J. Soil Sci. and Agric. Eng., Mansoura Univ., Vol.1 (12): 1207 - 1219, 2010

IMPACT OF ADDITION OF SOME SOIL AMENDMENTS ON AVAILABLE NUTRIENTS IN SOIL AND SESAME PRODUCTIVITY GROWN UNDER SALINE CONDITION

Abd El-Kader, Mona G.; Awatef A. Mahmoud and Amira M. Hasan
Soils, Water and Environ. Res. Inst., Agric. Res. Centre, Giza, Egypt

ABSTRACT

Two field experiments were conducted at Sahl El-Tina at North Sinai Governorate in private farm in two successive summer seasons of 2009 -2010. The study was conducted to check up the effect of applying gypsum, sulphur and compost on availability of nutrients in soil and sesame productivity grown under saline soil condition. The seeds of sesame were Cv. (Shandawil 3). Application rates for gypsum and compost were 0, 2 and 4 Mg fed^{-1} but it was 0, 0.2 and 0.4 Mg fed^{-1} for sulphur. Addition was performed 30 days before sowing . Basial fertilizers were applied at the recommended doses ; and were applied in 3 successive doses.

The results showed that the application of high rate of all amendments led to decrease EC and soil pH. Available macro and micronutrients in soil were elevated with increasing the rate of application of gypsum, compost and sulphur. Compost treatment at 4 Mg fed^{-1} gave the highest seed yield and oil contents of sesame; compared to the zero level of amendments. Elevating the application rates of the studied treatments heightened the uptake of macro and micronutrients in the seed of sesame. Again compost treatment superimposed the other studied treatments. Consequently,it may be recommended to utilize 4Mg fed^{-1} of compost to have good and higher quality of sesame yield grown on salt affected soil.

Keyword: Sand clay- saline soil – Gypsum – compost – sulphur - sesame-productivity.

INTRODUCTION

Soil degradation caused by salinization and sodification is of universal concern. It was reported that nearly one billion hectares of soil around the world were saline and sodic soil(FAO, 1992).

Gypsum ($CaSO_4.7H_2O$) is the most commonly used amendment due to its availability besides its lower cost. The amelioration of saline-sodic soils, thus, require both leaching and application of gypsum (Abrol *et al.*,1988). However, this approach fails to improve the physical and biological properties of the already degraded soil Suffering from low hydraulic conductivity caused by dispersion. Indeed, during the leaching gypsum treatment, the soil is kept soaked for such a prolonged time and this let soil aggregates lose their stability. But, on the contrary addition of organic matter to the soil may have a positive effect on the physical and biological soil properties including water stable aggregates, water holding capacity, cation exchange capacity, and plant nutritional elements (Hanay and Yardimci (1992). The work of Zaka (2007) Showed that application of gypsum and compost led to decrease soil pH. Stamford *et al*. (2002) reported that addition of sulphur to soil could reduce soil pH from 8·2 to 4·7 and electrical conductivity of the soil saturation extract from 15·3 to 1·7 dS m^{-1} values below those used for classifying the saline and sodic soil. Abdurrahman *et al.* (2004) reported that the application of gypsum alone to saline alkaline soil has successfully reduced its EC and ESP values. EC decreased from 12.35 to 1.98 dS m^{-1}, and ESP from 14.75 to 6.69 %. Nevertheless, compost application decreased soil pH from (9.75 to 8.22), EC (from 12.35 to 2.25 dS/m^{-1}), and ESP (from 14.75 to 6.61%) of the soil. Ilyas *et al.*(1997) indicated that gypsum application increased the soluble Na^+ in the top 20 cm soil. However, one year after the treatment, under crop rotation and addition of gypsum; SAR, EC, pH and Cl^- in top 20 cm of soil were significantly decreased. They concluded that a combination of added gypsum plus crop rotation was the best. However,in the case of surface soil improvement of the deeper soil profile, gypsum and alfalfa planting were the most effective of those treatments used.

