J. Agric. Sci. Mansoura Univ., 32 (9): 7967 - 7978, 2007

EFFECT OF SOME SOIL AMENDMENTS APPLICATION ON SOME SOIL PHYSICAL AND CHEMICAL PROPERTIES.

El-Hamdi, Kh.H.*; S.A. Hammad,*; M.A.Abou El-Soud and G.M.A.El-Sanat****

*** Soil Sci. Dept. Faculty of Agric. Mansoura Univ.**

**** Soils, Water and Environment Res. Inst., ARC.**

ABSTRACT

Two field experiments were carried out during two successive growing seasons (2004/2005 and 2005) to investigate the effect of some soil amendments on some soil physical and chemical properties under the cultivation of wheat and soybean. A split-split plot design with three replicates was used. The main plots were devoted to compost application levels, C (0 and 20 $m^3 fed^{-1}$.). The subplots were allocated to sulphur application levels, S (0, 450 and 900 kg fed^{-1}). The sub- subplots were assigned for mineral fertilizers, NP (50,75 and 100% of the re-commended dose).

The interaction between applications of 20 m^3 compost fed^{-1}., 900kg sulphurfed-1. and N P fertilizers at rate of 100% from the recommended dose was the most suitable in improving the bulk density and total porosity since they gave the lowest values of bulk density and the highest values of total porosity and basic infiltration rate. While, the lowest values of total porosity and infiltration rate and the highest value of bulk density were obtained under combination between zero compost, zero sulphur and N P mineral fertilizers at 50 % from the recommended dose.

Soil organic matter percentage was increased by 36.39 and 15.49% after harvesting of wheat and soybean respectively in the plots which treated with compost compared with untreated soil. On the other hand, the soil organic matter content was slightly increased by 2.7 and 1.35% with application of 450 and 900 kg sulphur fed^{-1}., compared to control After harvesting of wheat. Data revealed that application of N P fertilizers at rate of 100% from the recommended dose increased the soil organic matter percentage by 3.36 and 2.01% compared to application of 75% and 50% from recommended dose respectively after harvesting of wheat .While after harvesting of soybean, the application of NP fertilizers at rate of 100% from the recommended dose surpassed the rate of 50 and 75% in increasing the soil organic matter by 5.85 and 14.69%, respectively. The interaction between application of zero compost, zero sulphur and 50% mineral NP fertilizers recorded the maximum calcium carbonate content while application of soil amendments at higher levels recorded the minimum calcium carbonate content in soil. The interaction between application of 20m^3 compost/fed., sulphur at rate of 900 kg fed^{-1}+., and 75% N P fertilizers from the recommended dose greatly decreased on soil ECe, SAR and ESP values in soil.

Keywords: Compost, Sulphur, Mineral Fertilizers, Soil properties.

INTRODUCTION

The most important aims of the Egyptian Agricultural Policy are to increase land production by adding new areas for cultivation and improving the productivity of cultivable soils. Under arid and semiarid condition, much attention has been drown on the significance of supplementing soil amendments such as compost, sulphur and mineral fertilizers to improve its chemical, physical and biological properties for plant growth. The ECe and

SAR values of saline sodic soils treated with different organic amendments were decreased (Rehman *et al* 1996). Most soil physical and chemical properties were improved particularly in the surface layer as a result of sulphur application (Koriem 1994). The application of sulphur and organic manure decreased pH and EC values of soil (Ghazy *et al* 2002).

Some soil amendments such as sulphur, gypsum and FYM caused reduction in soil reaction (pH), EC and ESP values (Salem 2003). The addition of FYM decreased CaCO3%, ECe, SAR and ESP but increased organic matter content in soil (Zein *et al*, 1996a). The application of sulphur amendment to the soil decreased the values of ESP (Abd-Allah, 1990).The addition of phosphogypsum and farmyard manure decreased pH, EC and ESP while organic matter was increased (EL-Shahawy, 2004). The addition of rock phosphate, compost, sulphur and phosphorein caused significant increase in organic matter content (Laila *et al* 2005).

Also crop residues and manures increased the soil aggregation, water infiltration, moisture retention, aeration and root penetration (Datta and Hundal 1984).The application of sulphur and sludge up to 30 ton fed^{-1}. decreased the soil bulk density while the soil porosity was increased (El–Fayoumy *et al* 2000). The soil bulk density was decreased while total porosity and infiltration rate increased by increasing the level of farmyard manure (FYM) and plant residual (EL-Maddah,2000). The addition of sulphur mixed with sludge tended to lower soil bulk density (El–Fayoumy *et al* 2000). The addition of the compost decreased the soil bulk density values (Sanaa *et al* 2005). Soil physical properties were markedly affected with both of sulphur and compost application (El–Ghamry *et al* 2005). The application of compost improved some physical and chemical properties. (Taha, 2000). The aim of this study is to investigate the effect of some soil amendments on some physical and chemical properties of soil under cultivation of wheat and soybean.

