INFLUENCE OF TOWN REFUSES COMPOST AND POTASSIUM APPLICATIONS TO A SANDY SOIL ON SOIL PROPERTIES ALONG WITH GROUNDNUT YIELD AND COMPOSITION.

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Abstract

A field experiment was conducted in Ali Moubarak experimental farm at EL-Bostan Reclaimed Soil Secter (100 km north west of Cairo) where the soil is normal sandy soil irrigated with drip irrigation to study the influence of 3 or 6 tons of town-refuses compost applied with either 25 or 50 kg K_2O/fed on soil properties as well as yield and some yield components of groundnut plants along with their uptake of macronutrients (N, P and K) and micronutrients (Fe, Mn and Zn).

The obtained results could be summarized as follows:

In 1-5 soil extract, soluble salts were generally very low, application of compost and K slightly increased their concentration fractions. There was no carbonate while bicarbonate and chloride decreased. Sulphate, Ca and Mg, Na and K being increased by compost application. Bicarbonate, Ca and Mg decreased with Cl^-, $SO_4^=$, Na^+ and K^+ being increased by K^+ applications. Each of the mentioned applications generally increased field capacity, E C E, organic matter, total N contents, available N (NH_4^+ + NO_3^-), P, K, Fe, Mn and Zn with some exceptions .

The trend of the subsurface 20-40 cm layer data was as the same as that of the upper 0-20 cm layer but the available NO_3^--N and P in that subsurface layer were lower than those of the upper one.

Compost increased seed yield along with yield of seeds, pods, straw per plant as well as uptake of N, P, K, Fe, Mn and Zn at particularly 6 ton/fed.

Potassium also caused increases in the indicated parameters as well as 100 seed weight by using either 25 or 50 kg K_2O/ fed, the significance being obtained by the higher rate.

The interactions between compost and K were without significant effects rather than that attributed to the studied factors individually regardless combination in almost cases.

INTRODUCTION

Manuring with one kind or another of organic manures does not be considered only as a source of nitrogen only but also for many other benefits especially in soils poor in their structure and contents of organic matter and nutrients. Therefore, groundnut, similar to the other legume crops having the ability to fix atmosphere N_2 through symbiotic Rhizobia, can be cultivated in organic manured soil along with a certain programme. Many trials used groundnut or other legumes as a test crop in organic manure investigations and recorded good responses. In sandy soils, groundout dry matter and N content of inoculated and uninoculated plants increased with increasing compost rate as well as soil biomass, organic matter and available N (Moharram *et al.*, 1999). In a sandy loam soil, groundnut yield was significantly higher as a result of treatment with rich commercially compost than those of two controls one without organic manureing and the other without fertilization, (Peng *et al.*, 1999).

Since sandy soils suffer from potassium deficiency and organic materials cannot hold much potassium; K fertilization is important in such soils. Besides, groundnut needs K fertilization in widely different soils as found by Golakiya (1999), Mahadkar *et al.*, (1999). The optimum rate of K differed according soil type, K status and groundnut plantation density. Mondal *et al.* (1997). Golakiya (1999) and Mohadkar *et al.* (1999) suggested 80, 96 and 50 kg K_2O/ha, respectively.

In this study, groundnut planted in a sandy soil was subjected to town-refuses compost and potassium applications as a trial to obtain a relatively suitable treatment for such conditions.

MATERIALS AND METHODS

A field experiment was conducted in the Experimental Farm at Ali Moubarak village, El-Bostan Reclaimed Soil Sector (about 100 km northern west of Cairo). The soil was normal sandy soil with less than 7.5% field capacity, 0.50% organic matter, 0.01% total nitrogen, 7.5 mg /kg soil available potassium and 4 meq/100g soil cation exchange capacity, analyzed according to Black (1965).

The added organic material was town refuses composted aerobically for 2 months by an Egyptian company. The compost analyses are shown in Table 1. Such analyses being performed according the methods described by Brunner and Wasmer (1978).