Sesame *(Sesamum indicum L.)* is one of the important oil seed crops. Sesame oil has high oil content (46 – 64 % and a dietary energy of 6355 Kcal/kg). The seeds serve as rich source of protein(20–28 %).Sugar(14–16 %) and minerals (5 – 7%) (Thanvanathan *et al.*, 2001). In an attempt to ameliorate saline alkaline soil and make it a productive one, different materials such as compost, gypsum and sulphur were tested by many workers. Rebeka (2006) found that most chemical parameters of the compost extracts generally reflect the chemical composition of starting materials. Compost fertilizer extracts lower pH, salinity (EC,for lower and K dilutions) concentration. But relatively raise N, P, Ca,and Mg concentrations as a source of nutrients for plant growth. Avnimelech *et al*. (1992) found that the application of compost or gypsum to a saline sodic soil led to the dissolution of $CaCo_3$, and increase soluble calcium; causing an effective displacement and leaching of sodium from the soil.Such managemen increased yields in the treated saline–alkaline soil to almost normal yields. The role of sulphur application in improving soil properties and growing yields were noted by some workers. Mostafa *et al.* (1990) stated that sulphur application plays several important roles in soil , such as, reducing soil pH , improving water relations, increasing solubility and availability of some nutrient elements , i.e . S, P, Fe, Mn and Zn. Koriem (1994) found that sulphur application improves soil aggregation, structure, permeability, infiltration, EC and SAR values. Wadile *et al.* (2005) revealed that the application of sulphur significantly increased seed yield of sesame compared to the control but did not have any significant effect on oil content. Amar and Meen (2004) showed that increasing level of sulphur significantly increased dry matter, weight of seed per plant and seed yield of mustard.

MATERIALS AND METHODS

A field experiment was conducted on saline alkaline soil at Galbana village, east Suez Canal, North Sina Governorate, Egypt (30^0 /55 N,32 ^{0} /28 E), on summer seasons of 2009 and 2010. The aim was to study the effect of gypsum, compost and sulphur amendments on some soil properties and sesame production. This area is irrigated through El-Salam canal (Nile water mixed with agriculture drainage water at a rate of 1:1). Soil samples taken from the upper 0- 30 cm soil layer were passed through 2-mm diameter sieve. Some soil properties of the experimental field were determined according to Richards (1954) and Page *et al.* (1982) and presented in Table (1) .Gypsum, of 97% purity, were sieved through a sieve having an opening of 0.149 mm to enhance its solubility. Compost was prepared by mixing straw of rice, maize, sesame and faba bean with farm manure. The mature compost was obtained after 3 months of composting and was passed through a sieve of 10-mm diameter prior to use in this study some chemical characteristics of the compost are given in table (2). A randomized, complete block experimental design with 3 replicates for each treatment was employed in this study. The unit plot size was 6 X 10 m^2 . The amendments used in the experiment were: 1- gypsum* applied at rates of 0, 2 and 4 Mg fed^{-1*}. 2- Compost at rates 0, 2 and 4 Mg fed^{-1}; and 3 – sulphur at rates 0, 0.2 and 0.4 Mg fed^{-1}. All amendment treatments together with super phosphate were applied during soil tillage, prior to sesame planting. The recommended dose of N, P and K fertilizers 150 kg fed^{-1} urea (46% N) , 200 kg fed^{-1}

Superphosphate (15.5 % P_2O_5) and 50 kg fed^{-1} potassium sulphate (48 % K_2O), were applied. Urea and potassium sulphate were added at three equal doses, namely at 20, 35 and 45 days after Sowing.

The soil of the experimental plot was subjected to some pretreatments processes as follows: a) leveling the soil surface by using laser technique. b) Deep sub-soil ploughing. c) Establishment of filed drains at a distance of 10m between each of drains row, 90 cm deep at drainage beginning, and the water flow was towards the main collectors of 2 m in depth and d). An irrigation canal in the middle part of the experimental pilot unit is established. One third of used amounts compost; gypsum and sulphur were incorporated in soil and ploughed followed by irrigation. The treatments were lift for 10 days for drying. This process was repeated three times. All soil treatments were applied one month earlier to ensure its complete decomposition. The application of irrigation water was higher than F.C (2.5 cm, water depth) to enhance leaching of salts from soil.

