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EFFECT OF WATER AND SALT STRESS ON GROWTH AND YIELD OF TWO VARIETIES OF WHEAT (*TRITICUM AESTIVUM* L.)

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Abstract

A potted experiment was conducted in the plastic house Department of Soil and Water Resources Sciences / College of Agricultural Engineering Sciences / University of Baghdad in Jadiriyah for the agricultural season 2018-2019 in silt clay loam soil, in order to study the effect of water and salt stress on the growth and yield of two varieties of wheat. Using experiment was conducted according to complete random design (CRD) with three replications, including 18 experimental treatments, including comparative treatment resulting from three levels of saline stress 2, 8, and 12 dS M^{-1} (S_0, S_1 and S_2) respectively, and three levels of water stress are irrigation when 40, 60 and 80% of available water (I_0, I_1 and I_2) and Two varieties of wheat are Ibaa $_{99}$ and Bohoth $_{22}$ (W_0 and W_1) sequentially, bringing the number of experimental units to 54 experimental units. The results showed that Salt stress resulted in a significant decrease in the average height of plants, number of branches, dry matter product (straw), number of spikes, total grain yield and weight of 100 grains. The highest decrease in soil was S_2 compared to S_0 soil (47.48, 29.33, 22.96, 22.27, 13.66, 25.70%) respectively. As led Water stress resulted in a significant decrease in plant height, number of branches, dry matter product (straw), number of spikes, grain yield and weight of 100 grains was the highest decrease at the water stress level I_2 compared to the control treatment I_0 by (21.64, 11.83, 6.94, 23.19, 14.03, 16.40%) respectively. Also, the triple interference resulted in a significant decrease in average plant height, number of branches, dry matter product (straw), number of spikes, grain yield, weight of 100 grains, the highest decrease in treatment was $S_2I_2W_0$ by 76.74, 43.59, 25.40, 27.70, 13.81 æ 16.36 %, respectively compared to the control treatment ($S_0I_0W_0$).

Key words : salt stress, wheat, *Triticum aestivum L.*

Introduction

Salt stress is one of the most important problems facing agricultural expansion in Iraq, as the proportion of land affected by salt is increasing, especially in irrigated areas, as a result of excessive use of irrigation water and the lack of regulation of drainage systems, as in central and southern Iraq. More than 10% of the world's arable land suffers from salinization (Tanji, 2004). The response of plants to environments with high salt content is one of the most important determinants of agricultural interest in the field of agricultural production. Salinity is one of the main factors limiting the production of agricultural crops. High salt concentrations negatively affect agricultural expansion, especially in arid and semi-arid areas. (Ola *et al.*, 2012), increasing, speed and homogeneity of germination leads to good field formation and increased yield, but salt stress hinders this as it is one of the most important physiological stresses affecting seed germination and seed germination, which in turn affects the subsequent stages of growth to Continued due to the accumulation or accumulation of dissolved salts to a degree exceeding the normal levels in the soil, which leads to inhibition of germination and slow plant growth and stunting and reduced yield as a result of the negative impact on water absorption by the roots and the entry of some ions in proportion to the need of the cell and affect the biological processes in them (Zubaidi, 1989).

Salt stress can be accompanied by water stress, especially if the soil contains a proportion of harmful salts. This causes a lack of water, which causes an increase in the concentration of salts in the soil solution, as well as a decrease in the presence of water in the soil means that there is no washing of the salts, which keeps them in the

