, 2001).

The combination treatment of organic and mineral nitrogen fertilizers, to improve the productivity of the tomatoes and to reduce the plant contaminations by reducing the inputs of N- mineral, would be considered. Therefore the objective of this work was to study the effect of combination between farmyard manure and mineral nitrogen fertilizer on the dry weight, minerals uptake and yield of tomato under sandy soil conditions.

MATERIALS AND METHODS

This work was carried out during the two winter seasons of 1999 – 2000 and 2000 – 2001, at El-Khattara Experimental Farm, Fac. Agric., Zagazig University, to study the effect of the combination treatments of farmyard manure and mineral nitrogen fertilizer on dry weight, minerals uptake and yield of tomato under sandy soil conditions.

The physical and chemical properties of the experimental soil were 96.23 and 95.72 % sand, 2.46 and 2.15% silt, 1.31 and 2.13% clay, 8.01 and 7.96 pH, 2.11 and 1.99 EC (dsm^{-1}), 1.35 and 1.46% organic matter, 0.12 and 0.13% total N, 13.85 and 14.23 ppm available N, 13.16 and 13.44 ppm available P, and 70.92 and 66.15 ppm available K, in the first and the second season, respectively.

Table1. Total N % in farmyard manure (FYM)

Seasons	1999-2000	2000-2001
Total N%	0.88	0.86
Total N units in m^3 (336 kg)	2.96	2.89

This study included four nitrogen levels; i.e., 60, 90, 120 and 150 kg N / *fed* Nitrogen levels were added as mineral N using ammonium sulphate, (20.5 % N), organic N using FYM; and as a combination between organic and mineral N forms.

The studied treatments were 21 as follows:

100% N as (FYM)+ 0% mineral N:

1. 20 m^3 FYM / fed (60 kg N).
2. 30 m^3 FYM / fed (90 kg N).
3. 40 m^3 FYM /fed (120 kg N).
4. 50 m^3 FYM /fed (150 kg N).

75% N as (FYM)+25 % mineral N:

5. 15m^3 FYM +15 kg N / fed (60 kg N).
6. 22.5m^3 FYM+22.5 kg N/ fed (90 kg N).
7. 30m^3 FYM + 30 kg N / fed (120 kg N).
8. 37.5m^3 FYM+37.5 kg N /fed(150 kg N).

50% N as (FYM) + 50% mineral N:

9. 10m^3 FYM + 30 kg N / fed (60 kg N).
10. 15m^3 FYM + 45 kg N / fed (90 kg N).
11. 20m^3 FYM + 60 kg N / fed (120 kg N).
12. 25m^3 FYM + 75 kg N / fed (150 kg N).

25% N as (FYM) + 75% mineral N :

13. 5 m^3 FYM + 45 kg N/ fed (60 kg N).
14. 7.5m^3FYM +67.5kg N/ fed (90 kg N).
15. 10 m^3 FYM + 90 kg N/ fed (120 kg N).
16. 12.5m^3 FYM +112.5kgN/ fed (150 kg N).

100% mineral N :

17. 60 kg N/ fed.
18. 90 kg N/ fed.
19. 120 kg N/ fed.
20. 150 kg N/ fed.
21. Control (without organic and mineral N).

These treatments were arranged in a randomized complete blocks design with three replications. Plot area was 21m^2. It contained two dripper lines, each of 7m length and 1.5m wide, and the distance between dippers was 50 cm. Seedlings were transplanted at 50 cm apart. Plants of the 1st line were used to measure vegetative growth and for chemical analysis, meanwhile plants of the 2nd line were used for yield determination.

Super Marmand cultivar was used and supplied by the Egyptian Company of Seeds, Oils and Chemicals (Cairo). Tomato seeds were sown on September, 1st in 1999 and 2000 and transplanted into the field on October 10th and 17th , 1999 and 2000, respectively.

Farmyard manure (FYM) was added at the time of soil preparation. The source of mineral nitrogen fertilizer was ammonium sulphate (20.5% N). Amount of the mineral nitrogen was divided into eight equal portions and weekly applied starting from 15 days after transplanting.

