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EFFECT OF SOME SOIL AMENDMENTS APPLICATION ON THE PRODUCTIVITY OF WHEAT AND SOYBEAN, MOBILITY AND AVAILABILITY OF NITROGEN.

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ABSTRACT

Two field experiments were carried out during two successive seasons (2004/2005 and 2005) to investigate the effect of some soil amendments on productivity of wheat and soybean and mobility and availability of nitrogen in soil. 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). The subplots were allocated to sulphur application levels, S (0, 450 and 900kg/fed). The sub-subplots were assigned for mineral fertilizers, NP(50,75 and 100% of the recommended dose). The main results could be summarized as follows:

The 1000 grain weight of wheat, 100 seed weight of soybean and productivity of both crops were influenced significantly by alternative soil amendments treatments. The highest mean values of wheat grain and soybean seed yield were achieved from the interaction between application of 20m^3 compost/ fed, 900kg sulphur/ fed, and 100% NP mineral fertilizer of the recommended dose. The application of compost increased the total nitrogen content in soil by 22.5 and 56.96% over the control after the harvesting of wheat and soybean, respectively. Application of sulphur had a positive effect on total nitrogen content in soil. The N content in soil was significantly increased with increasing the rate of sulphur up to 900kg/fed and NP up to100% from the recommended dose.

The most effective interaction effect on increasing the NO^-_3 concentration in soil after harvesting of wheat was under 20m^3compost, 900kg sulphur/ fed and mineral fertilizer at rate of 100% from the recommended dose.While after soybean the best interaction was detected between 20m^3 compost, 900kg sulphur/ fed and adding NP mineral fertilizer at rate of 75% from the recommended dose. With regard to the interaction effect of different treatments on NH_4^+ concentration in soil the data demonstrated that the highest values were resulted from combination between applications of 20 m^3 compost, 900 Kg sulphur/fed. and application of mineral fertilizers at rate of 75 % or 100 % from the recommended dose after harvesting of wheat and soybean, respectively.

Keywords: compost, sulphur, mineral fertilizers, productively, n-mobility.

INTRODUCTION

Egyptian soils are known to be rather poor in organic matter. Thus, the application of organic manure to soil is recognized way of improving their physical, chemical and biological properties. The chemical improvement of these soils arises among the other factors, such as release of available macro and micronutrients from the added organic residues through the microbial activity. This depends mainly on soil type, soil reaction, temperature and moisture content, source of organic matter and microbial activity (Abd El-Latif and Abd El-Fatah, 1985).

Attention has been paid to the application of elemental sulphur to soil in sufficient quantities to correct soil alkalinity. Elemental sulphur is oxidized by microorganisms in soil to sulphuric acid which reduce soil pH, improves soil structure and increases the availability of certain plant macro and micro nutrients; notably P, iron, manganese and zinc (Mostafa *et al..* 1990).

In Egypt, farmers consume a large amount of chemical fertilizers aiming to increase the yield without any care of the hazard effect on the environment. The availability of soil nitrogen will be changed depending on the amount of N mineralized or immobilized during the decomposition of organic residues.

Wheat is very strategically important crop in Egypt (3.04 million fed. in 2005) and the mean production of wheat in Egypt in the Valley and Delta soils is about 2.7 ton/fed., hence the national production of wheat is 8.22 million tons in 2004, while the national consumption of wheat is about 10.7 million tons in 2004 (Yearly Statistic Book).

Soybean is a promise crop to solve the deficit of protein and oil. It considered an available source for high energy, high protein and other nutrients to human and livestock, some of the most exciting research taking place today involves the use of soybean in preventing cancer, reducing the risk of coronary heart disease and controlling glucose levels in diabetic patients. Adding soybean as apart of our diet could improve our health (Ali, 1998). Soybean is one of legumes that have special agronomic and economic significance because of their ability to fix N_2 symbiotically in many cropping systems. It fixes average rates of 57-94 Kg N_2/ha. (Keyser and Fudi, 1992 and El-Haddad *et al.* 1998). In this respect, the N mobility is very complicated and influenced by climate and soil factors. Even the total nitrogen content of soil is high and ranges between 0.01 to 0.2 % (depending on the organic matter content) only about 5% of total is inorganic N (NH_4^+ and NO_3^-) that available to plants (Amberger, 1989).

