Plant Archives Vol. 19 No. 2, 2019 pp. 3728-3734 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF SALINITY LEVELS OF IRRIGATION WATER AND SPRAYING WITH GIBBERELLIC ACID AND ORGANIC FERTILIZER ON THE ABSORPTION OF N P K BY *SORGHUM BICOLOR* PLANT

Hanan Abdel Wahab Saeed

Department of Soil Science and Water Resources, College of Agriculture, University of Basrah, Basrah, Iraq.

Abstract

The experiment was carried out in wooden canopy of College of Agriculture / Basrah University during the Agricultural season 2018 in soil with texture silty clay according to the design of complete block and three replicates to study the effect of salinity of irrigation water and spray the gibberellic acid and the addition of organic fertilizer to absorption of some plant nutrients (N, P, K) in plant *Sorghum bicolor*. The experiment included three variables, its irrigation water which is electrical conductivity (1, 3 and 6). dsm^{-1} (W1, W2 and W3) and three levels of spray (0, 25, 50) ml^{-1}. (G0, G1 and G2) and three levels of organic fertilizer (sheep residues) (0, 70 and 150) g Pot^{-1} (O_0, O_1 and O_2).they were measured the dry weight of the vegetative and absorbent of N, P, K, also soil samples were taken before Agriculture and estimated some chemical and physical properties of the study showed that the salinity of irrigation water, which caused significant differences in dry weight, decreased ratio 26.4 and 35.05 % compared to W1. The salinity of irrigation water significantly affected the values of nitrogen, phosphorus and potassium absorbed in the plant and decreased ratio (17.73, 31.06 and 19.80, 31.02 and 14.97, 22.05) %for W2 and W3 respectively, compared with W1. The gibberellic acid spraying significantly increased in the dry weight and the absorbent value of N, P K. The G2 treatment recorded the highest values (21.20, 47.38 and 4.50, 8.94 and 16.14, 23.31 and 7.19, 12.41) % For treatments G1 and G2 respectively compared with G0 treatment.

The addition of organic fertilizer significantly affected dry weight and absorbed N, P K. The treatment of O_2 was highest and the increase (5.61, 13.74and 3.21, 6.27 and 17.70, 43.54 and 6.55, 10.16) % was for O_1 and O_2, respectively, compared with O_0, and the two-way and three-way interaction had a significant effect between the experimental treatments in the studied properties.

Key words : Gibberellic acid, organic fertilizer, dry weight, absorbed of K, P, N.

Introduction

The maize *Sorghum bicolor* crop is an important economic crop. It's a healthy food for humans because its rich in antioxidants and alternative food for patients suffering from wheat allergy, and free of gluten and also a precursor for extracting starch, cellulose, producing alcohol and animal food. In addition to as cereals or as green fodder (Rampho, 2005). Mohamed Ali and Hamza (2014) noted that salt stress is one of the most important problems that facing the agricultural expansion in Iraq, especially in the southern regions because of the excessive use of irrigation water and the disorganization of drainage nets and use of chemical fertilizers as well as the problem of environmental pollution. Therefore, its necessary to search for environmentally clean that reduce the effects of salt stress and improve the soil properties and improve the quality and quantity of the crop. Therefore, there are International calls for the use of growth regulators that encourage the plant to exploit its potential physiological and genetic capabilities and demands to abandon to use of chemicals in agriculture After increasing the phenomenon of pollution of food and soil from residues of fertilizers and chemical pesticides (Radi *et al.,* 2006).The use of growth regulators has become a common practice in modern agriculture. and Among these regulators like the group of gibberellic acid which its organic compounds that the plant needs to perform certain roles. The GA3 acid, which plays an important role in increasing the speed of germination by stimulating the essential hydrolysis enzymes which necessary for food analysis and cell division and stimulating elongation and expanding cells and increasing

plant efficiency in nutrient uptake (Sheykhbaglou, 2014). The methods of biotechnological and plant breeding and improvement programs have been applied to improve salinity tolerance for crops like rice, wheat and maize. The aim of this study is to know the effect of GA3 acid and its efficiency in improving germination properties and vegetative growth under the influence of salt stress and the use of organic fertilizers for white maize (Rabeh variety).