All experimental units received equal amounts of P and K fertilizers at the rates of 450kg calcium superphosphate (15.5% P_2O_5) and 200kg potassium sulphate (48% K_2O)/*fed*, respectively. One third of P and K fertilizers were added with FYM at the time of soil preparation. The other two thirds were divided into three equal portions and added every fortnight. The first portion was added after 30 days from transplanting.

The other normal agricultural treatments of growing tomato plants were practiced.

Data recorded

1. Plant growth

A random sample of three plants from every plot was taken at 80 days after transplanting and the dry weight of different plant parts; i.e., roots, stems and leaves were dried at 70°C, till constant weight.

2. Minerals contents

The dry weight of different plant parts were finely ground and wet digested using sulfuric acid and perchloric acid (3:1). Nitrogen, Phosphorus and Potassium were determined, only in 2000/2001 season, on the basis of dry weight, according to the methods described by Bremner and Mulvaney (1982), Olsen and Sommers (1982) and Jackson (1974), respectively. Minerals uptake were calculated on dry weight basis.

3.Yield and its components

Fruits of each plot were harvested weekly at full-ripe maturity stage, then counted, weighed and the following data were calculated.

1. Total number of fruits/plot
2. Average fruit weight (gm)
3. Yield/plot (kg) and */fed* (ton).

Statistical analysis

The obtained data were subjected to the analysis of variance according to Snedecor and Cochran (1967). Means separation was done using LSD at 0.05 level probability.

RESULTS AND DISCUSSION

1. Plant growth

Data in Tables 2 and 3 show significant differences, in the dry weight of tomato roots, leaves, and stems and total dry weight/plant, among the 21 studied treatments, in the two growing seasons.

Application of N, irrespective of the level or source used, significantly, increased the dry weight of roots, leaves and stems/ plant as well as total dry weight/ plant compared to the control. Comparisons among the four N

levels applied as FYM or mineral N alone, within each of the studied growth parameter, generally, indicated that increasing N level depressed roots, leaves, stems and total dry weights/plant. Application of N, irrespective of the level used, as a combination between FYM and mineral N, irrespective of the ratio between them, generally, attained heavier dry weight for the different plant parts than the sole application of FYM or mineral N. It was , also, obvious that, the dry weights of the various plant parts and total dry weight / plant were the heaviest as a results of addition 150 kg N/*fed* to the grown tomato plants as FYM and mineral N in a ratio of 25: 75%, orderly.

These results indicated that application of nitrogen fertilizer as mineral N to sandy soil with high rates (beyond 90 kg N) may be leached and /or had deleterious effect on tomato D.W. yield, even when applied through eight equal doses. The benefical effect was found with 60 and 90 kg N/feddan. El-Beheidi *et al.* (1990) and El-Robae (2003) found that the best fertigation N level for tomato D.W. in sandy soil was 100 and 120 kg N/feddan, respectively. The results also revealed that using moderate amount of FYM (20 or 30 m^3) had a considerable effect on tomato D.W. Moreover, such effect, from moderate FYM amounts; i.e., 20 and 25 m^3 and 10 or 12.5 m^3 could be elevated by using 60 or 75, and 90 or 112.5 kg N, respectively. Fattahallah (1992a) found that FYM at 40 m^3 / *fed* increased total dry weight / plant of tomato compared with the control. Since FYM is a soil conditioner, it also needs mineral N for N-fixing bacteria, and those combinations would be fruitful, when using 150 kg N from those combination treatments.

The obtained results agree with those reported by Abd-Allah *et al.* (2001) on tomato. They found that adding 40m^3 organic fertilizer + 50% NPK increased dry weight of different plant organs of tomato.