Most of inorganic nitrogen in agricultural soil is organically bound, while the N uptake by plants and also the N losses from the soil – plant system into the environment is as inorganic N (Appel and Mengel 1998).

The aim of this study is to investigate the effect of some soil ammendments on productivity of wheat and soybean and their quality as well as mobility and availability of nitrogen.

MATERIALS AND METHODS

Two field experiments were conducted during two successive seasons (2004/2005 and 2005) at Sakha Agricultural Research Station Farm, Kafr El-Sheikh, Governorate, Egypt to investigate the effect of some soil amendments on productivity of wheat and soybean and mobility and availability of nitrogen in 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 m3/fed.). The sub-plots were allocated to sulphur application levels, S (0, 450 and 900 Kg/fed.) the sub-sub plots were assigned for mineral fertilizers, NP (50,75 and 100 % of the recommended dose, 224 kg ammonium nitrate/fed and 100 kg calcium super phosphat/fed for wheat)

Ammonium nitrate (33.5%N) was applied at the rates of 112, 168 and 224 Kg/fed for wheat crop. These rates were divided into two doses, which were added before the first irrigation and the remainder 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 P/fed. for wheat. The other agronomic practices were performed as same as normally recommended in the area. Compost was made from rice straw mixed with farmyard manure and incubated 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 Table (1). Some soil physical and chemical properties were measured according to Richards(1954) and Jackson(1967). Some macronutrients content were measured in soil according to Patterburgski (1968), Knudesen *et al.* (1982), Olsen and Sommers (1982), and Page (1982), (Table 2).

Agronomic characters

At maturity (harvest stage), plants of wheat and soybean were removed and separated into grain or seed and straw to measure the following: grain and straw yield (Kg/ fed), 1000-grain weight for wheat and 100 seeds of soybean (g), crude protein concentration (%) was calculated from total nitrogen percentage in grain yield multiplied by 6.25 for soybean and 5.57 for wheat according to A.O.A.C (1980). Oil yield of soybean was determined by using soxlhet apparatus according to A.O.A.C (1975).

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 %	pH	EC dS//m	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	8.2	9.42	0.5
20-40	0.98	21.50	27.31	50.21		1.50	43.40	8.0	8.70	
40-60	1.05	26.14	29.10	43.71		1.55	41.51	7.9	7.60	

Table 2: Some macronutrient contents (Total and available NPK ppm) in the used soil.

Soil depth (cm)	N		P		K	
	Total	Available	Total	Av.	Total	Av.
0-20	265.81	9.10	25.10	1.35	8246	861
20-40	142.30	7.42	14.56	0.95	6159	712
40-60	24.20	0.19	8.30	0.57	4512	584

At harvesting samples from wheat and soybean straw and seeds in each plot were oven dried at 70 °C for 24 hours. The dried materials of grain and straw were ground at a fine powder and kept for determination of nitrogen, phosphorus and potassium. The dried plants were crushed and digested using the mixture of H_2SO_4 and HCL acids for different analysis i.e. N P and K according to Jackson (1967). The total nitrogen was determined in the acid digest solution of plant by semi micro-Kjeldahl as described by Cotteine *et al.* (1982 a). Total nitrogen in soil was determined by macro-Kjeldahl method (Page 1982). Available nitrogen was extracted by K_2 SO_4 (1%) and determined by macro-Kjeldahl method. All data statistically analyzed according to the method described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Effect of different treatments on:

1- 1000 grain weight of wheat and 100 seed weight of soybean:

It is obvious in Table (3) that the 1000-grain weight of wheat and 100 seed weight of soybean were influenced significantly by alternative soil amendments treatments. Application of 20 m^3 compost/fed. gave the highest 1000-grain weight (55.58 gm) compared to untreated soil (49.56 gm). While 100 seed weight of soybean were 16.26 for the control and 17.87 gm for 20m^3 compost/fed. The increase as a percentage over control due to application of 20m^3 compost/fed., were 10.83% and 7.33% for wheat and soybean, respectively. Furthermore, 1000-grain weight of wheat and 100-seed weight of soybean significantly affected by sulphur application. Application of sulphur at rate of 900 kg/fed., surpassed the other levels in increasing the 1000-grain weight of wheat and 100 seed weight of soybean, since it increases the 1000-grain weight of wheat by 8.69 and 4.97% over the control and 450 kg/fed., respectively. While the increase of 100 seed weight of soybean, were 3.26 and 1.43% over the control and 450kg sulphur/fed, respectively.

