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EFFECT OF ORGANIC AMENDMENT AND SPRAYING WITH THE PROLINE ON THE PRODUCTIVITY OF BARLEY PLANTS GROWN IN CALCAREOUS SOIL UNDER IRRIGATION WITH SALINE WATER

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ABSTRACT: *A Field experiment was carried out at Ras Sudr Experimental Station, that belongs to Desert Research Center, to investigate the effect of three saline irrigation water levels, i.e., 9.39,11.02 and 12.88 dS m^{-1},two rate of sheep dung manure, i.e., 0 and 20 m^3/fed.as well as spraying plants with praline using three levels, i.e., 0,100 and 200 mg/L., on the productivity of barley plants and on some soil properties.*

The results showed that increasing as salinity of irrigation water led to decrease the barley growth by about 22 and 116% it compared with the level of irrigation water (9.39dSm^{-1}), under no addition of organic manure, while being 12 and 60% at adding of 20 m^3/fed. of sheep dung manure.

Adding the highest level of praline (200mg/L)led to the maximum increase of plant growth in the case of adding or not adding of sheep dung manure .Also, increasing of irrigation water salinity level decreased significantly yield of barley grains by about 13 and 60 % under no addition of organic manure it compared with the low salinity level of water irrigation. While the corresponding decreases under addition of organic manure reached 10 and 50 %. Also data indicted that the tower with the highest level of praline led to the highest yield of barley grains either at the addition of organic manure one not.

Regarding to the effect of the studied parameters, data indicated that increasing the level of irrigation water salinity gradually decreased the N,P and K content of grains. The percentage of decrease in N,P and K concentration reached 6 and 18% ,3 and 11%, 11 and 22% at water salinity 11.02and 12.88ds/m compared to 9.39ds/m,without SM. While, under OM reached 5 and 15%, 3 and 10%,10 and 21% in the same order, application of proline to barley plant through foliar spray up to 200mg/L was associated an increase in N,P and K content OM application.

Also, increasing salinity level of irrigation water and increasing application of organic manure increased significantly the soil EC values and the organic matter content, while springing with praline did show a dear effect on the soil EC and /or the soil organic matter content.

For the effect of the studied parameter an the balk density and the hydraulic conductivity ,increasing of water salinity level decreased unsignificatly the values of the hydraulic conductivity, while the opposite in true for the values of bulk density. Addition of organic manure to the soil increased unsignificatly the hydraulic conductivity, while the reuse is true for the bulk density. Spraying with praline had no effect on both the bulk density and hydraulic conductivity values.

***Key words**: Sandy soil- proline- Irrigation water salinity-sheep dung manure- barley.*

INTRODUCTION

The use of saline water for irrigation is one of the important factors affecting growth and yield of most crops. The effect of salinity on plant growth may be more related to the Na^+ /K^+ ratio of the plant tissue than to absolute Na^+ concentration.

The most common problem that results from using a saline water is the accumulation of salts in the crop root zone. More salt deposition occurs within the porous of soil matrix. Exchangeable sodium builds up on the cation exchange complex and available water within the soil reservoir decreases, then crop production is reduced.

Abou El- Defan (1990) and Nessim *et. al,* (2007) reported that the increasing salinity of irrigation water either as NaCl solutions or diluted sea water increased EC values of soil as compared to the control treatment.

In contrast Eman (2011) indicated that organic matter decompositions increased with increasing the salinity level in soil and in irrigation water due to losses of humic acids in form of Na-humates.

Omar and Ghowail (1990) reported that the increasing of salinity of irrigation water from 2000, to 4000,6000 ppm decreased plant height .Also, they showed that salinity of irrigation water reduced grains yield significantly, the rate of decrement in grains yield being 66 and 72 % at 6000 ppm salinity level of the studied first and second seasons, respectively.

Walter and Calvin (1991) using water salinity treatments i.e. 0.0, 0.6, 7.0 and 14.0 ds/m, they found that reductions of gain yield due to the 7.0 and 14.0 dS/m treatments were 5 and 19%,respectively. The high reduction of 68% of in grain yield was obtained due to increasing water salinity up to 14,0 dS/m. Similar results were also obtained by El-Haddad *et al.,* (1993) and Sekina *et al.* (1993). Zaki *et al.,* (2009) found that increasing salinity of irrigation water decreased vegetative growth and green yield up to the highest concentration (5000 ppm).Similar results were obtained by Ahmad, (1999) and Abou- El-Magd *et al*, (2008).

Wassif *et al.* (1983a) studied the effect of irrigation with saline water at different growth stages on yield and mineral composition of some cereal crops.They found that significant decrease in dry weights of straw and grains of wheat, barley and tritical by increasing salt concentrations in irrigation water. The reduction in dry matter was more pronounced in case of the higher salinity levels.

Francois *et al,* (1986) found that increasing soil salinity had little effect on mineral composition except P which was significantly reduced, while K and Cl increased significantly by increasing salinity levels. Moreover Ebad (1990) indicated that salinity had reduced K and p concentration in tissue when salinity levels increased from 0.0 up to 6000 ppm.

Richard, (1991) mentioned that under salinity stress, K concentrations increased but did not reach the significant degree in leaves of wheat grass. On the contrary, Charles *et al*, (1992) stated that K content of leaves ,plant shoots significantly decreased by increasing soil salinity levels.