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rhizosphere (Rodriguez et al. 1997). Stress caused by water stress is one of the most important impediments to the growth and productivity of wheat plant as it causes a decrease in plant height, leaf growth and leafy area due to its negative impact on growth processes, cell division and elongation, which is reflected on wheat productivity and decrease the unit area yield compared to developed countries. Makes the crop unable to exploit its physiological and genetic abilities (Gupta and Thind, 2015). Taking wheat. *Triticum aestivum* L is one of the world's most important strategic food crops and most important among grain crops. This importance lies in the good balance between proteins and carbohydrates in its grains. It also provides more than 70% of the calories needed, and is a major source of protein for the world population (Mollasadeghi *et al.,* 2011). Wheat occupies the third place among the most productive cereal crops in the world and due to the distinctive location of this crop from the rest of the crops, but its productivity in Iraq is still low as it reached 1002.30 kg per hectare in 2005, while the world production reached 2262.70 kg ha^{-1} therefore ranks Six of the countries that import wheat (FAO, 2014). The above shows that wheat production should be doubled by increasing the cultivated area, or increasing the production per unit area both are associated with several determinants such as soil salinity and irrigation water. There are a large number of wheat varieties that differ in their genetic capacity and environmental adaptation, and one of the most important methods that can be used to overcome such a crisis and meet the needs of the country for this crop is to select and produce varieties that have the ability to resist salt and water stress while maintaining the highest possible yield according to So many criteria were conducted so that this study aimed to: To determine the extent of tolerance of two varieties of wheat to the levels of water and salt stress and to know the effect of water and salt stress levels in some chemical soil characteristics and to know the effect of water stress levels on growth and relative yield

Materials and Methods

A soil experiment was conducted in the Department of Soil and Water Resources Department / College of Agricultural Engineering Sciences / University of Baghdad in AL- Jadiriyah for the agricultural season 2018-2019 in the plastic house using soil taken from the depth 0 - 30 cm from one of the fields of the Faculty of Agriculture in Abu-Ghraib of texture SiCL and classified at the level of Under the great group *Typic Torrifluvent*. The soil was smoothed, air dried, grinded and passed through a 4 mm diameter sieve for planting and then mixed well and 10 kg dry soil in each pot, which is an experimental unit. A sample of the soil itself was passed through a 2 mm diameter sieve to estimate some of the chemical and physical properties of the soil before Agriculture shown in table 1.

A global trial was carried out according to a randomized design (CRD) was carried out, included 18 experimental treatments, including comparative treatment resulting from three levels of saline stress 2, 8 and 12 deci-Siemens M^{-1} (S_0, S_1 and S_2) respectively, and three levels of water stress are watering at Depletion of 40, 60 and 80% of available water (I_0, I_1 and I_2) sequentially, two wheat varieties are $Ibaa_{99}$ and $Bohoth_{22}$ (W_0 and W_1) sequentially, and three replicates (R) bringing the number of experimental units to 54 experimental units.

Two different soil samples were prepared in the electrical conductivity to obtain electrical conductivity of soil 8 and 12 desi-siemens M^{-1} sequentially in addition to the control treatment (2 desi-siemens m^{-1}). The amount of salts was calculated (calcium chloride, magnesium chloride and sodium chloride) Additive for soil and by 2: 1: 1 sequentially. Fertilizers of each treatment were well mixed with the topsoil of the pots. Urea fertilizer (120 kg N ha^{-1}) was added in three equal batches, the first in planting, the second after 40 days of planting and the third after 120 days of planting, Triple calcium superphosphate fertilizer (40 kg P ha^{-1}) was added at one time in planting and potassium sulphate fertilizer (100 kg K ha^{-1}) was added in two batches, the first mixing with soil when planting and the second at the branching stage (Faraj, 2005). The seeds were planted with seeds of the wheat crop of the Ibaa 99 and Bohoth22 on 25/11/ 2018 by 20 seeds of the pot that were reduced to 10 plants after a week of germination. Irrigation was carried out after determining the field capacity and available water in the soil and then the difference between the moisture content at the field capacity and the wilt point. Potting was then irrigated after planting at the soil field capacity to ensure emergence, and then irrigation was carried out according to each treatment (soil depletion of 40% of available water, 60% and 80%) until the plants reached maturity. Plants were harvested in 15/4/2019 after measuring the height of plants and the number of branches and the number of spikes for each treatment, and dried the plants and took the total weight of the dry matter and separated the grains from the straw and took their weight and the weight of 100 grains. The experimental data were statistically analyzed using GenStat discovery edition 3 according to the design used, and the averages of the coefficients were compared with the least significant difference (LSD) at the level of 0.05 (Steel and Torrie, 1980).

Table 1: **S**ome chemical and physical characteristics of the study soil before Agriculture.