Regarding the effect of mineral fertilizer levels, data in Table (3) show a significant increases in 1000-grain weight of wheat and 100-seed weight of soybean due to application of N P fertilizers. The values of 1000-grain weight of wheat were 51.92, 52.56 and 53.23g for N P rates of 50, 75 and 100% from the recommended dose, respectively.While the 100-seed weight values for soybean were 17.16, 17.23 and 17.26g for application of mineral fertilizers at level of 50, 75 and 100% from the recommended dose, respectively. The application of N P fertilizers at rate of 100% from the recommended dose resulted in increasing the 1000 grain weight of wheat by 2.46 and 1.26% over than 50 and 75% from the recommended dose, respectively. While this increase for 100-seed weight of soybean was 0.58% and 0.17% than the stated treatments, respectively. It can be concluded that the interaction between application of 20 m^3 compost/fed., 900 kg sulphur/fed., and N P fertilizers at rate of 100 % from the recommended dose achieved the highest values of 1000-grain and 100-seed weight for wheat and soybean, respectively. These results are in agreement with those obtained by El-Etr,Wafaa *et al.* (2004) and Saddik *et al.* (2004)

2- Wheat grain yield and seed yield of soybean:

Data in Tables (3) illustrated the response of wheat grain and seed yield of soybean to different treatments. Data show a significant increase in the yield of wheat and soybean due to the effect of different soil amendments. Application of 20 m^3 compost/fed., produced the highest values of wheat grain yield (2.478 ton/fed.) and seed yield of soybean (0.862 ton/fed.) compared to untreated plots. The increase in yield of wheat and soybean over than the control due to application of the compost were 15.74 and 15.78%, respectively. Regarding the sulphur application, the obtained results illustrated that there are significant effect on the grain and seed yield of wheat and soybean, respectively. The values of dry grain yield of wheat were 2.122, 2.291 and 2.424 ton/fed., for control, 450 and 900 kg sulphur/fed., respectively. While the corresponding values for seed yield of soybean were 0.743, 0.803 and0.836 ton/fed., for the above mentioned treatments, respectively. It is clear from data that the application of sulphur at rate of 900 kg/fed., increased wheat grain yield by 12.46 and 5.49% compared to control and 450 kg sulphur/fed., respectively. While, the increase in seed yield of soybean were 11.12 and 3.95% over control and 450 kg sulphur/fed., with the above mentioned treatments, respectively. Respecting to the effect of mineral fertilizers, data revealed that there were significant responses in grain and seed yield of wheat and soybean to various mineral fertilizers treatments. Application of mineral fertilizers at rate of 100% from the recommended dose gave the highest yield compared to the other levels of application. Mineral fertilizers at rate of 100% from the recommended dose surpassed the rate of 50% and 75% from the recommended dose in increasing wheat grain yield by 3.87 and 1.81%, respectively. While the increase in seed yield of soybean due to above mentioned rates were 3.1 and 1.24%, respectively. Concerning the interaction effect, data indicated that the highest mean values of wheat grain and soybean seed yield were achieved from the combination between application of 20m^3 compost/fed., 900kg sulphur/fed. and 100% mineral fertilizer from the recommended dose. Similar results were obtained by EL-Fayoumy *et al.* (2000), Omer (2003) El-Etr,Wafaa *et al.* (2004), Riffat (2004) and Atia (2005).

3. Protein content:

Data of total protein in wheat grain and soybean seeds as affected by different application of compost, sulphur and mineral fertilizers are presented in Tables (3). The obtained results showed that increasing application rate of compost, sulphur and mineral fertilizers increased total protein in grains and seeds of wheat and soybean. The value of protein content in wheat grains was 7.66 and 10.58 % for untreated treatments and 20 m^3 compost /fed.,respectively. While the values in protein content of soybean seeds were 8.361 and 13.924 % for the same treatments, respectively.

