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YIELD AND YIELD COMPONENTS OF SUNFLOWER AND SOME PHYSICAL AND CHEMICAL PROPERTIES OF DIFFERENT USED SOILS AS AFFECTED BY ORGANIC AND MINERAL FERTILIZATION.

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ABSTRACT

Two lysimeter experiments were carried out during 2001 and 2002 seasons at El-Gemmeiza Agricultural Research Station, to study the effect of two organic fertilization treatments (farmyard manure and chicken manure) and three nitrogen levels (0,30 and 40 kg N/fed.) as well as their interactions on yield, yield components and oil content of sunflower and some physical and chemical properties of the different soils (Clay, Loamy, Sandy and Calcareous) under the study. Split plot design with two replicates were used. The obtained results could be summarized as follows:-

1- Dry matter, plant height, head diameter, 100- seed weight and seed yield per fed. of sunflower were increased with chicken manure than farmyard manure for all soils under the present study. Also, all the previous characteristics were increased by increasing nitrogen levels addition in all soils.
2- The highest values of dry matter, plant height, head diameter, 100-seed weight and seed yield per fed. were obtained from loamy soil with chicken manure at 40 kg N/fed.
3- Seed oil and seed protein percentage were increased with chicken manure than farmyard manure in all soils, except the clay one. Also, they were increased by increasing nitrogen levels addition in all soils, except the clay one where they were decreased at the highest nitrogen doses over than 30 kg N/fed.
4- The highest value of seed oil percentage was recorded by clay soil with farmyard manure at 30 nitrogen unite, while the highest one of seed protein percentage was recorded by loamy soil with chicken manure at 40 nitrogen unit.
5- Chicken manure caused an increase in seed and straw nitrogen percentage than farmyard manure in all soils, except the clay one in seed nitrogen percentage and raising nitrogen levels caused an increase in seed and straw nitrogen percentage, except the clay one, the seed nitrogen was reduced after 30 kg N/fed.
6- The highest values of seed and straw nitrogen percentage were obtained from the loamy soil, coupled with chicken manure at 40 unite from nitrogen per feddan.
7- Available soil nitrogen after harvesting was increased with chicken manure compared with farmyard manure in all soils, also the increase was found in soil available nitrogen after harvesting by raising nitrogen levels addition in all soils.
8- The highest value of available soil nitrogen was obtained from the loamy soil with chicken manure at 40 unit nitrogen per feddan.
9- The values of bulk density were decreased and total porosity were increased with chicken manure compared with farmyard manure, also with increasing nitrogen levels addition, but hydraulic conductivity values were increased in clay and loamy soils, while they were decreased in sandy and calcareous ones.
10- The lowest value of bulk density and the highest one of total porosity were obtained from clay soil with chicken manure at 40 kg N/fed. , while the lowest value of hydraulic conductivity was obtained from the clay soil with farmyard manure at zero nitrogen level.

Keywords: Farmyard manure, chicken manure, bulk density, hydraulic conductivity, sunflower, head diameter, seed oil.

INTRODUCTION

Sunflower (Helianthus annus, L.) is one of the most important oil crops in the world. Sunflower production has increased to the extent that is now the second leading oil crop in the world. In Egypt, there is a bright future for sunflower as an oil crop adapted to a wide variety of soils and climatic conditions. Planting sunflower should be increased especially in the newly reclaimed soils with conducting the best agricultural practices such as mineral, organic and bio-fertilization and controlling by irrigation treatments.

Nitrogen fertilizer has a pronounced effect on the growth and physiology of sunflower. Many reports indicated that nitrogen is the most effective factor for increasing seed and oil yields of sunflower. In this connection, Saleh *et al.* (1984) found that increasing nitrogen fertilizer levels from 15 to 45 kg N/fed. significantly increased head diameter, seed weight per plant and weight of 1000-seeds. Narwal and Malik (1985) reported that application of nitrogen rates up to 60 kg N/ha. decreased oil content. Salama (1996) showed that increasing nitrogen fertilizer levels from 20 through 60 kg N/fed. significantly increased plant height, head diameter, 1000-seed weight, seed and oil yields/fed. However, application of N fertilizer at the rate of 80 or 100 kg N/fed. markedly reduced head diameter, seed and oil yields/fed. compared with the adding of 60 kg N/fed.

Organic fertilizers (farmyard or chicken manure) are one of the natural amendments which correct and improve both chemical and physical properties of the soils, especially the heavy texture one. El-Awag *et al.* (1992), Kaoud (1994), Hanna and El-Awag (2000) and El-Maddah (2000) stated that bulk density decreased, while hydraulic conductivity increased in plots receiving organic fertilizers. Othman (1995), El-Naggar *et al.* (1996), Hanna and El-Awag (2000) and El-Maddah (2000) pointed out that addition of 30 m^3 farmyard manure reduced the bulk density and increased the hydraulic conductivity and total porosity in clay soil. El-Awag *et al.* (1996) stated that the soil bulk density was decreased by increasing the nitrogen levels in clay soil, while the hydraulic conductivity was increased.

The objective of the present work was to study the effect of organic fertilization and nitrogen fertilizer rates and their interaction on yield and yield components of sunflower and some chemical and physical properties for the different Egyptian soils under the study.