It was observed that K and micronutrients (Fe, Mn, and Zn) content decreased as salinity increases in different plants as stated by El-Haddad *et. al,* (1993) for wheat shoots; Sekina *et. al,* (1993) on wheat grains and Huang and Redmann (1995) for barley. Also, it in observed that p content reduced as salinity increases in different plants as stated by sekina *et. al,* (1993) fore wheat grains.

Wassif *et al,* (1995) studied the effect of some soil amendments on production of wheat under saline irrigation water .They found that the magnitude of increase over the control treatment for FYM treated plots reached 20.9, 38.4 and 27.9% for straw, grains and total yields, respectively. Ismail (1992) indicated that the application of organic manure led to a significant increase in P and K contents of wheat grain. Similar trend was obtained by Jarecki (1991).

In contrast, El-Maghraby (1995) found that the addition of FYM and Town refuse led to reduce soil EC values. Also, Omar and Abou Bakr (1995) studied effect of three organic materials on sunflower and wheat plants. They indicated that there was a decease in EC of the soil by the addition of organic matter.

Soils of arid and semi- arid regions have low organic carbon (OC) content and need organic amendments to improve their properties and consequently their productivity and natural fertility (Usman *et. al.,* 2004). Addition of organic matter from different sources, to the soil is an important practice to improving the physical and chemical properties of soil and consequently increasing its productivity organic manure

addition could be reputed to increase the organic content in soil, resulting in more release of plant nutrients. similar trends were obtained by Nahed *et al* (2011).

Amino acids can directly or indirectly influence, the physiological activities of the plant. The requirement of amino acids in essential the quantities is well as a mean to increase yield and overall quality of crops. The application of amino acids for foliar spray is based on their requirement by plants in general and critical stages of growth in particular. Khalil *et al*., (2008) found that foliar spray of amino acids could improve the onion yield and its components. Also, Salwa *et al*., (2010) found that a combined application of the amino acids increased significantly the sesame yield.

Johari *et. al.* (2010)showed that the proline have a key role in stabilization of cellular proteins and membranes in presence of high concentrations of osmotic stress. Also, Raafat and Tharwat (2011) showed that addition of FYM and Azotobacter Chroococum(NB) as soil application in combination with foliar application of organic acid (i.e., salicylic acid, ascorbic acid and proline) increased wheat yield and its components as well as improved the nutritional status and quality of wheat grains grown on a newly reclaimed soil under salt stress condition, with relatively higher ability for increasing available micronutrients. Also, proline amino acid play an adaptive role in the tolerance of plant cells to salinity by increasing the concentration of cultural osmotic components in order to equalize the osmotic potential of the cytoplasm (Wated *et. al,* 1983). Begum and Karmoker (1999) suggested that praline produced in the leaf is transported to the root thereby , helping the plant to regulate the osmotic potential of root cells under salinity conditions.

El- Mancy (1994) reported that spray with proline increased the yield and yield components of wheat plant. Warren and pulich (1986) found that 26 Umole/g fresh weight of endogenous praline is required to obtain better growth of any barley cultivar under salt stress conditions. Reda *et al*, (2003) found that the spraying of wheat plants with proline amino acid decreased the adverse effect of soil salinity on the yields of grain and straw, they this effect being more pronounced with plants treated with FYM, where the maximum increases in the grains and straw yields were obtained at 20 mg/l proline

The objective of the present study was to determine the possibility of compensating the effect of irrigation water salinity foliar application the plants with proline and addition organic manure on the growth and grains, yield of barley, grains elemental concentrations as well as there effects on some properties soil .

MATERIALS AND METHODS

A field experiment was conducted at Agricultural Experimental Station of Desert Research Center at Ras Sudr, South Sinai, Governorate, Egypt during winter growing seasons of 2011/2012 to study the individual and combined effect of salinity of irrigation water, organic amendments and foliar application of proline on some sandy loam soil, properties as well as and its productivity of barley(Hordeum Vulgare L.Gize 127).

Before planting, surface soil sample (0-20cm) representing the used soil was a air-dried ground, good mixed, sieved through a 2mm sieve and analyzed for some physical and chemical properties according to the methods described by Black (1965) and Jackson (1973). The obtained data were recorded in Table (1).

Sample of each irrigation water resource was taken and analyzed for its chemical composition according to the methods described by Cottenie *et.al,* (1982) and the obtained data were recorded in Table (2). Also, sample of the used organic amendment (sheep dung manure0 was taken, air-dried ground, good mixed and analyzed for some chemical composition properties and its content of some macro- and micronutrients according to the methods described by Page *et.al.,* (1982) and the obtained data were recorded in Table(3).

Table (1): Some chemical and physical properties of the experimental station soil at Ras Sudr.

pH in water susp. 1:2.5	EC dS/m	O.M %	$CaCO_3$ %	Bulk density g/cm^3	Ks cm/h	particle size distribution %				Texture Class
						Coarse sand	Fine sand	Silt	Clay	
7.52	13.32	0.22	38.55	1.46	1.29	41.66	37.50	9.66	11.18	Sandy loam

Table (2): Chemical composition of the wells water used for irrigation the studied site.

Salinity levels	EC dS/m	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO^{=}$	$H\ co^{-}$	$C\ L^{-}$	$SO^{=}$	SAR
Well (S1)	9.39	18.20	15.50	26.60	0.14	-	1.18	26.89	22.50	6.34
Well (S2)	11.02	19.60	19.70	36.50	0.26	-	2.66	39.20	26.20	9.08
Well(S3)	12.88	25.80	22.60	59.80	0.38	-	2.70	68.00	36.60	12.15

Table (3): Some chemical properties of the used sheep dung manure .

