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EFFECT OF ORGANIC AMENDMENTS APPLICATION ON SOME SOIL CHARACTERISTICS AND YIELD RESPONSE OF WHEAT AND SOYBEAN

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ABSTRACT

Two field experiments were conducted at Sakha Agricultural Research Station Farm, Kafr El-Sheikh Governorate, Egypt during the two successive growing seasons, winter 2011/2012 and summer 2012 to evaluate the effect of application different rates i.e. 0, 5, 10, 20 & 30 ton fed^{-1} of organic amendments (farmyard manure "FYM" and poultry manure "PM") on some soil characteristics and yield of wheat and soybean. The obtained results could be summarized as follow:

1) Application of organic amendments (farmyard and poultry manures) improved some soil physical properties through decreasing soil bulk density and penetration resistance, while total porosity, infiltration rate, aggregation index, mean weight diameter and optimum size aggregates were increased.

2) Increasing organic amendments application rates up to 30 ton fed^{-1} led to a slight decrease in soil pH and remarkable increase in soil salinity, organic matter content and soil elemental contents.

3) The yields of both wheat and soybean crops were increased significantly with increasing the application rate of organic amendments. The yield increment due to PM surpassed that due to FYM by about 2.4%.

It could be concluded that utilization of farmyard manure and poultry manure as an organic fertilizer is essential in improving soil productivity and crop production, through enriching the soil with nutritional elements and their beneficial effects on the physical and chemical characteristics of soil, as well as minimizing the intensive use of chemical fertilizers, consequently decrease their negative impact on the environmental and economical conditions.

Keywords: Farmyard manure, poultry manure, soil chemical and physical properties, wheat, soybean yield.

INTRODUCTION

The organic matter content of the cultivated soils in Egypt is usually less than 2%. It is difficult to increase soil organic matter or even maintain it in the subtropics as organic matter turnover is high and crop residues are used as fodder by roaming animals or burned. Low input of organic matter in semiarid regions makes soil structure and its stability less favorable for agriculture (Dexter, 1988). Frequent and high application of organic manure is necessary to maintain soil fertility. It has been shown that the amendment of soil with organic matter leads to increase sustainability in agricultural production because it possesses many desirable properties such as high water holding capabilities, cation exchange capacity, ability to sequester contaminants (both organic and inorganic), enhanced nutrient uptake, plant hormone-like activity and beneficial effects on the physical, chemical and biological characteristics of soil (Abdel-Moez *et al.*, 1999 ; Aggelides and Londra, 2000 and Weber *et al.*, 2007).

Moubarek (1960) pointed out that FYM increased the yield of both barley and corn. Addition of FYM significantly increased the availability of

macro elements (Barbaria and Patel, 1980). Abd El-Ghaffar (1982) found that FYM is the most commonly organic fertilizer used in the Egyptian agriculture for maintaining soil organic matter, reclaiming degraded soils, and supplying plant nutrients. Makaraviciute (2003) illustrated that application of FYM increased dry matter and starch contents in the tuber, where potato tuber yield increased by 20 %. Gazia *et al.* (2004) found that FYM increased grain yield of maize at the low rate (up to 10 ton fed^{-1}) while the high rate (up to 30 ton fed^{-1}) decreased the yield. Application of FYM increased dry shoot yield, fresh tuber yield, dry matter %, protein % and specific gravity of tubers (El-Sirafy *et al.*, 2008). El-Ghamry *et al.* (2009) stated that application of FYM gave a significant increase in wheat grain and straw yields.

Warman (1986) and Duncan (2005) reported that chicken manure is preferred amongst other animal wastes because of its high concentration of macro-nutrients. Eck and Stewart (1995) stated that poultry manure have relatively high nutrient contents and the nitrogen in a form that is almost all available during the year of application. Reddy *et al.* (2000) pointed out that poultry manure is agronomically efficient in sunflower production. Dikinya and Mufwanzala (2010) stated that the utilization of chicken manure as an organic fertilizer is essential in improving soil productivity and crop production. They found that EC_e values were increased with increasing the addition rate of chicken manure and there was a significant increase in both of nitrogen and phosphorus contents in the soil. Also, they recorded initial increases and subsequent decreases of the dry biomass of spinach with application rates of poultry manure.