The applications of 20 m^3 compost/fed. increased the protein content by 27.58 % in wheat grains and 39.95 % in seeds of soybean, respectively.Also, application of 900 kg sulphur/fed achieved the highest value of protein content in wheat and it was increased by 22 % and 9.14 % over the control and 450 kg/fed., respectively. While, the increasing of protein content in soybean seeds were 24.79 and 14.5 % over the control and 450 kg/fed., respectively.

Data in Table (3) showed that total protein content varied with different NP fertilizers treatments. It was found that the 100 % N P fertilizers from the recommended dose produced the highest value of protein content in wheat grains and seeds of soybean. The application of 100% N P fertilizers increased content of protein in wheat grain by 4.8 and 3.2 % while in soybean seeds it was increased by 8.94 and 3.61 % over 50 % and 75 % from the recommended dose, respectively. It could be noticed that the interaction between application of 20m3 compost/fed., 900 kg sulphur/fed and N P fertilizers at rate of 100 % gave the highest values of protein content in grain and seeds of wheat and soybean (11.17 and 16.69%, respectively). Similar results were obtained by Gendy *et al.* (1996), Al-Abdulsalm (1997), Behera *et al.* (2000), Melgar *et al.* (2002) and Atia (2005).

Table 3 : Effect of treatments on yield and yield components of wheat and soybean plants.

Treatments	Wheat 2004/2005				Soybean 2005				
	Grain yield Ton/fed	Straw yield Ton/fed	1000 grain weight (g)	Protein %	Seed yield Ton/fed	Straw yield Ton/fed	100 seed Weight (g)	Protein %	Oil yield %
Compost rates without	2.080	3.518	49.56	7.660	0.726	0.878	16.26	8.36	25.25
$20m^{3}$/fed	2.478	4.025	55.58	10.577	0.862	1.084	17.87	13.92	27.26
F. Test	**	**	**	**	**	**	**	**	**
Sulphur Levels control	2.122	3.468	50.13	7.936	0.743	0.916	16.92	9.644	23.68
450	2.291	3.795	52.17	9.245	0.803	1.032	17.24	10.963	26.41
900	2.424	4.052	54.90	10.175	0.836	0.995	17.49	12.822	27.13
F. Test	**	**	**	**	**	**	**	**	**
L.S.D 0.05	0.22	0.28	2.03	0.70	0.03	0.02	0.25	0.90	0.95
0.01	0.31	0.55	3.52	1.35	0.08	0.03	0.42	2.32	3.01
NP Fertilizers 50 %	2.233	3.771	51.92	8.92	0.781	0.964	17.16	10.59	25.86
75 %	2.281	3.780	52.56	9.07	0.796	0.983	17.23	11.21	26.29
100 %	2.323	3.764	53.23	9.37	0.806	0.996	17.26	11.63	26.61
F. Test	**	*	**	**	*	**	*	**	*
L.S.D 0.05	0.03	0.013	0.23	0.29	0.008	0.012	0.038	0.005	0.24
0.01	0.06	0.022	0.91	0.40	0.021	0.032	0.067	0.017	0.63
Interaction C × S	ns	*	**	*	*	**	*	*	**
C × NP	*	**	**	ns	ns	ns	**	ns	**
S × NP	*	*	*	*	ns	*	8	*	ns
C × S × NP	*	**	**	*	**	*		**	*

4. Oil yield in soybean:

Data presented in Table (3) showed the effect of different soil amendments on oil percentage in seeds of soybean. It is quite obvious from the obtained data that addition of 20 m^3 compost/fed., increased the oil percentage by 7.37% compared to untreated treatments. Concerning the effect of sulphur on oil percentage in seeds of soybean, data in Table (3) showed that sulphur application at rate of 450 and 900kg/fed., increased the oil percentage from 25.22 to 26.41 and 27.13, respectively. The highest value of oil percentage was obtained from 900 kg/fed sulphur application with increasing by 7.04% and 2.65% over control and 450 kg/fed, respectively.