Table 1. Some main characters of the used compost.

Weight of bulk m^3 (kg)	Dry m^3 Weig ht (kg)	Moisture %	pH (1-10 susp.)	EC (1-10 extract) (dS/m)	Ash %	O.M. %	O.C. %	Total N%
600	450	25	8.7	2.95	55	28.5	16.537	0.95
	Total nutrient contents							
C/N	NH_4-N (ppm)	NO_3-N (ppm)	P (%)	K (%)	Fe (ppm)	Zn (ppm)	Mn (ppm)	Cu (ppm)
17.4	990	283	0.45	1.29	6450	660	264	224

A split plot design was followed with four replicates for each main treatment. 0, 3 or 6 tons bulk material of the town refuses compost/ fed was added to plots of 6 x 7 m area on the 28th of May 2002. The organic additions were of fine homogeneous pieces having a light brown colour. The low rate, recommended by the producing company for legumes in newly reclaimed soils, and its double rate composts were being thoroughly mixed with the 20 cm surface layer of soil.

On the 4th of June 2002, Rhyzobia–inoculated seeds of groundnut (*Arachis hypogaea*) cv. Giza 5 were planted using drip irrigation technique every 20 cm in rows of 50 cm distance. Di–ammonium phosphate (21.2% N and 53.8% P_2O_5) was added through fertigation at a rate of 10 kg N and 25 Kg P_2O_5 /fed. Potassium was added top dressing at a rate of either 25 or 50 Kg K_2O % fed to represent with K untreated plots the sub-main treatments in three equal doses after 4, 7 and 10 weeks of planting. On the 25th October 2002, crop was harvested.

Fresh weight of pods and seeds were recorded. Samples of soil from 0-20 and 20-40 cm layers as well as 5 plants were collected from each plot for analytical analysis after Chapman and Pratt (1961) and Black (1965). Micronutrients availability were evaluated using Diethyline triamin pentaacetic acid (DTPA) extract as described by Lindsay and Norvell (1978).

The statistical analyses for the obtained data were performed according to Petersen (1976).

RESULTS AND DISCUSSION

a) Soil Properties:

Values of total soluble salts in 1-5 soil water extract reported in Table 2 were generally slight ranged between 0.040 and 0.065%. Slight increases were found as a result of manure and / or potassium applications.

There was no carbonate in the soil extract. Bicarbonates decreased by manuring and potassium application which may be due to more microorganism activity of some true hydrogen oxidizing complicated organic compounds (Schilengel, 1968). Chlorides decreased by application of compost due to more absorption of Cl^- by plant roots and microbial cells which increased by compost application. Chloride increased by K fertilization due to some contamination of KCl with the added K_2SO_4 salt as a fertilizer. Sulphates increased by application of either compost or potassium sulphate as a residual anionic group of some sulphate or sulphides compounds in the compost and of applied K_2SO_4.

Calcium and magnesium increased in soil extract by compost application. In case of K treatments, soluble Ca^{++} and Mg^{++} decreased possibly due to more absorption by plants encouraged by potassium application. Sodium and potassium concentrations in soil extract increased in all treatments possibly due to the initial Na^+ and K^+ in added materials, subsurface layer 20-40 cm followed the same trend of the surface 0 – 20 cm but with almost lower concentrations.

Table 3 shows some soil properties that were affected with different applications.

Field capacity markedly increased by compost application about 36 and 53% increases for the 3 and 6 tons compost/fed compared to untreated plots and 8 and 32% by application of 25 and 50 kg K_2O/fed., respectively. These increases were attributed to increasing the soil organic matter and increasing the density of root growth as a result of the indicated additions.