MATERIALS AND METHODS

Two field experiments were conducted during the two successive seasons (2004/2005 and 2005) at Sakha Agricultural Research Station Farm, Kafr El-Sheikh Governorate, Egypt to investigate the change in some physical and chemical properties of soil as affected by application of compost, sulphur and NP fertilizers under cultivation of wheat *(Triticum Aestivum*) Giza 168 variety and soybean (*Glycine Max L.*) Giza 23 variety. A split-split plot design with three replicates was used in the two seasons of study. The main plots were devoted to compost application levels C; (0 and 20 m^3fed^{-1}.). The sub-plots were allocated to sulphur application levels: S; (0, 450 and 900 $kg.fed^{-1}$. The sub-sub plots were assigned for mineral fertilizers (NP): 50,75 and 100 % of the recommended dose. Appropriate amounts of Ammonium nitrate (33.5%) was applied at the three rates (112, 168 and 224 $Kgfed^{-1}$.). These rates were divided into two doses, which were added before the first irrigation and the remaining dose was applied before the second irrigation.

Also, calcium super phosphate (15.5 % P_2O_5) was added for specific treatments before sowing at rates of 3.75, 5.0 and 6.25 Kg $Pfed^{-1}$. The other agronomic practices were performed as normally recommended in the area. Compost was made from rice straw mixed with farmyard manure and inoculated for maturity. Soil samples were taken before planting and after harvesting during the two growing seasons from soil layers namely 0-20, 20-40 and 40-60 cm, for physical and chemical analysis as shown in Tables 1 and 2.

- Soil paste extract was carried out according to the method described by Richards, (1954). Electrical conductivity (ECe) was measured according to Jackson (1967).
- Particle size distribution: was determined using the international pipette method as described by Piper (1950).
- Bulk density (BD): was determined by using the core method, Vomocil, (1957)
- Infiltration rate: using double ring according to Garcia (1978).
- Organic matter content (O.M%): was determined according to Walkey and Black method, (Jackson, 1973).
- SAR and ESP: were calculated according to Richard (1954)
- Total carbonate (%); was determined using the colln's calcimeter and calculated as $CaCO_3$ percent (Wright, 1939).

Table 1: Some physical properties of the used soil.

Soil Depth (cm)	Distribution of particles size, %				Soil Texture	Bulk density g cm^{-3}	Total porosity %	Infiltration rate cm hr^{-1}
	C. Sand	F. Sand	Silt	Clay				
0-20	1.81	24.67	27.43	46.09	Clayey	1.39	47.55	0.5
20-40	0.98	21.50	27.31	50.21		1.50	43.40	
40-60	1.05	26.14	29.10	43.71		1.55	41.51	

Table 2: Some chemical properties of the used soil.

Soil depth (cm)	pH	EC dSm^{-1}	SAR	ESP	CaCO3 %	O.M %
0-20	**8.27**	9.42	15.64	17.90	3..39	0.56
20-40	**8.11**	8.70	15.52	17.78	3.20	0.35
40-60	**7.9**	7.60	15.12	17.38	2.21	0.07

RESULTES AND DISCUSSION

1. The effect of different treatments on some soil physical properties:-

1.1. Soil bulk density and total porosity:

Values of bulk density and total porosity as affected by application of compost, sulphur and N, P mineral fertilizers after harvesting of wheat and soybean are given in Tables (3 and 4). It should be mentioned that the values of bulk density were increased with soil depth, while total porosity took the opposite trend. The data revealed that the application of compost and sulphur decreased the bulk density after harvesting of wheat and soybean. The highest values of bulk density in surface layer (1.37 and 1.35 g/cm^3) were obtained under control, while the lowest values of bulk density (1.10 and 1.08 g cm^{-3}) were obtained with application of 20 m^3 compost/fed., 900kg sulphur/fed., and 100% of N P fertilizers after harvesting of wheat and soybean, respectively.