MATERIALS AND METHODS

Two lysimeter experiments were conducted at El-Gemmeiza Agricultural Research Station, El-Gharbia Governorate during both summer seasons of 2001 and 2002. Forty lysimeters 2m in length, 1m in width and 2m in depth were used in this study. Lysimeters divided into four groups, each group were filled with a soil type namely clay, loamy, calcareous and sandy soils. Each soil is considered as an independent experiment as split plot design with two replicates. The main plots are two organic fertilization treatments, the first fertilization treatment is farmyard manure and the second one is chicken manure. Organic manure rates were 20 m^3/fed. Nitrogen

fertilizer rates were considered as sub plots including N additions of 0, 30 and 40 kg N/fed. The plot area (2x1m) was planted with sunflower (G101 variety). Sunflower seeds were hand sown in March 1st and March 5th in 2001 and 2002 seasons, respectively. Plants were thinned to single plant per hill and the distance between hills was 20cm apart (35000 plant/fed.) just equal 15 plants per plot area. Nitrogen in the form of ammonium nitrate (33.5%N) at the above mentioned rates was added in two equal portions before the first and the second irrigation. The basel doses of P and K were applied according to recommendations. Sunflower plants were hoed twice to control weeds before 2nd and 3rd irrigation, respectively. Normal agricultural practices for growing sunflower were conducted in the usual manner followed by farmers at the region. At the time of heading, the heads of all plants were bagged at early seed development to avoid damage that could be caused by birds until maturity. Ten plants were randomly chosen at the physiological full maturity development from each experimental unite and the following data were recorded:-

1- Plant height (cm)
2- Head diameter (cm)
3- 100-seed weight (g)
4- Dry matter
5- Seed yield (kg/fed.) which was determined from all heads within each plot and left to dry and seed yield was measured.
6- Seed protein percentage was determined using the improved Kjeldahel method of A.O.A.C. (1984).
7- Seed oil, % was determined using Soxholet's extraction method according to A.O.A.C. (1984).
8- Seed and straw nitrogen percentage and soil available nitrogen (ppm) were determined using the improved Kjeldahel method of A.O.A.C. (1984).

Soil samples were taken from each soil for physical and chemical analysis. The main soil properties and the used organic manure analysis were determined according to the standard methods described by Hesse (1971), Lovenday (1974) and Black (1965) and presented in Table (1).

Soil samples were collected from each plot at the end of each growing season to determine some physical and chemical properties of soils. Soil bulk density (Db) was determined using the core method (Vomocil, 1986). Total Porosity (E,%) was calculated according to the equation : E=(1- Db/Dr)X100, where Dr : is the real density. Hydraulic conductivity (cm/hr) was determined using undisturbed soil cores using a constant water head according to (Richards, 1954). Available soil nitrogen was determined using micro-Kjeldahel method according to A.O.A.C. (1984).

Table (1-a) : Some physical properties of the experimental soils.

Soil Type	Particle size distribution,%			Soil Texture Class	O.M., %	$CaCO_3$ %	Bulk Density g cm^{-3}	Total Porosity %	Hydraulic Conductivity cm/hr
	Sand	Silt	Clay						
Clay	22.18	33.17	44.65	Clay	2.20	3.50	1.19	55.09	0.60
Loamy	35.43	35.94	28.63	Loamy	1.50	3.20	1.29	51.32	1.60
Sandy	88.67	6.07	5.26	Sandy	0.40	5.10	1.68	36.60	18.65
Calcareous	71.98	18.92	9.10	Sandy L.	0.60	25.30	1.48	44.15	10.32

Table (1-b) : Some chemical properties of the experimental soils.

Soil Type	Soluble cations, meq/l.*				Soluble anions, meq/l.*				EC* dSm^{-1}	pH 1:2.5 susp.	C.E.C meq/ 100g soil	Available NPK, ppm		
	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$				N	P	K
Clay	16.00	10.00	5.20	1.02	0.26	0.96	16.70	14.30	2.84	7.80	55.00	26.60	8.30	360
Loamy	15.00	10.00	6.30	0.74	0.18	0.66	16.60	14.60	3.40	7.70	39.00	22.15	6.40	300
Sandy	2.50	1.50	4.90	0.40	0.26	0.46	3.80	4.78	0.84	7.10	7.00	10.70	1.80	50
Calcareous	7.50	1.50	4.20	0.44	0.38	0.76	4.80	7.70	1.40	8.10	8.00	18.20	2.80	70

* In soil paste extract

Table (1-c): Characteristics of different used organic manure.

Properties	Farmyard manure	Chicken manure
pH (1:10 organic manure : water susp.)	7.50	8.25
EC dSm^{-1} (1:10 organic manure : water extract)	1.30	1.90
$CaCO_3$, %	1.20	5.80
O.M., %	32.30	49.10
Total N., %	0.78	1.72
Available P, %	0.05	0.10
Available K, %	0.50	1.20
Available Ca, %	0.03	0.01
Available Mg, %	0.18	0.13
Available Na, %	0.03	0.02
Available Fe, ppm	35.75	84.15
Available Mn, ppm	84.45	110.60
Available Zn, ppm	21.90	88.45
Available Cu, ppm	8.70	11.45

Statistical analysis was done according to procedure out-lined by Sendecor and Cochran (1967). The mean values were compared at 0.05 level using L.S.D.

RESULTS AND DISCUSSION

i- Yield and yield components.

dry matter:

Data in Table (2) show that application of the two studied organic fertilizers had a significant effect on the dry matter of sunflower under all soils of study. Generally the dry matter was increased with chicken manure than farmyard manure for all soils. Also, Table (2) show that the highest value of dry matter was recorded for loamy soil; while the lowest one was for the sandy one. These results are in harmony with that obtained by Anton *et al.* (1995).