Cation exchange capacity (C. E. C.) also increased by those treatments (about 3, 18 or 14% for the surface layer receiving 3 and 6 tons compost or 50 kg K_2O /fed, respectively. For the subsurface layer, about 4, 11% increases were obtained by application of 3 and 6 tons compost but 8 and 16% by 25 and 50 kg K_2O/fed., respectively. With regard to the low C. E. C. of that soil, these increases were of considerable values where the surface layers had higher figures than the subsurface ones.

Table 2. Soluble cations and anions in soil after harvesting.

Compost	K_2O kg/fed.	Depth (cm)	T.S.S (%)	Cations (meq/100 g soil)				Anions (meq/100 g soil)		
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^-	Cl^-	$SO_4^=$
Control	0	0-20	0.041	0.20	0.71	0.25	0.11	0.25	0.80	0.22
		20-40	0.040	0.25	0.67	0.23	0.11	0.25	0.80	0.21
	25	0-20	0.046	0.20	0.63	0.35	0.27	0.20	1.00	0.25
		20-40	0.042	0.30	0.51	0.32	0.18	0.20	0.80	0.31
	50	0-20	0.048	0.15	0.53	0.45	0.37	0.20	1.06	0.30
		20-40	0.045	0.20	0.63	0.37	0.22	0.15	1.00	0.27
3 Ton/fed	0	0-20	0.048	0.25	0.77	0.37	0.12	0.20	0.80	0.51
		20-40	0.040	0.30	0.57	0.25	0.13	0.25	0.60	0.40
	25	0-20	0.048	0.40	0.44	0.35	0.32	0.20	0.80	0.51
		20-40	0.044	0.30	0.51	0.32	0.25	0.25	0.80	0.33
	50	0-20	0.056	0.15	0.74	0.50	0.37	0.20	1.00	0.56
		20-40	0.48	0.35	0.45	0.40	0.30	0.15	1.00	0.35
6 Ton/fed	0	0-20	0.050	0.30	0.50	0.50	0.25	0.20	0.60	0.75
		20-40	0.047	0.25	0.53	0.47	0.21	0.30	0.80	0.36
	25	0-20	0.054	0.40	0.14	0.69	0.46	0.15	0.80	0.74
		20-40	0.046	0.35	0.16	0.53	0.40	0.20	0.80	0.44
	50	0-20	0.065	0.25	0.20	1.07	0.52	0.10	0.80	1.14
		20-40	0.046	0.35	0.03	0.63	0.42	0.10	0.80	0.53
Mean values of Comp. Treat	0	0-20	0.045	0.18	0.62	0.35	0.25	0.22	0.93	0.26
		20-40	0.042	0.25	0.60	0.31	0.17	0.20	0.87	0.26
	3 ton	0-20	0.051	0.27	0.65	0.41	0.27	0.20	0.87	0.53
		20-40	0.044	0.32	0.51	0.32	0.23	0.22	0.80	0.36
	6 ton	0-20	0.056	0.32	0.28	0.42	0.41	0.15	0.73	0.88
		20-40	0.046	0.32	0.24	0.54	0.34	0.20	0.80	0.44
Mean values of K_2O Treat	0	0-20	0.046	0.25	0.66	0.3.7	0.16	0.22	0.73	0.55
		20-40	0.042	0.27	0.59	0.32	0.15	0.27	0.73	0.32
	25	0-20	0.049	0.27	0.40	0.46	0.35	0.18	0.87	0.50
		20-40	0.044	0.32	0.39	0.39	0.28	0.22	0.80	0.36
	50	0-20	0.056	0.18	0.49	0.67	0.42	0.17	0.93	0.67
		20-40	0.046	0.30	0.37	0.47	0.31	0.13	0.93	0.38

Table 3. Some characteristics of the studied soil after harvesting.

