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EFFECT OF DIFFERENT FORMS OF NITROGEN ON TOMATO PRODUCTION AND SOME SANDY SOIL PROPERTIES

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ABSTRACT

The effect of organic nitrogen (compost added at 30 m3/fed., chicken manure at 20 m3/fed.) and inorganic nitrogen (calcium nitrate, ammonium sulphate added at 100, 150 and 200 kg/fed. For all them) on the production of tomato (Vr. Bacar) and some soil properties of sandy soil was evaluated through a field experiment using a complete randomized blocks design at El-Ferdan area, El-Ismalyia governorate. Results showed that the inorganic materials led to the best results of plant growth and yield of tomato where the calcium nitrate treatment at 200 kg/fed. gave the maximum value of plant growth parameters and fruit yield of tomato followed by ammonium sulphate, while the organic materials gave the minimum effect. The treatment of 20 m3/fed. chicken manure was more effective than 30 m3/fed. compost for the later one.

On the other hand, the best results for soil properties were obtained by organic materials application, where the chicken manure treatment exhibited the highest value of organic matter, total porosity and available N, P and K, while gave the lowest values for pH, ESP and B.d. followed by compost treatment.

Keywords: nitrogen forms, tomato, sandy soil

INTRODUCTION

Tomato is considered one of the major vegetable crops which plays an important role in the Egyptian National Income. On the other hand, sandy soil characterized by being well treated, low organic matter content and low fertility and the exchangeable capacity is low. Organic and inorganic have materials been used as a means to increase soil fertility and crop production. Reichbuch *et al.,* 1989, stated that the application of organic and inorganic fertilizers led to increase in potato yield and improving soil structure factor . Organic material additivites are the only safe mean of adding nitrogen and the other most important nutrients until development of chemical fertilizers production and distribution. Trehan, 1995 showed that application of cattle sulurry gave higher dry matter in potato yields than the equivalent amount of ammonium sulphate. Born and Magrini, 1989, stated that, N efficiency was greatest when plants were given N in both mineral and organic forms.

Omar, 1990 showed effects of applying farmyard manure (FYM) on soil aggregates under potato production in loamy alluvial soil, the effect of organic matter content in FYM was highly positive and significant on soil aggregation, but the effect on dispersion ratio was highly negative and significant.

The objective of this work is to study the influence of different organic materials application on tomato yield and some sandy soil properties compared with mineral nitrogen fertilizers.

MATERIALS AND METHODS

A field experiment was conducted in a sandy soil at El-Ferdan village, El-Ismalyia governorate to study the effect of different organic materials on soil properties and tomato production compared with mineral nitrogen fertilizers. Both soil, compost and chicken manure analyses were carried out according to Black *et al.*, 1982 as shown in Table (1 & 2). The experiment design was a randomized complete block with three replicates, the plot area was 10 x 10.5 m2 (1/40 fed.).

Table (1): Some physical and chemical properties of the investigated soil (0-30 cm layer).

A : The physical estimations

Sand %		Slit + Clay %	$CaCO_3$ %	O.M %	B.d g./cm^3	Total porosity %	Hydraulic conductivity (K) cm/h
Coarse	Fine						
56.52	36.07	7.41	6.15	0.58	1.70	36.00	31.50

B: The chemical estimations.

E.C	pH 1:2.5 susp	Cations meq/100 g soil				Anions meq/100 g soil				CEC meq/100g Soil	ES meq/100g soil	ESP %
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3	Cl^{-}	$SO_4^{=}$			
2.65	8.05	4.39	1.64	8.08	0.41	-	0.61	5.09	8.78	8.78	1.17	12.18

Table (2) : Compost and chicken manure analyses.

Property	Compost	Chicken manure
Moisture content %	36.2	15
PH	6.15	6.0
EC (mmhos/cm)	10.62	7.50
O.M %	32.57	60
Total N %	1.21	3.50
Total P %	0.47	1.30
Total K %	0.80	0.55
Ca++ %	1.50	5.85
Mg++ %	0.14	0.40
Fe (ppm)	15068	10000
Mn (ppm)	598	100
Zn (ppm)	65	1000
Cu (ppm)	37	200

The treatments were :

A- Organic materials at rate

30 m3 compost /feddan.