Materials and Methods

The experiments were carried out in the College of Agriculture - University of Basrah. The soil samples were collected from the surface layer (0-30 cm) from the Qurna region, it was dried and grated from a 2 mm diameter sieve and the soil was mixed to be more homogeneous and measured some chemical and physical analysis according to the methods on page *et al*., (1982) as the texture of the soil was absorbed by a pipette method according to the Black (1965). The experimental treatments included three levels of irrigation water (1, 3 and 6) desi-Siemens. m^{-1} has W1, W2, and W3, respectively, prepared from a drainage water dilution. And three levels of GA3 (0, 25 and 50) mg. L^{-1} the symbol G0, G1 and G2 and three levels of organic fertilizer (0, 70 and 150) g. Pot^{-1} and its symbol O0, O1 and O2 table 2 and three replicates. The experiment included 81 experimental units and was designed according to the design of the complete blocks with three replicates (Al-Rawi and Khalaf Allah, 1980) The sorghum seeds of Rabh variety were sprayed with Gibberellic acid solution and left for 8 hours, then washed with distilled water and stored at laboratory temperature 20-25 °C. After 5 days the germination percentage was 100% for all treatments, including comparison treatment (control).

Nine seedlings were planted in each plastic pot (capacity of 12 kg) that it adds 10 kg of Soil and organic fertilizers were mixing before planting for each pot, the treatments were planted on 10/3/2018. Nitrogen fertilizer was added at each level of 320 kg of fertilizer Urea 46% h^{-1} on two steps. The first before the agriculture was mixed with the soil and the second after 30 days of agriculture with the irrigation water. The phosphate fertilizer was added at the level of 100 kg h^{-1} in form of Super Phosphate 46% P_2O_5 and potassium was added at the level of 120 kg h^{-1} in form Potassium Sulphate 52% K_2SO_4. And the two fertilizers were added together in a mixture with the soil before agriculture, after one week the plants reduced to 6 plants per pot. The plants were exposed to saline stress after the emergence of the fourth leaf using prepared irrigation water and according to the above mentioned treatments (except control treatment) for 8 weeks. After two weeks of exposure to salt stress, the GA3 were sprayed and with above known concentrations and the rate 100 mL of solution per pot. The number of sprayings about 6 continued at a rate of one spray per week. Cut the Plants and measured the dry weight of the vegetative and nutrient intake of Phosphorus and potassium in the vegetative tissue and according to the methods Murphy and Rieely (1962) and Page *et al.,* (1982).

Table 1: Some chemical and physical properties of soil before planting.

Properties		Qurna soil
Interaction degree (1:1) (pH)		7.5
Electrical conductivity ds. m^{-1}		3.20
Organic substance $g.kg^{-1}$		2.97
Nitrogen-ready mg. Kg^{-1}		30.24
Phosphorus-ready mg. Kg^{-1}		12.81
Potassium-ready mg. Kg^{-1}		66.41
Positive ions. ml mol. L^{-1}	Ca^{+2}	8.1
	Mg^{+2}	5.5
	Na^{+}	21.3
	K^{+}	0.5
Negative ions of ml mol. L^{-1}	Cl^{-}	26.3
	So_4^{-2}	6.7
	HCo_3^{-}	2.5
	Co_3^{-2}	.....
Soil separation g. Kg^{-1}	Clay	450
	Green	380
	Sand	170

Table 2: Some chemical and physical properties of organic fertilizer (sheep waste) after fermentation.

Unit	The value	Properties
d s. m^{-1}	5.13	Electrical conductivity EC
	6.97	PH
mg. Kg^{-1}	108	Nitrogen ready
mg. Kg^{-1}	28.71	Total phosphorus
mg. Kg^{-1}	150.22	Total potassium
mg. Kg^{-1}	224.50	Organic Carbon
mg. Kg^{-1}	20.78	C / N

Results and Discussion

Effect of experimental treatments on the dry weight of the vegetative group

The results of table 3 showed that the salinity of irrigation water, gibberellic acid and organic fertilization and their overlap were affected in the dry weight of the vegetative group of maize ($g.pot^{1}$). The results of the statistical analysis at level 0.05 showed that the salinity

Table 3: Effect of experimental treatments on the dry weight rate of vegetative part (g pot^{-1}).