Table (2) : Effect of organic manure, mineral nitrogen fertilization and their interactions on yield and yield component of sunflower under different soils.

Organic Fertilizer	Mineral fertilizer dose, Kg N/fed	Clay					Loamy				
		Dry matter,%	Plant height,cm	Head diameter,cm	Seed yield kg/fed	100- seed weight,gm	Dry matter,%	Plant height,cm	Head diameter,cm	Seed yield kg/fed	100- seed weight,gm
Farmyard manure	0	24.87	107.00	12.00	589.50	3.91	25.93	120.00	12.00	1153.68	3.97
	30	26.29	115.00	13.00	818.91	4.11	27.15	144.00	14.00	1178.32	4.23
	40	32.85	122.00	17.00	1212.61	4.37	33.84	147.00	15.00	1403.82	4.49
Mean		**28.00**	**114.67**	**14.00**	**873.67**	**4.13**	**28.97**	**137.00**	**13.67**	**1245.27**	**4.23**
Chicken manure	0	28.35	109.00	14.00	880.10	3.98	29.58	121.00	13.00	1160.75	4.16
	30	34.33	118.00	15.00	1120.50	4.23	35.35	148.00	17.00	1298.36	4.59
	40	36.12	125.00	17.00	1205.86	4.55	37.19	150.00	18.00	1608.80	4.75
Mean		**32.93**	**117.33**	**15.33**	**1068.82**	**4.25**	**34.04**	**139.67**	**16.00**	**1422.64**	**4.50**
Average of N.dose	0	26.61	108.00	13.00	734.80	3.95	27.76	120.50	12.50	1157.22	4.07
	30	30.31	116.50	14.00	969.71	4.17	31.25	146.00	15.50	1238.34	4.41
	40	34.49	123.50	17.00	1209.24	4.46	35.52	148.50	16.50	1606.31	4.62
L.S.D. 5%	Organic F.	1.47	5.80	2.99	196.39	0.94	1.97	2.87	1.43	46.24	0.86
	Mineral F	1.48	3.80	1.44	107.92	0.80	1.32	4.72	1.80	38.18	0.85
	Interaction	2.09	5.38	2.03	152.62	1.14	1.86	6.68	2.55	54.00	1.20
Organic Fertilizer	Mineral fertilizer dose, Kg N/fed	Sandy					Calcareous				
		Dry matter,%	Plant height,cm	Head diameter,cm	Seed yield kg/fed	100- seed weight,gm	Dry matter,%	Plant height,cm	Head diameter,cm	Seed yield kg/fed	100- seed weight,gm
Farmyard manure	0	21.67	61.00	4.00	117.30	3.72	22.35	107.00	13.00	344.50	3.81
	30	22.29	66.00	6.00	170.30	3.91	23.76	110.00	14.00	370.40	3.99
	40	24.40	69.00	8.00	195.40	4.22	28.77	121.00	14.00	418.70	4.32
Mean		**22.85**	**65.33**	**6.00**	**161.00**	**3.95**	**24.96**	**112.67**	**13.67**	**377.87**	**4.04**
Chicken manure	0	22.79	62.00	4.00	121.75	3.79	23.91	106.00	12.00	346.37	3.92
	30	24.37	69.00	7.00	261.90	4.17	26.35	112.00	15.00	489.50	4.22
	40	26.13	75.00	8.00	272.18	4.34	29.77	124.00	16.00	492.40	4.44
Mean		**24.43**	**68.67**	**6.33**	**218.61**	**4.10**	**26.68**	**114.00**	**14.33**	**442.76**	**4.19**
Average of N.dose	0	22.33	61.50	4.00	119.53	3.76	23.13	106.50	12.50	345.44	3.87
	30	23.33	67.50	6.50	216.10	4.04	25.06	111.00	14.50	429.95	4.11
	40	25.27	72.00	8.00	233.79	4.28	29.27	122.50	15.00	455.55	4.38
L.S.D. 5%	Organic F.	0.15	2.48	2.19	27.18	0.48	0.39	3.61	1.43	9.63	0.98
	Mineral F	1.39	1.88	1.27	24.54	0.71	0.86	5.13	1.80	9.93	0.51
	Interaction	1.97	2.66	1.80	34.71	1.01	1.22	7.25	2.55	14.05	0.72

With respect to the effect of nitrogen addition on sunflower dry matter, data in Table (2) revealed that positive significant effect with increasing nitrogen levels for all soils under the study. Generally, the best soil produced dry matter was loamy soil and the lowest one was sandy soil; the highest value of dry matter was 35.52% which was recorded by loamy soil at 40 unite of nitrogen, and the lowest one was 22.33% which was recorded by sandy soil at zero nitrogen level. These results are in agreement with those obtaind by Mishra *et al.* (1995).

Regarding the interaction between organic manure and nitrogen doses on dry matter of sunflower data presented in Table (2) revealed that the highest value was 37.19% for the loamy soil with chicken manure at 40 unite nitrogen; while the lowest one was 21.87% for sandy soil with farmyard manure at zero nitrogen level.

Plant Height :

Data presented in Table (2) show that plant height was not affected significantly by organic manure in all soils except the sandy one. Generally the effect of chicken manure was better on plant height than farmyard manure in all soils. The highest mean value was recorded by loamy soil with chicken manure which was 139.67cm, while the lowest mean was obtained for sandy soil with farmyard manure, the lowest value was 65.33 cm. These results are in agreement with those obtained by Narwal and Malik (1985).