Table 3: Mean values of bulk density (g cm^{-3}) as affected by compost, sulphur and fertilizer levels during the two seasons.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels % from the recommended dose	After wheat			After soybean		
			Soil depths (cm)			Soil depths (cm)		
			0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	1.37	1.41	1.46	1.35	1.39	1.45
		75	1.35	1.40	1.44	1.34	1.39	1.44
		100	1.33	1.40	1.45	1.32	1.38	1.44
	450 kg	50	1.30	1.39	1.44	1.28	1.36	1.42
		75	1.29	1.38	1.41	1.27	1.44	1.43
		100	1.27	1.36	1.40	1.25	1.39	1.43
	900 kg	50	1.26	1.39	1.48	1.23	1.31	1.42
		75	1.24	1.37	1.49	1.21	1.30	1.42
		100	1.22	1.35	1.47	1.20	1.30	1.41
20 m^3	Control	50	1.21	1.29	1.48	1.18	1.27	1.46
		75	1.20	1.27	1.49	1.17	1.25	1.47
		100	1.18	1.25	1.47	1.15	1.23	1.45
	450 kg	50	1.17	1.28	1.47	1.14	1.26	1.46
		75	1.15	1.27	1.45	1.13	1.24	1.45
		100	1.14	1.27	1.42	1.11	1.21	1.41
	900 kg	50	1.12	1.24	1.43	1.11	1.20	1.41
		75	1.11	1.25	1.42	1.10	1.22	1.40
		100	1.10	1.22	1.41	1.08	1.18	1.40

Table 4: Mean values of total porosity (%) as affected by compost, sulphur and fertilizer levels during the two seasons.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels % from the recommended dose	After wheat			After soybean		
			Soil depths (cm)			Soil depths (cm)		
			0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	48.30	46.79	44.91	49.06	47.55	45.28
		75	49.06	47.17	45.66	49.43	47.55	45.66
		100	49.81	47.17	45.28	50.19	47.92	45.66
	450 kg	50	50.94	47.55	45.66	52.08	49.06	46.42
		75	51.32	47.92	46.79	52.45	49.43	46.04
		100	52.08	48.68	47.17	52.83	50.19	46.04
	900 kg	50	52.45	47.55	46.42	53.58	50.57	46.42
		75	53.21	48.30	46.79	54.34	50.94	46.42
		100	53.96	49.06	47.17	54.72	50.94	46.79
20 m^3	Control	50	54.34	51.32	44.15	55.47	52.08	44.91
		75	54.72	52.08	43.77	55.85	52.83	44.53
		100	55.47	52.83	44.53	56.60	53.58	45.28
	450 kg	50	55.85	51.70	44.53	56.98	52.45	44.91
		75	56.60	52.08	45.28	57.36	53.21	45.28
		100	56.98	52.08	46.42	58.11	54.34	46.79
	900 kg	50	57.74	53.21	46.04	58.11	54.72	46.79
		75	58.11	52.83	46.42	58.49	53.96	47.17
		100	58.49	52.08	46.79	59.25	55.47	47.17

On contrary, the effect of different treatments on total porosity was in an opposite trend of that recorded with bulk density.

It is clear from the data that the application of 20m^3 compost/fed., decreased the mean values of bulk density from 1.29 to 1.15 g/cm^3 and from 1.27 to 1.13 g/cm^3 after harvesting of wheat and soybean, respectively. Also, increasing the application of sulphur up to 900 kg.fed^{-1}., decreased the bulk density from 1.27 to 1.18 g/cm^3 and from 1.25 to 1.16 g/cm^3 after harvesting of wheat and soybean, respectively. Also, the highest values of soil porosity (58.49 and 59.25%) were obtained with application of 900 kg sulphur/fed. combined with application of 20 m^3 compost/fed., and 100% of N P fertilizers after harvesting of wheat and soybean, respectively.

With regard to the effect of N P fertilizers levels on bulk density and total porosity, the data indicated that the application of N P mineral fertilizers at rate of 100% from recommended dose was the most effective in decreasing the bulk density and increasing total porosity. It can be concluded that the interaction between applications of 20 m^3 compost/fed., 900kg sulphur/fed. and N P fertilizers at rate of 100% from the recommended dose was the most suitable in improving the bulk density and total porosity since they gave the lowest values of bulk density and the highest values of total porosity .The maximum decrease in bulk density as a result to application of soil amendments may be attributed to the aggregating effect on soil particles which create more aggregates leading to increase of apparent volume and consequently decrease bulk density and increase total porosity. These results are in good harmony with that found by El-Awag *et al* (1992), Logan *et al.* (1997), El-Ghamry and El-Naggar (2001), Salem (2003), Saddik *et al* (2004) and Sanaa *et al* (2005)

1.2. Effect of different treatments on basic infiltration rate:-

Data in Table (5) show that all treatments increased the values of basic infiltration rate as compared to values obtained before experiment. The results indicated that addition of 20 m^3 compost/fed. increased the basic infiltration rate by 37.17% and 36.34% under cultivation of wheat and soybean, respectively. It was noticed that the application of 900 kg sulphur/fed., raised the values of basic infiltration rate by 12.5 % and 28.13 % as compared to 450 kg.fed^{-1}. and the control, respectively under wheat crop. While under soybean crops, the application of 900 kg sulphur/fed. surpassed the 450 kg sulphur/fed. and the control treatment in increasing the basic infiltration rate by 12.86% and 27.14%, respectively.