Sheep dung manure (OM)	EC dS/m	O.M %	N %	C/N	P%	K%	Fe	Mn	Zn
							Mg/Kg		
	1.88	43.80	1.68	15.12	5.11	1.20	5.88	11.9	1.4

The experimental were designed in split-split plot with three replicates. The area of each plot was 20m^2(1m width and 20m length)

The main plot was occupied with the three levels of salinity irrigation water (S_1=9.39,S_2=11.02 and S_3=12.88 dS/m). The sub-main plots was occupied with sheep dung manure incorporated with surface soil layer(0-20cm), in two rate of OM 0 and 20m^3/fed. and sub-sub main plots was occupied the foliar of proline at three rate(P_0=0,P_1=100 and P_2=200mg/L). Foliar application of proline was applied at three time. The1stone was after 45 days from sowing (before tailoring stage), the 2st and the third times were sprayed separately after 15 days for each.

Barley grains were planted in the mid of November using 60 Kg/Fedden. All plots were fertilized as commonly practiced, superphosphate (15.5% P_2O_5)was added at rare of 200 Kg/fed., it banded adjacent to seed hills at planting and potassium sulphate (48% K_2O) was applied after thinning at the rate of 100 Kg/fed. Nitrogen fertilizer was applied as ammonium nitrate (33.5%N) at rate of 180 Kg/fed. in a three equal doses, the first was at sowing, the second was at thinning,, while the third was applied two weeks after thinning. Cultivation practices were followed as recommended by Ministry of Agricultural and Land Reclamation.

At the end of the experiment, the barley plants were harvested, the yield of grains were recorded. The grains were grow ad and wet digestion (Van Strowenbery,1968). Phosphorus was determined using ammonium molybdate and ascorbic acid (Wataneble and Olsen,1965). Potassium was determined by Flamephetometer, while N was determined using micro-Kjeldahl method (Black,1983).

After plant harvest disturbed soil sample from each plot was taken from 0-20cm depths to determination some soil properties. In the soil content the total double salts were determined conductimetricall according to Jackson (1973). Organic matter was determined following by the modified walkley (Page *et.al,* 1982). Bulk density (BD g/cm^3), according to Black (1965) and Saturated hydraulic conductivity (Ks,cm/h) using the method ascribed by Klute (1986)

The results were statistically analyzed using the technique of analysis of variance (ANOVA) and the least significant difference (LSD) at 0.05 according to Snedecor and Cochran, (1990).

RESULTS AND DISCUSSION

Effect of the studied treatments on:

a -Plant growth of Barley:

Data presented in table (4) showed the effect of sheep manure (OM) and proline levels on plant growth of barley under different levels of saline irrigation water .It is quite clear that increasing irrigation salinity from S_1 to S_3 consistently decreased the plant growth of barley. This trend was observed at all levels of proline and with or without OM application. The rate decrease in growth plant reached 22 and 116% at water salinity S_2 and S_3 compared to the water S_1 level, without OM addition, respectively. While, reached 12 and 60% with OM application for growth in the same order. The reduction in the plant growth as a result of increasing salinity levels of irrigation water might be due to the increase in osmotic pressure and the effects the ability of plants to absorb water for its growth processes from the soil solution. The relative decrease in plant growth of barley at high water salinity (S_3) ,when proline was no added, reached 56 and 42 % compared to the low water salinity level (S_1) for without and withOM application, respectively. These results are particularly in agreement with of Alamgir *et al* .(1997) who showed that increasing salinity inhibited growth of wheat plants. This decrease may be attributed to the water balance causing " physiological; drought " or depletion of energy required for metabolism Rahman *et al*., (1993).

Table (4): Effects of the studied treatments on growth barley grain, yield as well as some properties of soil.