Therefore, this research aimed to study the effect of application of farmyard manure and poultry manure in different rates on some soil physico-chemical characteristics and yield of wheat and soybean crops.

MATERIALS AND METHODS

Two field experiments were conducted at Sakha Agricultural Research Station Farm, Kafr El-Sheikh Governorate, Egypt during the two successive seasons, winter 2011/2012 and summer 2012 to study the effect of organic amendments application on some soil physico-chemical characteristics and yield of wheat and soybean.

The experimental design was split plots with 3 replicates. The main plots were two types of organic amendments (farmyard manure "FYM" and poultry manure "PM"), while five rates (0, 5, 10, 20, 30 tons fed^{-1}) of the used organic amendments were assigned as sub-plots. The FYM and PM were applied before tillage and mixed well in the soil.

Soil samples were taken from the experimental sites from the surface layer (0-25 cm) before planting and after harvesting of the two crops for chemical and physical analysis. Also, samples from organic amendments were subjected to chemical analysis. Available P was determined according to Olsen *et al* (1954) and K was determined according to Page (1982). Total N content determined by micro-Kjeldahl method (Jackson, 1967). Total P was determined according to Snell and Snell (1967). Total K content determined using flame photometer (Jackson 1967). Mechanical analysis was

determined according to Piper (1950). Bulk density (Mg m^{-3}) was measured by core sampler according to Vomocil (1957). In undisturbed soil samples, wet sieving technique described by Yoder (1936) was carried out, using a set of sieves having 2.00, 1.00, 0.5 and 0.25 mm screen opening to determine aggregation index (AI), optimum size of aggregates (op. size) and mean weight diameter (MWD). Optimum size of aggregates was calculated as percentage of the peds ranged between 0.5 and 2 mm in diameter according to Baver *et al.* (1972). Mean weight diameter (MWD) was calculated according to Black, (1983) by using the following equation:

$$MWD = \Sigma^{n}_{i=1} x_i \cdot w_i$$

Where:

$\bar{X}i$ = The mean diameter of each size fraction

Wi = The proportion of the total sample weight occurring in the corresponding size fraction.

$\sum^{n}_{i=1}$ = Summation is carried out over all n size fractions.

The crops yield and yield components were statistically analyzed according to procedures outlined by Cochran and Cox (1960). Some physical and chemical characteristics of soil and organic amendments before planting were presented in Table (1).

Table (1): Some chemical and physical properties of the experimental soil and farmyard and poultry manures:

Characteristics	Soil	Farmyard manure	Poultry manure
EC dS/m/ 25 C°	2.24	4.62	3.54
Ca^{++} meq L^{-1}	3.6	7.4	8.7
Mg^{++} meq L^{-1}	4.9	10.6	2.7
Na^{+} meq L^{-1}	15.2	28.2	24.1
K^{+} meq L^{-1}	0.2	0.5	0.6
Co_3^{-} meq L^{-1}	0.0	0.0	0.0
Hco_3^{-} meq L^{-1}	3.0	5.5	3.8
Cl^{-} meq L^{-1}	10.7	19.7	16.5
SO_4^{-} meq L^{-1}	10.2	21.4	15.8
SAR	7.4	9.3	9.3
Soil pH **	8.08	7.9	7.4
Organic matter %	1.98	16.61	31.80
Total carbon %	1.13	9.48	18.15
Total N %	0.15	1.33	2.66
C/N ratio	7.53	7.13	6.82
Total P %	0.034	0.51	1.03
Total K %	0.24	0.68	0.38
Available macro-elements (mg kg^{-1}):			
Available N Available P	25.12	43.80	67.89
Available K	11.53	18.56	13.13
	353.5	814.69	481.5
Available micro-elements (mg kg^{-1})			
Fe	42.8	82.6	40.37
Zn	8.72	25.4	20.3
Mn	32.3	40.2	35.5
Cd	0.36	1.01	0.43
Pb	1.84	2.76	2.31
Particle size distribution (%)			
Sand	11.54	-	-
Silt	27.45	-	-
Clay	61.01	-	-
Texture grade	Clayey	-	-