G × W	Levels of organic fertilizer			Levels of GA3	Irrigation water salinity
	O_2	O_1	O_0		
18.24	19.20	18.22	17.32	G_0	W_1
23.57	25.13	23.11	22.48	G_1	
31.88	36.18	30.55	28.91	G_2	
15.24	15.97	15.04	14.71	G_0	W_2
17.81	19.10	18.00	16.33	G_1	
21.16	22.03	21.35	20.11	G_2	
14.20	15.11	14.08	13.41	G_0	W_3
16.42	17.00	16.40	15.87	G_1	
17.24	18.12	17.61	16.00	G_2	
the average W	O_2	O_1	O_0		O / W
24.56	26.83	23.96	22.90		W_1
18.07	19.03	18.13	17.05		W_2
15.95	16.74	16.03	15.09		W_3
20.86	19.37	18.34	the average		O
the average G	O_2	O_1	O_0		O / G
15.89	16.76	15.78	15.14		G_0
19.26	20.41	19.17	18.22		G_1
23.42	25.44	23.17	21.67		G_2
the average G	W_3	W_2	W_1		W / G
15.89	14.20	15.24	18.24		G_0
19.26	16.42	17.81	23.57		G_1
23.42	17.24	21.16	31.88		G_2
					LSD (0.05)

W× G × O	G × O	W × O	W × G	O	G	W
3.85	3.13	3.67	2.99	1.32	2.88	2.91

of irrigation water caused significant differences dry weight values were 24.56, 18.07 and 15.95 g.pot^{-1} respectively and decreasing ratio (26.42 and 35.05) % for W2 and W3 respectively, compared to the W control treatment. This due to increased intracellular sodium ions which increased salinity of the medium, thereby reducing enzymatic efficiency, which changes metabolic activity in turn affects the opening and closing of gaps, which it causes to damage the plant growth (Nawaz, 2010). The effect of the gibberellic spray resulted in a significant increase in the dry weight of the vegetative group. The values were 15.89, 19.26 and 23.42 g.pot^{-1} Respectively, with an increase of 21.20% and 43.38% for G1 and G2, respectively, compared to G0, and 50 mg L^{-1} respectively. This was due to the role of Gibberellic acid in increasing cell division and elongation and stimulating growth through Increase the softness of cell walls as well as the overlapping of gibberellic acid with oxygen and increase the activation of the formation of nucleic acids that stimulate enzymes responsible for increased growth (Iqbal and Ashtaf, 2012). There was a significant increase in the dry weight of the vegetative group when the levels of organic fertilizer were increased. The values (18.34, 19.37 and 20.86) g.pot^{-1} with an increase of 5.61% and 13.74% for O1 and O2, respectively, compared with O0 and gave the treatment 170 g.pot^{-1} is the highest dry weight value. The increase in organic fertilizer is attributed to increased and improved plant growth through increased cell division and increased elongation due to its increased water and nutrient availability. These results were agreement with Kumar (2004). The overlap exceeded (G2 × W1) and gave the highest dry weight of the total vegetation at 31.88 g. (G0 × W3) and gave the lowest dry weight and reached 14.2 g. Pot^{-1} O_2 × W1 showed the highest dry weight of 26.83 g. Pot^{-1} and the lowest rate of 15.09 g. pot^{-1} in the interference (O0 × W3). The effect of triple-W interference in (O0 × G0 × W1), (O0 × G0 × W2) and O0 × G0 × W3) in the dry weight of the vegetative part was found to be significant (17.32, 14.71 and 13.41) g. Pot^{-1}, respectively, with a decrease of 15.06 and 22.57% for the last two overlaps, respectively.