20 m3 chicken manure/ feddan.

The analyses of compost and chicken manure in Table (2).

B- Mineral applications.

Ammonium sulphate [$(NH_4)_2SO_4$] at rates 100, 150 and 200 kg/feddan.

Calcium nitrate [$Ca(NO_3)_2$] at rates 100, 150 and 200 kg/feddan

C- Control (without application).

The studied yield was tomato (Vr. Bacar). The organic materials (compost and chicken manure) were added before agriculture, while the mineral application were added in equal portions at many times during growth season. The date of sown was 15^{Th} July, 2000. At harvest, the weight of tomato fruit yield of each plot were recorded. Representative surface soil samples (0-30 cm depth) were collected before tomato sowing and after harvesting to determine certain physical and chemical characteristics (Black *et al.*, 1982). Analysis of variance was achieved according to Snedecor and Cochran (1971).

RESULTS AND DISCUSSION

1- Effect of different treatment on soil properties.

1.a. The effect on some soil chemical properties and fertilizers.

Data of Table (3) show the application of organic materials (compost and chicken manure) led to marked decrease in soil pH values, where the values decreased from 8.05 in control treatment to 7.15 and 7.05 for compost and chicken manure additions respectively. A little decrease for pH values was found by using ammonium sulphate [$(NH_4)_2SO_4$] or calcium nitrate [$Ca(NO_3)_2$]

A slight increase was noticed in the EC values as a result of using organic materials, while the application of mineral materials (ammonium sulphate and calcium nitrate) was no effect on soil salinity. The obtained data of exchangeable sodium percentage (ESP) as shown in Table (3) reveal that the values decreased with using all treatments (organic and inorganic), but the addition of compost and chicken manure gave the maximum effect, Concerning the effect on soil organic matter, it is noticed that the values significant increased with application compost or chicken manure, when the values increased from 0.58 % to 1.18% and 1.22% for compost and chicken manure respectively. The effect of ammonium sulphate and calcium nitrate on soil content of organic matter was slightly effect compared with the effect of compost and chicken manure. This result may be attributed to the high content of organic matter.

Regarding to the effect on N, P and K soil content, data in Table (3) show that all treatments led to increase N, P and K for treated soil. Organic materials gave the high increase , where the chicken manure treatment led to the maximum value for N, P and K nutrient followed by compost treatment.

Table (3): Effect of different treatments on some investigated soil properties.

Treat.	pH	EC	ESP %	O.M %	B.d g/cm^3	T.P %	K cm/h	Available (ppm) N	P	K
Control	8.00	2.64	12.03	0.62	1.72	35.09	30.15	27.00	6.72	208.51
Compost	7.15	2.68	11.08	1.18	1.54	41.89	26.50	28.58	7.69	215.80
Chicken manure	7.05	2.70	10.75	1.22	1.50	43.40	25.78	30.78	7.85	219.32
Am.S.1	8.00	2.65	11.96	0.75	1.70	35.85	29.95	28.01	6.96	212.00
Am.S.2	8.00	2.65	12.01	0.75	1.70	35.85	29.95	28.51	7.01	212.00
Am.S.3	8.00	2.65	11.85	0.74	1.72	35.09	29.95	28.90	7.01	212.00
Ca.N.1	8.01	2.62	11.90	0.70	1.70	35.85	29.96	28.82	7.00	212.00
Ca.N.2	8.01	2.65	11.96	0.70	1.70	35.85	30.00	28.85	7.00	211.80
Ca.N.3	8.02	2.65	11.96	0.70	1.70	35.85	30.00	28.80	6.90	211.00

Where :

Am. S.1= 100 kg $(NH_4)_2SO_4$/fed. **Ca.N.1= 100 kg $Ca(NO_3)_2$/fed.**
Am. S.2= 150 kg $(NH_4)_2SO_4$/fed. **Ca.N.2= 150 kg $Ca(NO_3)_2$/fed.**
Am. S.3= 200 kg $(NH_4)_2SO_4$/fed. **Ca.N.3= 200 kg $Ca(NO_3)_2$/fed.**

1.b.The effect on some physical properties:

The results are shown in Table (3) indicate that the application of organic materials (compost and chicken manure) to investigated soil decreased the values of bulk density (B.d) while total porosity (T.P) values were increased . The values of Bd decreased with 9 and 11% for compost and chicken manure respectively.