Compost	K_2O kg/fed.	Depth (cm)	Field capacity (%)	C.E.C (me/100g soil)	Organic Matter (%)	Total N (%)	C/N ratio
Control	0	0-20	7.5	4.10	0.62	0.010	35.96
		20-40		3.80	0.88	0.006	85.07
	25	0-20	8.5	4.20	0.67	0.024	16.19
		20-40		4.00	0.84	0.017	28.66
	50	0-20	11.0	4.80	0.72	0.015	27.84
		20-40		4.60	0.82	0.013	36.54
3 ton/fed.	0	0-20	11.5	4.30	0.75	0.012	36.25
		20-40		3.90	0.84	0.009	54.13
	25	0-20	12.0	4.40	0.82	0.035	13.59
		20-40		4.30	0.83	0.019	25.33
	50	0-20	13.0	4.80	1.01	0.024	24.41
		20-40		4.60	1.12	0.014	46.40
6 ton/fed.	0	0-20	12.0	4.80	0.80	0.016	29.00
		20-40		4.30	0.84	0.014	34.8
	25	0-20	13.0	5.20	0.99	0.040	14.36
		20-40		4.70	0.87	0.023	24.94
	50	0-20	17.0	5.50	1.04	0.029	20.80
		20-40		4.70	1.12	0.020	32.48
Mean values of comp. treat	0	0-20	9.0	4.37	0.67	0.016	26.66
		20-40		4.13	0.85	0.012	50.09
	3 ton	0-20	12.2	4.50	0.86	0.024	24.75
		20-40		4.27	0.93	0.014	41.95
	6 ton	0-20	13.8	5.17	0.94	0.028	21.39
		20-40		4.57	0.94	0.019	29.74
Mean values of K_2O treat	0	0-20	10.3	4.40	0.72	0.013	33.74
		20-40		4.00	0.85	0.010	58.00
	25	0-20	11.1	4.37	0.83	0.033	14.71
		20-40		4.33	0.85	0.020	25.31
	50	0-20	13.6	5.03	0.92	0.023	24.35
		20-40		4.63	1.02	0.016	24.55

As for organic matter content in the soil after harvesting compared to that before cultivation, it was increased in all plots even the control due to the plant residues and root nodules, particularly at the higher rates of application. These results were in accordance to those of Moharram *et al.* (1999). From the same table it could be noticed that the subsurface layers 20-40 cm had a relatively higher organic matter content than the upper one due to the sandy nature of soil under drip irrigation.

Concerning total nitrogen, the increases by compost 3 and 6 ton application were 33 and 75% at the surface layers, 10 and 58% at the subsurface ones respectively, the same finding was obtained by Moharram *et al.* (1999). In case of K treatments, the increases were 153 and 77% at the surface layers, 200 and 60% at the subsurface layers by application of 25 and 50 kg K_2O / fed., respectively. That trend could be explained due to the importance of K to Rhyzobia and plant nutrition. The higher level of K produced more root which consumed more nitrogen and thus the remained total N in the soil after 50 kg K_2O/fed application was less than that of 25 kg K_2O/fed application. The surface layers contained higher concentration of N than the subsurface 20-40 cm layers where the zone of the most density of groundnut roots. The ratio of C to N was wider in untreated plots but narrowed by application of compost and / or K where the higher rates caused more narrowed C/N ratios with exception of K treatment for the surface layers. The upper 20 cm layers were of lower C/N ratios as a function of low organic and high total N contents.

Regarding nutrients availability, Table 4 represents their values in mg/ kg soil which were less than the lower limits suggested by Black (1965) for the macronutrients and Lindsay and Norvell (1978) for the micronutrients in spite of K which was in the middle limit (60-120 ppm) and raised by 6 ton compost, 25 or 50 kg K_2O /fed which gave values more than the higher limit.

Available N in the form of NO_3^-, K and Zn increased by any of the studied applications over the control. Available N in the form of NH_4^+, however, decreased while Fe was of irregular trend by increasing compost rates. Availability of both increased by K rate application increase. The distribution through the surface and subsurface layers was found to give more values in the upper 20 cm layer in nutrients of NH_4^+ N, K, Fe, Mn and Zn but low Values in case of anionic NO_3^- -N and P which may be related to the relative high C. E. C. in the surface layer holding cations more than the subsurface ones.