Concerning the effect of mineral fertilization doses on plant height, the same Table show the significant effect of nitrogen fertilization doses in clay and sandy soils only, but in loamy one the significant was found only between zero and both 30 and 40 nitrogen unite, while no significant differences between 30 and 40 nitrogen unite, while in calcareous soil there was significant differences between zero and 40 nitrogen unite, also between 30 and 40 nitrogen unite.

Generally the increase in plant height by increasing nitrogen levels might be attributed to the role of nitrogen in initiation of merestemic activity and hence it resulted in an increase in cell number and cell size with an increase in plant height. More, nitrogen is essential for growth and development of sunflower stem. These results ingeneral are in agreement with those obtained by Haron and Salah (1991) and Said (1998).

Regarding, the interaction between organic manure and mineral fertilization on plant height data in Table (2) reveal that the highest value was 150.0 cm for the loamy soil with chicken manure at 40 nitrogen unit; while the lowest one was 61.0 cm for the sandy soil with farmyard manure at zero nitrogen unit.

Head diameter :

Data in Table (2) reveal that head diameter was not affected significantly by organic manure in all soils except the loamy soil. It is clear that the effect of chicken manure was better than farmyard manure on head diameter; the highest value was 16.0 cm which was recorded by loamy soil with chicken manure; and the lowest value was 6.0 cm for the sandy soil with farmyard manure. Generally the loamy soil is considered as a best soil which was produced the better head diameter. This increase in head diameter may be attributed to the good texture of loamy soil and to its reflect on a good growth. Similar results had been obtained by Grove and Summer (1982) and El-Naggar *et al.* (1996).

Regarding to the effect of nitrogen addition on head diameter, data in Table (2) reveal significant differences on head diameter by nitrogen doses in all soils under the study were found, where increasing of nitrogen doses caused an increment in head diameter in all soils; where the values in clay, loamy and calcareous soils were nearly each other, while the sandy one was very small. Generally, the highest values were obtained from loamy and clay soils with 30 and 40 nitrogen unit and 40 nitrogen unit respectively, where the values were 17.0 cm. The lowest one was obtained from sandy soil with zero nitrogen unit, where the value was 4.0 cm. This is attributed to a poor nutrition in sandy soil (Table 1-b). The obtained results are in agreement with those obtained by Said (1998).

From Table (2) it can be seen that the best interaction between organic and mineral fertilization doses on head diameter was from loamy soil with chicken manure at 40 nitrogen unit, while the lowest value was from the sandy soil with non nitrogen addition.

Seed yield and 100-seed weight :

Data in Table (2) show means of seed yield in Kg/fed., as affected by organic manures. It revealed the significant effect on seed yield by organic fertilization for all soils except the clay one. Generally, the highest seed yield was obtained from the loamy soil with chicken manure; which was 1422.64 kg/fed., while the lowest value was recorded with the sandy soil coupled with farmyard manure which was 161.00 kg/fed. This increase may be attributed to the optimum properties of the loamy soil which reflect on productivity of these soils. Similar results were reported by Said (1998).

With regard to the effect of nitrogen levels on seed yield, data revealed that significantly differences on seed yield with nitrogen levels for all soils except the sandy one was found. Generally, adding nitrogen doses caused an increase in seed yield under any soil, the highest seed yield of sunflower plants was obtained from the loamy soil with 40 unit of nitrogen; the value was 1606.31 kg/fed.., while, the lowest seed yield was recorded for the sandy soil, where the value was 119.53 kg/fed.. Increasing seed yield in loamy soil may be due to the good physical and chemical properties of this soil which tended to high productivity of sunflower. These results agree with those obtained by Kamel *et al.* (1983) and Said (1998) who reported that markedly increase in seed yield / fed. with increasing nitrogen fertilizer rates.

Regarding the effect of interaction between organic manure and nitrogen levels; it can be seen that, the highest value of seed yield was recorded by loamy soil when the chicken manure coupled with 40 nitrogen unite; while the lowest value was obtained from sandy soil when farmyard manure adding without nitrogen addition.

Concerning 100 seed weight, data in Table (2) reveal that no marked differences were detected between organic fertilizers on 100 – seed weight in all soils under study. Generally the effect of chicken manure was better than farmyard manure. It can be seen that, the loamy and clay soils were the best soils in producing 100 – seed weight than the others under study. These results are similar to Harmati (1993).

Regarding the effect of nitrogen levels on 100 – seed weight, data illustrated that no significant effects between nitrogen levels in all soils under study. Generally, increasing nitrogen levels tended to increase 100 – seed weight. Also, loamy and clay soils were the best soils which produced the highest values of 100 – seed weight. This may be due to good physical and chemical properties of these soils. These results are agreement with that obtained by Saleh *et al.* (1984) ; Haron and Saleh (1991) ; Anton *et al.* (1995) and Salama (1996).

With regard to the effect of interaction between organic fertilization and nitrogen levels, it could be detected that the highest value was 4.75 gm which was recorded by loamy soil with chicken manure at 40 nitrogen unit, while the lowest one was 3.72 gm which was recorded by sandy soil with farmyard manure without nitrogen doses.

Seed Oil, % :

Data in Table (3) reveal that organic fertilization had no significant effect on seed oil %, in all soils under study except the loamy soil which had a significant effect. Also, it can be seen that chicken manure in all soils produced highest seed oil %, except the clay one. Generally the highest seed oil %, was recorded by clay soil which was 43.3% for farmyard manure, while the lowest one was 40.97% for the sandy soil with farmyard manure. This concept is supported by data of Salama (1991).