2. Nitrogen, phosphorus, and potassium uptake

Data listed in Tables 4 and 5 elearly displayed positive significant effect of N fertilization on the uptake of N, P and K by roots, leaves, stems and whole plant. At 150 kg N *fed* (50% FYM + 50% mineral N), N uptake of roots was the best, nevertheless at 150 kg N / *fed* (25 % FYM + 75% mineral N), N uptake of both leaves and stems as well as whole plant was the greatest. Phosphorus uptake of roots appeared to be the

highest at 60 kg N/*fed* (100% FYM), but at 150 kg N/*fed* (50% FYM + 50% mineral N), P uptake of leaves, stems and whole plant was the maximum. Potassium uptake of roots seemed to be the greatest at 60 kg N/*fed* (100% FYM), but at 150 kg N/*fed* (25% FYM + 75% mineral N), K uptake of leaves and whole plant was biggest, meanwhile at 120 kg N/*fed* (50% FYM + 50% mineral N), K uptake of stems ranked the 1st.

These results seemed to be in agreement with those reported by Abd El-Hakeem (2003), who found that adding 50% of N as organic form (30 kg N) especially as biogas or chicken manure and 50% of N as mineral N (30 kgN) +PK increased N,P and K uptake of sweet pepper *cv* California Wonder.

Farmyard manure contains microorganisms which release phytohormones necessary for stimulating plant growth, dry matter content and absorption of nutrients (Reynders and Vlassak, 1982). Many types of soil bacteria and actinomycetes have the ability to dissolve complex of inorganic and organic phosphate (Hammad, 1984).

3.Yield and its components

Illustrated data in Tables 6 and 7 show that the effect of various N fertilization treatments on average fruit weight was not significant. However, the reverse was true for number and weight of fruits / plot as well as total yield/ *fed*, in both seasons. The comparisons among the means of different N fertilization treatments demonstrated that the application of 150 kg N *fed* to the growing tomato plants as FYM (50%) and mineral N (50%) was satisfactory and sufficient for the plants to express their best performance on number and weight of fruits / plot and total yield/*fed*. These results were true in the two growing seasons.

These results suggest that the combination treatments of FYM with mineral N (120 or 150 kg N/*fed* as 50% FYM + 50% mineral or 25% FYM + 75% mineral. In other words, these four combination treatments were 20 m^3 FYM + 60 kg N, 25m^3 FYM +75 kg N, 10 m^3 FYM + 90 kg N, and 12.5 m^3 FYM + 112.5 kg N) improved all plant traits and its productivity. Such treatments represent a reduction in the use of FYM which is costly managed, and also represent a reduction in the use of N mineral in the three former treatment, out of the four ones.

Similar results were reported by Gianquinto and Borin (1990),

Alexiev *et al.* (1997), Duraisamy *et al.* (1999), and Youssef *et al.* (2001). They found that using organic manure (FYM) in combination with chemical fertilizers (NPK) increased tomato yield compared with FYM or NPK alone. However, FYM at $40m^3$ / *fed* increased total yield of tomato compared to untreated control (Fattahalla , 1992b)

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Table 2. Effect of the combination between organic and mineral nitrogen fertilizers on dry weight of tomato plants, in 1999/2000 season

N % from FYM + Mineral	N amount from FYM+N (m^3)(units)	Dry weight (gm) / plant			
		Roots	Leaves	Stems	Total
100% + 00%	20 + 0	2.72	14.60	12.35	29.68
	30 + 0	2.39	14.16	11.44	27.99
	40 + 0	2.35	13.95	11.38	27.68
	50 + 0	1.92	13.09	10.61	25.63
75% + 25%	15+15	3.41	17.25	12.56	33.23
	22.5+22.5	3.82	20.39	16.21	40.42
	30+30	4.70	24.68	18.33	47.72
	37.5+37.5	4.56	24.00	18.22	46.78
50% + 50%	10 + 30	4.17	24.86	18.49	47.52
	15 + 45	4.75	24.87	21.40	51.03
	20 + 60	5.32	29.97	21.70	56.99
	25 + 75	5.38	33.11	24.02	62.51
25% + 75%	5 + 45	3.58	25.67	18.60	47.86
	7.5+67.5	4.13	28.52	19.45	52.10
	10+90	5.35	29.59	22.20	57.14
	12.5 +112.5	5.16	33.20	25.27	63.64
00% + 100%	0 + 60	3.71	20.47	18.72	42.90
	0 + 90	2.96	18.66	15.36	39.99
	0 +120	2.68	17.80	14.52	35.01
	0 +150	2.56	14.94	12.85	30.36
Control	0 + 0	1.43	9.65	9.13	20.21
LSD at 0.05 level		0.84	2.77	2.23	4.18