Table 4 . Nutrients availability of the studied soil after harvesting.

Compost	K_2O	Depth	Available nutrients (mg/kg soil)						
	kg/fed.	(cm)	NH_4^+-N	NO_3^--N	P	K	Fe	Mn	Zn
Control	0	0-20	8.30	3.60	2.55	78.20	2.72	0.906	0.109
		20-40	4.40	2.67	2.90	70.38	2.49	0.208	0.073
	25	0-20	9.40	3.62	2.10	93.84	2.93	0.596	0.108
		20-40	7.70	2.72	2.85	78.20	2.49	0.206	0.082
	50	0-20	12.20	4.32	2.10	109.48	3.46	0.570	0.200
		20-40	7.90	3.22	2.80	86.02	2.58	0.124	0.177
3 ton/fed.	0	0-20	7.70	3.72	3.95	78.20	2.80	0.984	0.119
		20-40	3.50	4.52	3.50	86.02	2.57	0.292	0.109
	25	0-20	8.70	4.01	3.60	129.03	2.96	0.896	0.143
		20-40	4.70	6.74	3.50	101.66	2.63	0.244	0.110
	50	0-20	10.00	6.52	3.20	148.58	3.71	0.692	0.200
		20-40	6.70	7.42	3.15	113.39	2.69	0.172	0.187
6 ton/fed.	0	0-20	3.80	4.42	4.60	78.20	2.85	1.060	0.174
		20-40	3.10	3.72	4.05	101.66	2.64	0.364	0.124
	25	0-20	5.60	5.82	3.80	164.22	3.07	1.032	0.216
		20-40	4.40	4.92	4.00	125.12	2.78	0.298	0.150
	50	0-20	9.80	7.32	3.60	187.68	3.12	0.864	0.216
		20-40	5.80	9.62	3.90	140.76	2.93	0.196	0.190
Mean values Of comp. Treat	0	0-20	9.97	3.85	2.25	93.84	3.04	0.691	0.139
		20-40	6.67	2.87	2.85	78.20	2.52	0.179	0.111
	3 ton	0-20	8.80	4.75	3.58	118.60	3.16	0.857	0.154
		20-40	4.97	6.23	3.38	100.36	2.63	0.236	0.135
	6 ton	0-20	6.40	5.85	4.00	143.37	3.01	0.985	0.202
		20-40	4.43	6.09	3.98	122.51	2.78	0.286	0.155
Mean values Of K_2O Treat	0	0-20	6.60	3.91	3.70	78.20	2.79	0.983	0.134
		20-40	3.67	3.64	3.48	86.02	2.57	0.288	0.102
	25	0-20	7.90	4.48	3.17	129.03	2.99	0.841	0.156
		20-40	5.60	4.79	3.45	101.66	2.63	0.249	0.114
	50	0-20	10.67	6.05	2.97	148.58	3.43	0.709	0.205
		20-40	6.80	6.75	3.28	113.39	2.73	0.164	0.185

b) Plant responses:

The agronomy parameters including seed yield in Ardab /fed, 100 seed weight in grams along with seed, pods, straw yields and dry matter of seed and straw in grams /plant are presented in Table 5.

Addition of 6 ton compost/fed was significantly superior to 3 tons or unmanured plots in increasing seed yield/fed, pods and straw/plant and to unmanured plots only in increasing fresh and dry seeds/plant. This rate had no significant effect on 100 seed weight and dry straw/plant. In all cases, 3 ton compost /fed was without any significant effect. These results were in agreement with those of Moharram *et al.*, (1999), Mabrouk (2002) and Salib (2002).