Concerning the effect of nitrogen levels on seed oil %, data indicated an increase in seed oil % by increasing nitrogen levels for all soils except the clay one which decrease with the high dose of nitrogen over than 30 kg N / fed. These increases were insignificant in all soils except loamy one. The highest value was 43.55% for clay soil with 30 nitrogen unite, while the lowest one was 39.85% which was recorded by sandy soil with zero nitrogen unit. Similar results had been obtained by Salama (1996).

Regarding the effect of interaction between organic manure and nitrogen levels, data reveal that the highest value was 43.9% for clay soil at 30 nitrogen unit coupled with farmyard manure, while the lowest one was 39.8% for sandy soil with farmyard manure at zero nitrogen dose.

Table (3) : Effect of organic manure, mineral nitrogen fertilization and their interactions on chemical composition of sunflower plants and available soil N under different soils.

Organic Fertilizer	Mineral fertilizer dose, Kg N/fed	Clay					Loamy				
		Seed oil %	Seed Protein*,%	Seed N,%	Straw N,%	Available soil N.,ppm	Seed oil %	Seed Protein*,%	Seed N,%	Straw N,%	Available soil N.,ppm
Farmyard manure	0	42.30	29.00	4.64	1.23	27.37	40.80	25.69	4.11	1.52	22.56
	30	43.90	31.69	5.07	1.75	32.89	41.20	30.75	4.92	1.78	34.85
	40	43.70	31.06	4.97	2.05	32.98	41.90	31.06	4.97	2.21	38.12
Mean		**43.30**	**30.58**	**4.89**	**1.68**	**31.08**	**41.30**	**29.17**	**4.67**	**1.84**	**31.84**
Chicken manure	0	42.60	29.19	4.67	1.41	27.52	40.90	25.75	4.12	1.53	22.89
	30	43.20	30.45	4.89	1.85	34.80	41.70	30.88	4.94	1.82	36.98
	40	42.90	30.13	4.82	2.34	34.95	42.40	31.13	4.98	2.46	39.59
Mean		**42.90**	**29.92**	**4.79**	**1.87**	**32.42**	**41.67**	**29.25**	**4.68**	**1.94**	**33.15**
Average of N.dose	0	42.45	29.10	4.66	1.32	27.45	40.85	25.72	4.12	1.53	22.73
	30	43.55	31.07	4.98	1.80	33.85	41.45	30.82	4.93	1.80	35.92
	40	43.30	30.60	4.90	2.20	33.97	42.15	31.10	4.98	2.34	38.86
L.S.D. 5%	Organic F.	0.57	0.39	0.03	0.38	2.06	0.14	1.44	0.23	0.24	43.00
	Mineral F	0.39	0.49	0.08	0.13	2.54	0.38	0.95	0.15	0.05	1.18
	Interaction	0.55	0.70	0.11	0.18	3.60	0.54	1.35	0.22	0.07	1.67
Organic Fertilizer	Mineral fertilizer dose, Kg N/fed	Sandy					Calcareous				
		Seed oil %	Seed Protein*,%	Seed N,%	Straw N,%	Available soil N.,ppm	Seed oil %	Seed Protein*,%	Seed N,%	Straw N,%	Available soil N.,ppm
Farmyard manure	0	39.80	24.13	3.86	1.27	20.06	40.20	24.81	3.97	1.63	21.56
	30	41.50	29.50	4.72	1.74	24.66	41.70	30.13	4.82	1.76	25.92
	40	41.60	29.63	4.74	1.99	26.79	41.60	30.31	4.85	1.84	26.95
Mean		**40.97**	**27.75**	**4.44**	**1.67**	**23.84**	**41.23**	**28.42**	**4.55**	**1.74**	**24.81**
Chicken manure	0	39.90	24.06	3.85	1.32	20.12	40.30	24.69	3.95	1.65	21.65
	30	41.80	29.50	4.72	1.82	24.95	41.90	30.31	4.85	1.85	26.74
	40	41.90	30.50	4.88	1.97	30.58	42.10	30.56	4.89	2.14	30.85
Mean		**41.20**	**28.02**	**4.48**	**1.70**	**25.22**	**41.43**	**28.52**	**4.56**	**1.88**	**26.41**
Average of N.dose	0	39.85	24.10	3.86	1.30	20.09	40.25	24.75	3.96	1.64	21.61
	30	41.65	29.50	4.72	1.78	24.81	41.80	30.22	4.84	1.81	26.33
	40	41.75	30.07	4.81	1.98	28.69	41.95	30.44	4.87	1.99	28.90
L.S.D. 5%	Organic F.	0.30	1.26	0.20	0.03	1.40	1.09	1.21	0.03	0.18	0.48
	Mineral F	0.47	1.21	0.19	0.07	0.91	0.82	1.13	0.21	0.03	0.40
	Interaction	0.67	1.71	0.27	0.09	1.28	1.15	1.60	0.29	0.05	0.57

* Protein % = N % x 6.25

Seed Protein, % :

It is clear, as shown in Table (3) that the applied organic fertilization had significant effects on seed proteins % in clay soil only, while insignificant in the other soils. Often, chicken manure produced the higher values than farmyard manure in all soils. These results, in general, are in agreement with those obtained by Blamey and Chapman (1981).