*: measured in soil paste extract **: measured in 1-2.5 soil: water suspension

Some chemical characteristics of irrigation water were determined according to Klute (1986) and shown in Table (2).

Table (2): Chemical characteristics of irrigation water used in the experiment:

Parameters	pH	Ec, ($dS\ m^{-1}$)	SAR	Soluble cations (meq L^{-1})				Soluble anions (meq L^{-1})			
				Na^{+}	Ca^{++}	Mg^{++}	K^{+}	Cl^{-}	CO_3^{-2}	HCO_3^{-}	SO_4^{-2}
Values	8.36	0.52	3.56	3.5	0.8	1.1	0.1	2.5	0.0	2.5	0.50

RESULTS AND DISCUSSION

1) Effect of organic amendments application on chemical properties of the experimental soil:

Data in Table (3) indicate that increasing the rate of organic amendments application leads to a slight decrease in soil pH and a markedly increases both of soil salinity (dSm^{-1}) and organic matter contents (%) after both of wheat and soybean harvesting. The decrease in soil pH might be due to the formation of some organic acids resulted from decomposition of the applied organic additions, while increasing soil salinity could be attributed to the salinity of the add organic amendments. These results are in agreements with those obtained by Gazia *et al.* (2004).

FYM application was more effective than PM in decreasing soil pH and increasing soil salinity (ECe), while PM was more effective in increasing organic matter contents (O.M). This might be due to that FYM has higher salinity content and lower O.M content than that of PM as shown in Table (1).

Table (3): Some soil chemical characteristics after wheat and soybean harvesting.

Properties / Type*	pH				EC_e (dsm^{-1})				Organic matter (%)			
	FYM		PM		FYM		PM		FYM		PM	
Rate (ton fed^{-1})	After wheat	After soybean	After wheat	After soybean	After wheat	After soybean	After wheat	After soybean	After wheat	After soybean	After wheat	After soybean
0	8.17	8.16	8.17	8.16	2.24	2.21	2.24	2.21	1.98	1.85	1.98	1.85
5	8.14	8.10	8.12	8.03	2.48	2.54	2.39	2.46	2.32	2.13	2.56	2.42
10	8.12	8.07	7.98	7.95	2.71	2.91	2.53	2.72	2.63	2.32	2.90	2.66
20	8.10	8.03	7.94	7.86	2.98	3.20	2.61	2.91	2.85	2.63	3.18	3.94
30	8.08	7.95	7.89	7.80	3.30	3.46	2.78	3.28	3.05	2.82	3.32	3.11

* FYM: farmyard manure, PM: poultry manure

2) Effect of organic amendments application on soil elemental contents:

Data in Table (4) show that soil elemental contents are increased with increasing the application rates of organic manure up to 30 ton fed^{-1} after both of wheat and soybean.

PM application is more effective in increasing available nitrogen and less effective in increasing soil contents of other studied elements than that with FYM. This could be attributed to that the content of nitrogen in PM is higher and consequently the value of C/N ratio is lower than that in FYM and vice versa with other studied elemental contents. These results are in agreements with those obtained by Dikinya and Mufwanzala (2010).

Soil elemental contents after soybean harvesting are lower than that measured after wheat harvesting due to decrease the residual effect of organic amendments after two growing seasons.