The effect of gibberellic acid in the interference (O0 × G0 × W1), (O0 × G1 × W1) and (O0 × G2 × W1) was significant and the values were 17.32, 22.48 and 28.91 g. Respectively, with an increase of 29.79% and 66.91% for the last two treatments overlaps compared with the non-spray and additive treatment. Other W2 and W3 treatments followed the same trend. The effect of the levels of addition of organic fertilizer O (O0 × G0 × W1), (O1 × G0 × W1) and (O2 × G0 × W1) was significant and the values were 17.32, 18.22 and 19.20 g. pot^{-1}, respectively, with an increase of 5.19% and 10.85% for the other interference respectively compared to the non-spraying and additive treatment. The other treatments followed the same trend. The effect of the triple interference of (O2 × G2 × W2) and (O2 × G2 × W3) was significant and the values were 22.03 and 18.12 g.pot^{-1} and decrease ratio 39.11% and 49.91%, respectively, compared to the spray treatment and addition in W1. It was noted that the highest dry weight of the vegetative group was observed in (O2 × G2 × W1) and reached 36.18 g.pot^{-1} And the lowest (O0 × G0 × W3) was 13.41 g. pot^{-1}

Effect of Experimental treatment in Absorbed Nitrogen Rate

The results of table 4 showed the effect of salinity

Table 4: Effect of Experimental treatments in Nitrogen Rate (g N kg $^{-1}$ dry substance).

G × W	Levels of organic fertilizer			Levels of GA3	Irrigation water salinity
	O_2	O_1	O_0		
32.18	33.01	32.41	31.12	G_0	W_1
33.91	34.43	33.81	33.51	G_1	
35.23	36.02	35.07	34.61	G_2	
26.46	27.40	26.13	25.85	G_0	W_2
28.00	29.10	28.15	26.77	G_1	
28.87	30.00	29.45	27.18	G_2	
22.56	23.71	22.12	21.85	G_0	W_3
22.94	23.60	23.19	22.04	G_1	
24.35	24.94	24.30	23.81	G_2	
the average W	O_2	O_1	O_0		O / W
33.77	34.48	33.76	33.08		W_1
27.78	28.83	27.91	26.60		W_2
23.28	24.08	23.20	22.56		W_3
29.13	28.29	27.41	the average		O
the average G	O_2	O_1	O_0		O / G
27.06	28.04	26.88	26.27		G_0
28.28	29.04	28.38	27.44		G_1
29.48	30.32	29.60	28.53		G_2
the average G	W_3	W_2	W_1		W / G
27.06	22.56	26.46	32.18		G_0
28.28	22.94	28.00	33.91		G_1
29.48	24.35	28.87	35.23		G_2
					LSD (0.05)

W× G × O	G × O	W × O	W × G	O	G	W
3.01	1.63	2.48	2.83	1.11	1.42	2.23

of irrigation water, gibberellic acid and organic fertilization and their overlap in the percentage of nitrogen absorption of the maize plant (g N. kg $^{-1}$ dry substance) The increased salinity of irrigation water caused significant differences and values were (33.77, 27.78 and 23.28)g N kg^{-1} dry substance respectively, with a decrease ratio of 17.73% and 31.06% for W2 and W3, respectively, compared to the W1 control. This is due to the fact that increased saline concentration in the root zone increases the osmotic pressure, causing a plant imbalance to absorb water and nutrients that affect enzymatic activity and metabolism. Lacerda *et al.,* (2003) that increasing the salinity of irrigation water has resulted in reduced nitrogen uptake in sorghum. The gibberellic acid spraying process significantly increased nitrogen uptake by increasing the levels of the added gibberellic acid and gave the level of 50 mg. L $^{-1}$ highest value of 29.48 g N kg $^{-1}$ dry substance compared to the lowest value of 27.06 g N. kg $^{-1}$ dry substance With an increase of 4.50% and 8.94% for G1 and G2, respectively, compared to non-G0. This is due to the role of gibberellic acid in increasing the plant's ability to absorb nutrients, including nitrogen. It also distributes nutrients and increases the number of ribosomes and amino acids And protein (Sedqi, 1999). The addition of organic fertilizer resulted in a significant increase in the absorbed nitrogen rate and gave the level of 150 g. Pot $^{-1}$, the highest value of 29.13 g N kg $^{-1}$ dry substance compared to the lowest value of 27.41 g N kg $^{-1}$ dry substance with an increase of 3.21% and 6.27% for O1 and O2 respectively, compared with the addition of O0. because organic fertilizers are rich in nutrients (Table 2) and have a role in improving plant growth and increasing nutrient uptake (Lotfollahi, 2000).