As for K effects; 50 kg K_2O/ fed increased all the studied parameters significantly over the control and also over the rate of 25 kg K_2O /fed in case of fresh and dry seeds and straw/plant. The rate 25 kg was without any significant effect over the control. These results were in agreement with Ghatak *et al.*, (1997), Golakiya (1999), Mahadkar *et al.*, (1999) and Peng *et al.*, (1999).

The interaction effects on the indicated parameters were without significance. It means that the combination of each factor with the other did not cause significant effects more than occurred by each individually.

The macronutrient N, P and K contents of plant parts of seeds and straw were determined as Table 6 shows.

Town refuses compost applied at 6 tons/fed produced more content of N, P and K in seeds and straw than that in untreated plots with significant differences. In case of N content of groundnut straw, 6 tons compost was of a significant effect than 3 tons where 3 tons compost was also of significant effect over the control. That was the only significant difference between 3 tons compost and the control. The marked benefit of organic additions in increasing the macronutrients N, P and K contents of groundnut plants were in accordance with results of Salib, (2002).

Table 5. Effect of compost and potassium rates on groundnut yield, some yield components and dry matter production.

Treatments		Seed.* yield (Ard./fed)	100 seed weight (g)	Seeds per plant (g)	Pods per plant (g)	Straw per plant (g)	Seed dry matter (g/plant)	Straw dry matter (g/plant)
Compost	K							
0	0	3.76	62.00	18.19	26.21	49.55	14.55	18.80
	25	3.97	66.00	19.46	28.47	55.25	15.57	22.70
	50	4.25	67.18	21.96	30.23	66.14	17.57	26.08
3	0	4.07	66.00	19.63	26.23	51.53	15.71	21.08
	25	4.33	68.50	21.03	28.69	55.38	16.83	22.92
	50	4.48	68.88	23.13	30.74	68.35	18.50	26.10
6	0	4.72	65.50	22.00	30.08	55.43	17.60	21.96
	25	4.88	67.70	22.78	30.55	65.61	18.22	26.02
	50	5.38	72.50	23.59	31.56	70.97	18.87	26.20
L.S.D		n.s.	n.s.	n.s.	n.s	n.s.	n.s.	n.s.
Compost (ton/fed)	0	3.99	64.73	19.87	28.30	56.98	15.90	22.53
	3	4.29	67.79	21.26	28.55	58.42	17.01	23.36
	6	4.99	68.57	22.79	30.73	64.00	18.23	24.73
	L.S.D	0.50	n.s	2.12	1.63	3.56	1.72	n.s
K_2O (kg/fed)	0	4.19	64.50	19.94	27.51	52.17	15.95	28.30
	25	4.39	67.08	21.09	29.23	58.74	16.87	28.56
	50	4.70	69.52	22.89	30.84	68.49	18.31	30.73
	L.S.D	0.37	3.83	1.50	1.94	3.67	1.19	2.29

- Ardab = 75 kg of groundnut seeds.
- n.s. = not significantly different.

Potassium application also had significant effect on increasing the amount N, P and K in seeds and straw over the control by using the rate of 50 kg K_2O/fed. Straw was more sensitive to K application where 25 kg K_2O/fed was significantly lower than the rate of 50 kg and higher than the control. This may be due to the increases in rate of photophosphorylation and photosynthetic electron transport in plants well supplied with K (Pfluiger and Mengel, 1972) and to enzyme activation where more than 60 different enzymes are now known which require univalent cations for their activity (Evans and Wildes, 1971). Other possibility explanation due to lowering water loss of plants well supplied with K may be reduction in transpiration rate (Brag , 1972).

Table 6. Effect of compost and potassium rate on macronutrients contents of groundnut seeds and straw (mg/plant).