Table (4): Some soil elemental contents (available form) after wheat and soybean harvesting:

Treatments / Elements		N (%)	P (%)	K (%)	Fe (ppm)	Zn (ppm)	Mn (ppm)	Pb (ppm)	Cd (ppm)
Rate (ton fed^{-1})	Type*	After wheat harvesting							
0	Cont.	28.12	11.53	393.5	42.8	8.72	32.32	1.84	0.36
5	FYM	31.12	14.21	452.2	52.6	11.12	40.58	2.25	0.48
	PM	34.56	13.87	431.5	48.6	10.57	37.54	2.10	0.42
10	FYM	33.12	16.25	479.3	58.3	12.87	44.58	2.43	0.52
	PM	37.47	15.24	456.5	52.3	11.87	39.25	2.23	0.47
20	FYM	35.67	17.82	508.4	64.8	14.12	49.75	2.61	0.58
	PM	42.15	16.25	467.1	57.4	12.33	44.48	2.37	0.51
30	FYM	38.23	19.26	539.6	73.6	15.57	55.54	2.81	0.62
	PM	44.52	17.81	488.3	62.5	14.08	50.54	2.43	0.55
After soybean harvesting									
0	Cont.	26.54	09.22	352.4	35.2	06.15	26.12	1.42	0.29
5	FYM	29.83	12.35	407.3	44.2	09.54	34.57	1.90	0.37
	PM	31.14	11.47	388.5	40.8	08.64	31.13	1.66	0.32
10	FYM	30.54	13.54	431.4	47.8	10.47	38.33	2.15	0.43
	PM	32.62	12.57	408.6	42.6	09.34	34.64	1.82	0.37
20	FYM	31.03	14.67	458.5	52.3	10.88	42.26	2.28	0.48
	PM	34.53	14.05	430.5	45.8	10.15	39.24	1.93	0.40
30	FYM	33.45	16.08	489.7	58.4	12.15	48.45	2.40	0.56
	PM	36.15	15.17	451.8	49.6	11.03	42.65	2.11	0.46

* FYM: farmyard manure, PM: poultry manure

3) Effect of organic amendments application on soil physical properties:

Data in Table (5) indicate that increasing the application rates of organic amendments leads to a slight decrease in soil bulk density, markedly decrease in soil penetration resistance and a significant increase in both infiltration rate and total porosity. This mean that there is an increment influences in the soil aggregates and accordingly in the soil pores. These results are confirmed with those obtained by Ghazy (1994) and Talha *et al.* (1979).

Also, aggregation indexes (AI), mean weight diameter (MWD) and optimum size are increased with increasing the application rate of organic amendments. These results are in agreement with that obtained by Wahab *et al.* (1987) and Kheir (2010).

PM application is more effective than FYM in improving soil physical properties this could be attributed to the higher organic matter content of PM than that of FYM.

Table (5): Some soil physical characteristics after wheat and soybean harvesting:

Properties / Treatments		Bulk density Mg m^{-3}	Porosity (%)	SPR (%)	IR	MWD	Opt. size	AI
Rate (ton fed^{-1})	Type*	After wheat harvesting						
0	Cont.	1.30	50.00	2.15	0.75	0.46	40.76	0.235
5	FYM	1.24	52.31	2.03	0.83	0.50	43.00	0.263
	PM	1.19	54.23	1.92	0.88	0.54	44.00	0.302
10	FYM	1.20	53.85	1.88	0.92	0.54	43.80	0.295
	PM	1.12	56.92	1.72	1.09	0.60	44.30	0.311
20	FYM	1.13	56.54	1.70	1.06	0.61	44.70	0.362
	PM	1.06	59.23	1.53	1.19	0.65	46.00	0.371
30	FYM	1.08	58.46	1.41	1.17	0.68	45.60	0.401
	PM	1.01	61.15	1.28	1.30	0.72	47.60	0.409
After soybean harvesting								
0	Cont.	1.32	49.23	2.20	0.72	0.46	40.76	0.235
5	FYM	1.27	51.15	2.10	0.80	0.30	37.00	0.198
	PM	1.24	52.31	2.08	0.82	0.36	38.20	0.201
10	FYM	1.23	52.69	2.00	0.92	0.33	37.50	0.231
	PM	1.19	54.23	1.83	0.93	0.40	37.90	0.255
20	FYM	1.18	54.62	1.91	0.95	0.40	38.10	0.275
	PM	1.15	55.77	1.72	0.99	0.45	40.50	0.292
30	FYM	1.14	56.15	1.68	1.04	0.43	40.76	0.235
	PM	1.10	57.69	1.53	1.18	0.50	43.00	0.263