In addition, data in the same Table revealed that the values were not effect with inorganic addition (ammonium sulphate and calcium nitrate).

Regarding the effect of different treatments (organic and inorganic) on hydraulic conductivity coefficient (K), the data in Table (3) show that the K values of treated soil decreased with all treatments. The effect of organic materials (compost and chicken manure) on " K " values was more than the effect of inorganic materials [$Ca(NO_3)_2$ and $(NH_4)_2SO_4$]. The decrease of K values of treated soil after organic materials addition could be attributed to the creation of micro pores between sand particles as a results of aggregates formation. These results are in agreement with those of El-Hady, 1979; Awad, 1989.

2- Effect of different treatment on tomato plant growth and yield

2.a. The effect on plant growth

Data recorded in Table (4) showed that, ammonium -N as compared to NO_3-N , has resulted in reduced shoot fresh and dry weight per plant. These weight were increased significantly by increasing substrate NO_3 level but were unaffected by NH_4 rate. The highest values of percentage dry matter (shoot dry wet as a percentage of fresh wet.) was obtained by NO_3 nutrient with significant difference compared to the other form which significantly did not exert any difference by N level . The obtained results are a good agreement with those of several investigators who indicated that shoot fresh and dry weight of plant as an indicator for plant growth exhibited a positive response towards NO_3-N nutrition as compared with ammonium-N. The highest dry matter was achieved with increasing N rates to plants treated with NO_3-N. (Pill and Lambeth, 1977; Huett and Dettman,1988 and Ruiz and Romero, 1998).

Table (4): The effect of different treatments application on the Tomato plant growth parameters.

Treatment	Rate (kg N/fed.)	Plant growth											
		Shoot fresh wt.(g)				Shoot dry wt. (g)				Leave dry matter (%)			
		R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Control	-	256	260	255	257	20.00	20.00	23.00	21.00	8.25	8.11	8.15	8.17
Compost	30 m^3/f	450	452	460	454	42.50	41.70	40.60	41.60	9.30	9.20	9.00	9.17
Chicken Manure	20 m^3/f	465	470	474	470	46.60	47.00	45.60	46.50	9.55	9.60	9.40	10.52
$Ca(NO_3)_2$	100	585	580	575	580	71.00	70.58	70.79	70.79	12.30	12.10	12.23	12.21
	150	672	682	680	678	96.00	95.00	95.23	95.41	13.80	14.11	14.30	14.07
	200	862	875	873	870	128.0	130.0	135.0	131.0	15.15	15.10	14.93	15.06
$(NH_4)_2SO_4$	100	500	505	510	505	52.00	51.40	51.55	51.65	10.30	10.20	10.28	10.26
	150	580	572	573	575	60.00	58.00	56.00	58.00	10.10	10.00	10.17	10.09
	200	520	530	528	526	58.00	52.0	55.00	55.00	10.70	10.27	10.40	10.46

L.S.D.			
Form	5 %	4.691	0.266
	1 %	6.376	0.361
Rate	5 %	3.832	0.217
	1 %	5.206	0.295

Regarding to the effect of organic form of nitrogen (compost and chicken manure) on tomato plant growth, Data in Table (4) illustrate that, chicken manure treatment was more than effect on plant growth parameters, where the values increased by 3.1%, 12.3%, 14.7% for fresh weight, dry weight and organic matter respectively compared with compost treatment.

Generally, the inorganic treatments gave the best effect plant growth parameters of tomato plant.

2-b. The effect on number and weight of fruits.

