Effect of Clean Salt on some vegetative traits of Ficus carica L. Aswad Diyala and White Adriatic fig seedlings under salt stress conditions.

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Abstract

This study was conducted in one of the greenhouses of the Agricultural Research Station at the College of Agriculture - University of Basra during the growing season from 11/28/2019 to 1/8/2020. In order to improve the salt tolerance of two cultivars of fig seedlings (*Ficus carica* L.) by treating them with Clean Salt treatment. The experiment was conducted statistically as a factorial experiment (3 x 3 x 2 x 3) according to the Randomized Complete Block Design (R.C.B.D). The experiment included three factors. The first factor represents the Clean Salt processor with three concentrations (0, 0.2, 0.4) ml L^{-1} The second factor is the salinity levels of irrigation water with three concentrations (0, 3, 6 dSm^{-1}), The third factor represents the cultivar (Aswad Diyala and White Adriatic), where the number of experimental units reached 54 experimental units, with four seedlings for each experimental unit. The averages were compared according to the least significant difference (L.S.D) test at a probability level of 0.05.The aforementioned treatments and their interactions in some indicators of vegetative growth were studied, plant height cm, stem diameter cm, number of Nodes, Nodes.plant $^{-1}$, number of leaves (leaf. Plant $^{-1}$, leaf area cm^2 for fig seedlings. The following results were obtained:The treatment of saline treatment with a concentration of 0.4 ml L^{-1} was significantly excelled in most of the studied vegetative traits (plant height 108.14 cm, stem diameter 1.65 cm, number of Nodes 37.93 Nodes.$plant^{-1}$, number of leaves 32.78 leaves, leaf area 1089.56 cm^2 compared with the control treatment. The treatment at the salinity level of 6 dSm^{-1} gave a significant decrease in most of the vegetative traits (plant height 93.87 cm, number of Nodes 24.42 Nodes.$plant^{-1}$, number of leaves 21.27 leaves, leaf area 418.01 compared to the control treatment,The cultivar Aswad Diyala showed significantly excelled in all studied vegetative traits (104.88 cm, 1.57 cm, 32.44 Nodes, 29.09 leaves, 788.08 cm^2, 174.63 g, 92.93 g, 39.24 g, 11.42 g) for each of the traits (plant height, stem diameter, The number of nodes, the total number of leaves, the leaf area, respectively, in comparison with the control treatment.The study also showed that the bi and triple interaction of the study factors gave a significant superiority to all indicators of vegetative growth.

Keywords: figs, salt processor, clean salt, sodium chloride, NaCl, vegetative traits

Introduction :-

Figs (*Ficus carica* L.) are deciduous fruit trees belonging to the Moraceae family, which contain more than 2000 species of trees and shrubs (24) (23). It is an important crop worldwide for fresh and dried consumption (16).It is believed that the original home of the fig is in the south of the Arabian Peninsula and spread quickly to the area around the Mediterranean Sea (11). The global production of figs is 131,588 tons, and the cultivated area in the world is about 289,818 hectares. As for Iraq, the total production amounted to about 9265 tons for the year 2019, and the fig crop constituted a percentage of (1.11% of the total production of summer fruit trees in Iraq (18). Figs are used in the manufacture of many processed food products such as jam, tea, wine, canned food and pastries (20). Due to the chemical composition of figs, it was found that it contains many essential nutrients, as it contains 79% water, 16% sugars, 56% of which are fructose sugar, then Followed by glucose (43% of the total sugars), in addition to a small amount of

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protein less than 1% and fats 0.3% (28) (21). Figs have been widely studied for medicinal uses, which justifies their therapeutic potential ((27). It contains a large number of useful natural chemical compounds, and the fruits are rich in vitamins A and B. The fruits are also a source of potassium, which plays an important role in reducing the risk of arterial hypertension. They contain both types of carbohydrates and fibers, which play an important role in revitalizing the digestive system and contribute to reducing the risk of some cancerous diseases. Fruits are useful in treating gout (6). The problem of salinity and saline soils is one of the main problems that hinder agriculture in most countries of the world, where the problem of salinity has become a global problem, where the lands affected by salinity are spread all over the world and are constantly increasing (5). The location of Iraq in the arid and semi-arid areas, which are characterized by high temperatures and little rainfall, made it one of the countries most affected by salinity, where 70-80% of its central and southern lands are located within medium to highly salinity soils (10). The figs are considered a moderately salt tolerant plant, as the critical limit for the salinity tolerance of figs is 8 $ds.m^{-1}$ (15). Many studies indicate that the addition of chemical fertilizers leads to many negative effects on human and animal health (3). Therefore, some companies have produced organic compounds that improve amelioration and reduce the negative effects of salinity, including the Clean Salt compound (2). The soil conditioner contains calcium and organic matter in its composition and contributes to the replacement of calcium instead of sodium (30). The Clean Salt also contains the organic matter that preserves the nutrients of the plant and microorganisms and increases the exchange capacity of positive ions such as calcium and potassium, and it is an important source of carbon supply for microorganisms in the soil and regulates the interaction of soil PH in addition to increasing the percentage of nitrogen and phosphorous that the plant needs (29).In view of the absence of any study on the use of the Clean Salt treatment in improving the salt tolerance of young fig seedlings, the study aimed to know the effect of adding a Clean Salt treatment on some growth traits of the fig seedlings of the studied cultivars.