Characteristic		**Value**	**Unit**
pH (1:1)		7.70	
Electrical conductivity (ECe)		2.09	Desi Siemens M^{-1}
The exchange capacity of positive ions(CEC)		14.40	C mall Kg^{-1}
Organic matter (O.M)		1.15	Gm kg^{-1}
Gypsum		0.17	
Lime		224.50	
Sodium adsorption ratio SAR		2.58	$(Meq\ L^{-1})^{0.5}$
Dissolved ions	Ca^{2+}	8.80	Meq L^{-1}
	Mg^{2+}	4.30	
	K^{+}	0.03	
	Na^{2+}	6.70	
	CO_3^{2-}	0.00	
	HCO_3^{-}	1.90	
	SO_4^{2-}	7.20	
	Cl^{-}	10.20	
Elements Ready	N	39.00	Mg^{-1} kg
	P	18.60	
	K	237	
Soil separators	sand	124	Gm kg^{-1}
	silt	464	
	clay	412	
Texture	Silt Clay Loam (SiCL)		
Bulk density		1.42	Mcg M^{-3}
Field capacity		25	%
Permanent wilting point		13	
Available water		12	

Results and Discussion

Plant height (cm)

The results in table 2 indicate that there was a significant decrease in the salinity stress of soil S_1 and S_2 in the average plant height, The values were 77.00 and 47.90 cm, with a decrease of 15.58 and 47.48%, respectively, compared with the control treatment (S_0) 91.22 cm. The results showed a significant decrease in water stress in the average plant height The highest decrease at the third level of water stress (I_2) was 62.55 cm, a decrease of 21.64% compared to the control treatment (I_0) of 79.83 cm. The results also indicated that the Bohoth 22 is superior to the highest average height of the plant at 77.85 cm, an increase of 17.56% compared to the parent Ibaa 99, which is 66.22 cm, The reason is due to the different susceptibility of different varieties to withstand salt stress.

Table 2 shows that there is a significant effect of bilateral interference between the levels of salt and water stress in the average height of the plant, The highest decrease occurred when treatment S_2I_2 reached 28.50 cm, a decrease of 70.00% compared to the control treatment (S_0I_0) of 95.00 cm, This indicates the different behavior of water stress levels towards soil quality. The results showed a significant reduction of the bilateral interaction between salt stress and wheat cultivars in the average height of the plant, The highest decrease was recorded at S_2W_0 of 42.67 cm, a decrease of 49.20% compared to S_0W_0 of 84.00 cm, This is due to the different tolerances of the varieties in salinity tolerance to varying degrees. The results of bilateral overlap between water stress and wheat cultivars showed the average plant height, Decrease in mean plant height was highest when treatment I_2W_0 was 56.67 cm with a decrease of 22.71% compared to the control treatment (I_0W_0) 73.33 cm.

The results in table 2 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average plant height, The highest reduction was recorded in $S_2I_2W_0$ of 20 cm, a decrease of 76.74% compared to the control treatment ($S_0I_0W_0$) of 86 cm.

Number of branches in the plant (branch plant $^{-1}$)

The results in table 3 indicate a significant decrease in saline stress in the mean number of branches the highest decrease in the third soil (S_2) was 2.65 branches plant^{-1}, a decrease of 29.33% compared to the control treatment (S_0) of 3.75 branches plant^{-1}. the results showed a significant decrease in water stress in the average number of branches The highest decrease at the third level of water stress (I_2) was 3.13 branches plant^{-1}, a decrease of 11.83% compared to the control treatment (I_0) of 3.55 branches plant^{-1}. The results also indicated that the Bohoth 22 is superior to the highest average number of branches at 3.50 branches plant^{-1}, an increase of 11.46% compared to the parent Ibaa 99, which is 3.14 branches plant^{-1}.

Table 3 shows that there is a significant effect of bilateral interference between the levels of salt and water stress in the average number of branches, The highest decrease occurred when treatment S_2I_2 reached 2.32 branches plant^{-1}, a decrease of 40.05% compared to the control treatment (S_0I_0) of 3.87 branches plant^{-1}, This indicates the different behavior of water stress levels

Table 2: Effect of salt and water stress and two wheat varieties on average plant height (cm).