Data presented in Table (5) reflect the influence of N form and rate application on fruit number and weight tomato plant. The statistical comparisons revealed that number of fruit was significantly affected by nitrogen form. Plant fertilizered with NO3-N had the highest number of fruit per plant than those received NH_4-N.

Concerning the effect N rates, the average of fruit number of plant increased significantly as a result of increasing N dose with using NO_3-N. The mean values were 20.33, 29.67, and 30.33 compared with the other N form where the values did not exceed 19.67 fruit per plant. The fruit numbers of plants treated with 150 kg N/feddan as NO3-N was increased by about 46% over those treated with 100 kg N/feddan. There is no significant difference between the second and third rate of NO_3-N application. Moreover, the results showed no marked difference in number of fruits between all N-rates as affected by ammonium form.

Regarding the average fruit weight, the obtained results revealed that N forms different significantly in their effects on this property. The lowest average weight of fruit were recorded when nitrogen was applied in the form of ammonium with significant difference compared to the other one. On the other hand, the average of fruit weight was decreased as a result of increasing nitrogen rate with using NH_4-N , there is no significant difference between the first and second rate of application, where significant decrease was obtained with increasing the rate up to 200 kg N/feddan . In case of using NO_3-N, there is no difference between all N rates. Such a results agreed with that was observed by Pill *et al.*, 1978, on tomato and Hartz *et al.*, 1993, on poppers, who mentioned that ammonium N reduced mean and total fruit weight, and fruit number per plant. Although NH_4-N level was without effect on fruit number and weight, increasing NO_3-N dose increased fruit number per plant.

As occurred with the inorganic treatments [$Ca(NO_3)_2$, $(NH_4)_2SO_4$]. Organic treatments caused an increase in number and weight of tomato fruit but less than inorganic. On the other hand, there is no difference between compost and chicken manure for their effect on the number or weight of tomato fruit .

Table (5): The effect of different treatments application on Tomato fruit number and weight .

Treatment	Rate (kg N/fed.)	Fruit No.(g / plant)				Fruit wt..(g / plant)			
		R1	R2	R3	Mean	R1	R2	R3	Mean
Control	-	9	8	8	8.33	13.00	132.65	171.25	131.30
Compost	30 m^3/f	13	13	15	14.00	146.5	151.7	151.75	149.98
Chicken Manure	20 m^3/f	13	14	14	14.00	150.5	148.8	151.90	150.40
$Ca(NO_3)_2$	100	20	22	19	20.33	182.0	178.75	180.0	180.25
	150	30	29	30	29.67	181.0	178.00	182.14	180.38
	200	32	30	29	30.33	178.2	180.14	182.50	180.28
$(NH_4)_2SO_4$	100	18	19	20	19.00	177.0	178.41	180.00	178.47
	150	21	20	18	19.67	180.0	178.34	175.00	177.78
	200	20	18	20	19.33	160.0	154.00	158.20	157.40

L.S.D.

Form	5 %	0.081	0.438
	1 %	0.110	0.596
Rate	5 %	0.066	0.123
	1 %	0.090	0.150

2.c. The effect on tomato yield

The influence of N form and rate of application on the production of tomato yield is shown in Table (6). The statistical comparisons revealed that tomato yield was significantly affected by N form. The highest yield was recorded with NO_3-N where the commerical yield reached 3664, 5352 and 5468 g/plant compared with NH_4-N where the yield did not exceed 3391, 3497 and 3043 g/plant at the rate of 100, 150, 200 kg/feddan , respectively . The results corroborate the results of Pill and Lambeth, 1977 and Wien and Minotti, 1988 on tomato and Nathan *et al.,* 1989, on snap bean, who found that NO_3 nutrition was better than NH_4-N nutrition and gave significant increase in yield.

The superiority of calcium nitrate as a source of NO3 nutrition may be because the growth of plant is often improved when the plants are nourished with both NO^-_3 and Ca^{++} rather than with NH^+_4 and $SO_4^=$. Calcium as a calcium pectate, is a constituent of the middle lamella and thus contributes to cell-wall stability.