Materials and methods

The experiment was conducted during the season 2019-2020 in one of the unheated greenhouses of the Department of Horticulture and Landscaping, College of Agriculture / University of Basra. The fig seedlings of the studied varieties were brought from one of the private nurseries in the province of Baghdad and shipped to the province of Basra by one of the well-known nurseries in the province by special order, knowing that the seedlings are marked with semantics to distinguish between the cultivars used. The planting medium consisting of corn and peat moss in a ratio of 1:3 was prepared with the addition of the fungicide benlite to the agricultural medium. The plants were transferred from the commercial bags to anvils with a size of (10 kg) and then the treatments were arranged on the seedlings inside the plastic house with three lines, each line representing a sector containing All treatments are factorial (3×3×2×3) according to Randomized Complete Block Design (R.C.B.D), The experiment included three factors, the first factor represents the clean salt treatment at three concentrations (0, 0.2, 0.4) ml L^{-1}, the second factor represents the salinity levels of the irrigation water at three concentrations (0, 3, 6 dSm^{-1}, and the third factor represents the cultivar Aswad Diyala and White Adriatic) The number of experimental units in the experiment was 54 experimental units, with four seedlings for each experimental unit. The data of the experiment were analyzed using analysis of variance according to the statistical program Genstat var 2012) and the averages were compared according to the least significant difference (L.S.D) test at the probability level of 0.05. The following measurements were taken for several plants from each experimental unit:

1- Plant height (cm): The plant height was measured from the place of its contact with the

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soil to the top of the main stem for each experimental unit using the metric tape and the reading was estimated in the unit (cm).

Main stem diameter (cm):

The diameter of the main stem was measured using Verneirs caliper from a height of 5 cm from the soil for each seedling of the experimental units and in (cm) units.

3- Number of nodes (nodes. plant $^{-1}$): The number of nodes for each seedling of the experimental units was calculated.

4- Number of total leaves (leaf. plant^{-1}): according to the total number of leaves for each plant (seedling) of the experimental unit plants and record its average.

5- Leaf area (cm^2 plant $^{-1}$):-

The paper area was calculated by the gravimetric method as mentioned (6).

The addition of salinity levels was started on 1/2/2020 and up to 4/15/2020 as a ground addition between each addition and another 8 days. Each addition is 15 days.

Results and discussion :-

plant height:

The results in Table (1) indicate that the salinity treatment with a concentration of 40.ml.L^{-1} was significantly excelled by giving the highest value of plant height amounted to 108.14 cm compared to the control treatment which gave the lowest value of 93.93 cm.The results showed that the salinity levels of 3 and 6 dSm m^{-1} caused a decrease in the plant height traits, where it gave the lowest value of 102.66 and 93.87 cm, respectively, compared to the control treatment, which gave the highest value of plant height, which amounted to 108.16. The Aswad Diyala cultivar also significantly excelled, where it gave the highest value for plant height of 104.88 cm compared to the White Adriatic cultivar, which gave the lowest value of 98.24 cm. The results show that there is a significant difference between the bi-interaction between the cultivars and the salinity of the irrigation water, as the Aswad Diyala cultivar irrigated with RO water excelled by giving the highest value of 113.21 cm compared to the White Adriatic cultivar irrigated with water with a salt level of 6 dSm^{-1} and gave the lowest value of 91.67 cm.As for the bi-interaction between the salinity treatment and the level of salinity of the irrigation water, it is noted from the results that there is a significant effect in increasing the height of the plant, where the control treatment of the level of salinity of the irrigation water with a concentration of 0.4 ml L^{-1} of the salinity treatment achieved the highest value of the plant height , which amounted to 114.03 cm compared to with plants irrigated with water with a salt level of 6 dSm m^{-1} and not treated with saline treatment, which gave the lowest value of 85.46 cm.As for the triple interaction, it is noted from the results shown in the table that there are significant differences in plant height.Where (Aswad Diyala cultivar irrigated with RO water and treated with a concentration of 0.4 ml L^{-1} of saline treatment) gave the highest value of 120.72 cm compared with (Adriatic White cultivar irrigated with water with a saline level of 6 dSm m^{-1} and not treated with saline treatment) which gave The lowest value was 81.91 cm