Data revealed that the application of mineral fertilizer NP at 100% from the recommended dose increased the basic infiltration rate by 8.7 and 2.61% over than 50% and 75% treatments, respectively under wheat crop. For soybean crop, the application of mineral fertilizers at rate of 100% from the recommended dose raised the basic infiltration rate by 6.4 and 2.4 % over than the application of fertilizers at rate of 50% and 75%, respectively.

It can be concluded that the highest value of basic infiltration rate was obtained under interaction between application of 20 m^3 compost, 900 kg sulphur and mineral fertilizers at 100 % from the recommended dose. While, the lowest value was obtained under combination between zero compost and sulphur and N P fertilizers at 50 % from the recommended dose. The increase in basic infiltration rate may be due to that the application of amendments improved the flocculation of soil particles, hence improved soil water infiltration. These results are in agreement with those obtained by Talha *et al* (1979), Datta and Hundal (1984)), Koriem (1994), Taha (2000) and El-Maddah (2000)

Table 5: Mean values of infiltration rate cm/hr as affected by compost, sulphur and fertilizer levels during the two seasons.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels % from the recommended dose	Infiltration rate (cm/hr)	
			After wheat	After soybean
Zero	*Control*	50	0.6	0.7
		75	0.7	0.7
		100	0.7	0.7
	450 kg	50	0.8	0.9
		75	0.9	1.0
		100	0.9	1.0
	900 kg	50	1.0	1.1
		75	1.0	1.2
		100	1.1	1.2
20 m^3	Control	50	1.1	1.3
		75	1.2	1.3
		100	1.2	1.4
	450 kg	50	1.3	1.4
		75	1.4	1.5
		100	1.4	1.5
	900 kg	50	1.5	1.6
		75	1.5	1.6
		100	1.6	1.7

2. Effect of different treatments on some soil chemical properties:-

2.1. Soil organic matter:

Data presented in Table 6 show that soil organic matter percentage was increased by 36.39 and 15.49% after harvesting of wheat and soybean respectively in the plots which treated with compost compared with untreated soil. These increases were more pronounced in the surface layer where the values of organic matter were increased from 1.16 to 1.72% and from 1.08 to 1.69% after wheat and soybean harvesting, respectively, as a result of addition of 20 m^3 compost/fed.

On the other hand, the soil organic matter content slightly increased by 2.7 and 1.35% after harvesting of wheat with application of 450 and 900 kg sulphur/fed., respectively compared with untreated soil. It was observed from obtained data that there is insignificant difference between application of sulphur at rate of 450 and 900 kg.fed^{-1}., after harvesting of soybean. Since they increased the soil organic matter percentage by 21.36% compared to control. The relative slight increase in soil organic matter due to application of sulphur may be attributed to increase the activity of microorganisms for oxidation of the organic matter in the soil and partially exhausted by plants. Also soil organic matter content was increased from 1.16 to 1.79 and 1.85% after wheat and from 1.08 to 1.74 and 1.81% after soybean as a result of added 450 and 900kg sulphur/fed. combined with 20 m^3 compost, respectively. These increases in soil organic matter may be due to the addition of compost and the improvement on soil condition which increased the soil organic matter.

Table 6: Organic matter content (%) as affected by compost, sulphur and fertilizer rates during the two seasons.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels % from the recommended dose	After wheat			After soybean		
			Soil depths (cm)			Soil depths (cm)		
			0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	1.38	1.18	0.97	1.32	1.13	0.82
		75	1.38	1.12	0.96	1.30	1.06	0.80
		100	1.39	1.21	0.89	1.35	1.16	0.77
	450 kg	50	1.35	1.15	0.84	1.30	1.12	0.79
		75	1.32	1.12	0.81	1.31	1.09	0.75
		100	1.33	1.18	0.79	1.32	1.15	0.74
	900 kg	50	1.36	1.14	0.72	1.29	1.11	0.69
		75	1.35	1.12	0.75	1.28	1.05	0.71
		100	1.30	1.16	0.73	1.29	1.13	0.70
20 m^3	Control	50	2.62	1.47	0.99	2.60	1.45	0.93
		75	2.66	1.50	0.97	2.62	1.47	0.91
		100	2.71	1.55	1.00	2.69	1.52	0.98
	450 kg	50	2.72	1.57	1.00	2.68	1.49	1.00
		75	2.74	1.61	1.07	2.66	1.57	1.02
		100	2.74	1.59	1.08	2.65	1.53	1.05
	900 kg	50	2.76	1.64	1.10	2.72	1.60	1.08
		75	2.79	1.62	1.12	2.75	1.56	1.10
		100	2.81	1.70	1.14	2.77	164	1.12

Concerning the effect of mineral fertilizers on soil organic matter, data revealed that application of N P fertilizers at rate 100% from the recommended dose increased the soil organic matter percentage by 3.36 and 2.01% compared to application of 75% and 50% from recommended dose after harvesting of wheat .While after harvesting of soybean, the application of NP fertilizers at rate 100% from the recommended dose surpassed the application NP fertilizers at rate 50 and 75% in increasing the soil organic matter by 5.85 and 14.69%, respectively. Similar results and conclusion were reported by Khalifa and Hassan (1993), Sen *et al* (1994), El-Basioni *et al* (1995), Ghazy *et al* (2002) and Laila *et al* (2005).