Soil S	**I**	**W**		**Average**
		W_0	**W_1**	**S×I**
S_0	40	86.00	104.00	95.00
	60	84.00	98.00	91.00
	80	82.00	93.30	87.65
Average S×W		84.00	98.43	91.22
S_1	40	76.00	90.00	83.00
	60	72.00	81.00	76.50
	80	68.00	75.00	71.50
Average S×W		72.00	82.00	77.00
S_2	40	58.00	65.00	61.50
	60	50.00	57.40	53.70
	80	20.00	37.00	28.50
Average S×W		42.67	53.13	47.90
		W_0	W_1	Average
Average W×I	40	73.33	86.33	79.83
	60	68.67	78.80	73.74
	80	56.67	68.43	62.55
Average		66.22	77.85	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
14.82	8.56	8.56	10.48	4.94	6.05	6.05

Table 3: Effect of salt and water stress and two wheat varieties on average number of branches (branches plant^{-1}).

Soil S	**I**	**W**		**Average**
		W_0	**W_1**	**S×I**
S_0	40	3.67	4.07	3.87
	60	3.60	3.93	3.77
	80	3.43	3.80	3.62
Average S×W		3.57	3.93	3.75
S_1	40	3.43	4.03	3.73
	60	3.30	3.63	3.47
	80	3.27	3.63	3.45
Average S×W		3.33	3.76	3.55
S_2	40	2.90	3.20	3.05
	60	2.57	2.60	2.59
		2.07	2.57	2.32
Average S×W	2.51	2.79	2.65	
		W_0	W_1	Average
Average W×I	40	3.33	3.77	3.55
	60	3.16	3.39	3.28
	80	2.92	3.33	3.13
Average		3.14	3.50	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
0.5251	0.3032	0.3032	0.3713	0.1750	0.2144	0.2144

towards soil quality. The results showed a significant reduction of the bilateral interaction between salt stress and wheat cultivars in the average number of the branches, The highest decrease was recorded at S_2W_0 of 2.51 branches plant^{-1}, a decrease of 29.69% compared to S_0W_0 of 3.57 branches plant^{-1}, This is due to the different tolerances of the varieties in salinity tolerance to varying degrees. The results of bilateral overlap between water stress and wheat cultivars showed the average number of branches, Decrease in mean was number of branches highest when treatment I_2W_0 was 2.92 branches plant^{-1} with a decrease of 12.31% compared to the control treatment (I_0W_0) 3.33 branches plant^{-1}.

The results in table 3 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average number of branches, The highest reduction was recorded in $S_2I_2W_0$ of 2.07 branches plant^{-1}, a decrease of 43.59% compared to the control treatment ($S_0I_0W_0$) of 3.67 branches plant^{-1}.

Dry matter yield (straw) (gm pot^{-1})

The results in table 4 indicate a significant decrease in saline stress in the mean dry matter yield (straw) the highest decrease in the third soil (S_2) was 63.22 gm pot^{-1}, a decrease of 22.96% compared to the control treatment (S_0) of 82.06 gm pot^{-1}. the results showed a significant decrease in water stress in the average dry matter yield The highest decrease at the third level of water stress (I_2) was 72.89 gm pot^{-1}, a decrease of 6.94% compared to the control treatment (I_0) of 78.33 gm pot^{-1}. The results also indicated that the Bohoth 22 is superior to the highest average dry matter yield at 77.78 gm pot^{-1}, an increase of 6.61% compared to the parent Ibaa 99, which is 72.96 gm pot^{-1}.

Table 4 shows that there is a significant effect of bilateral interference between the levels of salt and water stress in the average dry matter yield, The highest decrease occurred when treatment S_2I_2 reached 62.33 gm pot^{-1}, a decrease of 26.38% compared to the control treatment (S_0I_0) of 84.67 gm pot^{-1}, This indicates the different behavior of water stress levels towards soil quality. The results showed a significant reduction of the bilateral interaction between salt stress and wheat cultivars in the

Table 4: Effect of salt and water stress and two wheat varieties on average Dry matter yield (straw) (gm pot-1).