Salinity dSm^{-1}	Amendment m^3/Fed	Proline mg/L	Growth parameters		Grains content of macronutrients			Soil properties			
			Growth g/plant	Grains Kg/Fed	N %	P %	K %	O.M %	EC dS/m	BD g/cm^3	Ks h/cm
S_1	Without	P0	2.64	819	4.36	0.27	1.44	0.76	10.83	1.35	1.65
		P1	2.79	853	4.79	0.29	1.54	0.77	10.89	1.36	1.66
		P2	3.00	900	5.00	0.31	1.69	0.78	10.88	1.34	1.65
	With	P0	2.75	931	4.96	0.29	1.70	1.17	11.03	1.33	1.72
		P1	3.14	1040	5.23	0.31	1.95	1.18	11.11	1.32	1.71
		P2	3.40	1128	5.82	0.32	2.22	1.19	11.10	1.31	1.72
S_2	Without	P0	2.59	681	3.26	0.26	1.26	0.59	12.66	1.38	1.57
		P1	2.63	798	3.98	0.28	1.34	0.60	12.67	1.38	1.57
		P2	2.69	783	4.30	0.30	1.58	0.61	12.67	1.37	1.58
	With	P0	2.64	851	4.50	0.29	1.52	1.12	13.13	1.34	1.69
		P1	2.82	898	4.72	0.30	1.83	1.12	13.12	1.35	1.68
		P2	3.09	1067	5.00	0.31	1.98	1.13	13.14	1.34	1.69
S_3	Without	P0	2.29	486	1.90	0.24	1.19	0.51	13.39	1.40	1.34
		P1	2.38	518	2.15	0.26	1.21	0.52	13.38	1.40	1.33
		P2	2.45	600	2.30	0.28	1.41	0.53	13.39	1.41	1.33
	With	P0	2.39	609	2.88	0.27	1.41	1.00	14.18	1.37	1.48
		P1	2.46	648	3.00	0.28	1.62	1.01	14.16	1.38	1.49
		P2	2.95	798	4.09	0.29	1.78	1.02	14.18	1.37	1.48
I.S.D 0.05 for S			0.025	1.805	0.022	0.0078	0.007	0.020	0.097	0.010	0.013
I.S.D 0.05 for P			0.013	1.257	0.009	0.0068	0.011	0.009	0.007	0.012	0.011
I.S.D 0.05 for M			0.021	0.897	0.009	0.0096	0.0097	0.009	0.071	0.007	0.010
I.S.D 0.05 for Sx P			0.023	2.178	0.017	0.0097	0.019	0.016	0.133	n.s	n.s
I.S.D 0.05 for S x M			0.037	1.553	0.015	0.0166	0.016	0.015	0.124	n.s	n.s
I.S.D 0.05 for M x P			0.019	1.778	0.013	0.0096	0.015	0.013	0.109	n.s	n.s
I.S.D 0.05 for SxPxM			0.033	3.081	0.024	0.0166	0.027	0.023	0.189	n.s	n.s

Also, data in Fig. (1) showed that spraying barley plants with proline at different levels markedly decreased the adverse effect of saline water irrigation on plant growth. Where, spraying proline increased the plant growth. The maximum crease in growth reached 14 and 31 % at 200mg/L. proline and without OM at S_1 and S_3 respectively. While, the corresponding value with OM were about 17 and 42 %. Similar results were also obtained by Warren an Pulich .(1986) who attributed increasing of plant growth with proline under salt stress to enzymatic breakdown and rapidly converted to useful metabolic intermediates for growth and energy . Also, the OM adoptive role in plant growth might be due to improvement of the structure of the soil by increasing the soil water holding capacity which gave rise to good aeration and drainage that encourage better root growth and nutrient absorption.

Moreover, the supplied organic manures amended the microorganisms with necessary nutrient elements and increased microbial respiration and CO_2 output. These organisms consume carbon and nitrogen in a ratio of approximately 30:1 producing the proteins necessary for the growth. All these response resulted to improve plant growth. These results are in line of those obtained by Vendrame *et al*. (2005).

b -Barley yield :

Data in Table (4) revealed that the grains yield of barley progressively decreased with increasing water salinity. The reduction being 13 and 60 % for grain yield at S_2 and S_3 compared to the S_1,without OM. The corresponding values under OM were 10 and 50 % for grain yield in the same order. It could be concluded that increasing salinity levels in irrigation water inhibiter plant growth of barley. This may be due to the increase of salt accumulation in root rhizosphere which decreases the ratio of available nutrients to be absorbed by the root system. These results are in good agreement with those reported by Salaman *et al*. (1994) who stated that the straw and grains yields of wheat were depressed to about 40 and 49% under salt stress.

On the other hand, spaying barley plants with proline decreased the adverse effect of salinity irrigation water on the yield of grain. The grain yield of barley was enhanced by the application of proline. This being more pronounced with plants treated with OM, where the maximum increases in the grain yield was obtained at 200mg/L. proline. The corresponding values calculated as percentage to 0 proline was 9,14 and 23% at S_1,S_2 and S_3 ,respectively. While the corresponding values with OM application was 21,25 and 31% in the same order. Such results being agreeable with those of Reda *et al*. (2003) who pointed out that the exogenous addition of proline to wheat through foliar application decreased the adverse effect of soil salinity on the yields of grain and straw.

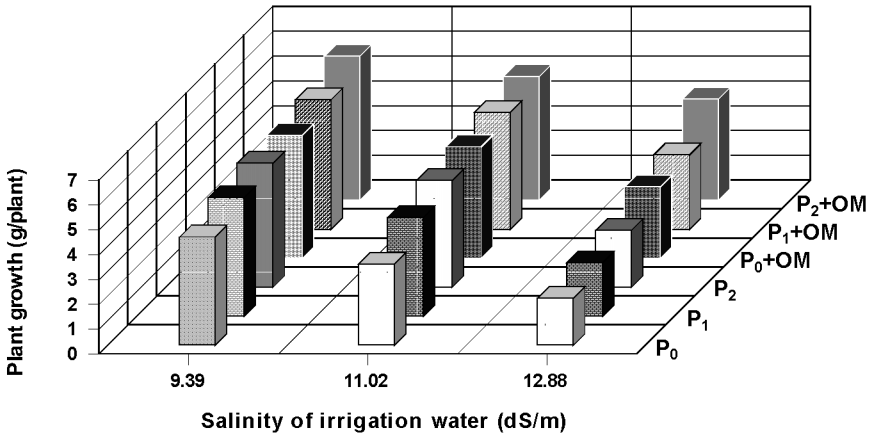

Fig.(1) Effect of the studied treatments on plant growth of barley.