2.2. Total $CaCO_3$ % in soil:

From Table 7, it can be observed that the application of soil amendments decreased the total calcium carbonate after harvesting of wheat and soybean. The application of 20 m^3 compost/fed. decreased the total calcium carbonate from 2.83 to 2.41 % after harvesting of wheat and from 2.82 to 2.47% after harvesting of soybean.

Data reveal also that the addition of sulphur resulted in decreasing the total calcium carbonate in soil from2.89 to 2.59 and 2.49% after wheat and from 2.88 to 2.54 and 2.45% after soybean as a result to addition of sulphur at rate of 450 and 900 kg.fed^{-1}., respectively. It can be noticed that the application of mineral N P fertilizers at rate of 100% from the recommended dose slightly decreased the total calcium carbonate after

Table 7: Means of total $CaCO_3$ (%) as affected by compost, sulphur and fertilizer rates during the two seasons.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels % from the recommended dose	After wheat			After soybean		
			Soil depths (cm)			Soil depths (cm)		
			0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	3.36	3.19	2.18	3.35	3.18	2.17
		75	3.34	3.17	2.16	3.33	3.17	2.16
		100	3.33	3.15	2.15	3.31	3.14	2.14
	450 kg	50	3.31	3.13	2.15	3.30	3.13	2.14
		75	3.30	3.12	2.14	3.30	3.11	2.13
		100	3.30	3.08	2.12	3.29	3.07	2.12
	900 kg	50	3.29	2.90	2.12	3.28	2.88	2.11
		75	3.27	2.82	2.11	3.27	2.80	2.11
		100	3.27	2.75	2.10	3.26	2.73	2.09
20 m^3	Control	50	3.14	2.73	2.13	3.08	2.67	2.10
		75	3.10	2.65	2.11	3.06	2.63	2.08
		100	3.06	2.68	2.09	2.98	2.59	2.03
	450 kg	50	2.56	2.52	2.07	2.42	2.43	1.98
		75	2.45	2.45	2.05	2.37	2.40	1.95
		100	2.48	2.42	2.03	2.35	2.37	1.92
	900 kg	50	2.47	2.41	1.98	2.35	2.35	1.90
		75	2.43	2.39	1.92	2.32	2.32	1.87
		100	2.39	2.32	1.90	2.25	2.27	1.85

Harvesting of soybean, while after harvesting of wheat, the application of mineral fertilizers at rate 75 % from the recommended dose decreased the total calcium carbonate compared to 50% and 100% .Also, data showed that the total calcium carbonate in the upper layer of soil was higher than its content in sub surface layers. Various investigators reported that the decrease in $CaCO_3$ content in the presence of compost and sulphur was primary due to its hydrolyses and reaction of the produced sulphuric acid with soil carbonates. It can be concluded that the interaction between application of zero compost, zero sulphur and 50% mineral NP fertilizers recorded the maximum calcium carbonate content while application of soil amendments at higher levels recorded the minimum calcium carbonate content. Similar results were obtained by Zein *et al* (1996a)

2.3. ECe, SAR and ESP:-

Data in Tables (8 and 9) indicate that the addition of 20 m^3 compost/fed., caused a decrease in ECe values in all soil layers compared to control. The mean values of ECe were reduced from 7.40 to 5.97 dS/m after wheat and from 6.87 to 5.77 dS/m after soybean. Also, addition of sulphur at rate of 450 or 900kg.fed^{-1}., decreased the mean values of ECe from 7.40 to

7.03 and 6.50 dS/m, after harvesting of wheat and from 6.87 to 6.48 and 6.19 dS/m after harvesting of soybean, respectively. Whereas, the combined effect of compost and sulphur was more effective on salt leaching than application of sulphur rates alone.