Soil samples from surface (0- 30 cm) were collected from each treatment after harvest , ground and subjected to the determination of available nutrients N, P and K as outlined by Black (1965) . Soil pH was determined in 1:2.5 soil water extract. Electrical conductivity and soluble cations and anions of soil saturation paste extract were determined (Richards, 1954). Available Fe, Mn and Zn were extracted by DTPA according to Lindsay and Norvell (1978) and were determined by the Atomic Absorption Spectrophotometer model GBC932.

Sesame seeds (Shandaweel 3 cv.) were sawn on 10 May 2009 and 12 May 2010 at the rate of 3 kg fed^{-1}, thinning was done 15 th days after sowing. The yield was harvested on 15^{th} of September 2009 and 20 th of September 2010.

***fed. ; feddan = 0.42 hectare.**
***2 Mg gypsum contains 0.244 Mg sulphur.**

Plant samples of straw and grains were wet digested by a mixture of $HClO_4$ and H_2SO_4 acids according to Sommers and Nelson (1972). Nitrogen was determined by micro Keldahl, phosphorus was determined spectrophotometercally using ammonium molybdate stannus chloride method according to Chapman and Pratt (1961), Potassium was determined by a flame photometer, micronutrients; Fe, Mn and Zn were determined by an atomic absorption as above mentioned. Oil seed content was determined using Soxhlet method (AOAC, 1990). Crude protein content was derived by multiplying the seed nitrogen content with the factor 6.25 (Humphries, 1956). The obtained data were statistically analyzed according to Snedecore and Cochran (1979).

Table (1): Some Physical and chemical properties of the studied soil

Course sand (%)	**Fine sand (%)**	**Silt (%)**	**Clay (%)**	**Texture**		**O.M (%)**		**$CaCO_3$ (%)**
15.25	66.77	6.08	11.90	Sandy loamy		0.68		**10.23**
pH (1:2:5)	**EC (dSm^{-1})**	**Cations (meq/l)**				**Anions (meq/l)**		
		Ca^{++}	**Mg^{++}**	**Na^{+}**	**K^{+}**	**HCO_3^-**	**Cl^-**	**SO_4^{--}**
8.20	12.03	7.89	16.50	95	0.83	9.23	77	33.99
Available Macronutrients (mg/kg)			**Available Micronutrients (mg/kg)**					
N	P	K	Fe	Mn	Zn	Cu		
44	4.60	205	2.51	1.68	0.73	0.45		

Table (2):The chemical properties of compost

pH	**EC (dSm^{-1})**	**Total N %**	**OM %**	**Total C %**	**C/N**	**Total P %**	**Total K %**
7.5	4.5	1.69	1.5	28.6	16.9	0.8	1.0

RESULTS AND DISSCUSSION

Effect of adding gypsium, compost and sulphur on soil properties.

Data presented in Table (3) show that the soil pH was decreased as affected by all treatment compared with untreated ones. However, such decrease was insignificant. This finding could be justified due to the buffering capacity of the soil in the one hand and the comparatively short period of treatment on the other hand. The obtained decrease in pH was in a descending in order: Sulphur > Compost > Gypsum. The results obtained are in agreement with Stamford *et al.* (2002) and Zaka (2007).

Soil EC was lowered due to the application of amendments namely; gypsum, Compost and Sulphur where differences among these treatment and among their rates of application were significant. It is believed that deep ploughing of soil before and after application of gypsum; compost and sulphur helped in reducing the soil EC as it drastically affected leaching of salts. The data indicated that amendments application caused relative decreases from 29.10 to 57.37 % for gypsum; from 26.39 to 42.08 % for compost and from 15.57 to 38.55 % for sulphur as the lower rate of application and higher one were implicated, respectively. The treatments could be arranged according to their efficiency in lowering EC values into: Gypsum > Compost > Sulphur.

Therefore, it may be concluded that leaching of saline soil using continuous head of water (2.5cm) under tested amendments management caused a remarkable decrease in Ec soil values. The obtained results are similar to those reported by Abdurrahman *et al.* (2004) and Seddik *et al.* (2006). They found that values of pH and EC were lowered, due to application of FYM and chicken manure compared to treatments without organic manure. Lone *et al.* (1990) concluded that the application of gypsum and successive leaching of saline alkaline soil caused a decrease of soil pH values, Esp and soil sodium adsorption rate.