Following the yield of tomato as affected by the different N rate, revealed that higher significant values were concomitant with the highest level of applied as a calcium nitrate. This rotation was not constant with other N form. Increasing the rate of $NH_4(SO_4)_2$ fertilizer up to 200 kg N /feddan resulted in a significant decrease in the yield. This finding agreed with those reported by Wien and Minotti, 1988 and Ahmed and Chudhry, 1990 who found that tomato yield was delayed and decreased at the highest levels of nitrogen used as ammonium sulphate.

The detrimental effect of the high dose of ammonium sulphate fertilizer may be due to the phytotoxicity of ammonium ion to roots due to locally high concentration of NH3 released during the hydrolysis stage and/or the accumulation of nitrate during nitrification process.

Application of organic materials gave the lowest values of tomato yield and there is no difference between compost and chicken manure in their effect on tomato yield.

Table (6): The effect of different treatments application on Tomato fruit yield (kg / feddan).

Treatment	Rate (kg N/fed.)	Yield (g / plant)			
		R1	R2	R3	Mean
Control	-	1430	1420	1431	1427
Compost	30 m^3/f	2250	2282	2275	2269
Chicken Manure	20 m^3/f	2300	2290	2280	2290
$Ca(NO_3)_2$	100	3674	3660	3658	3664
	150	5350	5364	5342	5352
	200	5470	5478	5456	5468
$(NH_4)_2SO_4$	100	3400	3380	3393	3391
	150	3490	3494	3507	3497
	200	3046	3050	3033	3043

L.S.D.

Form	5 %	4.573
	1 %	6.216
Rate	5 %	3.734
	1 %	5.075

2.d. The effect on nutrient uptake.

Concentration of some essential elements in the leaf were affected by the form and rate of nitrogen (Table 7). Plants treatment with NO_3 nutrition were significantly higher in their leaf Ca. Mg and NO_3 content than those received NH_4-N . Neither nitrogen form nor rate of application had marked effect on leaf K and P content. Such results were similar to those observed by Pill *et al.,* 1978 on tomato and Nathan *et al.*, 1989 on snap bean, who found that ammonium-N , as compared to NO_3-N, has resulted in lower plant Ca, Mg and NO_3 concentration and higher anion concentration especially phosphate.

Table (7): The effect of different treatments application on leaf ion concentration of tomato grown on sandy soil.

Leaf ion concentration %

Leaf Ion	Ca $(NO_3)_2$ kg N / fed. 100				150				200			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	4.40	4.60	4.50	4.50	4.50	4.54	4.55	4.53	3.20	3.30	3.25	3.25
Mg	0.96	0.98	1.00	0.98	0.90	0.93	0.93	0.92	0.89	0.92	0.95	0.92
K	3.30	3.25	3.25	3.27	3.25	3.00	3.20	3.15	3.40	3.25	3.25	3.30
P	0.45	0.50	0.37	0.44	0.50	0.46	0.48	0.48	0.45	0.45	0.48	0.46
NO_3	0.46	0.50	0.48	0.48	0.70	0.75	0.68	0.71	0.80	0.85	0.75	0.80
NH_4	0.03	0.02	0.01	0.02	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.03

Leaf Ion	Ca $(NH_4)_2 SO_4$ kg N / fed. 100				150				200			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	2.80	2.90	2.85	2.85	1.50	1.75	1.55	1.60	1.20	1.15	1.10	1.15
Mg	0.43	0.47	0.45	0.45	0.35	0.41	0.38	0.38	0.30	0.34	0.32	0.32
K	3.50	3.46	3.48	3.48	3.50	3.50	3.50	3.50	3.50	3.35	3.65	3.50
P	0.44	0.50	0.47	0.47	0.50	0.40	0.45	0.45	0.52	0.45	0.50	0.49
NO_3	0.04	0.03	0.05	0.04	0.05	0.07	0.06	0.06	0.09	0.05	0.07	0.07
NH_4	0.20	0.13	0.15	0.16	0.30	0.28	0.35	0.31	0.50	0.43	0.48	0.47

Leaf Ion	Compost 30 m^3 / f				Chicken Manure 20 m^3 / f			
	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	2.08	2.12	2.15	2.12	2.05	2.10	2.00	2.05
Mg	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.95
K	2.98	2.90	2.95	2.94	3.10	3.10	3.15	3.12
P	0.52	0.52	0.49	0.51	0.55	0.52	0.50	0.52
NO_3	0.30	0.35	0.31	0.32	0.36	0.36	0.33	0.35
NH_4	0.16	0.15	0.18	0.16	0.20	0.19	0.19	0.19

Table (8): The effect of different treatments application on fruit ion concentration of "Bacar" tomato grown on sandy soil.