* FYM: farmyard manure, PM: poultry manure

4) Effect of organic amendments application on yields of wheat and soybean:

Data in Table (6) indicate that grain and straw yields of wheat are increased significantly with increasing the application rate of both of FYM and PM up to 30 ton fed^{-1}. The rate of wheat grain yield increment ranges between 7.52% and 38.23% while that of wheat straw yield ranges from 9.98% to 41.37% compared to control treatment (without amendments).

Data also, show that grain, oil yields and protein of soybean are increased significantly as a result of increasing application rate of organic amendments, where the rate of this increment ranges from 11.95% to 42.49%, 9.08% to 44.87% and 11.66% to 47.97% for grain, oil yields and protein, respectively.

On the other hand, data clarified that application of PM is more effective in increasing the yields of both of wheat and soybean crops than that with FYM by about 2.4%. This might be attributed to the higher nitrogen content of PM than that of FYM and the difference in the C/N ratio between them which leads to a significant increase in nitrogen content in the soil. These results are in harmony with those obtained by El-Ghamry *et al.* (2009) and Dikinya and Mufwanzala (2010)

Table (6): Effect of organic amendments application on yields of wheat and soybean:

Crops / Treatments		Wheat		Soybean		
Type*	Rate (ton fed^{-1})	Grain yield (ton fed^{-1})	Straw yield (ton fed^{-1})	grain yield (ton fed^{-1})	Oil yield (Kg fed^{-1})	Protein (Kg fed^{-1})
FYM	0	2.67	2.99	0.89	224.89	333.69
	5	2.87	3.29	1.00	245.34	372.60
	10	3.14	3.59	1.08	275.14	414.60
	20	3.40	3.86	1.16	299.58	452.61
	30	3.59	4.08	1.23	316.85	479.37
PM	0	2.67	2.99	0.89	224.89	333.69
	5	2.96	3.40	1.03	251.33	382.11
	10	3.24	3.68	1.12	282.91	427.60
	20	3.51	4.00	1.19	310.48	467.21
	30	3.69	4.23	1.25	325.82	493.75
F- test		**	**	**	**	**
LSD: 0.05		0.004	0.006	0.005	1.40	0.58
0.01		0.005	0.013	0.012	3.12	1.28

* FYM: farmyard manure, PM: poultry manure

Conclusion: Utilization of farmyard manure and poultry manure as an organic fertilizer is essential in improving soil productivity and crop production, through enriching the soil with nutritional elements and their beneficial effects on the physical and chemical characteristics of soil, as well as minimizing the intensive use of chemical fertilizers, consequently decrease their negative impact on the environmental and economical conditions.

REFERENCES

Abdel Ghaffar, A. S. (1982). The significance of organic materials to Egyptian Agriculture and Maintenance of soil productivity. FAO Soils Bulletin, 45 pp. 15-20, FAO, of U.N. Rome, Italy.

Abdel-Moez, M. R.; A. L.; Saleh and Sh. A H.; Wanas (1999). Influence of some organic composts on yield; nutrients uptake and consumptive use of fennel and coriander plants and some soil physical properties. J. Agric. Sci. Mansoura univ., 24(10): 6237-6253.

Aggelides, S. M. and P. A., Londra. (2000). Effects of compost produced from town wastes and sewage sludge on the physical properties of a loamy and a clay soil. Bioresour. Technol., 71: 253-259.