Table (3): Mean values of soil pH, soil EC and available macro and micronutrients content of soil after sesame harvest planting two summer seasons (2009 &2010)

Treatment	Mg fed^{-1}	pH (1:2.5)	EC dSm^{-1}	Available Macronutrients (mgkg^{-1})			Available Micronutrients (mgkg^{-1})		
				N	P	K	Fe	Mn	Zn
Gypsum	0	8.02	7.25	55	5.03	209	2.77	1.70	0.79
	2	7.98	5.14	61	6.15	216	3.66	2.16	0.82
	4	7.89	3.09	67	6.22	220	3.84	2.22	0.85
Compost	0	8.01	7.20	58	5.05	208	2.76	1.72	0.76
	2	7.88	5.30	82	7.05	223	3.88	2.47	0.85
	4	7.86	4.17	85	7.12	234	3.93	2.52	0.88
Sulphur	0	8.00	7.19	60	5.02	211	2.78	1.74	0.79
	0.2	7.83	6.07	72	6.26	218	3.23	2.24	0.78
	0.4	7.80	4.85	79	6.28	223	3.34	2.26	0.79
Amendments		ns	**	**	**	**	ns	**	**
Rates		ns	*	**	**	**	ns	**	**
Amend X Rate		ns	*	*	ns	**	ns	**	**

Abdul-Wahid *et al.* (1998) reported that amelioration of saline-sodic soils with organic matter added to saline sodic soils decreased pH and electrical conductivity of soil extract.

Nutrients availability of the studied soils:

The impact of application different amendments at various levels to soil on its available nutrient is shown in Table (3). The soils treated with the compost showed, relatively higher values of available N, P and K compared with soil treated with gypsum or sulphur. This could be mainly due to its relatively higher organic matter content; rich in these nutrients. This finding is in harmony with the results obtained by Rebeka (2006). It can be observed from Table (3) after sesame harvest; the values of available N, P, and K in soil of various treatments were significantly increased with respect to the initial ones. The corresponding relative increases of N in soil compared to control were 10.91 and 21.82 % for gypsum ; 41.37 and 46.55 % for Compost and 20.00 and 31.66 % for sulphur; as affected with the amendments added to soil at the rates 2 and 4 Mg fed^{-1} for gypsum and compost and by 0.2 and 0.4 Mg fed^{-1} for sulphur , respectively. On the other hand relative increases of available P in soil as treated with different rate of amendments application were 22.27 and 23.66% for gypsum ; 39.66 and 41.00 %for compost and 24.70 and 25.10%for sulphur, respectively . Also the relative increases values of K were 3.34 and 5.26% for gypsum; 7.21 and 12.5 % for compost and 3.31 and 5.66 % for sulphur. The role of the studied amendments in increasing N, P and K was in the order Compost > Sulphur > Gypsum. These results are similar to those reported by Rebeka (2006).

As for the available values of N, P and K of the treated soil; available Fe, Mn and Zn in surface layer especially at the higher rate of application with compost, exhibited the highest values compared to the other treatments; gypsum or sulphur. This may be due to the accumulation of the organic colloids rich in these elements. Nevertheless in the case of sulphur application increase of these elements could be resulted from decreasing soil pH. These results are in agreement with those obtained by Ashmaye *et al.* (2008); Hanay and Yardimci (1992) and Shaban *et al.* (2008). It is worthy to mention that the values of the studied available micronutrients, in soil are generally, within the sufficient limits given by (FAO, 1992).

Effect of applying different amendments on the seed yield and oil content of sesame grown on the saline studied soil.

The effect of the used different rates of amendments on seed yield of sesame grown in two seasons in the studied soil is shown in Table (4). The obtained data indicated that values of dry matter of seed yield were slightly elevated. This could be probably due to reduction in soil salinity and sodictiy.

It could be mentioned that the yield of sesame in the order; compost > gypsum > sulphur is related to the efficacy of the tested amendments in improving the soil properties . These results were in agreement with those obtained by Avnimelech *et al.* (1992).

Data of 1000- seed weight, seed yield and oil content (%) of sesame as affected by the different rates of applied amendments during two growing seasons are presented in Table (4). The results show that different amendments had insignificant effect on the previously mentioned characters.