Soil S	I	W		Average
		W_0	W_1	S×I
S_0	40	81.33	88.00	84.67
	60	79.67	85.00	82.33
	80	77.67	80.67	79.17
Average S×W		79.56	84.56	82.06
S_1	40	82.33	90.00	86.17
	60	75.67	82.67	79.17
	80	74.33	80.00	77.17
Average S×W		77.44	84.22	80.83
S_2	40	63.33	65.00	64.17
	60	61.67	64.67	63.17
	80	60.67	64.00	62.33
Average S×W		61.89	64.56	63.22
		W_0	W_1	Average
Average W×I	40	75.66	81.00	78.33
	60	72.34	77.45	74.90
	80	70.89	74.89	72.89
Average		72.96	77.78	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
6.366	3.675	3.675	4.501	2.122	2.599	2.599

Table 5: Effect of salt and water stress and two wheat varieties on average Number of spikes (spike pot^{-1}).

Soil S	I	W		Average
		W_0	W_1	S×I
S_0	40	26.00	29.00	27.50
	60	24.67	27.00	25.84
	80	20.67	25.33	23.00
Average S×W		23.78	27.11	25.45
S_1	40	25.33	26.67	26.00
	60	21.33	23.33	22.33
	80	17.33	20.67	19.00
Average S×W		21.33	23.56	22.45
S_2	40	22.00	23.33	22.67
	60	19.33	21.00	20.17
	80	15.00	18.00	16.50
Average S×W		18.78	20.78	19.78
		W_0	W_1	Average
Average W×I	40	24.44	26.33	25.39
	60	21.78	23.78	22.78
	80	17.67	21.33	19.50
Average		21.30	23.81	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
7.350	4.244	4.244	5.198	2.450	3.001	3.001

average dry matter yield, The highest decrease was recorded at S_2W_0 of 61.89 gm pot^{-1}, a decrease of 22.21% compared to S_0W_0 of 79.56 gm pot^{-1}, This is due to the different tolerances of the varieties in salinity tolerance to varying degrees. The results of bilateral overlap between water stress and wheat cultivars showed the average dry matter yield, Decrease in mean was dry matter yield highest when treatment I_2W_0 was 70.89 gm pot^{-1} with a decrease of 6.30% compared to the control treatment (I_0W_0) 75.66 gm pot^{-1}.

The results in table 4 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average dry matter yield, The highest reduction was recorded in $S_2I_2W_0$ of 60.67 gm pot^{-1}, a decrease of 25.40 % compared to the control treatment ($S_0I_0W_0$) of 81.33 gm pot^{-1}.

Number of spikes (spike pot^{-1})

The results in table 5 indicate a significant decrease in salt stress of the soil (S_1 and S_2) in the mean number of spikes, the highest decrease in the third soil (S_2) was 19.78 spike pot$^{-1,}$ a decrease of 22.27% compared to the control treatment (S_0) of 25.45 spike pot^{-1}. the results showed a significant decrease in water stress in the average number of spikes The highest decrease at the third level of water stress (I_2) was 19.50 spike pot^{-1} a decrease of 23.19% compared to the control treatment (I_0) of 25.39 spike pot^{-1}. The results also indicated a significant effect of two wheat varieties on the average number of spikes it is excellence the Bohoth 22 Giving him the highest average of the product at 23.81 spike pot^{-1}, an increase of 11.78% compared to the parent Ibaa 99, which is 21.30 spike pot^{-1}.

The results are shown in a table 5 significant effect of bilateral interference between the levels of salt and water stress in the average number of spikes, The highest decrease occurred when treatment S_2I_2 reached 16.50 spike pot^{-1}, a decrease of 40% compared to the control treatment (S_0I_0) of 27.50 spike pot^{-1}, This indicates the different behavior of water stress levels towards soil quality. The results showed a significant reduction of the bilateral interaction between salt stress of the soil (S_1 and S_2) and wheat cultivars in the average number of spikes, The highest decrease was recorded at S_2W_0 of

Table 6: Effect of salt and water stress and two wheat varieties on average Grain yield (gm pot-1).