Treatments		Nitrogen		Phosphorus		Potassium	
Compost	K	by seeds	by straw	by seeds	by straw	by seeds	by straw
0	0	471.66	241.04	40.79	40.43	146.55	245.15
	25	498.21	300.07	43.55	49.85	156.61	343.71
	50	572.21	461.74	46.43	64.76	177.49	482.05
3	0	510.20	367.91	44.13	46.62	158.40	347.24
	25	550.48	422.66	47.65	51.97	170.49	427.24
	50	602.31	456.67	52.11	66.22	186.86	531.60
6	0	569.56	384.30	49.25	50.07	177.07	410.25
	25	591.78	606.15	51.19	62.97	183.74	541.11
	50	615.40	398.42	53.25	71.15	190.82	569.26
L.S.D		n.s.	100.27	n.s.	14.48	n.s.	97.39
Compost (ton/fed)	0	514.03	334.28	43.82	51.36	160.22	356.97
	3	554.33	415.74	47.97	54.75	171.92	435.56
	6	592.25	462.96	51.23	61.53	183.88	506.87
	L.S.D	56.89	37.56	4.58	6.93	17.81	107.44
K_2O (kg/fed)	0	513.81	331.08	44.72	48.35	160.67	334.41
	25	546.83	442.96	47.46	57.43	170.28	419.35
	50	596.66	438.94	50.83	61.86	185.06	527.63
	L.S.D	38.90	57.89	3.65	8.36	12.19	56.23

n.s. = not significant different.

Compost and K intraction was sometimes significantly effective on N, P and K content of groundnut straw. Application of K without compost raised N and P contents. Using 50 kg K_2O being better than using 25 kg K_2O; an opposite trend was true for N content for the 6 tons compost treatment. Also using 25 kg K_2O caused a significant increase in K contents when using 6 tons compost over that of 3 tons compost treatments. Thus compost application reduced the difference between 50 and 25 kg K_2O rates.

With respect to micronutrients Fe, Mn and Zn uptake, Table 7 presents the data of groundnut Zn contents of seeds and straw contents.

The added 6 tons compost increased Zn content of seed significantly over untreated plots and also over 3 tons application treatment. Straw content of Fe and

Zn decreased significantly to be less than the control. The same trend was observed also in case of Mn content of straw without significancy. This may be attributed to better translocation for these absorbed nutrients from vegetative parts to fruit ones in healthy plants than in case of untreated plots, (Tiffen, 1972). The rate of 3 tons followed the same trend regarding contents of both seed and straw, but insignificantly compared to the control. Similar resulted were reported by Sblib (2002).

Table 7. Effect of compost and potassium rates on micronutrients content of groundnut seeds and straw (μg/plant).

Treatments		Iron		Manganese		Zinc	
Compost	K	by seeds	by straw	by seeds	by straw	by seeds	by straw
0	0	55.97	165.87	4.70	6.51	8.87	8.67
	25	59.81	196.31	4.57	7.10	9.46	8.22
	50	67.78	204.37	5.39	6.94	10.79	7.74
3	0	60.49	178.30	4.80	6.13	9.60	7.01
	25	64.34	172.18	5.20	6.57	9.39	7.13
	50	71.35	189.01	5.67	6.11	11.35	7.06
6	0	67.63	150.93	5.35	5.51	10.70	5.43
	25	70.17	185.31	5.57	6.39	11.14	7.10
	50	72.86	175.37	5.80	5.72	11.60	6.03
L.S.D		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Compost (ton/fed)	0	61.18	188.85	4.81	6.52	9.71	8.21
	3	65.64	179.83	5.22	6.27	10.12	7.07
	6	70.22	170.54	5.57	5.87	11.15	6.19
	L.S.D	6.79	17.31	0.53	n.s.	0.91	1.13
K_2O (kg/fed)	0	61.36	165.03	4.88	5.72	9.72	7.04
	25	65.02	184.60	5.11	6.69	10.00	7.48
	50	70.66	189.58	5.62	6.26	11.25	6.94
	L.S.D	4.65	18.29	0.39	0.79	0.79	n.s.

n.s. = not significantly different.