The highest nitrogen uptake rate was 35.23 g N kg $^{-1}$ dry substance in (G2 × W1), while interference (G0 × W3) gave the lowest rate of 22.56 g N kg $^{-1}$ dry substance. Interference (O2 × W1) showed the highest N intake rate of 34.48 g N kg $^{-1}$ dry substance and the lowest average of 22.56 g N kg $^{-1}$ dry substance in the interference (O0 × W3). The effect of triple-W interference in (O0 × G0 × W1,) (O0 × G0 × W2)and (O0 × G0 × W3) in the nitrogen ratio was significant and the values (31.12, 25.85 and 21.85) were N. kg $^{-1}$ dry substance in the interference respectively, with a decrease of 16.93% and 29.78% for the last two interferences respectively. The effect of the gibberellic acid spray treatments in (O0 × G0 × W1),(O0 × G1 × W1) and (O0 × G2 × W1) was significant and the values (31.12, 33.51, 34.61) g kg^{-1} dry substance respectively, with an increase of 7.67% and 11.21% for other interference respectively, compared with the non-spraying and addition treatment. The treatments W2 and W3 behaved the same way. The effect of the levels of addition of organic fertilizer O (O0 × G0 × W1), (O1 × G0 × W1) and (O2 × G0 × W1) was significant and the values (31.12, 32.41, 33.01) Dry with an increase of 4.14% and 6.07% the overlap of others respectively, compared to the treatment of spraying and addition and other treatments followed the same trend. The effect of the triple interference of (O2 ×G2 × W2) and (O2 × G2 × W3) was significant and the values (30.0 and 24.94) g N kg $^{-1}$ dry substance decreased ratio 16.71% and 30.76% respectively, comparted with Spray treatment and addition in W1. It was observed that the highest absorption rate was observed in the (O2 × G2 × W1) and was 36.02 g N kg $^{-1}$ dry substance, while the lowest

Table 5: Effect of Experimental treatment on Phosphorus Absorption Rate (g. P Kg^{-1}).

G × W	Levels of organic fertilizer			Levels of GA3	Irrigation water salinity
	O_2	O_1	O_0		
2.84	3.74	2.70	2.09	G_0	W_1
3.01	3,92	2.81	2.31	G_1	
3.24	4.02	3.16	2.54	G_2	
1.98	2.41	1.82	1.73	G_0	W_2
2.56	2.83	2.60	2.25	G_1	
2.77	3.02	2.91	2.39	G_2	
1.87	2.21	1.78	1.62	G_0	W_3
2.17	2.44	2.18	1.91	G_1	
2.25	2.50	2.22	2.04	G_2	
the average W	O_2	O_1	O_0		O / W
3.03	3.89	2.89	2.31		W_1
2.43	2.75	2.44	2.12		W_2
2.09	2.38	2.06	1.85		W_3
3.00	2.46	2.09	the average		O
the average G	O_2	O_1	O_0		O / G
2.23	2.78	2.10	1.81		G_0
2.59	3.06	2.56	2.15		G_1
2.75	3.18	2.76	2.32		G_2
the average G	W_3	W_2	W_1		W / G
2.23	1.87	1.98	2.84		G_0
2.59	2.17	2.56	3.01		G_1
2.75	2.25	2.77	3.24		G_2
					LSD (0.05)

W× G × O	G × O	W × O	W × G	O	G	W
0.76	0.55	0.62	0.71	0.39	0.33	0.42

(O0 × G0 × W3) was 21.85 g N kg^{-1} dry substance.

Effect of experimental treatments in Absorption Phosphorus Rate

The results of table 5 showed the effect of salinity of irrigation water, gibberellic acid and organic fertilization and their overlap in the rate of phosphorus absorbed in the white maize plant. The results of the statistical analysis showed that the increase in salinity of irrigation caused significant differences and the values (3.03, 2.43 and 2.09) g. P kg^{-1} dry substance respectively, with a decrease ratio of 19.80% and 31.02% for W2 and W3 respectively, compared to W1 (control). That's due to the fact in irrigation of plants with high saline water negatively and affects plant growth and absorption of nutrients. Esmat (2016) has reduced plant content from phosphorus with increased salinity of irrigation water, and increased salinity reduces the plant's phosphorus readiness (Follett and Soltanpour, 2001). The spraying of gibberellic acid significantly increased acid levels, giving the level 50 mg. L^{-1} highest value of 2.75 g P kg $^{-1}$ dry substance compared to the lowest value of 2.23 g P kg $^{-1}$ dry substance with an increase of 16.14% and 23.31% for G1 and G2 respectively, compared to non-spray G0, Indicates that gibberellic acid stimulates plants to absorb nutrients (Azhar, 2000).