Table 8: Mean values of EC (dSm^{-1}), SAR and ESP as affected by different treatments after harvesting of wheat crop.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels%from the recommended dose	EC, dSm-1			SAR			ESP		
			0-20	20.40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	7.47	7.29	7.15	14.10	14.12	14.06	16.34	16.36	16.30
		75	7.45	7.37	7.18	14.31	14.20	13.87	16.55	16.45	16.11
		100	7.48	7.66	7.56	14.37	14.70	14.40	16.62	16.85	16.65
	450 kg	50	6.71	6.92	7.37	12.53	121.62	13.73	14.69	14.78	15.95
		75	6.74	6.95	7.29	12.78	13.04	13.37	14.95	15.23	15.58
		100	6.69	6.96	7.47	12.23	12.74	13.65	14.36	14.91	15.87
	900kg	50	6.12	6.49	6.88	11.20	12.56	13.37	13.23	14.72	15.58
		75	6.13	6.69	6.87	11.37	12.41	13.19	13.42	14.56	15.39
		100	6.11	6.55	6.67	11.08	11.93	13.41	13.11	14.04	15.62
20 m3	Control	50	5.65	6.12	6.54	10.21	12.10	12.74	12.12	14.22	14.91
		75	5.60	5.88	6.27	10.66	11.79	13.37	12.63	13.89	15.68
		100	5.26	5.93	6.38	10.43	11.33	12.18	12.38	13.12	14.31
	450kg	50	5.13	5.62	6.21	8.17	9.27	10.90	9.74	11.04	12.96
		75	5.14	5.73	6.19	7.75	8.98	9.99	9.23	10.70	11.88
		100	5.11	5.78	6.11	7.78	9.02	9.88	9.27	10.75	11.95
	900 kg	50	4.99	5.56	5.93	7.65	8.65	9.75	9.11	10.31	11.60
		75	4.97	5.60	5.75	7.67	8.31	10.53	9.13	9.91	12.49
		100	5.01	5.69	5.98	7.66	8.36	10.14	9.12	9.97	12.05

Table 9: Mean values of EC (dSm^{-1}), SAR and ESP as affected by different treatments after harvesting of soybean crop.

Compost rates (m^3 fed^{-1})	Sulphur treatments (Kg fed^{-1})	NP Fertilizer Levels%from the recommended dose	EC, dSm^{-1}			SAR			ESP		
			0-20	20.40	40-60	0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	7.00	6.78	6.70	12.12	13.50	13.86	14.24	15.72	16.10
		75	7.01	6.68	6.74	12.18	13.38	13.94	14.31	15.59	16.18
		100	6.81	7.00	7.11	12.43	13.14	14.00	14.58	15.34	16.24
	450	50	6.34	6.28	6.79	10.91	11.92	13.33	12.92	14.03	15.54
		75	6.37	6.45	6.84	10.65	11.75	13.68	12.62	13.85	15.90
		100	6.39	6.43	6.45	10.86	11.63	13.40	12.86	13.71	15.61
	900	50	5.91	6.13	6.51	10.25	11.16	12.28	12.17	13.19	14.42
		75	5.93	6.16	6.38	10.27	11.22	12..60	12.19	13.26	14.77
		100	5.95	6.28	6.49	10.31	11.57	12.64	12.24	13.65	14.81
20 m^3	Control	50	5.32	5.79	6.17	9.37	9.72	11.10	11.16	11.56	13.13
		75	5.33	5.70	6.20	9.34	9.81	11.21	11.12	11.67	13.25
		100	5.29	5.81	6.29	9.28	9.86	11.65	11.05	11.72	13.73
	450	50	4.72	5.12	5.73	7.58	8.31	9.03	9.03	9.91	10.76
		75	4.70	5.16	5.68	7.54	8.35	9.02	8.99	9.96	10.75
		100	4.65	5.19	5.70	7.51	8.26	9.27	8.74	9.85	11.04
	900	50	4.42	5.36	5.64	6.30	7.00	8.48	7.44	8.31	10.11
		75	4.40	5.34	5.66	6.33	7.72	8.98	7.47	9.20	10.70
		100	4.41	5.42	5.73	6.27	7.77	8.77	7.40	9.26	10.46

The results indicated that the application of N P mineral fertilizers at different levels from the recommended dose had a slight effect on salinity change. It could be concluded that the interaction between application of sulphur at rate of 900 $kg.fed^{-1}$, $20m^3$ compost/fed. and 75% N P fertilizers from the recommended dose had a great effect on salinity decreasing. Concerning the effect of different treatments on SAR and ESP in soil, data showed that both parameters behave the same trend of ECe. The positive effect of soil amendments on decreasing the ECe, SAR, and ESP may be due to the enhancing effect of compost and sulphur on increasing hydraulic conductivity and increasing the solubility of calcium salts in soil. The results are similar to those obtained by Khafagi and AbdEl-Hadi (1990), Rehman *et al*(1996), Ghazy *et al* (2002) and Laila *et al* (2005)

REFERENCES

Abd-Allah, M.A.A. (1990). Studies on the reclamation of salt affected soils in Northern Nile Delta. M.Sc. Thesis, Fac. Agric. Kafr El-Sheikh, Tanta Univ.

Datta, S.K. de; S.S. Hundal (1984). Effect of organic matter management on land preparation and structural regeneration in rice-based cropping systems. Organic matter and rice. 399-415 Los Banos, Laguna Philippines: International Rice Research Institute.