Table 3. Effect of the combination between organic and mineral nitrogen fertilizers on dry weight of tomato plants, in 2000/2001 season

N % from FYM + Mineral	N amount from FYM+N (m^3) (units)	Dry weight (gm) / plant			
		Roots	Leaves	Stems	Total
100% + 00%	20 + 0	5.08	20.26	19.37	44.71
	30 + 0	4.56	17.89	13.31	35.76
	40 + 0	3.44	12.59	11.24	27.27
	50 + 0	2.63	11.38	8.65	22.67
75% + 25%	15+15	2.71	22.14	14.75	39.60
	22.5+22.5	3.43	22.40	14.90	40.73
	30+30	3.23	22.90	15.49	41.62
	37.5+37.5	2.57	23.00	15.23	40.80
50% + 50%	10 + 30	3.17	20.60	20.30	44.07
	15 + 45	4.15	22.33	22.00	48.48
	20 + 60	4.28	24.75	25.98	55.01
	25 + 75	5.30	26.54	25.01	56.85
25% + 75%	5 + 45	3.20	21.33	19.69	44.22
	7.5+67.5	4.87	21.52	19.93	46.32
	10+90	4.51	23.41	26.55	54.48
	12.5 +112.5	4.56	27.55	25.81	57.92
00% + 100%	0 + 60	3.01	19.00	17.95	39.96
	0 + 90	5.28	18.94	16.83	41.05
	0 +120	4.14	17.83	15.37	37.34
	0 +150	3.99	17.53	13.35	34.87
Control	0 + 0	1.37	8.93	8.43	18.74
LSD at 0.05 level		0.89	3.00	2.58	4.38

Table 4. Effect of the combination between organic and mineral nitrogen fertilizers on uptake of N, P and K (mg /plant) by roots, leaves and stems of tomato plants , in 2000 / 2001 season

N % from FYM + Mineral	N amount from FYM + N (m^3) (units)	Roots uptake			Leaves uptake			Stems uptake		
		N	P	K	N	P	K	N	P	K
100% + 00%	20 + 0	120.2	28.1	45.5	680.5	147.8	672.2	578.9	109.4	973.5
	30 + 0	126.4	20.1	31.5	600.9	125.5	650.4	442.1	79.8	607.8
	40 + 0	88.6	14.4	23.6	454.3	83.2	556.7	420.2	67.1	445.3
	50 + 0	73.3	11.7	19.6	380.4	77.0	486.1	283.8	51.0	383.4
75% + 25%	15 + 15	53.5	10.7	19.9	630.5	161.6	818.7	486.1	81.1	671.2
	22.5 + 22.5	87.1	15.1	27.6	705.8	138.4	710.9	519.8	81.9	690.9
	30 + 30	82.1	16.0	26.4	843.1	156.3	956.7	524.3	92.7	682.3
	37.5 + 37.5	85.3	12.5	21.7	898.1	147.6	911.2	598.8	94.8	683.6
50% + 50%	10 + 30	85.9	10.6	25.1	801.3	132.0	969.0	660.1	92.1	774.6
	15 + 45	96.1	11.5	31.4	818.5	117.4	924.7	783.6	91.7	984.5
	20 + 60	129.5	15.2	37.5	876.3	147.0	1209.7	887.4	115.8	1128.0
	25 + 75	165.9	18.3	43.2	971.6	173.3	1238.8	863.8	121.7	1082.6
25 % + 75%	5 + 45	90.8	11.7	22.6	718.3	127.3	1025.5	750.7	99.6	824.2
	7.5 + 67.5	125.7	16.4	32.6	743.7	120.2	1045.4	772.0	85.8	925.9
	10 + 90	106.6	15.7	35.3	816.7	152.8	1273.0	973.0	123.9	1094.6
	12.5 +112.5	136.0	15.3	33.4	1013.5	152.0	1381.3	931.4	109.9	1015.3
00% + 100%	0 + 60	90.1	11.6	22.7	606.4	100.8	538.8	696.4	81.4	575.4
	0 + 90	153.9	20.1	35.8	517.8	96.0	498.5	609.0	67.3	548.8
	0 + 120	109.9	17.7	27.2	591.4	107.8	579.8	559.4	65.9	433.5
	0 + 150	121.7	17.1	29.4	606.1	89.5	477.8	543.6	57.8	532.5
Control	0 + 0	35.3	4.1	9.1	251.5	48.4	330.2	295.6	33.7	202.7
LSD at 0.05 level		38.5	5.8	15.2	191.9	31.3	181.0	186.0	22.9	276.9