Regarding, the positive effect of soil conditioner in grain yield may be due to its influence on increasing the availability of phosphorus by reducing soil pH values through the organic acid content. Also, increasing of grains yield by conditioner may be due to micro and macronutrients provided by OM. All of these could result in good growth and consequently increased the grain yield. Wassif *et al*.(1995) reported that the increase of wheat production under the condition of organic manure addition is due to improve under saline irrigation water.

Concerning, the interaction effects between salinity levels, organic manure and spraying proline, data presented in Fig. (2) showed an among in plant growth and grain yield of Barley values with low salinity levels at with OM application and also, with spraying by 200 mg/L proline.

The favorable effect of OM on increasing the yield of barley plants may be due to the reduction of the soil pH values, improving soil structure and increasing nutrients availability in the soil. Also, the application of OM decreased the adverse effects of salinity on the barley growth and grains yield. These results are in agreement with those obtained by Saleh *et al*. (2003) who revealed that the use of saline water for irrigation decreased the yield of onion plants and the application of organic manure significantly increased onion yield. On the other hand, the proline play an adaptive role in the tolerance of plant cells to salinity by increasing the concentration of cultural osmotic components in order to equalize the osmotic potential of the cytoplasm.

c - Macronutrients content :

The effect of salinity levels on the nitrogen, phosphorus and potassium content of grains was shown in Table (4). Data reveal that increasing the level salinity of irrigation water gradually decreased the N,P and K content of grains. The percentage of decrease in N, P and K concentration reached 6 and 18 % ,3 and 11 % ,11 and 22% at water irrigation with S_2 and S_3 level compared to the original water S_1,without OM application. While, under OM reached 5 and 15 %, 3 and 10% ,10 and 21% for N,P and K ,respectively in the same order. Sekina *et al*.(1993) stated that increasing salinity level, unfavorably, affect plant growth which reflects the metabolic status of plant and consequently the accumulation of nutrients.

Concerning, the effect of organic manure on grain N, P and K content, data revealed that application OM increased N, P and K content of grains. Organic manure enhanced the availability of certain elements and their supply to the plant during growth period (Saleh *et al*.,2003)

The individual and combined effects of salinity level of irrigation water and different levels of grains content of N, P and K are shown in Fig. (3) .Data reveal that increasing the level salinity gradually decreased the N content. This decrease was observed at all levels of proline and with or without OM application.

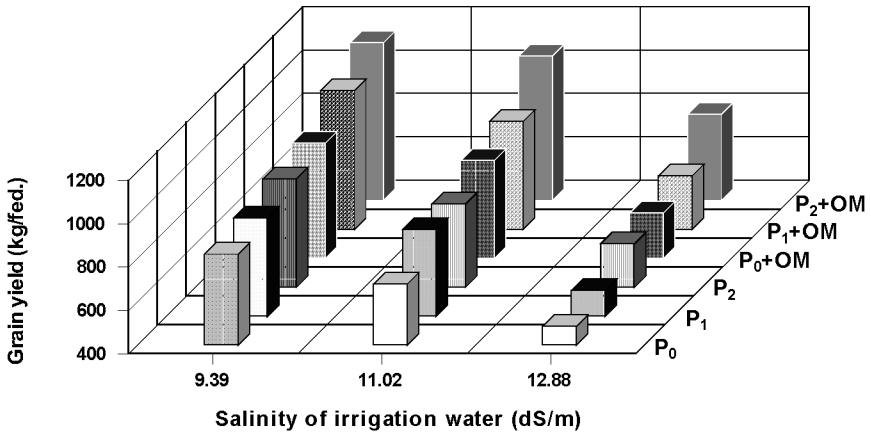

Fig. (2): Effect of the studied treatments on grains yield of barley plant.

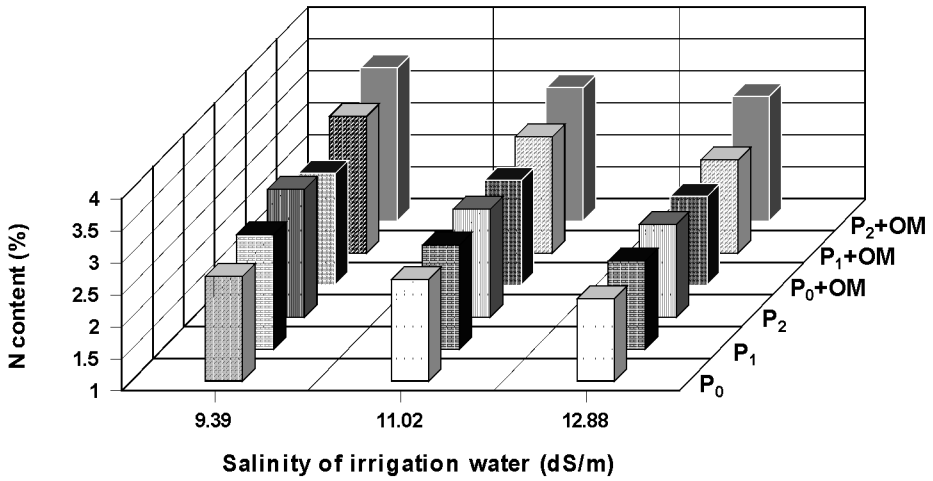

Fig.(3): Effect of the studied treatments on grain contents of Nitrogen.

In addition, application of proline to barley plant through foliar spray up to 200mg/L was associated with an increase in N content. This effect was more obvious with OM application than without SM application. The relative increase in N content of grain at 200mg/L proline without OM compared to 0 proline was 13, 3 and 6 % at S_1,S_2 and S_3 ,respectively. The corresponding values with OM application were 23,5 and 10 % in the same order. These results reflect the effect of both OM and proline on barley growth.