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Table (1): The effect of the Clean Salt treatment, the salinity of irrigation water and the cultivar and their interactions on plant height(cm)

Interaction between cultivars and salinity processor	The salinity of the irrigation water (ds.m-1(			Clean Salt (ml.L-1(	cultivars
	6	3	0		
97.40	89.00	96.71	106.50	**0**	**Aswad Diyala**
105.95	97.42	108.03	112.41	**0.2**	
111.29	101.75	111.39	120.72	**0.4**	
90.45	81.91	90.40	99.03	**0**	**White Adriatic**
99.28	94.60	100.31	102.93	**0.2**	
104.98	98.50	109.11	107.34	**0.4**	
N.S	3.605			**L.S.D 0.05**	
cultivars average					
104.88	96.06	105.38	113.21	**Aswad Diyala**	**Effect of interaction between cultivars and salinity of irrigation water**
98.24	91.67	99.94	103.10	**White Adriatic**	
1.202	2.081			**L.S.D 0.05**	
average salinity processor					
93.93	85.46	93.56	102.77	**0**	**The effect of the interaction between the salinity treatment and the salinity of the irrigation water**
102.62	96.01	104.17	107.67	**0.2**	
108.14	100.13	110.25	114.03	**0.4**	
1.472	2.549			**L.S.D 0.05**	
	93.87	102.66	108.16	**Average salinity of irrigation water**	
	1.472			**L.S.D 0.05**	

Stem diameter (cm)

The results in Table (2) indicate that adding a Clean Salt treatment with a concentration of 0.4 ml L^{-1} significantly excelled and the average stem diameter, as it gave the highest value of 1.65 cm compared to the control treatment that gave the lowest value of 1.23 cm. The treatment at the salt level of 6 dSm m^{-1} gave the highest average of stem diameter of 1.67 cm compared to the control treatment, which gave the lowest average of 1.18 cm, and the Aswad Diyala cultivar was significantly excelled by giving

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the highest average of stem diameter of 1.57 cm compared to the White Adriatic cultivar, which gave the lowest average. It was 1.30 cm.As for the bi-interaction between the cultivar and the salinity treatment, the Aswad Diyala cultivar treated with a concentration of 0.4 ml L^{-1} of the salinity treatment gave the highest value of 1.85 cm compared with the white Adriatic cultivar that was not treated with the salinity treatment, which gave the lowest diameter of 1.11 cm.The bi-interaction between the cultivars and the salinity levels had a "significant" effect, where (Aswad Diyala cultivar irrigated with water with a salt level of 6 dSm m^{-1}) excelled by giving the highest value of plant diameter, which was 1.83 cm compared to "White Adriatic cultivar irrigated with RO water, which gave the lowest value for stem diameter 1.05 cm.As for the bi-interaction between saline concentrations and the Clean Salt treatment, the plants irrigated with water of 6 dSm m^{-1} and the treatment with a concentration of 0.4 ml L^{-1} of the salinity treatment excelled them by giving the highest value of stem diameter of 1.93 cm. In comparison with the control treatment of saline treatment and irrigated with RO water), which gave the lowest value of stem diameter amounted to 1.00 cm.

Table ((2) Effect of Clean Salt treatment, irrigation water salinity and cultivar and their interactions on stem diameter (cm)

Interaction between cultivars and salinity processor	**The salinity of the irrigation water (ds.m-1(**			**Clean Salt (ml.L-1(**	**cultivars**
	6	**3**	**0**		
1.34	1.56	1.35	1.10	**0**	**Aswad Diyala**
1.51	1.78	1.43	1.31	**0.2**	
1.85	2.15	1.89	1.51	**0.4**	
1.11	1.25	1.20	0.89	**0**	**White Adriatic**
1.33	1.54	1.29	1.16	**0.2**	
1.44	1.71	1.53	1.09	**0.4**	
0.055	N.S			**L.S.D 0.05**	
cultivars average					
1.57	1.83	1.56	1.31	**Aswad Diyala**	**Effect of interaction between cultivars and salinity of irrigation water**
1.30	1.50	1.34	1.05	**White Adriatic**	
0.031	0.055			**L.S.D 0.05**	
average salinity processor					
1.23	1.41	1.28	1.00	**0**	**The effect of the interaction between the salinity treatment and the salinity of the irrigation water**
1.42	1.66	1.36	1.24	**0.2**	
1.65	1.93	1.71	1.30	**0.4**	
0.039	0.067			**L.S.D 0.05**	
	1.67	1.45	1.18	**Average salinity of irrigation water**	
	0.039			**L.S.D 0.05**	