Table 5. Effect of the combination between organic and mineral nitrogen fertilizers on total N, P and K uptake of tomato plants, in 2000/2001 season

N % from FYM + Mineral	N amount from FYM+N (m^3) (units)	Total uptake (mg/plant)		
		N	P	K
100% + 00%	20 + 0	1379.8	285.3	1691.2
	30 + 0	1169.4	225.4	1289.7
	40 + 0	963.1	164.7	1025.6
	50 + 0	737.5	139.7	889.1
75% + 25%	15+15	1170.1	253.4	1509.8
	22.5+22.5	1312.7	235.4	1429.4
	30+30	1449.5	265.0	1665.4
	37.5+37.5	1582.2	254.9	1616.5
50% + 50%	10 + 30	1548.1	234.7	1768.7
	15 + 45	1698.2	220.6	1940.6
	20 + 60	1893.2	278.0	2375.3
	25 + 75	2001.3	313.3	2364.6
25% + 75%	5 + 45	1559.8	238.6	1872.3
	7.5+67.5	1641.4	222.4	2003.9
	10+90	1896.3	292.4	2402.9
	12.5 +112.5	2080.9	277.2	2430.0
00% + 100%	0 + 60	1392.9	193.8	1136.9
	0 + 90	1280.7	183.4	1083.1
	0 +120	1260.7	191.4	1040.5
	0 +150	1271.4	164.4	1039.7
Control	0 + 0	582.4	86.0	542.0
LSD at 0.05 level		289.0	47.8	402.8

Table 6. Effect of the combination between organic and mineral nitrogen fertilizers on average fruit weight, fruit number, total yield per plot and per feddan of tomato plants, in 1999 / 2000 season

N % from FYM + Mineral	N amount from FYM+N (m^3)(unit)	Fruit weight (gm)	Number of fruits /plot	Total yield (kg) /plot	Total yield (ton/fed)
100% + 00%	20 + 0	70.33	292.19	20.550	8.220
	30 + 0	72.00	297.77	21.440	8.576
	40 + 0	72.33	303.47	21.950	8.780
	50 + 0	67.00	300.44	20.130	8.052
75% + 25%	15 +15	67.66	318.94	21.580	8.632
	22.5 +22.5	74.33	340.64	25.320	10.128
	30 +30	72.66	372.14	27.040	10.816
	37.5 +37.5	68.66	396.88	27.250	10.900
50% + 50%	10 + 30	71.66	402.45	28.840	11.536
	15 + 45	71.00	398.02	28.260	11.304
	20 + 60	68.66	442.76	30.400	12.160
	25 + 75	69.33	465.02	32.400	12.896
25% + 75%	5 + 45	71.66	373.15	26.240	10.496
	7.5 +67.5	71.66	379.29	27.180	10.872
	10 +90	70.33	434.66	30.570	12.228
	12.5+112.5	72.66	456.09	33.140	13.256
00% + 100%	0 + 60	72.33	357.52	25.860	10.344
	0 + 90	70.33	316.79	22.280	8.912
	0 +120	73.66	297.04	21.880	8.752
	0 +150	72.66	250.48	18.200	7.280
Control	0 + 0	68.00	206.32	14.030	5.612
LSD at 0.05 level		NS	52.89	3.328	1.331