El-Awag, T.I.; A.M. Hanna and I.M. EI-Naggar (1992). Effect of added amendments and plowing types on zea maize root growth, sub soil mechanical impedance, chemical and physical properties of soil and ion uptake. J. Agric. Sci. Mansoura Univ.,17(7): 2510-2520

El-Basioni, S.M.; H.M. Hassan and Y.H. Awad (1995). Residual effect of FYM and sulphur on wheat yield and properties of clay desert soil. Fayoum J. Agric. Res. & Dev..9 (2):15-25.

El-Fayoumy, M.E.; E.I. EI-Maddah and H.M. Ramadan (2000). Effects of sludge-sulphur applications as soil amendments on some Egyptian soil properties and productivity of wheat and corn. Egypt. J. Appl. Sci., 15(12): 323-349.

El-Ghamry, A.M. and E.M. EI-Naggar (2001). Evaluation of some organic residues as soil conditioners on different Egyptian soil . J. Agric. Sci. Mansoura Univ., 26(12):8207-8214.

El-Ghamry, A.M.; Z.M. Eisirafy and R.A. EI-Dissoky (2005). Response of potato grown on clay loam soil to sulfur and compost application. J. Agric. Sci. Mansoura Univ., 30(7): 4337-4353.

El-Maddah, E.I. (2000). Effect of some amendments on some physical and hydrophysical soil properties. J. Agric. Sci. Mansoura Univ., 25(7): 4765-4775.

El-Shahawy, M. I. (2004) Effect of phosphogypsum, F Y M and subsoiling on some salt affected soil properties and its productivity at North Delta. J Agric. Mansoura Univ., 28(10),7539-7546.

Garcia, I. (1978). Soil-Water Engineering Laboratory Manual. Department of Agricultural and Chemical Engineering, Colorado State University, Fort. Collins, Colorado, U.S.A.

Ghazy, M.A.; M.A. Abou El-Soud; E.A.E. Gazia and E.H. Omar (2002). Effect of some soil amendments on improvement of salt affected soil. Proceeding of the National Symposium on Problems of Land Degradation in Egypt and Africa, 23-24 March 2002.

Jackson, M.L. (1967)."Soil Chemical Analysis". Prentice Hall of India,Private Limited, New Delhi.

Jackson, M.L. (1973)." Soil Chemical Analysis". Constable and Company Ltd. London.

Khafagi, M and Abd El-Hadi, Y (1990). Effect of sulphur application on salt distribution in a sodic calcareous soil. Egypt J. Soil Sci., 30 : 199–212

Khalifa, M.R. and N.A. Hassan (1993). Effect of sewage sludge and FYM on some clay soil properties, yield and elemental composition of squash fruits. J. Agric. Res. Tanta Univ., 19(1): 212-224.

Koriem, M.A. (1994). Effect of different rates and methods of sulphur application on some soil properties and elemental leaf composition of succari orange. J. Agric. Res. Tanta Univ., 20(2): 345-362.

Laila, K.M. All; M.H. Abd El-Salam and N.R. Habashy (2005). Effect of soil amendments on some properties of calcareous soils and its productivity. Minufiya. J. Agric. Res. Vol. 30 No. (2): 735-749.

Logan, T.J.; B.J. Lindsay; L.E. Goins and J.A. Ryan (1997). Field assessment of sludge metal bioavailability to crops: Sludge rate response. J. Environ. Qual., 26: 534-550.

Piper. C.S. (1950). Soil and Plant Analysis inter. Science Pub., Inc., New York

Rehman, H.A.A.; M.H. Dahab and M.A. Mustafa (1996). Impact of soil amendments on intermittent evaporation, moisture distribution and salt redistribution in saline sodic clay soil columns. Soil Sci. 161: 793-802.

Richards, L.A. (1954). Diagnosis and improvement of saline and alkali soils. Agriculture Handbook, No. 60, USDA, Chapter 7, pp. 83-126.

Saddik, Wafaa, M.A. and Laila, K.M. Ali (2004). Effect of some natural soil amendments on some soil physical properties, peanut and carrot yields in a sandy soil. Egypt. J Agric. Res., 28(2): 95-105.

Salem, F.S. (2003). Effect of some soil amendments on the clayey soil properties and some crops production. Minufiya. J. Agric. Res. Vol. 28 No. 5(2): 1705-1715.

Sanaa, A. Othman, A.M.M. Shehata and I.M. El-Naggar (2005). Effect of rice straw compost and N-fertilization on maize production and some soil physical properties. Minufiya. J. Agric. Res. Vol. 30 No. (6): 1853-1863.