Regarding potassium application, the rate of 25 kg K_2O did not improve Fe, Mn and Zn contents of groundnut seeds significantly compared to K-untreated plots. The rate of 50 kg K_2O caused significancy over each of 0 and 25 kg K_2O. Potassium application treatments at either 25 or 50 kg K_2O increased Fe content of straw significantly over the control and without significancy for Zn content of straw. Manganese content increased significantly in straw with 50 K_2O treatment over the control while in 25 K_2O the increase was insignificant.

CONCLUSION

The previous discussion clarifies that the studied sandy soil was poor in their organic matter and nutrient contents and needs their continuous supply. The higher used rates of 6 tons town refuses compost and 50 kg K_2O/fed individually or in combination with each other were of significant effect on increasing groundnut yield , yield components and mineral composition due to considerable improvement in soil conditions. It may be useful to mention that the commercial recommendation of the used rates may be sometimes of less sufficiency to plant requirement.

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تأثير إضافات مكمور قمامة المدن والبوتاسيوم لأرض رملية على خواص الأرض ومحصول الفول السودانى وتركيبه

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نفذت تجربة حقلية بالمزرعة التجريبية بعلى مبارك قطاع البستان للأراضى المستصلحة (١٠٠ كم شمالى غرب القاهرة) حيث الأرض رملية غير ملحية تروى بنظام التنقيط لدراسة اثر إضافة ٣ أو ٦ أطنان من مكمور قمامة المدن مع ٢٥ أو ٥٠ كجم بو٢أ/ فدان على خواص الأرض ومحصول الفول السودانى وبعض خصائصه المحصولية وإمتصاص عناصر ن ، فو ، بو ، ح ، من ، خ.

ويمكن تلخيص النتائج المتحصل عليها فيما يلى:

فى مستخلص مائى (١–٥) ظهرت الأرض منخفضة الملوحة وزادتها إضافات المكمور والبوتاسيوم بدرجة بسيطة فالأنيونات لم يكن بها كربونات كما قلت البيكربونات والكلوريد بينما زاد الكبريتات والكاتوينات كا، مغ، ص، بو بإضافة المكمور وقلت البيكربونات كا، مغ وزاد كل، كب أ، ، ص، بو بإضافة البوتاسيوم .

زادت السعة الحقلية والسعة التبادلية الكاتيونية للأرض ومحتواها من المادة العضوية والنيتروجين وكذلك الميسر من النيتروجين الآمونيومى والنتراتى ، فو، بو، ح، من ، خ بإضافة معدلات العاملين تحت الدراسة باستثناء النيتروجين الآمونيومى فى بعض الحالات وعدم وضوح سلوك الحديد الميسر بزيادة معدلات المكمور وكذلك قلة الميسر من الفوسفور والمنجنيز بزيادة معدلات البوتاسيوم، وقد سلكت الطبقة تحت السطحية من ٢٠–٤٠ سم نفس مسلك الطبقة السطحية ولكن بتركيزات أقل إلا فى حالات محتوى هذه الطبقة من المادة العضوية والميسر من النيتروجين النتراتى والفوسفور.

أدت إضافة المكمور بمعدل ٣ أو ٦ أطنان إلى زيادة فى محصول البذور ووزن البذور والقرون والقش للنبات وكذلك الممتص من عناصر ن ، فو ، بو ، ح ، من ، خ وكان المعدل الأخير ذا تأثير معنوى. أدت إضافة البوتاسيوم بمعدل ٢٥ أو ٥٠ كجم بو٢أ لزيادات فى المعايير السابقة إضافة لوزن ١٠٠ بذرة حيث حقق المعدل الأعلى الفروق المعنوية عن المقارنة.

لم يكن للتداخل بين المكمور والبوتاسيوم تأثير معنوى خلاف ما ظهر لأى من هذين العاملين من تأثير مطلق أى بغض النظر عن إشتراكه مع الآخر فى معظم الحالات.