On the other hand, data in Fig. (4) show that P content in grains slightly decreased by raising the salinity level of irrigation water. In addition pf proline up to 200mg/L slightly increased P content, but there was no obvious trend with respect to OM application.

The above mentioned results ware supported by interaction effect between salinity levels and proline levels with or without OM application, also, Fig (5) shown the increase in K content of grains at 200mg/L proline without OM application compared to 0 proline was 17,25 and 18 % at S_1, S_2 and S_3 respectively. While, the values with OM were 30,30 and 26% in the same order. El-Shazly (2001) found that addition of proline up to the level of 40mg/L increased K in plants compared to the control. This increase being more pronounced when FYM.

d- Soil organic matter content:

Data presented in Table (4) and Fig.(6) showed the effect of water irrigation salinity level, spraying proline and addition of organic manure application on soil organic matter content, it is clear that organic matter content in the soil was decreased with increasing salinity levels,. This trend was observed at all levels of proline and with or without OM application.The reduction being 28 and 48 % for organic matter content at salinity S_2 and S_3 compared to S_1 ,without application of OM. While, values under OM were 5 and 18 %for organic matter content in the same order. Eman (2011) found that the decrement of soil organic matter resulted from increasing salinity levels may be due to the formation of sodium hamates which leached from soil surface where. On the other hand, application of OM with increasing salinity levels of irrigation water more effective than proline for increasing content of organic matter in soil.

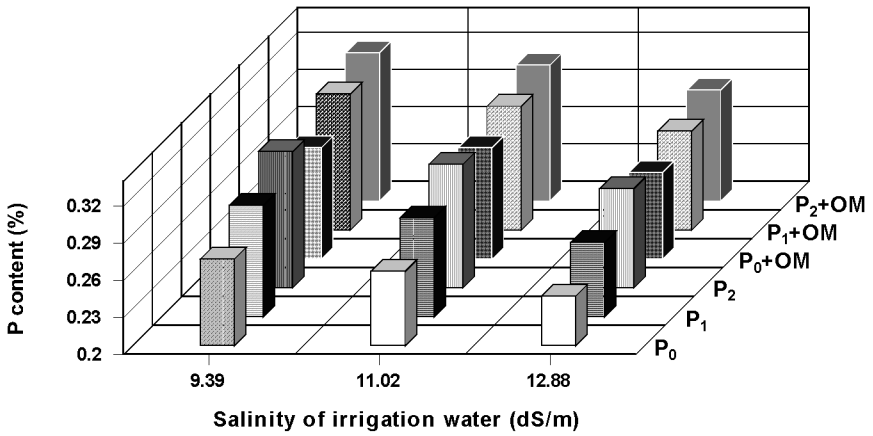

Fig (4): Effect of the studied treatments on grain contents of phosphor

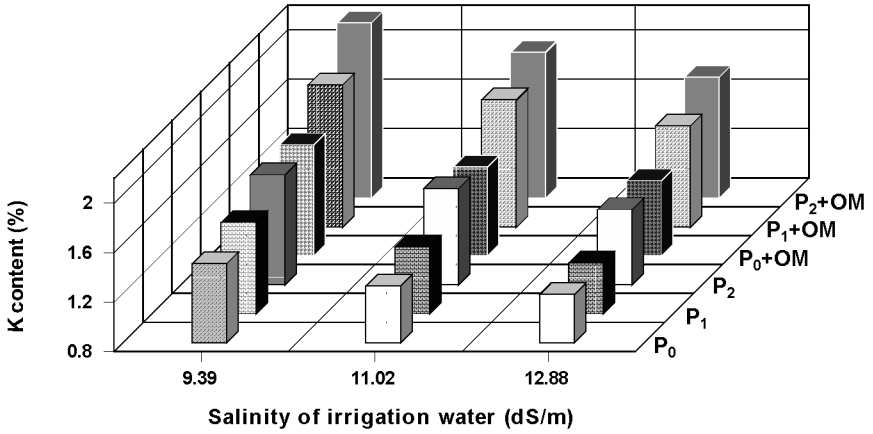

Fig (5): Effect of the studied treatments on grain contents of potassium.

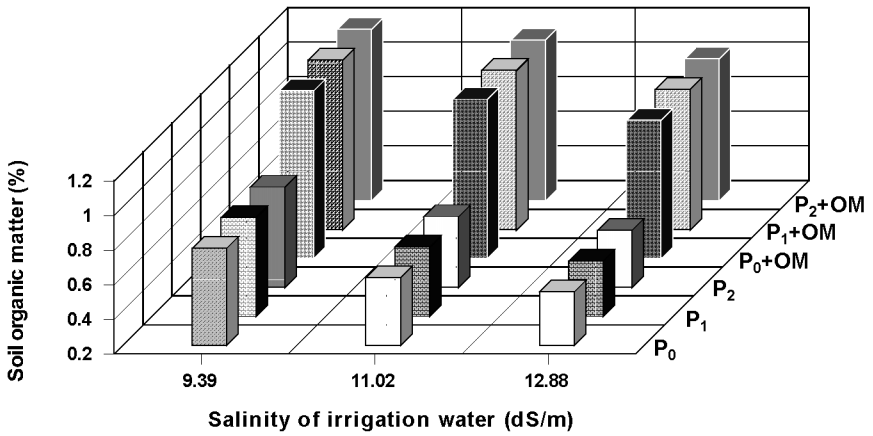

Fig (6): Effect of the studied treatments on the soil content of O.M.

e-Salinity build up in soil :

Table (4) and Fig.(7) showed that, the salinity of soil increased with increasing salinity of irrigation water. This trend was observed at all levels of proline and with or without OM application. This is due to the accumulation of salts on the soil surface from water of irrigation. Similar results were obtained by Abou Hussion et.al(2009) and Eman(2011) who found significant increases in soil EC when soil was irrigated with highly saline water. Regarding, the effect of organic manure on EC values. It is clear that the EC values increased with application of organic manure.