Sen, D.; E.F. Chen; X.C. Xu; J.H. Zhang and H.Z. Li (1994). Effect of organic manure application on physical properties and humus characteristics of paddy soil. Pedosphere,4(2): 127-135 (C.F. Soil and Fert. Vol., 58 No .4, Abs. No. 3764, 1995).

Taha, M.B. (2000). Effect of using some organic amendments for improving the productivity of coarse textured soils. M.Sc. Thesis Fac. Agric., Minia Univ., Egypt.

Talha, M.; A.G. Abd El-Samie and M.S. Omar (1979a). Factors affecting water movement in alluvial soils. Egypt. J. Soil. Sci. 19(1): 55-72.

Vomocil, L.A. (1957). Measurements of soil bulk density and penetrability. A review of methods Adv. Agr. 9:159-176.

Wright, C.H. (1939).Soil analysis Tomas Murby & Co., London.

Zein, F. I. ;A. A.Amer.;A. A. El-Leithi and Maani. Z. Abou Amou (1996 a). Improving effect of gypsum and farmyard manure on the chemical properties of moderately salt affected soils. J. Agric. Sci. Mansoura Univ., 21(6): 2377-2386.

Zein, F.I.;Sayd,K.M. and El-Leithi,A.A. (1996b). Effect of gypsum and farmyard manure on the physical characteristies of moderately salt affected soils. J. Agric. Sci., Mansoura Univ.,36, 1-15.

تاثيرإضافة بعض محسنات التربة على بعض الخواص الطبيعية والكيماوية للتربه.

خالد حسن الحامدى*، سامى عبد الحميد حماد*، محمود احمد ابو السعود و جمال محمد عبد السلام الصناط****

*** قسم الاراضى- كلية الزراعه- جامعة المنصوره.**

**** معهد بحوث الاراضى والمياه والبيئة.**

اجريت تجربتان حقليتان خلال موسمين متتاليين 2004/ 2005، 2005 لدراسة تاثير بعض محسنات التربة على بعض الخواص الطبيعيه والكيماويه للتربة تحت زراعة محصولى القمح وفول الصويا. استخدم التصميم الاحصائى نظام القطع المنشقة مرتين مع ثلاثة مكررات. ووضعت المكمورات السمادية بمستويين بدون إضافة ، 20م3/ فدان فى القطع الرئيسية بينما تم اضافة الكبريت بثلاث معدلات وهى صفر، 450كجم، 900كجم/ فدان فى القطع المنشقة الاولى. ووضع السماد المعدنى بمعدلات اضافة 50%، 75%، 100% من السماد الموصى به فى القطع المنشقة الثانية. ويمكن تلخيص اهم النتائج المتحصل عليها فيما يلى.

- كان للتفاعل المشترك بين اضافة 20م3 كمبوست/ فدان، 900كجم كبريت/ فدان مع 100% سماد معدنى من الكمية الموصى بها أفضل تأثيرا في خفض قيم الكثافة الظاهرية للتربة وزيادة المسامية الكليه.
- كانت اعلى القيم لمعدل الرشح الأساسي تم الحصول عليها نتيجة اضافة 20م3 كمبوست/ فدان، 900 كجم كبريت/ فدان مع اضافة 100% من الكمية الموصى بها من التسميد المعدنى بينما اقل القيم تم الحصول عليها نتيجة اضافة 50% من الكمية الموصى بها من التسميد المعدنى فقط.
- زاد محتوى التربة من المادة العضوية بنسبة 36.39%، 15.49% بعد حصاد كل من القمح وفول الصويا وذلك نتيجة اضافة الكمبوست مقارنة بالكنترول بينما ادت اضافة الكبريت بمعدل 450كجم، 900كجم/ فدان الى زيادة محتوى التربة من المادة العضوية زيادة قليلة بعد حصاد كل من القمح وفول الصويا.
- كما تشير النتائج الى ان اضافة السماد المعدنى بمعدل 100% من الكمية الموصى بها ادت الى زيادة النسبة المئوية للمادة العضوية بنسبة 3.36%، 2.01% مقارنة باضافة 75%، 50% وذلك بعد حصاد القمح. بينما بعد حصاد فول الصويا تفوقت إضافة السماد المعدني بنسبة 100% من الكمية الموصى بها على 50%، 75% بنسبة 5.85%، 14.69%.
- أدى التفاعل المشترك بين اضافة صفر كمبوست، صفر كبريت مع 50% من السماد المعدنى من الكمية الموصى بها إلى الحصول على أعلى القيم من كوبونات الكالسيوم الكلية في التربة.
- كان للتفاعل المشترك بين اضافة 20م3 كمبوست/ فدان، 900كجم كبريت/ فدان و إضافة 75% سماد معدنى من الكمية الموصى بها كان له أثر معنوي في خفض قيم التوصيل الكهربى وكـــــذلك SAR, ESP .