Table 7. Effect of the combination between organic and mineral nitrogen fertilizers on average fruit weight, fruit number, total yield per plot and per feddan of tomato plants, in 2000/2001 season

N % from FYM + Mineral	N amount from FYM+N (m^3)(unit)	Fruit weight (gm)	Number of fruits /plot	Total yield (kg)/plot	Total yield (ton/ fed)
100% + 00%	20 + 0	72.00	311.94	22.460	8.984
	30 + 0	74.00	311.62	23.060	9.224
	40 + 0	70.66	347.43	24.550	9.820
	50 + 0	69.66	309.24	21.440	8.576
75% + 25%	15 +15	69.66	315.96	22.010	8.804
	22.5 +22.5	72.00	326.94	23.540	9.416
	30 +30	72.00	350.27	25.220	10.088
	37.5 +37.5	74.00	346.69	25.770	10.308
50% + 50%	10 + 30	70.00	358.33	25.320	10.128
	15 + 45	70.00	355.14	24.860	9.944
	20 + 60	68.66	416.69	28.610	11.444
	25 + 75	72.66	420.45	30.550	12.220
25% + 75%	5 + 45	70.66	356.49	25.190	10.076
	7.5 +67.5	70.33	364.14	25.610	10.224
	10 +90	69.33	395.06	27.390	10.956
	12.5+112.5	71.00	409.57	29.080	11.632
00% + 100%	0 + 60	73.33	306.83	22.500	9.000
	0 + 90	73.66	297.99	21.950	8.780
	0 +120	73.66	289.16	21.300	8.520
	0 +150	72.33	290.88	21.040	8.416
Control	0 + 0	72.66	228.59	16.610	6.644
LSD at 0.05 level		NS	83.00	4.703	1.232

تأثير توليفات من السماد النيتروجيني العضوى والمعدنى على الوزن الجاف، والممتص من العناصر، ومحصول الطماطم النامية فى الأراضي الرملية

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آجرى هذا البحث خلال شتاء موسمي ١٩٩٩ – ٢٠٠٠ و ٢٠٠٠-٢٠٠١ بمزرعة البحوث الزراعية بالخطارة ، والتابعة لكلية الزراعة – جامعه الزقازيق لدراسة تأثير ٤ مستويات من النيتروجين هى : ٦٠ ، ٩٠ ، ١٢٠ أو ١٥٠ كجم/ فدان على صورة نيتروجين عضوي أو نيتروجين معدني أو توليفات بينهم على الوزن الجاف، والممتص من العناصر، والمحصول فى الطماطم تحت ظروف الاراضى الرملية .

وأظهرت النتائج أن تسميد نباتات الطماطم بمعدل ١٢٠ و ١٥٠ كجم نيتروجين على صورة ٥٠% سماد بلدي + ٥٠ % سماد معدني (٢٠ م٣ سماد بلدى + ٦٠ كجم نيتروجين معدنى و ٢٥ م٣ سماد بلدى + ٧٥ كجم نيتروجين معدنى / فدان) وكذلك على صورة ٢٥ % سماد بلدى + ٧٥ % سماد معدنى (١٠م٣ سماد بلدى + ٩٠ كجم نيتروجين معدنى و٥ ر١٢ م٣ سماد بلدى + ٥ر١١٢ كجم نيتروجين معدنى / فدان) على التوالى أدت إلى زيادة الوزن الجاف الكلى للنبات، والممتص الكلى من النيتروجين والفوسفور والبوتاسيوم بواسطة نبات الطماطم، ومحصول الوحدة التجريبية ومحصول الفدان، فيما عدا تسميد الطماطم بمعدل ١٢٠ كجم نيتروجين / فدان (٢٥% سماد بلدى + ٧٥ % سماد معدنى) فى الموسم الثانى حيث أعطى محصول أقل نسبياً .