The results indicated that the addition of organic fertilizer resulted in a significant increase in the absorbed phosphorus rate and gave the level 150 g. Pot^{-1}, the highest value of 3.00 g. P kg $^{-1}$ dry substance with an increase rate of 17.70% and 43.54% for O1 and O2, respectively, compared with the addition of O0 because organic fertilizer has a role in improving soil properties as well as its content of nutrients Which is positively reflected on plant growth (Kumar *et al.,* 2004). (G2 × W1) and gave the highest rate of absorbed phosphorus at 3.24 g. P kg -1 dry. (O2 × W1) showed the highest absorption rate of 3.79 g. P kg $^{-1}$ dry substance and the lowest mean 1.85 g. P kg $^{-1}$ dry substance in the interference (O0 × W3). The effect of W triple interference in(O0 × G0 × W1),(O0 × G0 × W2) and(O0 × G0 × W3) in the phosphorus rate was significant and the values (2.09, 1.73 and 1.62) g P kg^{-1} dry substance respectively and 17.22% and 22.48% respectively for the last two overlaps, respectively, compared with the non-spraying and additive treatment and other transactions followed the same trend. The effect of the gibberellic acid spray treatments in the interference (O0 × G0 × W1) and (O0 × G1 × W1) and (O0 × G2 × W1) was significant and the values (2.09, 2.31 and 2.54) g p kg^{-1} dry substance respectively with 10.52% and 21.53% for the last two overlaps, respectively, compared with the non-spraying and additive treatment. W2 and W3 transactions went the same way. The effect of organic fertilizer additive levels (O0 × G0 × W1), (O1 × 0G × W1) and (O2 × G0 × W1) was significant and the values (2.09, 2.70 and 3.74) g P kg^{-1} dry substance with an increase ratio of 29.18% and 78.94% for the other interference respectively, compared with the non-spraying and additive treatment and other transactions followed the same trend. (O2 × G2 × W2) and (O2 × G2 × W3) was significant and the values were (3.02 and 2.50 g) P kg $^{-1}$ dry substance with a decrease of 24.87% and 37.81% respectively compared to the treatment Spray and add in W1. (O2 × G2 × W1) was 4.02 g. P kg $^{-1}$ dry substance, while the lowest (O0 × G0 × W3) was 1.62 g. P kg $^{-1}$ dry substance.

Effect of Experimental Parameters on the Absorption Rate of Potassium

Table 6: Effect of Experimental treatments on the Absorption Rate of Potassium (g. K kg^{-1} dry substance).

G × W	Levels of organic fertilizer			Levels of GA3	Irrigation water salinity
	O_2	O_1	O_0		
25.41	26.23	25.87	24.15	G_0	W_1
27.11	28.71	27.23	25.41	G_1	
28.44	30.06	29.18	26.09	G_2	
20.97	21.79	21.00	20.12	G_0	W_2
23.28	24.18	23.54	22.14	G_1	
24.59	25.89	24.82	23.07	G_2	
20.33	21.10	20.27	19.64	G_0	W_3
21.21	22.0	21.18	20.20	G_1	
21.92	22.61	22.14	21.19	G_2	
the average W	O_2	O_1	O_0		O / W
26.98	28.33	27.42	25.21		W_1
22.94	23.95	23.12	21.77		W_2
21.03	21.90	21.19	20.34		W_3
24.72	23.91	22.44	the average O		
the average G	O_2	O_1	O_0		O / G
22.24	23.04	22.38	21.30		G_0
23.84	24.96	23.98	22.58		G_1
25,00	26.18	25.38	23.45		G_2
the average G	W_3	W_2	W_1		W / G
22.24	20.33	20.97	25.41		G_0
23.84	21.12	23.28	27.11		G_1
25.00	21.98	24.59	28.44		G_2