Concerning the effect of nitrogen levels there was insignificant effect in all soils except the clay one. Generally, increasing nitrogen doses caused an increase in seed protein %, where the highest value was 31.10% which was recorded by loamy soil with 40 kg N / fed., while the lowest one 24.10% which was recorded by sandy soil with zero kg N / fed. This may be due to, as known, that loamy and clay soils are rich in all elements nutrition and their physical and chemical properties are good. Similar results were reported by Blamey and Chapman (1981) ; Haron and Salah (1991) and Sarkar *et al.* (1995).

Regarding the effect of interaction between organic manure and nitrogen levels on seed protein, data in Table(3) reveal that the highest value was 31.13% which was recorded by loamy soil with chicken manure at 40 kg N / fed., while the lowest one was 24.06% which was obtained from sandy soil with chicken manure at zero nitrogen level.

Seed Nitrogen, % :

As shown from Table (3) seed nitrogen % of sunflower was little increased with chicken manure compared by farmyard manure in all soils except the clay one which was decreased, where the values were 4.89 and 4.79% with farmyard and chicken manures, respectively. The lowest value was 4.44% which was recorded by sandy soil with farmyard manure. The same results were obtained by Hensler *et al.* (1970) and El-Awag *et al.* (1996).

Concerning the effect of nitrogen levels, data in Table (3) reveal that increasing nitrogen doses led to increase seed nitrogen % in all soils except the clay one. The highest value was 4.98% which was recorded by loamy soil at 40 kg N / fed., while the lowest one was 3.86% which was obtained from sandy soil at zero kg N / fed. These results agree with El-Baisary *et al.* (1980) and El-Naggar *et al.* (1995).

Regarding the effect of interaction between organic fertilization and nitrogen levels addition data in Table (3) clear that the highest value was 4.98% which was obtained by loamy soil with chicken manure at 40 kg N / fed., while the lowest one was 3.85% which was produced by sandy soil with chicken manure at zero kg N / fed.

Straw Nitrogen, % :

Data in Table (3) reveal that insignificant differences were found by organic manure on straw nitrogen % in all soils except the sandy one which had a significant effect. Generally, straw nitrogen% was increased with chicken manure than farmyard manure in all soils. The highest value was obtained from loamy soil with chicken manure where the value was 1.94% while the lowest one was 1.67% which was recorded by sandy soil with

farmyard manure. These results are in harmony with the finding of El-Naggar *et al.* (1996).

Concerning the effect of nitrogen doses, data in Table (3) demonstrated that significantly effects were found on straw nitrogen % for all soils, where increasing nitrogen levels tended to increase straw nitrogen %. The highest value was 2.34% which was recorded by loamy soil at 40 kg N / fed., while the lowest value was 1.30% which was found in sandy soil at zero nitrogen level. Similar results were obtained by Mishra *et al.* (1995).

Regarding the effect of interaction between organic manure and nitrogen levels, Table (3) shows that the highest value was 2.46% in loamy soil with chicken manure at 40 kg N / fed., while the lowest one was 1.27% in sandy soil with farmyard manure without nitrogen addition.

Ii- Soil properties.

Available soil nitrogen, % :

Data in Table (3) show that available soil nitrogen was significantly effected by organic manure in loamy and sandy soils ; while clay and calcareous soils were insignificant. Generally, chicken manure was more effective than farmyard manure on available soil nitrogen. This may be due to the high content of total nitrogen in chicken manure than farmyard manure (Table 1-c). The highest value was 33.15 ppm which was obtained from loamy soil with chicken manure ; while the lowest one was 23.84 ppm which was recorded by sandy soil with farmyard manure. Increasing available soil nitrogen in loamy and clay soils may be due to rich of these soils in macro-nutrients (Table 1-b). These results are in harmony with the findings of El-Naggar *et al.* (1996) and El-Awag *et al.* (1996).

Regarding the effect of nitrogen levels, data in Table (3) reveal that the significant effects were recorded in all soils except clay one, where the significant effect was found between zero and 30 kg N / fed., while non significant in high doses of nitrogen in clay soil. The highest value was 38.86 ppm in loamy soil with 40 kg N /fed., While the lowest one was 20.09 ppm in sandy soil with zero nitrogen level. These findings have been supported by El-Naggar *et al.* (1995).

Considering the interaction effect between organic fertilization and nitrogen doses, data in Table (3) reveal that, the highest value was 39.59 ppm which was obtained by loamy soil with chicken manure at 40 kg N / fed., while the lowest one was 20.06 ppm which was recorded by sandy soil with farmyard manure at zero nitrogen level.

soil bulk density and total porosity :

Soil bulk density is one of the useful values which used as an indication for soil structure. This property was mainly affected by macro pore spaces. Data in Table (4) show that application of studied organic manures led to a significant decrease in bulk density of loamy and sandy soils, while the decrease in clay and calcareous ones was insignificant. Generally the effect of chicken manure was better than farmyard manure on decreasing bulk density. This may be due to its height content of organic matter (Table 1-c). The lowest values of bulk density, and the highest ones of total porosity

were associated with chicken manure in clay and loamy soils, where the values were 1.05, 1.13 gm / cm^3 for bulk density, and 60.50, 57.23% for total porosity, respectively. Generally it appears from the previous data that organic manure addition to sandy and calcareous soils changed bulk density and total porosity in positive direction towards maximizing the ability of these soils to retain and conserve irrigation water against rapid loss by percolation. This decrease in bulk density may be attributed to the high content of organic matter in chicken manure (Table 1-c), which refers to formation of soil aggregates. Such results agree with that obtained by El-Awag *et al.* (1992) and El-Maddah (2000).