Nonetheless, the values recorded for compost treatments were higher than those exhibited in the case of the other two amendments. In this respect, Ghosh *et al.* (2004) pointed out that organic manures played an important and significant role in increasing yield of soybean.

Table (4): Mean values of 1000 seed weight, seed yield and oil content of sesame as affected by addition different soil amendments

Treatments	Mg fed^{-1}	1000-seed weight (gm)		Seed yield weight fed(Kg)		Oil content (%)	
		1st	2nd	1st	2nd	1st	2nd
Gypsum	0	3.19	3.22	373	379	40	42
	2	3.30	3.36	386	394	43	45
	4	3.32	3.37	403	410	45	48
Compost	0	3.20	3.23	375	381	41	43
	2	3.38	3.41	412	419	47	50
	4	3.40	3.45	422	430	49	51
Sulphur	0	3.20	3.23	379	382	41	42
	0.2	3.33	3.36	403	412	45	46
	0.4	3.36	3.40	408	418	47	48
LSD. 5% Amend.		ns		ns		ns	
LSD. 5% Rates		ns		ns		ns	
LSD. 5% seasons		ns		ns		ns	

Nutrients and protein content in sesame seeds:

Macronutrient contents in sesame seed as affected by amendments applications are given in Table (5). The application of gypsum, compost and sulphur at the different studied rates led to augment N, P and K in the seed of sesame plant as compared with untreated soil. The highest values of N, P and K content in seeds of sesame plant were obtained when the uppermost level of amendments was used ; especially in the case of compost and sulphur. The obtained results by Abdel-Sabour and Abo El-Seoud (1996) resemble those recorded herein.they indicated that compost treatments stimulated sesame growth and enhanced its pigment, carbohydrate and mineral contents. The current data showed that the value of protein (%) of sesame seeds was augmented with increasing the application rates of the tested amendments; managed for two seasons. Although the current data showed a slim increase in biomass and oil content of sesame yield it reflects the essential role of N. Sulphur is involved in protein synthesis and part of the amino acids, cystine and thiamine. Sulphur is present in peptide glutathione, coenzyme A, and vitamin B1 and in glucosides, Janes (1997) And Collins et al., (2008) reported that when plants encounter salinity, growth is reduced initially by water stress and subsequently by toxic levels of ions and by interference with nutrient acquisition and translocation.Calcium (Ca^{2+}) in particular seems to have an important role in salt tolerance and there are reports of a beneficial effect of increasing Ca^{2+} availability. Higher potassium (K^+) concentrations in plants may also improve salinity tolerance as sodium Na^+/K^+ ratios have been shown to be important. On the other hand , effect of different amendments on Fe , Mn and Zn content in sesame seed in both seasons are presented in Table (6).

5

6

Data show that the used high rate from all amendments studied led to increase Fe , Mn and Zn concentrations of sesame seed through sesame growing two seasons.

It could be noticed that the soil treated with amendments caused positive effect on the seed sesame content of, Fe, Mn, and Zn as compared to soil without amendments. The results obtained are in agreement with Shaban *et al.* (2008). The presented results indicated that treatment of 4 Mg fed^{-1} gypsum with the recommended NPK Could cause the higher increases in bothoil, macro and micronutrients in sesame seed compared with other treatments. Finally, it can be concluded that application of compost, is the best treatment for raising the quantity and quality yield of sesame grown on saline sandy soil.

REFERENCES

Abdel-Sabour M. F and Abo El-Seoud M. A. (1996) Effects of organic-waste compost addition on sesame growth, yield and chemical composition. Agriculture,Ecosystems & Environment.60(2-3): 157-164.

Abdul-Wahid;Shamshad,A.;Iftikhar,A.and Ejaz,R.(1998). Amelioration of saline-sodic soils with organic matter and their use for wheat growth. Communication in Soil Science and Plant. Analysis.29 (15-16): 2307-2318.

Abrol, I.P; Yadav J.S and Massoud F.I. (1988) Salt-affected soils and their management. FAO Soils Bulletin, Soil Resources, Management and Conservation Service, FAO Land and Water Development Division, 39: pp.131.

Abdurrahman H.; Fatih B.; Fatih M. and Mustafa Y. (2004) Reclamation of Saline-Sodic Soils with Gypsum and MSW Compost. J. Compost Science & Utilization, 12(2:175-179.