Data in the same table showed that increasing N P fertilizers levels from 50 to 100% from the recommended dose slightly increased the oil content. The values of oil content were 25.86, 26.29 and 26.62% for 50, 75 and 100% of N P mineral fertilizers, respectively.The increases in oil yield due to 100% application from the recommended dose were 2.25 and 1.28% higher than 50 and 75% rates, respectively.

The interaction between application of 20m^3 compost/fed., 900 kg sulphur /fed and 100% of N P fertilizers from the recommended dose achieved the highest oil percentage (28.32%).These results are in good harmony with that found by Abou Hussien (1999) Bayoumi *et al.* (2003), Nasef (2004), Knany *et al.* (2004) and Atia (2005)

5. Nitrogen content in soil:

The effect of different treatments on total nitrogen content in soil is given in Table (4). Data showed that, the application of soil amendments increased the total nitrogen in soil because the compost are rich in N and most essential nutrients. The compost application increased the total nitrogen content in soil by 22.5 and 56.96% over the control after harvesting of wheat and soybean, respectively.

Table 4: Means of total N (mg kg soil^{-1}) as affected by compost rates, 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 Soil depths (cm) 0-20	20-40	40-60	After soybean Soil depths (cm) 0-20	20-40	40-60
Zero	*Control*	50	680.00	560.00	190.00	380.00	100.00	20.00
		75	690.00	550.00	210.00	410.00	110.00	30.00
		100	710.00	570.00	220.00	420.00	190.00	40.00
	450 kg	50	740.00	590.00	220.00	620.00	110.00	110.00
		75	760.00	590.00	230.00	650.00	110.00	110.00
		100	780.00	560.00	250.00	660.00	120.00	120.00
	900 kg	50	790.00	580.00	250.00	710.00	140.00	140.00
		75	830.00	600.00	270.0	740.00	140.00	140.00
		100	860.00	630.00	280.00	760.00	530.00	150.00
20 m^3	Control	50	970.00	710.00	280.00	840.00	680.00	200.00
		75	990.00	730.00	310.00	850.00	710.00	230.00
		100	990.00	760.00	320.00	860.00	630.00	230.00
	450 kg	50	1010.00	720.00	330.00	900.00	730.00	250.00
		75	1030.00	740.00	350.00	930.00	770.00	250.00
		100	1040.00	740.00	360.00	940.00	790.00	250.00
	900 kg	50	1060.00	750.00	380.00	990.00	710.00	260.00
		75	1080.00	770.00	400.00	1020.0	740.00	290.00
		100	1080.00	790.00	450.00	1040.00	780.00	300.00

Furthermore, the application of sulphur had a positive effect on total nitrogen content in soil which significantly increased with increasing the rate of sulphur up to 900 kg/fed. The soil nitrogen content was increased by 12.61

and 13.66% after harvesting of wheat, while after harvesting of soybean, it increased by17.69 and24.75 over the control and450 kg sulphur/fed., respectively. The increase of soil nitrogen content as a result to sulphur application is mainly due to that elemental sulphur is oxidized by soil microorganisms to sulphuric acid which in turn lowers soil pH and increase the availability of certain plant nutrients, notably phosphorus, iron, manganese and zinc. Results revealed that total nitrogen was increased with increasing the rate of chemical N P fertilizers up to 100% from the recommended dose.

Also, it could be noticed that the highest concentration of total nitrogen was obtained at the highest rate of N P fertilizers combined with application of 20m^3 compost and 900kg sulphur /fed., after harvesting of wheat and soybean. It could be mentioned that the highest content of total nitrogen was found in the upper part of the soil profile. This increase may be due to the farming practices and organisms activities.

The favorable effect of the applied soil amendments on increasing the availability of plant nutrients might be as a result of reducing the soil pH and increasing the released organic acids. Similar results were obtained by El–Nashar (1985), Kaloosh *et al.* (1989) Koriem (1993), Mahmoud *et al.* (2001) and Sheta (2002).