With regard to the effect of nitrogen fertilization doses on bulk density and total porosity, data in Table (4) reveal that bulk density tended to decrease as the nitrogen level in the soil increase. Total porosity takes the opposite. The lowest values of bulk density and the highest ones of total porosity were obtained by clay and loamy soils at 40 nitrogen unit where the values were 1.03, 1.11 gm / cm^3 for bulk density and 61.13, 58.12% for total porosity, respectively. Similar results were obtained by El-Awag *et al.* (1992) and Mielke *et al.* (1984).

Concerning the interaction between the effect of organic manure and nitrogen doses on bulk density and total porosity it can be noticed from the data in Table (4) that mixed of 40 nitrogen unit plus chicken manure reveal the better treatment as affected on bulk density and total porosity in all soils under the study.

Hydraulic conductivity :

The hydraulic conductivity is a function of the pore size distribution, and affected by geometery of the pores especially the macro pores which are the main contribution to the passage of water. Data in Table (4) reveal that application of the studied organic manure led to significantly differences in hydraulic conductivity in loamy and calcareous soils only, while in clay and sandy ones was insignificant.

Generally, the effect of chicken manure was better than farmyard manure on increasing hydraulic conductivity in clay and loamy soils and decreasing it in sandy and calcareous ones. The lowest value was increased from 0.60 to 0.89 cm / hr. in clay soil, while the highest value was decreased from 18.65 to 8.25 cm / hr. in sandy soil. These increments and decreases may be due to the role of organic materials on formation of water stable aggregates and hence increasing in total porosity. Similar results had been obtained by El-Naggar *et al.* (1996) and El-Maddah (2000).

Concerning the effect of nitrogen fertilization doses on hydraulic conductivity, data in Table (4) reveal that hydraulic conductivity tended to increase in clay and loamy soils as the nitrogen level in the soil increase, while it decreases in sandy and calcareous ones. The lowest value was increased from 0.6 to 0.97 cm / hr. in clay soil, while the highest value was decreased from 18.65 to 8.77 cm / hr. in sandy soil. These results agree with those obtained by Sarker *et al.* (1973).

Table (4) : Effect of organic manure, mineral nitrogen fertilization and their interactions on some soil physical properties under different soils.

Organic Fertilizer	Mineral fertilizer dose, Kg N/fed	Clay			Loamy			Sandy			Calcareous		
		Db gm/cm^3	Total porosity,%	Hydraulic conductivity cm/hr	Db gm/cm^3	Total porosity, %	Hydraulic Conductivity cm/hr	Db gm/cm^3	Total porosity, %	Hydraulic conductivity cm/hr	Db gm/cm^3	Total porosity%	Hydraulic conductivity cm/hr
Farmyard manure	0	1.09	58.87	0.72	1.19	55.09	1.73	1.61	39.25	9.41	1.41	46.79	8.21
	30	1.06	60.00	0.92	1.15	56.61	2.15	1.58	40.38	9.35	1.37	48.30	8.14
	40	1.04	60.75	0.95	1.12	57.74	2.16	1.55	41.51	9.31	1.34	49.44	7.98
Mean		**1.06**	**59.87**	**0.86**	**1.15**	**56.48**	**2.01**	**1.58**	**40.38**	**9.36**	**1.37**	**48.18**	**8.11**
Chicken manure	0	1.07	59.62	0.71	1.17	55.85	1.74	1.59	40.00	8.29	1.39	47.55	7.75
	30	1.05	60.37	0.97	1.13	57.36	2.28	1.56	41.13	8.24	1.35	49.06	7.62
	40	1.02	61.51	0.99	1.10	58.49	2.29	1.51	43.02	8.22	1.32	50.19	7.59
Mean		**1.05**	**60.5**	**0.89**	**1.13**	**57.23**	**2.10**	**1.55**	**41.38**	**8.25**	**1.35**	**48.93**	**7.65**
Average of N.dose	0	1.08	59.25	0.72	1.18	55.47	1.74	1.60	39.63	8.85	1.40	47.17	7.98
	30	1.06	60.19	0.95	1.14	56.99	2.22	1.57	40.76	8.80	1.36	48.68	7.88
	40	1.03	61.13	0.97	1.11	58.12	2.23	1.53	42.27	8.77	1.33	49.82	7.79
L.S.D. 5%	Organic F.	0.02	0.83	0.04	0.01	0.31	0.08	0.02	0.62	1.29	0.09	3.38	0.32
	Mineral F	0.03	1.05	0.05	0.04	1.50	0.02	0.04	1.62	1.53	0.03	1.07	0.33
	Interaction	0.04	1.48	0.07	0.06	2.12	0.03	0.06	2.29	2.16	0.04	1.52	0.47

Regarding the interaction between the effect of organic manure and nitrogen doses on hydraulic conductivity it can be revealed that farmyard manure coupled with zero nitrogen unit recorded the highest value of hydraulic conductivity with sandy soil where the value was 9.41 cm / hr. This may be due to increasing macro pores in sandy soil and consequently increasing hydraulic conductivity.

Generally, it can be concluded that chicken manure coupled with 40 nitrogen unit in all soils gave the better characteristics of sunflower plants especially in loamy soil.