Amar, S. and Meen, N. (2004) Effect of nitrogen and sulphur on growth, yield attributes and seed yield of mustard (*Brassicca juncea*) in eastern plains of Rajasthan. India. J. Agronomy. 49 (3): 186- 188.

AOAC (1990). Official Methods of Analysis. Association of Official Analytical, Arlington, Virgina, USA.

Ashmaye; S.H.;Shaban ; Kh. A.and Abd El-Kader,M.G.(2008) Effect of mineral nitrogen, sulphure, organic and bio-fertilization on maize productivity in saline soil of Sahl El-Tina . Minufiya,Agric. Rec. 33(1): 195 – 209.

Avinmelech Y.; Kochva M.; Yotal Y. and Shked D. (1992) The use of compost as a soil amendment . International symposium on compost recycling of wastes. 1, (38) Athens, Greece.

Black , C.A.(Ed)(1965). Methods of Soil Analysis. Ser. Agron. No. 9 Amer. Soc. Agron., Madison, Wisconsin, USA.

Chapman, H.D. and Pratt P.F. (1961) Methods of Analysis for Soils, plants and Waters . Univ. of Colifornia, Division of Agric. Sci., USA.

Collins , R.P ; Harris , P.J ; Bateman, M.J and Henderson,J.(2008) Effect ocalcium and potassium nutrient on yield , ion content ,andsalt tolerance of Brassica campestris (rapa). J. Plant Nutrition , 31 (8) : 1461- 1481.

FAO, (1992). The use of saline water for crop production. Irrigation and Drainage Paper, 48. Rome,Italy.

Ghosh, P. K.; Ramesh, P. A.; Bandyopadhyay, K. K.; Tripathi A.K.Hati, K. M. and Misra,A. K. (2004).Comparative effectiveness of cattle manure, poultry manure, phosphocompost and fertilizer – NPK on three cropping systems in vertisols of semi-arid tropics. I. Crop yields and system performance. Bioresource Technology. 95: 77 – 83.

Hanay, A. and Yardimci N. (1992). A research on the effects of municipal compost and farmyard manure on some physical and chemical properties of soils and soil - water relations. Doga-Transaction]. Agric. Forestry. 16:91-102, Ankara, Turkey.

Humphries, E.C., (1956). Mineral components and ash analysis. Modern method of plant analysis. Springer-Verlag, Berlin, 1: 468-502.

Ilyas M.; Qureshi R. H. and Qadir M. A. (1997) Chemical changes in a saline-sodic soil after gypsum application and cropping . J. Soil Technol., 10(3): 247-260.

Janes. J .B (1997). Plant Nutrition Manual. Chapter I. Hand book manual. USA.

Koriem, M. N. (1994). Effect of different rates and methods of sulphur application on some soil properties and elemental leaf composition of succor- orange. J. Agric. Res. Tanta univ., 20 (2): 345- 360.

Lindsay , W.L and Norvell. W. A. (1978). Development of DTPA soil test for Zn, Fe, Mn, and Cu.Soil Sci,Soc. Amer . J. 42: 421.

Lone,M.I.;Sidhu,M.;Haq,I.;Ahmad,M.and Akhtar,M.E.(1990) The effect of water table depth on soil profile salinity /sodicity.Soil physics application under stress environments,22-26,January 1989, Islamabad, Pakistan. Pp.78-93.

Mostafa, M. A. ; El-Gala; A.M. ; Wassif; M.M. and El-Maghraby,M. (1990) Distribution of some micronutrients through a calcareous soil column under sulphure and saline water application. Middle East Sulphure symposium. Cairo, 12- 16- Feb. 263- 276.Page, A.L; Miller, R.H. and Keeney, D.R.(1982).

Methods of Soil Analysis.Part 2: Chemical and microbiological properties (Second Edition). American Society of Agronomy, Inc. and Sci. Soc. of America, Inc. Publishers, Madison, Wisconsin, USA.

Richards , L.A.(1954). Diagnosis and Improvement of Saline and Alkali SoilS. U. S. Dept Agric Hand Book , 60, U. S. Govt . Printing Office, Washington, USA.