The above mentioned results were supported by interaction effect between salinity levels and soil conditioner application. Show that the soil EC values increased with conditioner applied compared to without. The values increase being 16 and 23% in EC values at salinity S_2 and S_3 compared to the original water S_1, without OM. While, Values under OM were 18 and 27 % in values in the same order. In this respect, Swecd (2012) and Tantawy et.al. (2012).obtained on similar results through their studies on sandy calcareous soils.

Where, spraying proline was no markedly role in EC values, on the other hand, application OM with salinity levels of irrigation water more effective than proline for increased EC values in soil.

f- Bulk density

The effect of different salinity levels of irrigation water and soil amendments on the bulk density, after barley at the depth (0-20 cm), for the investigated soil was shown in Table (4). and Fig (8) dada showed clearly that organic manure, which were used, significantly decreased the values of the soil bulk density, under deferent salinity levels in of irrigation water, data also showed that all salinity levels, which were used , increased the values of the soil bulk density. These increments progressively increased with increasing salinity levels of the irrigation water. These results may be due to the increase of salts in the irrigation water progressively would increase sodium ion in the soil solution. These ions caused the dispersion of particles. Such dispersion caused on decrease in the bulk volume of soils which led to an increase in the soil bulk density. Similar conclusion was reported by Nikos *et al* (2003).

g- Saturated hydraulic conductivity

The effect of soil amendments and different salinity levels, in the irrigation water on the Saturated hydraulic conductivity at the depth (0-20cm). Data in Table (4) showed clearly that, the Saturated hydraulic conductivity of the investigated soil sample irrigation with soil amendments, significantly increased than the Saturated hydraulic conductivity values of the initial soil before crop.

The results also Fig.(9) showed clearly that, the saturated hydraulic conductivity values decreased progressively with increasing salinity levels in the irrigation water under different rate amendments. In this respect, EL-Mory,(1997) studied the impact of amelioration on physical properties of calcareous soil . These increments in Ks values, in surface soil, may be due to the high content of organic matter, which its decomposition will act with $CaCo_3$, which predominated in coarse fraction, and will increase the total pore space of the calcareous soil and subsequently will increase the H C of the soil. Also, the release of Ca^{2+} ion ,resulted from the acting of organic acid with $CaCo_3$, will be probably reacted with other anions such as PO_4, to form slightly soluble phosphates that acted as cementing agents, and made the aggregate surfaces more stable.

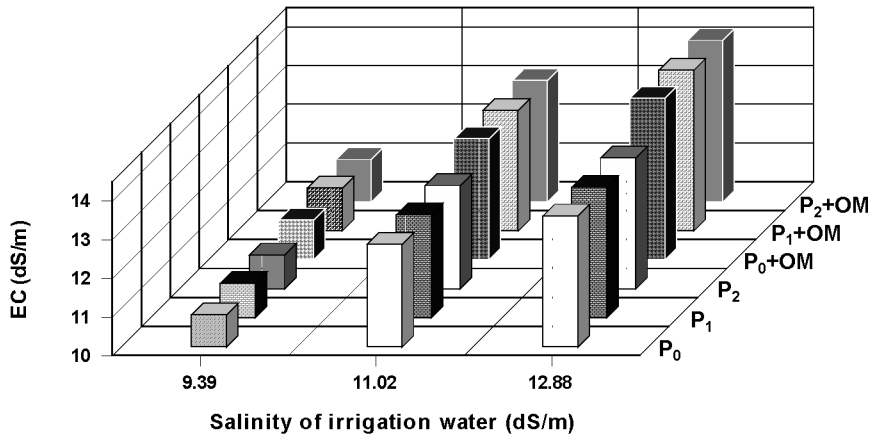

Fig. (7): Effect of the studied treatments on the soil content on soil EC(dSm^{-1}).