LSD (0.05)

W× G × O	G × O	W × O	W × G	O	G	W
1.82	1.44	1.64	1.73	1.17	1.29	1.56

The results of table 6 showed the effect of irrigation water salinity, gibberellic acid and organic fertilization and their interaction in the rate of potassium absorbed in the white maize plant. The results of the statistical analysis showed that the increase in salinity of irrigation of water caused significant differences. The values (26.98, 22.94 and 21.03) g K kg^{-1} dry substance respectively, decreased by 14.97% and 22.05% for W2 and W3 respectively, compared to W1. This is consistent with what happened in Al-AL-Uqaili et al. (2002). He observed a decrease in plant content of the main nutrients, including potassium, due to increased salinity of irrigation water.

The effect of gibberellic acid spray was significant in increasing the absorption rate of the potassium absorbed by increasing the levels of acid and gave the level of 50 mg. L^{-1} highest value of 25.00 g K kg^{-1} dry substance with an increase of 7.19% and 12.41% for G1 and G2 respectively, compared to non-spray G0.The results indicated that the addition of organic fertilizer resulted in a significant increase in the rate of absorbed potassium, and gave the level of fertilizer 150 g. Pot^{-1} was the highest value of 24.72 g K kg^{-1} dry substance with an increase of 6.55% and 10.16% for O1 and O2, respectively, compared with the non-addition O0. (G2 × W1) and gave the highest absorption rate of 28.44 g K kg^{-1} dry substance and the lowest rate of 20.33 g K kg^{-1} dry substance in the interference (G0 × W3). (O2 × W1) showed the highest absorption rate of 28.33 g K kg^{-1} dry substance and the lowest rate of 20.34 g K kg^{-1} dry substance in the interference (G0 × W3). The effect of triple-W interference in O2 × G0 × W1, O0 × G0 × W2 and O0 × G0 × W3 in the potassium rate was significant and the values (24.15, 20.12 and 19.64) g K kg^{-1} dry substance and a decrease ratio of 16.68% and 18.67% for the last two interferences respectively The effect of the gibberellic acid spray treatments in the interference (O0 × G0 × W1) and (O0 × G1 × W1) and (O0 × G2 × W1) was significant and the values were 24.15, 25.41 and 26.09 g kg^{-1} dry substance respectively, with an increase of 5.21% and 8.03% for the last two overlaps, respectively, compared with the non-spray and addition of treatment. W2 and W3 treatments and 17.22% and 22.48% respectively for the last two overlaps, respectively, compared with the non-spraying and additive treatment and other transactions followed the same trend. The effect of the gibberellic acid spray treatments in the interference (O0 × G0 × W1) and (O0 × G1 × W1) and (O0 × G2 × W1) was significant and the values (2.09, 2.31 and 2.54) g p kg^{-1} dry substance respectively with 10.52% and 21.53% for the last two overlaps, respectively, compared with the non-spraying and additive treatment. W2 and W3 transactions went the same way. The effect of organic fertilizer additive levels (O0 × G0 × W1), (O1 × 0G × W1) and (O2 × G0 × W1) was significant and the values (2.09, 2.70 and 3.74) g P kg^{-1} dry substance with an increase ratio of 29.18% and 78.94% for the other interference respectively, compared with the non-spraying and additive treatment and other transactions followed the same trend. (O2 × G2 × W2) and (O2 × G2 × W3) was significant and the values were (3.02 and 2.50 g) P kg^{-1} dry substance with a decrease of 24.87% and 37.81% respectively compared to the treatment Spray and add in W1. (O2 × G2 × W1) was 4.02 g. P kg^{-1} dry substance, while the lowest (O0 × G0 × W3)

was 1.62 g. P kg $^{-1}$ dry substance behave the same way. The effect of levels of addition of organic fertilizer O (O0 × G0 × W1), (O1 × G0 × W1) and (O2 × G0 × W1) was significant and values (24.15, 25.87 and 26.23) g dry substance, with an increase of 7.12% and 8.61% for the other interference respectively, compared to the non-spraying and additive treatment. The other treatments followed the same trend. The effect of the triple interference of O2 × G2 × W2 and (O2 × G2 × W3) (25.89 and 22.61) kg kg^{-1} dry substance with a decrease of 13.87% and 24.78% respectively Compared with spray treatment and addition in W1. (O2 × G2 × W1) 30.06 g kg $^{-1}$ dry substance, while the lowest (O0 × G0 × W3) was 19.64 g K kg $^{-1}$ dry substance.