Rebeka , S.L. (2006). Composting as an alternative method to dispose of slaughterhouse wastes in Puerto rice . MSc.Thesis Animal industry. University of Puerto Rico. Mayaguez Campus (Electronical-Published).

Seddik , W. A. ; Gehan,H .Y. and Mona,H.M. (2006) Changes in soil physico - chemical properties and macronutrients contents of pea and tomato plants due to organic manure and some natural minerals fertilization.J. Agric . Sci. Mansoura , Univ., 31 (11): 7347- 7362.

Shaban, KH. H. (2005. Effect of different irrigation water resources on properties and productivity of salt affected soils. Ph.D. Thesis, Fac. Agric., Monufiya University. Egypt.

Shaban , Kh. H. ; Khafaga, E.E . and Saied, H. S. (2008). Effects of organic manure and mineral N on soil properties and spinach (Spinacia olerasea L.,) productivity under saline soil conditions. J. Agric. Sci. Mansoura Univ.,33(5):3865- 3879.

Snedecor , G. W. and Corharn , W.G. (1979) .Statistical Methods. Iowa State University Press. pp. 593, Ames, Iowa, USA.

Sommers, L.E. and Nelson, D.W. (1972). Determination of total phophorus in soil. A rapid Perchloric acid digestion Procedure. Soil Sci. Soc . Amer. Proc., 36: 902- 904.

Stamford, N. P. ; Freitas,A. D.;Ferraz, D.S. and Santos, C. E. (2002). Effect of sulphur inocculated with Thiobacillus on saline soils amendment and growth of cowpea and yam bean legumes. J. Agric. Sci., 139:3:275-281.

Thanvanathan , K ; Ganapathy , M. ; Parkash, M. and Imayavaramban, V. (2001). "Nutrient uptake and quality characters of sesame (*Sesamum indicum* L.*)* as influenced by micronutrient, Bio- fertilizer and phytohormones ."Sesame and Sunflower Newsletter. (16): 1013- 1015.

Wadile, S. C; Patil , S.S ; Jadhav , M.G. ; Chaudhari, G. B.; Bahale, T.M .; Surywanshi,R. T. and Rajput, S. D. (2005) . Effect of sulphur application through different sources on seed yield and oil content in sesame (*Sesamum indicum* L.*)* . FAO Sesame and Sunflower Newsletter. (20) 1-5.

Zaka , M. A. (2007). Evaluation of effective and economical reclamation technology for salt. Ph.D. of Faculty of Organic Agricultural Science of the University of Kassal (Electronical-Published).

تأثير اضافه بعض محسنات التربه علي العناصر الغزائيةالميسرة قي التربة وانتاج محصول السمسم النامي تحت ظروف الملوحة

مني جمال عبدالقادر، عواطف عبد المجيد محمود و أميرة حسن محمد حسن
معهد الاراضي والمياه والبيئه- مركز البحوث الزراعية - الجيزة

أجريت تجربتان حقليتان في مزرعة بمنطقه سهل الطينه شمال سيناء خلال الموسمين الصيفين2009 – 2010.لدراسة تأثير استخدام الجبس الزراعي والكمبوست والكبريت الزراعي علي بعض صفات التربه وإنتاجيه محصول السمسم صنف شندويل 3 تحت ظروف الاراضي المتأثرة بالأملاح حديثة الاستصلاح.

وكانت معدلات الإضافة هي كالتالي 0-2-4 ميجا جرام لكل فدان من الجبس والكمبوست ومعدل0-0.2- 0.4 ميجا جرام لكل فدان من الكبريت الزراعي وتم إضافة كل هذه المحسنات قبل الزراعة وأثناء الخدمة للأرض.استخدمت الأسمدة المعدنية حسب التوصيات الموصي بها.

وكانت النتائج كالتالي:

1-إضافة المعدلات المرتفعه من المحسنات (الكبريت والجبس والكمبوست)إلي إنخفاض في رقم الحموضة وملوحة التربة.

2-زاد تيسر العناصر الكبري والصغري في التربة بزيادة معدلات الجبس والكمبوست والكبريت.
3-المعاملة بالكمبوست عند4 ميجا جرام للفدان أعطت أعلا محصولا للبذور والمحتوي من الزيت مقارنة بالكنترول .
4-لاضافة الكموست والكبريت والجبس تأثير علي امتصاص العناصر في النبات وخاصة في المعدلات العالية.