Soil S	I	W		Average
		W_0	**W_1**	**S×I**
S_0	40	14.30	14.96	14.63
	60	13.30	13.80	13.55
	80	11.84	12.62	12.23
Average S×W		13.15	13.79	13.47
S_1	40	13.15	13.42	13.28
	60	12.47	13.06	12.76
	80	11.29	11.65	11.47
Average S×W		12.30	12.71	12.51
S_2	40	11.88	12.70	12.29
	60	11.10	12.33	11.72
	80	10.78	10.96	10.87
Average S×W		11.25	12.00	11.63
		W_0	W_1	Average
Average W×I	40	13.11	13.69	13.40
	60	12.29	13.06	12.68
	80	11.30	11.74	11.52
Average		12.23	12.83	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
1.0151	0.5861	0.5861	0.7178	0.3384	0.4144	0.4144

Table 7: Effect of salt and water stress and two wheat varieties on average Weight of 100 grains (gm pot^{-1}).

Soil S	I	W		Average
		W_0	**W_1**	**S×I**
S_0	40	5.67	5.79	5.73
	60	5.25	5.39	5.32
	80	4.80	5.07	4.94
Average S×W		5.24	5.42	5.33
S_1	40	4.88	5.25	5.07
	60	4.69	5.08	4.89
	80	4.12	4.24	4.18
Average S×W		4.56	4.86	4.71
S_2	40	4.12	4.65	4.39
	60	3.79	4.07	3.93
	80	3.35	3.78	3.57
Average S×W		3.75	4.17	3.96
		W_0	W_1	Average
Average W×I	40	4.89	5.23	5.06
	60	4.58	4.85	4.72
	80	4.09	4.36	4.23
Average		4.52	4.81	

0.05 L.S.D						
S × I × W	W × I	S × W	S × I	W	I	S
0.3866	0.2232	0.2232	0.2733	0.1289	0.1578	0.1578

18.78 spike pot^{-1}, a decrease of 21.02 % compared to S_0W_0 of 23.78 spike pot^{-1}, This is due to the different tolerances of the varieties in salinity tolerance to varying degrees. It has led to bilateral overlap between water stress and wheat cultivars in average number of spikes, Decrease in mean was number of spikes highest when treatment I_2W_0 was 17.67 spike pot^{-1} with a decrease of 27.70% compared to the control treatment (I_0W_0) 24.44 spike pot^{-1}.

The results in table 5 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average number of spikes, The highest reduction was recorded in $S_2I_2W_0$ of 15.00 spike pot^{-1}, a decrease of 42.30 % compared to the control treatment ($S_0I_0W_0$) of 26.00 spike pot^{-1}.

Grain yield (gm pot^{-1})

Results in table 6 indicate a significant decrease in the salt stress of soil (S_1 and S_2) in the average grain yield the wheat in the experimental unit the values were 12.51 and 11.63 gm pot^{-1}, with a decrease of 7.13 and 13.66%, respectively compared to the control treatment (S_0) of 13.47 gm pot^{-1}. the results showed a significant decrease in water stress in the average grain yield The highest decrease at the third level of water stress (I_2) was 11.52 gm pot^{-1}, a decrease of 14.03% compared to the control treatment (I_0) of 13.40 gm pot^{-1}. The results also indicated that the Bohoth 22 is superior to the highest average grain yield at 12.83 gm pot^{-1}, an increase of 4.91% compared to the parent Ibaa 99, which is 12.23 gm pot^{-1}.

Table 6 shows that there is a significant effect of bilateral interference between the levels of salt and water stress in the average grain yield the wheat, The highest decrease occurred when treatment S_2I_2 reached 10.87 gm pot^{-1}, a decrease of 25.70% compared to the control treatment (S_0I_0) of 14.63 gm pot^{-1}. The results also showed a significant decrease in the interaction values between the levels of salt stress and two wheat grains in the average grain yield, The highest decrease was recorded at S_2W_0 of 11.25 gm pot^{-1}, a decrease of 14.45% compared to (S_0W_0) of 13.15 gm pot^{-1}. The results of bilateral overlap between water stress and wheat cultivars showed the average grain yield, Decrease in mean was grain yield highest when treatment I_2W_0 was 11.30 gm pot^{-1} with a decrease of 13.81% compared to the control treatment (I_0W_0) 13.11 gm pot^{-1}.