References

Al-Rawi, K.M., Khalafullah and A.A. Mohammed (1980). Design and analysis of agricultural experiments. Ministry of Higher Education and Scientific Research, University of Mosul Press.

Al-Uqaili, J.K., A.K. A. Jarallah, B.H. Al-Ammeri and A. Kredi (2002). Effect of saline drainage water on wheat growth and on soil salinity Iraqi. *J. Agric*., **7(2):**157-166.

Azhar, N. (2000). Response of barley Gibberellic acid under varying soil environments. Internet, www.parc.gv.pk/data/catpak/cataction.asp.

Black, C. A. (1965). Methods of Soil analysis. Part 1: Physical properties. Amer. Soc. Agron. Inc. Pub. Madison, Wisconsin. USA.

Esmat, H.A. (2016). Reutilization of drainage water in agriculture effect of salinity on some soil chemical proprieties, plant growth and availability of some plant nutrients. *Annals of Agic. Sc. Moshtohor*, **38(1):** 633-651.

Follett, R.H. and P.N. Soltanpour (2001). Irrigation water quality criteria Colorado state University cooperative extension (Internet).

Iqbal, M. and M. Ashraf (2012). Gibberellic acid mediated induction of salt tolerance in *Zea mays* L. Plants: Growth ionic partitioning, photosynthesis and hormonal. *Environ mental and Experimental and Botany*, 28.

Kumar, K.C., A.S. Halepyati and B.K. Desai (2004). Effect of organic manure and micronutrient on chlorophyll content and leaf area duration of wheat. *India Journal of Plant Physiology*, **9(1):** 98-99.

Lacerda, C.F., J. Cambraia, M.A.O. Cano, H.A. Ruiz and J.T. Prisco (2003). Solute accumulation and distribution during shoot and leaf development in two sorghum genotypes under salt stress. *Environ. Exp. Bot*., **49:** 107-120.

Lotfollahi, M. (2000). The yield and quality of wheat affected by individual and combined application of animal manure and chemical fertilizers. Internet, www.cropscience, org.aulics 2004.

Mohammed, A., M.K. Mohammed Ali and J.H. Hamza (2014). Effect of gibberelic acid on germination properties and growth of saline under saline stress in maize. *Muthanna Journal of Agricultural Sciences*, **2(2):** 65-72.

Murphy, T. and J.R. Riley (1962). A modified single solution method for the determination of phosphate in natural waters. *Anal. Chem. Acta*., **27:** 31-36.

Nawaz, K., K. Hassain, A. Majeed, R. Klan, S. Afghan and K. Ali (2010). Fatality of salt stress to plants: morphological-physiological and biochemical as pects, African. *J. Biotech*., **9:** 547: 5480.

Page, A.L., R.H. Miller and D.R. Keeney (1982). Methods of soil analysis part 2., 2nd (ed.). Agron. 9, Publisher, Madison, Wisconsin, USA.

Radi, A.F., M.A. Shadad, A.E. El-Anany and F.M. Omran (2006). Effect of plant hormones (GA3 or ABA) and Salinity on growth and some metabolites of wheat *seedlings development in Plant and Soil Sciences*, **92:** 436-447.

Rampho, E.T. (2005). National herbarium, Pretoria, South Africa.

Sheykgbaglou, R., R. Sacede, A. Omid and S. Mohammad (2014). The effect of salicylic acid and gibberellins on seed reserve utilization, germination and enzme activity of sorghum (*Sorghum bicolor* L.) seed under drought stress. *J. of Streephysio and Biochemistry*, **10(1):** 5-13.

Sidqi, B.A.J. (1999). Effect of Yellow Corn Treatment on Plant Growth Regulators on the Effectiveness of Alpha Amylase Enzyme, Carbide Content, Length of Fifth Leaf and Nutrient Content. *Iraqi Journal of Science*, **40(3):** 49-79.