7. NO^-_3 and NH^+_4 content in soil:-

It is clearly from the data in Tables (5 and 6) that the NO^-_3 concentration was increased by 16.27 and 24.86 % with application of 20 m^3 compost/fed. compared to untreated soil after harvesting of wheat and soybean, respectively. The application of 900 Kg sulphur/fed. increased NO^-_3 concentration by 18.43 and 5.94% after harvesting of wheat and by 16.82 and 11.24% after harvesting of soybean compared to untreated soil and 450 kg sulphur/fed., respectively.

Table 5: Means of NO^-_3 content (mg kg soil^{-1}) as affected by compost rates, sulphur and fertilizer levels.

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	22.19	17.95	6.25	22.55	18.42	7.46
		75	25.66	12.88	6.42	25.17	13.72	10.68
		100	28.19	12.27	10.22	27.82	12.32	11.21
	450 kg	50	29.38	18.63	13.92	28.09	18.02	12.74
		75	32.34	16.70	8.92	28.13	19.06	15.38
		100	32.26	18.26	8.87	30.12	19.71	12.72
	900 kg	50	32.69	22.14	17.21	30.12	22.33	14.25
		75	33.24	16.73	6.82	31.22	17.18	15.65
		100	35.14	18.98	14.82	33.54	20.10	15.21
20 m^3	Control	50	38.95	21.07	9.77	37.71	25.31	11.21
		75	40.90	25.27	9.46	38.39	26.99	11.48
		100	41.11	19.13	17.22	39.00	22.62	17.99
	450 kg	50	40.93	15.15	11.92	39.18	18.04	12.89
		75	42.02	17.11	10.78	43.29	18.01	12.44
		100	42.10	23.32	8.52	44.13	25.17	9.26
	900 kg	50	41.00	22.10	10.03	44.68	24.02	12.26
		75	42.28	28.68	15.31	46.13	30.14	17.65

		100	42.70	19.83	10.90	47.69	22.34	12.21

The application of mineral fertilizers at rate 100% from the recommended dose surpassed 50 and 75% treatments in increasing NO^-_3 concentration by 0.28 and 3.08% after wheat and by 5.66 and 0.81% after soybean, respectively.

The most effective interaction effect on increasing the NO^-_3 concentration was between 20 m^3 compost, 900 kg sulphur/fed. and mineral fertilizer at rate of 100% from recommended dose after harvesting of wheat. While after soybean the best interaction was detected between 20 m^3 compost, 900 kg sulphur/fed. and adding N P mineral fertilizer at rate of 75% from the recommended dose.

Table 6: Means of soil-NH^+_4 (mg kg $soil^{-1}$) 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 Soil depths (cm)			After soybean Soil depths (cm)		
			0-20	20-40	40-60	0-20	20-40	40-60
Zero	*Control*	50	0.131	0.12	0.091	0.332	0.120	0.000
		75	0.212	0.162	0.110	0.347	0.081	0.000
		100	0.160	0.087	0.011	0.410	0.098	0.000
	450 kg	50	0.233	0.128	0.081	0.516	0.152	0.005
		75	0.114	0.069	0.012	0.640	0.210	0.017
		100	0.256	0.072	0.021	0.660	0.231	0.000
	900 kg	50	0.305	0.151	0.100	0.681	0.262	0.008
		75	0.313	0.111	0.071	0.813	0.281	0.000
		100	0.162	0.091	0.000	0.791	0.212	0.007
20 m^3	Control	50	1.31	0.103	0.000	0.718	0.492	0.111
		75	0.56	0.117	0.011	0.612	0.171	0.015
		100	0.52	0.217	0.102	0.823	0.318	0.132
	450 kg	50	0.48	0.319	0.035	0.888	0.297	0.990
		75	0.51	0.062	0.011	0.178	0.081	0.025
		100	0.47	0.047	0.014	0.181	0.037	0.000
	900 kg	50	1.62	0.318	0.112	0.846	0.417	0.131
		75	0.58	0.164	0.005	0.923	0.518	0.200
		100	0.45	0.098	0.000	0.777	0.710	0.008

There were differences in NH^+_4 concentration after harvesting of wheat and soybean due to application of soil amendments and N P fertilizers as shown in Table (6). The concentration of NH^+_4 was increased by 31.55 and 35.37% due to application of 20 m^3 compost/fed., after harvesting of wheat and soybean, respectively. Results revealed that with application of 450 and 900 Kg sulphur/fed., the NH^+_4 was increased over than control by 24.29 and 7.91 %, respectively after harvesting of wheat and by 36.97 and 32.7 %, respectively after harvesting of soybean.