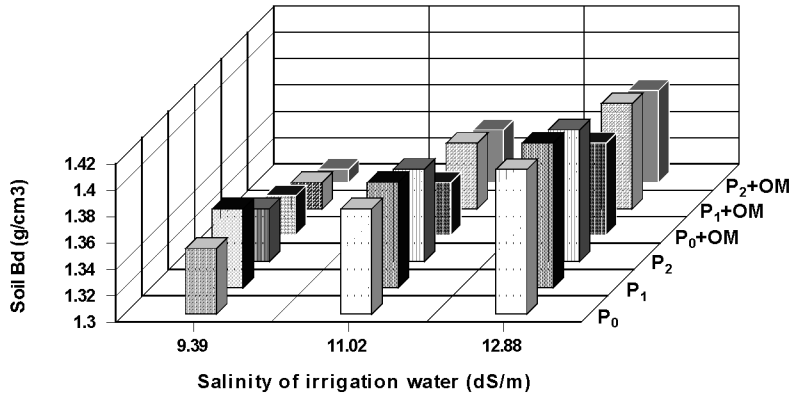

Fig. (8) Effect of the studied treatments on the soil content on soil Bd /cm^3

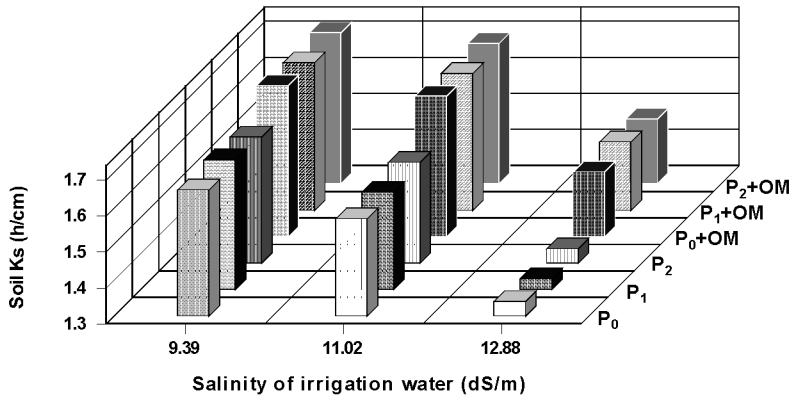

Fig. (9) Effect of the studied treatments on the soil content Ks h/cm

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تأثير إضافة المحسن العضوي والرش بالحامض الامينى البر ولين على إنتاجية نبات الشعير النامي في ارض جيرية تحت ظروف الري بمياه مالحة.

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الملخص العربي

أجريت تجربة حقلية في محطة بحوث رأس سدر لدراسة التأثير المنفرد أو المتداخل لملوحة ماء الري (٣ مستويات ٩،٣٩ – ١١،٠٢ – ١٢،٨٨ dSm^{-1}) من الآبار الموجودة بالمحطة وإضافة محسن عضوي (مخلفات الغنم بمعدل ٢٠ م ^{٣} /فدان) ورش النباتات باستخدام الحامض الامينى البر ولين بتركيزات(صفر، ١٠٠ ، ٢٠٠ مليجرام /لتر) على نمو وإنتاجية نبات الشعير النامي في ارض جيرية وعلى بعض خواص التربة.

أظهرت النتائج إن زيادة ملوحة ماء الري أدى إلى نقص في نمو الشعير بمقدار ٢٢-١١٦%عند المقارنة بالري بالتركيز الأقل ملوحة(في حالة عدم إضافة المحسن العضوي) وكان هذا النقص بين ١٢ ،٦٠ % عند

إضافة المحسن العضوي للأرض.بينما الرش بالحد الأقصى من البر ولين أدى إلى اعلي زيادة في نمو وإنتاجية الحبوب لنباتات الشعير سواء عند إضافة المادة العضوية أو عند عدم إضافتها.

أيضا أظهرت النتائج نقص محصول الحبوب بزيادة ملوحة ماء الري بمقدار ١٣- ٦٠% عند عدم إضافة المحسن للأرض وبنسبة ١٠ ،٥٠% عند إضافة المحس العضوي للأرض.

في حين بلغت اكبر زيادة في الحبوب مع استعمال البر ولين بنسبة ٢٠٠ملجم/لتر مع المحسن العضوي وذلك مع المستوى المنخفض من الملوحة.

زيادة ملوحة ماء الري أدى إلى نقص تركيز عناصر النتروجين و الفوسفور والبوتاسيوم في حبوب الشعير وكان هذا النقص بمقدار (٦-١٨% للنتروجين)،(٣-١١% للفوسفور) ،(١١-٢٢% للبوتاسيوم) عند المقارنة بالري بالمياه الأقل ملوحة.بينما إضافة المادة العضوية (مخلفات الغنم) والرش باستخدام البر ولين أدى إلى زيادة تركيز هذه العناصر في النبات.

وبالنسبة لتأثير معاملات الدراسة على بعض خواص التربة لوحظ إن زيادة ملوحة ماء الري وكذلك إضافة المادة العضوية تودي إلى زيادة EC وتركيز المادة العضوية بالأرض.بينما الرش باستخدام البر ولين ليس له تأثير على EC ومحتوى التربة من المادة العضوية. .كذلك زيادة ملوحة ماء الري أدت إلى نقص التوصيل الهيدروليكي والعكس بالنسبة لكثافة التربة بينما كان تأثير المادة العضوية على كل من الكثافة والتوصيل الهيدروليكي عكس تأثير ملوحة ماء الري والرش بالبر ولين ليس له تأثير على تلك الخواص.

تأثير التداخل بين المعاملات المدروسة(ثنائية أو ثلاثية) كانت لها تأثيرات معنوية موجبة أو سالبة متوقفا في ذلك على نوع الخاصية تحت الدراسة (اى الخواص الطبيعية أو الكيميائية للأرض وكذلك محتوى النبات من العناصر الغذائية).

وبصفة عامة فالنقص في نمو النبات نتيجة الري بماء ملحي قد تم تقليله بالرش بالبر ولين الذي يعتبر احد العوامل في عملية ضبط اسموزية الخلايا ووجود المحسن العضوي مع البر ولين يعطى النبات قدرة على تحمل ملوحة التربة.