Barbaria, C. J. and C. L. Patel (1980). Effect of application of iron,farmyard manure and sulphur on the availability of iron in medium black calcareous soil at different moisture regimes. J. Indian Soc. Soil Sci., 28, 302. C. F. Soils & Fert. (6597), (198).

Baver, L.D.; W.H. Gardner and W.R. Gardner (1972). Soil physics. John Wiley & Sons., Inc., New York, 4th edition.

Black, C.A. (1983). Methods of soil analysis. Amer. Soc. Agron. Inc. Madison, Wisconsin, USA.

Cochran, W. G. and G. M. Cox (1960). Experimental Designs, 2nd ed. John Welly, New York,:293-316.

Dexter, A.R. (1988). Advances in characterization of soil structure. Soil Tillage Res., 11: 199-238.

Dikinya, O. and Mufwanzala, N. (2010). Chicken manure-enhanced soil fertility and productivity: Effects of application rates. J. Soil Sci. and Envir. Management 1(3), pp. 46-54.

Duncan J. (2005). Composting chicken manure. WSU Cooperative Extension, King County Master Gardener and Cooperative Extension Livestock Advisor.

Eck, H.V. and B.A. Stewart (1995). Manure. Pp. 169-168 in "Rechcigl, J.E. (ed). Soil amendments and Environmental quality. CRC, Lewis pub. N.y., USA.

El-Ghamry A.M., A.M. Abd El-Hamid and A.A. Mosa (2009). Effect of farmyard manure and foliar application of micronutrients on yield characteristics of wheat grown on salt affected soil. American-Eurasian J. Agric. & Environ. Sci., 5(4): 460-465.

El-Sirafy Z. M. , Khadra A. Abbady; A. M. El-Ghamry and R. A. El-Dissoky (2008). Potato Yield Quality, Quantity and Profitabilty as Affected by Soil and Foliar Potassium Application. Journal of Agriculture and Biological Sciences, 4 (6) : 912-922.

Gazia, E. A. E. ; M. I. El-Shahawy; R. A. Saber and M. S. M. Abo Soliman. (2004). Effect of different kinds and rates of bio-solids on some soil properties and its productivity. J. Agric. Sci. Mansoura Univ., 29 (1): 465-477.

Ghazy, M. A. (1994). Effect of water regime, gypsum and sewage sludge increaments on the improvement and productivity of saline-sodic soils. Ph. D. Thesis, Fac. Of Agric. Tanta Univ.

Jackson, M. L. (1967). "Soil Chemical Analysis". Printic Hall of India, New Delhi. pp 144- 197.

Kheir, A. S. (2010). Effect of irrigation water quality on some soil physical and chemical properties of some north delta soils. M.Sc. Thesis, Fac. Agric., Kafr El-Sheikh Univ.

Klute, A. (1986). Methods of Soil Analysis (Part 1). American Society of Agronomy, Inc. Soil Sci. Soc of Amr., Inc. Madison, Wisconsin, USA. Second Edition.

Makaraviciute, A. (2003). Effect of organic and mineral fertilizers on the yield and quality of different potato varieties. Agro. Res.,1(2):197-209.

Moubarek, M. S. N. (1960). Addition of organic manures to Tahrir soil and their effect on microflora and plant nutrients, M.Sc. Thesis, Univ. of Ain Shams.

Olsen, S.R.; C. V. Cale; F. S. Watenable and L. A. Dean (1954). Estimation of available phosphorus in soil by extraction with sodium bicarbonate U. S. Dept., Agric. Circ., 939.

Page, A.L.; R. H. Miller and D.R. Keeney (1982). Methods of soil analysis. Part II: Chemical and microbiological properties, 2nd ed. Soil Sci. Soc. Am. Inc., Madison, USA.

Piper, C. S. (1950). Soil and plant analysis. Inter science Publication. New York.