The results in table 6 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average grain yield, The highest reduction was recorded in $S_2I_2W_0$ of 10.78 gm pot^{-1}, a decrease of 24.62 % compared to the control treatment ($S_0I_0W_0$) of 14.30 gm pot^{-1}.

Weight of 100 grains (gm pot^{-1})

Results in table 7 indicate a significant decrease in the salt stress of soil (S_1 and S_2) in the average weight of 100 grains is the values were 4.71 and 3.96 gm pot^{-1}, with a decrease of 11.63 and 25.70%, respectively compared to the control treatment (S_0) of 5.33 gm pot^{-1}. the results showed a significant decrease in water stress in the average weight of 100 grains The highest decrease at the third level of water stress (I_2) was 4.23 gm pot^{-1}, a decrease of 16.40% compared to the control treatment (I_0) of 5.06 gm pot^{-1}. The results also indicated that the Bohoth 22 is superior to the highest average weight of 100 grains at 4.81 gm pot^{-1}, an increase of 6.42% compared to the parent Ibaa 99, which is 4.52 gm pot^{-1}.

Table 7 shows that there is a significant effect of bilateral interference between the levels of salt and water stress in the average weight of 100 grains, The highest decrease occurred when treatment S_2I_2 reached 3.57 gm pot^{-1}, a decrease of 37.70% compared to the control treatment (S_0I_0) of 5.73 gm pot^{-1}. The results also showed a significant decrease in the interaction values between the levels of salt stress and two wheat grains in the average weight of 100 grains, The highest decrease was recorded at S_2W_0 of 3.75 gm pot^{-1}, a decrease of 28.44% compared to (S_0W_0) of 5.24 gm pot^{-1}. The results of bilateral overlap between water stress and wheat cultivars showed the average weight of 100 grains, Decrease in mean was grain yield highest when treatment I_2W_0 was 4.09 gm pot^{-1} with a decrease of 16.36% compared to the control treatment (I_0W_0) 4.89 gm pot^{-1}.

The results in table 7 show that there is significant effect of triple interference of salt and water stress levels of two wheat varieties on average weight of 100 grains, The highest reduction was recorded in $S_2I_2W_0$ of 3.35 gm pot^{-1}, a decrease of 40.92 % compared to the control treatment ($S_0I_0W_0$) of 5.67 gm pot^{-1}.

We can see from the above a significant decrease in growth indicators, which included plant height, number of spikes, number of branches, dry weight of vegetables (straw and grains) and weight of 100 grains of wheat crop when the salinity variance between soils S_0, S_1 and S_2, and to explain this there are four theories of the effect of soil salinity in the physiology is theory Water availability, Osmotic inhibition, Specific toxicity and Nutritional effect (Black, 1968), based on these theories, plant growth is negatively affected by the presence of dissolved salts in Soil solutions, and the cause of the decline is caused by the negative impact Salinity in root elongation, due to the osmotic effect of salts in soil solution and its effect on root permeability and water absorption (Ehret *et al*., 1990). the high osmotic pressure of soil solution due to salts accumulation and accumulation in the root zone, causing low water voltage and physiological disturbance despite water in soil. The effect of negative ions on intra-plant nutritional balance (Hernandez and Alamansa, 2002) and the occurrence of salinity reduction due to salinity, affecting plant growth (Shafi *et al*., 2010).

The decrease in growth indicators is also attributed to the effect of water stress in direct and indirect ways. The number of grains in the spike and the weight of 100 tablets, and this is consistent with what found Lin *et al*., (2004) and waterfall (2005) and Mehdi and Qais (2013).

This is due to the differences between cultivars in growth indicators due to different genotypes and environmental factors. Results with what Anbari (2004), AbouZiena *et al*., (2008), al-Akidi (2010) and Ihsan *et al*., (2016) found.

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