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محصول عباد الشمس ومكوناته وبعض الخواص الطبيعية والكيماوية لأراضي مختلفة متأثراً بالتسميد العضوي والمعدني

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معهد بحوث الأراضي والمياه والبيئة – مركز البحوث الزراعية – الجيزة – مصر.

في تجربة منشقة مرة واحدة أجري هذا البحث في موسمي ٢٠٠١ ، ٢٠٠٢ بمجموعة ليزيميترات مكونة من أربعين حوض أسمنتي ، أبعاد الحوض الواحد (٢م طول ، ١م عرض ، ٢م ارتفاع) ، وقسمت الأحواض الأربعون إلى أربع مجموعات كل مجموعة عشرة أحواض معبأة بنوع معين من التربة وهي على النحو الآتي:
أرض طينية ثقيلة القوام ، أرض طمية متوسطة القوام ، أرض جيرية نسبة كربونات الكالسيوم بها أعلى من ٢٠% ، وأرض رملية خالية من الأملاح ، اعتبرت كل مجموعة كتجربة مستقلة ، وكان تصميم التجربة قطع منشقة مرة واحدة ، حيث يمثل التسميد العضوي فيها القطع الرئيسية (سماد بلدى وسماد دواجن) ، ومعاملات التسميد النتروجيني (صفر ، ٣٠ ، ٤٠ كجم نتروجين / فدان) القطع تحت رئيسية ، ومجموعة الليزيميترات مقامة بمحطة البحوث الزراعية بالجميزة غربية ، وكان الهدف من البحث هو دراسة تأثير التسميد العضوي والمعدني والتفاعل بينهما على محصول عباد الشمس ومكوناته وبعض الخواص الطبيعية والكيماوية لأراضي مختلفة ، ويمكن تلخيص النتائج المتحصل عليها كالآتي :

١- لقد زادت المادة الجافة ، وطول النبات ، وقطر القرص ، ووزن الـ ١٠٠ بذرة ومحصول بذرة عباد الشمس للفدان مع سماد الدواجن عن سماد المزرعة لجميع الأراضي تحت الدراسة. أيضاً زادت كل القياسات السابقة بزيادة مستويات النتروجين لجميع الأراضي.
٢- القيم الأعلى للمادة الجافة ، وطول النبات ، وقطر القرص ، ووزن الـ ١٠٠ بذرة ، ووزن البذور للفدان تم الحصول عليها جميعاً من الأرض الطمية مع سماد الدواجن عند التسميد بـ ٤٠ وحدة نتروجين للفدان.
٣- زادت النسبة المئوية لكل من زيت وبروتين البذرة مع سماد الدواجن عن سماد المزرعة في جميع الأراضي تحت الدراسة ما عدا الأرض الطينية ، كما زادت النسبة المئوية لزيت وبروتين البذرة بزيادة مستويات النتروجين فيما عدا الأرض الطينية ، كما زادت النسبة المئوية لزيت وبروتين البذرة بزيادة مستويات النتروجين فيما عدا الأرض الطينية حيث نقصت تلك النسب عند مستويات النتروجين الأعلى من ٣٠ كجم/ف.
٤- القيمة الأعلى لنسب زيت البذرة سجلت للأرض الطينية مع سماد المزرعة عند التسميد بـ ٣٠ كجم نتروجين للفدان بينما القيمة الأعلى لبروتين البذرة سجلت للأرض الطمية مع سماد الدواجن عند التسميد بـ ٤٠ كجم نتروجين للفدان.
٥- سبب سماد الدواجن زيادة في النسبة المئوية لنتروجين القش والبذور عن سماد المزرعة في جميع الأراضي تحت الدراسة ما عدا نسبة النتروجين في البذور في الأراضي الطينية ، كما أدت زيادة نسبة النتروجين إلى زيادة النسبة المئوية لنتروجين القش والبذور فيما عدا الأرض الطينية حيث انخفضت النسبة المئوية لنتروجين البذرة عند التسميد بأكثر من ٣٠ وحدة نتروجين للفدان.
٦- تم الحصول على القيم الأعلى للنسب المئوية لنتروجين القش والبذور من الأرض الطمية مع سماد الدواجن عند التسميد بـ ٤٠ وحدة نتروجين للفدان.
٧- زاد النتروجين الميسر بعد الحصاد مع سماد الدواجن بالمقارنة بسماد المزرعة لجميع الأراضي ، كما زاد أيضا بزيادة مستويات النتروجين المضافة.
٨- القيمة الأعلى لنتروجين التربة الميسر كانت للأرض الطمية مع سماد الدواجن عند التسميد بـ ٤٠ وحدة نتروجين للفدان.
٩- انخفضت قيم الكثافة الظاهرية وزادت قيم المسامية الكلية مع سماد الدواجن بالمقارنة بسماد المزرعة ، وأيضا بزيادة مستويات النتروجين المضافة انخفضت قيم الكثافة الظاهرية وزادت قيم المسامية الكلية ، ولكن زادت قيم التوصيل الهيدروليكي في الأراضي الطينية والطمية بينما نقصت في الأرض الرملية والجيرية.
١٠- أقل قيمة للكثافة الظاهرية وأعلى قيمة للمسامية الكلية تم الحصول عليها من الأرض الطينية مع سماد الدواجن عند التسميد بـ ٤٠ وحدة نتروجين للفدان ، بينما أقل قيمة للتوصيل الهيدروليكي تم الحصول عليها من الأرض الطينية مع سماد المزرعة عند معاملة تسميد نتروجيني صفر.