يمكن التوصية باستخدام معدل 4 ميجا جرام للفدان من الكمبوست للحصول علي انتاج ذو جودة وانتاجيه مناسبة من محصول السمسم اذا تم استزراعه في الاراضي المتأثره بالاملاح.

قام بتحكيم البحث

أ.د / محمد وجدى العجرودى	**كلية الزراعة – جامعة المنصورة**
أ.د / أبو بكر الصديق محمد عبد الله	**مركز البحوث الزراعية**

Table (5): Macronutrients concentration , uptake and protein (%) in sesame seed

Treatments / Season	Mg fed^{-1}	concentration N (%)		uptake N (kg fed^{-1})		concentration P (%)		uptake P (kg fed^{-1})		concentration K (%)		uptake K (kg fed^{-1})		Protein (%)	
		Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	1st	2nd
Gypsum	0	2.94	3.04	10.96	12.32	0.46	0.49	1.72	1.85	0.52	0.54	1.93	2.04	18.37	19.00
	2	3.14	3.25	12.12	12.80	0.51	0.54	1.96	2.13	0.60	0.67	2.42	2.74	19.62	20.31
	4	3.19	3.32	12.85	13.61	0.55	0.59	2.21	2.42	0.63	0.69	2.54	2.83	19.94	20.75
Compost	0	2.96	3.05	11.10	11.62	0.46	0.48	1.72	1.83	0.53	0.55	1.99	2.09	18.50	19.10
	2	3.26	3.37	13.43	14.12	0.58	0.62	2.39	2.59	0.68	0.72	2.80	3.01	20.37	21.10
	4	3.32	3.41	14.01	14.66	0.63	0.66	2.66	2.84	0.72	0.75	3.03	3.21	20.75	21.31
Sulphur	0	2.99	3.07	11.33	11.73	0.47	0.50	1.78	1.91	0.54	0.55	2.05	2.10	18.69	19.19
	0.2	3.22	3.31	12.97	13.63	0.52	0.54	2.09	2.22	0.66	0.70	2.66	2.88	20.12	20.69
	0.4	3.29	3.35	13.42	14.00	0.57	0.60	2.33	2.50	0.69	0.73	2.81	3.05	20.56	20.94
LSD 5% amend		0.930		0.088		0.009		0.047		0.045		0.32		0.67	
LSD 5% rates		0.100		0.21		0.010		0.064		0.051		0.36		0.55	
LSD 5% season		ns		ns		ns		ns		ns		ns		ns	

Table (6) : Micronutrients concentration and uptake in sesame seed

Treatments	Mg fed^{-1}	concentration Fe (mgkg^{-1})		Uptake Fe (Kg fed^{-1})		concentration Mn (mgkg^{-1})		Uptake Mn (Kg fed^{-1})		concentration Zn (mgkg^{-1})		Uptake Zn (Kg fed^{-1})	
		Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd	Seed 1st	Seed 2nd
Gypsum	0	75	79	27.97	29.94	41	42	15.27	15.92	26	27	9.69	10.23
	2	77	80	29.72	31.52	44	46	16.98	18.12	33	36	12.74	14.18
	4	82	85	33.05	34.85	47	50	18.94	20.50	38	39	15.31	15.99
Compost	0	77	80	28.87	30.48	42	43	15.75	16.38	30	32	11.25	12.19
	2	95	98	39.14	41.06	48	51	19.77	21.37	38	42	15.65	17.64
	4	102	107	43.04	46.01	52	55	21.94	23.65	42	47	17.72	20.21
Sulphur	0	77	81	29.18	30.94	46	48	17.43	18.34	29	30	10.99	11.46
	0.2	81	88	32.64	36.26	47	50	18.94	20.60	34	35	13.70	14.42
	0.4	83	90	33.86	37.62	49	53	19.99	22.15	37	39	15.09	16.30
LSD 5% amend		5.86		0.16		4.58		ns		4.61		1.56	
LSD 5% rates		8.31		0.18		5.12		ns		3.58		1.83	
LSD 5% season		2.86		0.27		ns		ns		ns		ns	