Concerning the effect of mineral fertilizers levels, data indicated that the NH^+_4 concentration was decreased as N P fertilizers level increased from 50 % to 75 or 100 % from the recommended dose. The application of mineral N P fertilizers at level of 50 % from the recommended dose increased NH^+_4 by 15.17 and 17.98 % over 75 % and 100 %, respectively after harvesting of wheat. While the corresponding increases with soybean were 26.55 and

22.68 %, respectively. Concerning the concentration of NO^-_3 and NH^+_4 with soil depth, data declared that the highest values of NO^-_3 and NH^+_4 were found in the upper part of soil profile compared to the lower part. This increase due to application of mineral fertilizers and compost in the soil surface layer.

With regard to the interaction effect of different treatments on NH^+_4 concentration, the data demonstrated that the highest values were resulted from combination between application of 20 m^3 compost, 900 Kg sulphur /fed. and application of mineral fertilizers at rate of 75 % or 100 % from the recommended dose after harvesting of wheat and soybean. The increase in concentration of NO^-_3 and NH^+_4 is due to the decomposition of compost and release of the nutrients with raising either organic matter content or available macronutrients in soil.These results are in agreement with those obtained by Stevenson (1982), Nadia *et al.* (2000), El-Fayoumy *et al.* (2000) and Mahmoud *et al.* (2001).

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تأثير إضافة بعض محسنات التربة على إنتاجية محصولي القمح وفول الصويا وحركية ويسر النيتروجين فى التربة

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أجريت تجربتين حقليتين خلال موسمين متتاليين (2004/ 2005، 2005) لدراسة تأثير بعض محسنات التربة على إنتاجية محصولي القمح وفول الصويا وحركية ويسر النيتروجين في التربة، استخدم التصميم الاحصائى نظام القطع المنشقة مرتين وثلاثة مكررات. ووضعت مستويات إضافة المكموران السمادية صفر، 20م3/ فدان في القطع ألرئيسيه بينما مثلت مستويات إضافة الكبريت (صفر، 450، 900كجم/ فدان) ألقطعه المنشقة الأولى بينما وضعت الاسمده المعدنية (نيترات الامونيوم وسوبر فوسفات الكالسيوم) بمعدلات 50%، 75%، 100% من السماد الموصى به في القطع المنشقة الثانية ويمكن ترخيص النتائج المتحصل عليها فيما يلي:

- تأثر وزن أل 1000 حبه من حبوب القمح وكذلك وزن المائة حبه من حبوب فول الصويا معنويا بإضافة محسنات التربة وتحقق أعلى متوسط لقيم وزن الحبوب من القمح أو فول الصويا من التفاعل المشترك بين إضافة 20م3 كمبوست/ فدان و 900 كجم/ فدان مع التسميد المعدني بمعدل 100% من الكمية الموصى بها.
- زاد محتوى التربة من النيتروجين الكلى بنسبة 22.5، 56.96% عن الكنترول بعد محصول القمح وفول الصويا.
- كان لإضافة الكبريت تأثير موجب على زيادة محتوى التربة من النيتروجين الكلى وزاد زيادة معنوية نتيجة إضافة الكبريت حتى 900كجم/ فدان.
- زاد محتوى التربة من النيترات نتيجة التفاعل بين إضافة 20م3/ كمبوست/ فدان، 900كجم/ فدان مع التسميد المعدني بمعدل 100% من الكمية الموصى بها بعد حصاد القمح. بينما بعد حصاد فول الصويا كانت أعلى القيم تم الحصول عليها نتيجة إضافة 20م3 كمبوست/ فدان، 900كجم كبريت/ فدان مع 75% من السماد المعدني الموصى به.
- وبالنسبة لتركيز الامونيوم كانت أعلى القيم نتيجة لإضافة 20م3 كمبوست/ فدان، 900كجم كبريت/ فدان مع 75% او 100% من كمية السماد المعدني الموصى به وذلك بعد حصاد كل من القمح وفول الصويا على التوالي.