Fruit ion concentration %

Fruit Ion	Ca $(NO_3)_2$ kg N / fed. 100				150				200			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	0.17	0.20	0.17	0.18	0.30	0.23	0.22	0.25	0.45	0.34	0.38	0.39
Mg	0.15	0.20	0.19	0.18	0.18	0.23	0.22	0.21	0.28	0.35	0.27	0.30
K	4.50	4.30	4.40	4.40	4.21	4.48	4.45	4.38	4.50	4.45	4.40	4.45
P	0.80	0.73	0.72	0.75	0.70	0.75	0.74	0.73	0.77	0.72	0.76	0.75
NO_3 (ppm)	82.0	87.C	86.0	85.0	98.0	108	103	103	122	127	126	125
NH_4(ppm)	50.0	55.0	54.0	53.0	60.0	56.0	58.0	58.0	52.0	60.0	53.0	55.0

Fruit Ion	Ca $(NH_4)_2 SO_4$ kg N / fed. 100				150				200			
	R1	R2	R3	Mean	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	0.06	0.04	0.05	0.05	0.04	0.03	0.05	0.04	0.04	0.07	0.04	0.05
Mg	0.20	0.14	0.17	0.17	0.18	0.19	0.14	0.17	0.16	0.19	0.16	0.17
K	3.15	3.30	3.30	3.25	3.15	3.45	3.30	3.30	3.25	3.60	3.65	3.50
P	0.94	0.93	0.98	0.95	0.86	0.95	0.89	0.90	0.93	0.96	0.93	0.94
NO_3 (ppm)	40.0	35.0	39.0	38.0	30.0	40.0	35.0	35.0	35.0	42.0	34.0	37.0
NH_4(ppm)	172	179	180	177	200	217	210	209	300	280	275	285

Fruit Ion	Compost 30 m^3 / f				Chicken Manure 20 m^3 / f			
	R1	R2	R3	Mean	R1	R2	R3	Mean
Ca	0.09	0.09	0.08	0.09	0.09	0.11	0.10	0.10
Mg	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.06
K	5.56	5.01	5.00	5.19	5.52	5.45	5.40	5.45
P	0.85	0.85	0.82	0.83	0.88	0.88	0.88	0.88
NO_3 (ppm)	60.0	62.0	66.0	63.0	71.0	70.0	69.0	70.
NH_4(ppm)	50.0	46.0	48.0	49.0	45.0	45.0	46.0	45

L.S.D.

		Form	Rate
Ca	5%	0.13	0.17
	1%	0.22	n.s
Mg	5%	0.09	0.15
	1%	0.14	n.s
K	5%	n.s	n.s
	1%	n.s	n.s

L.S.D.

		Form	Rate
P	5%	n.s	n.s
	1%	n.s	n.s
NO_3	5%	0.06	0.09
	1%	0.11	0.16
NH_4	5%	0.08	0.19
	1%	n.s	0.28

Concerning the effect of N rates, leaf Ca and NH_4 concentration were decreased and increased, respectively, by increasing substrate NH_4 level. Edwards *et al.,* 1982 suggested that higher rates of organic acid synthesis as result of NH_4 nutrition may immobilze Ca and Mg within the roots. Leaf NO_3 concentration was generally increased by increasing NO_3-N supply, while leaf Ca content decreased significantly at the highest level. These results are in harmony with the findings of El-Sharkawy *et al.*, 1991, on cucumber and Avakyan *et al.*, 1992, on tomato.

2.e. The effect on fruit ion composition.