Reddy J., P., Sharanappa, Bandi, A.G. and Abdul Khalak, (2000). Efficiency of poultry waste composts in sunflower (Helianthus annus L.). In. Proc. Natl. Symp. on Agronomy: Challenges and Strategies for the New Millennium held at Junagadh, Nov. 15-18, 2000, p. 97.

Snell, F. D. and C. T. Snell (1967). Colorimetric methods of analysis. D. Van. Nostranad company Inc.: 551 – 552.

Talha, M.; A. G. Abd El-Samie and M. S. Omer (1979). Factor affecting water movement in alluvial soils. Egypt. J. Soil Sci., 19, No. 1, pp: 55-72.

Vomocil, J.A. (1957). Measurements of soil Bulk density and penetrability. A Review of methods Adv. Agron. 9: 159-176.

Warman PR (1986). The effect of fertilizer, chicken manure and dairy manure on Timothy yield, tissue composition and soil fertility. Agric. Wastes 18: 289-298.

Wahab, M.A.; A. Ghazy and M.Z. Salem (1987). Structural stability in relation to soil physiochemical characteristics. Egypt. J. Soil Sci., 27 No. (4), pp. 427-443.

Weber, J., A. Karczewska, J. Drozd, M. Licznar, S. Licznar and E. Jamroz, (2007). Agricultural and ecological aspects of a sandy soil as affected by the application of municipal solid waste composts. Soil Biol. Biochem., 39: 1294-1302.

Yoder, R.E. (1936). A direct method of aggregate analysis of soil and a study of the physical nature erosion losses. J. Amer. Sci., Agron., 28: 337-351.

تأثير إضافة بعض المصلحات العضوية على بعض خصائص التربة واستجابة محصولى القمح وفول الصويا

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اقيمت تجربة حقلية بمحطة البحوث الزراعية بسخا – محافظة كفر الشيخ – مصر خلال الموسم الشتوى ٢٠١١/ ٢٠١٢ والصيفي ٢٠١٢وذلك لدراسة تاثير اضافة معدلات مختلفة (٠ ، ٥ ،١٠، ٢٠ ,٣٠ طن/فدان) من المصلحات العضوية (سماد المزرعة و سماد الدواجن) على بعض الخواص الطبيعية والكيميائية للتربة وكذلك انتاجية القمح وفول الصويا. وكانت اهم النتائج التى تم الحصول عليها كلاتى:

١)إضافة اى من مصلحات التربة (سماد المزرعة او سماد الدواجن) ادى الى تحسين خواص التربة الطبيعية وذلك من خلال خفض كل من كثافة التربة الظاهرية و مقاومة الاختراق وزيادة كل من المسامية الكلية للتربة ومعدل الرشح ومعامل التحبب ومتوسط القطر الفعال والحجم الأمثل.

٢)أدى زيادة معدل إضافة المصلحات العضوية إلى التربة حتى ٣٠ طن/فدان إلى نقص طفيف في الرقم الهيدروجيني للتربة (pH) وزيادة ملحوظة في ملوحة التربة ومحتواها من المادة العضوية وكذلك محتواها من العناصر المغذية الكبرى والصغرى والثقيلة.

٣)ازداد محصول كل من القمح وفول الصويا زيادة معنوية بزيادة معدل اضافة اى من المصلحات العضوية المستخدمة حتى ٣٠طن/فدان. وكان معدل الزيادة الناتج عن اضافة سماد الدواجن يفوق الناتج عن اضافة سماد المزعة بنسبة تقدر بحوالى ٢.٤%.

الاستنتاج:

استخدام سماد المزرعة وسماد الدواجن كسماد عضوي يعمل على تحسين إنتاجية التربة وذلك من خلال تحسين خواصها الطبيعية والكيميائية واثرائها بالمغذيات علاوة على تقليل استخدام الأسمدة الكيماوية وما له من اثارسلبية على الناحية البيئية والاقتصادية.

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