Results of the ions concentration of the tomato fruit are presented in Table (8). It is worthy to note that ions content was affected significantly by N form and rate of application. Fertilization of tomato with NH_4-N decreased significantly the concentration of Ca, Mg and K but increased the P content compared to the plants treated with NO_3-N. Increasing N level did not induce any effect on concentration of K, P or NH_4 under NO_3-N nutrition or Ca, Mg, P and NO_3 with using ammonium -N. However, Ca, Mg and NO_3 concentration under NO_3-N nutrition and NH_4 concentration with NH_4-N were significantly increased by increasing substrate N level. The present results corroborate those of Pill *et al.*, 1978 on tomato ; Nathan *et al.*, 1989 on snap bean and Mishriky and Alphonse , 1994 on pepper , who indicated that the highest values of fibers, carbohydrates and mineral composition in fruit were accompanied with the applied of calcium nitrate and the less effective sources were urea and ammonium sulphate.

Concerning the effect of organic materials addition on plant uptake, results in Tables 7 & 8 indicate that , application of compost or chicken manure led to an increase in leaves and fruits ion content (Ca , Mg, K, P, NO3 and NH_4). Chicken manure treatment gave the maximum values. In general, Ca $(NO_3)_2$ and $(NH_4)_2SO_4$ gave the best results for plant growth plant uptake and fruit yield while compost and chicken manure gave the maximum effect on soil properties.

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تأثير الصور المختلفة للنيتروجين على محصول الطماطم وبعض خواص الاراضى الرملية

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أجريت تجربة حقلية على أرض رملية بمنطقة الفردان بمحافظة الاسماعيلية فى تصميم قطاعات كاملة العشوائية وذلك لتقييم تأثير الصور المختلفة للنيروجين عضوية وغير العضوية على محصول الطماطم صنف Bacar وبعض الخواص الكيماوية والطبيعية للاراضى الرملية .

أضيف مصدرين للنيتروجين العضوى أحدهما الكمبوست ٣٠ م٣ /ف ، سماد مخلفات الدواجن بمعدل ٢٠ م٣ /ف ، وكذلك مصدرين للنيتروجين المعدنى نترات الكالسيوم بمعدلات ١٠٠ ، ١٥٠ ، ٢٠٠ كيلوجرام / ف وكبريتات الامونيوم بمعدلات ١٠٠ ، ١٥٠ ، ٢٠٠ كيلوجرام /ف.

ولقد أوضحت النتائج ان هناك اتجاهاً عاماً فى زيادة محصول الطماطم وكذلك تأثير ايجابى على محددات النمو والامتصاص العنصرى للنبات مع كل المعاملات الا ان النتائج الافضل تم الحصول عليها من خلال الصورة المعدنية للنتيروجين ولقد اعطى سماد نترات الكالسيوم اعلى القيم خاصة عند استخدام معدل ٢٠٠ كيلوجرام /فدان . فى حين كان تأثير الصورة العضوية متمثلة فى الكمبوست وسماد الدواجن – أقل عنه فى حالة السماد المعدنى ، علماً بان سماد الدواجن أعطى أفضل النتائج عنه فى حالة استخدام سماد الكمبوست .

أما من حيث تأثير صور النيتروجين على خواص التربة المدروسة فكان اتجاة النتائج عكس ما سبق ، حيث كان التأثير الافضل يعود الى الصورة العضوية سواء الكمبوست او سماد الدواجن رغم ان سماد الدواجن اكثر ايجابية فى تأثيرة على خواص التربة عنه فى حالة سماد الكمبوست ، عموماً فلقد أدى اضافة المواد العضوية الى تحسين كل من الخواص الكيماوية والطبيعية للتربة حيث إنخفض الـ pH ، ESP والكثافة الظاهرية فى حين زادت قيم كل من المادة العضوية والمسامية الكلية ، كذلك زادت قيم كل من النتيروجين والفوسفور والبوتاسيوم الميسر فى التربة .

وكان تأثيرة الصورة المعدنية سواء نترات الكالسيوم او كبريتات الامونيوم على خواص التربة المدروسة تأثيراً محدوداً .