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Nodes number:

Table (3) showed that the concentration treatment of 0.4 ml L^{-1} of the saline treatment was excelled by giving the highest value of the number of Nodes amounted to 37.93 Nodes compared with the control treatment that gave the lowest value of 20.75 Nodes .The same table showed the effect of salinity levels, where the level of 6 dSm^{-1} led to a significant decrease in the number of Nodes, which gave the lowest value of 24.42 Nodes compared to the control treatment, which gave the highest value of 34.22 Nodes .As for the cultivar , the Aswed Diyala cultivar was significantly excelled by giving the highest value of 32.44 Nodes compared to the White Adriatic cultivar, which gave the lowest value of 26.49 Nodes.The results showed that the interaction between the cultivars and the salinity treatment was significant, as the "Aswed Diyala" cultivar was superior to the "Aswed Diyala" cultivar added with a concentration of 0.4 ml L^{-1} of the Clean Salt treatment, where it gave the highest value of 41.26 Nodes compared to "White Adriatic" that was not treated with the salinity treatment gave a value of 18.85 Nodes. As for the bi-interaction between the cultivars and the salinity levels, the Aswad Diyala cultivar + the control treatment excelled on the salinity levels by giving the highest value of 38.02 Nodes compared with the White Adriatic cultivar irrigated with water with a salt level of 6 dSm^{-1}, which gave the lowest value of 22.03 Nodes .The results of the table show that there is a significant difference for the bi-interaction between the salinity treatment and the level of salinity of the irrigation water. The plants treated with (concentration 0.4 ml L^{-1} of the salinity treatment + the control treatment of the salinity levels outperformed by giving the highest value of 43.86 Nodes compared to the plants not treated with the salinity treatment and the irrigated ones) With water with a salt level of 6 dSm m^{-1}, which gave the lowest value of 16.37 Nodes.As for the triple interaction between the cultivar and the level of salinity of irrigation water and the salinity treatment, the treatment (Aswed Diyala cultivar + the control treatment of saline levels + concentration of 0.4 ml L^{-1} of the salinity treatment) excelled by giving the highest value of 49.23 Nodes compared to the treatment (White Adriatic + The salinity level is 6 dSm^{-1} + the control treatment for salinity treatment), which gave the lowest value of 15.77 Nodes.

Table (3): Effect of salinity treatment, irrigation water salinity and cultivar and their interactions on the number of Nodes (node $plant^{-1}$)

Interaction between cultivars and salinity processor	The salinity of the irrigation water (ds.m-1(			Clean Salt (ml.L-1(	cultivars
	6	3	0		
22.65	16.97	23.58	27.39	**0**	**Aswad Diyala**
33.41	29.87	32.91	37.45	**0.2**	
41.26	33.56	40.99	49.23	**0.4**	
18.85	15.77	19.44	21.34	**0**	**White Adriatic**
26.05	20.27	26.43	31.44	**0.2**	
34.59	30.06	35.22	38.49	**0.4**	
1.000	1.732			**L.S.D 0.05**	
cultivars average					
32.44	26.80	32.49	38.02	**Aswad Diyala**	**Effect of interaction between cultivars and salinity of**
26.49	22.03	27.03	30.42	**White Adriatic**	

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					irrigation water
0.577	1.000			**L.S.D 0.05**	
average salinity processor					
20.75	16.37	21.51	24.37	**0**	**The effect of the interaction between the salinity treatment and the salinity of the irrigation water**
29.73	25.07	29.67	34.45	**0.2**	
37.93	31.81	38.11	43.86	**0.4**	
0.707	1.225			**L.S.D 0.05**	
	24.42	29.76	34.22	**Average salinity of irrigation water**	
	0.707			**L.S.D 0.05**	

Total number of leaves (leaf.plant^{-1}):-

The results in Table (4) show a significant increase in the number of leaves when treated with saline treatment with a concentration of 0.4 ml L^{-1}, which gave the highest value of 32.78 leaf.plant^{-1}compared to plants not treated with saline treatment, which gave the lowest value of 19.52 leaf.plant^{-1}.The significant decrease in the number of leaves was observed when treated at the saline level of 6 ds.m^{-1}, as it reached 21.27 leaf.plant^{-1}, compared to the control plants, which gave the highest value of 31.04 leaf.plant^{-1}.The Aswed Diyala cultivar also excelled, giving the highest value of 29.09 leaf.plant^{-1}, compared to the White Adriatic cultivar, which gave the lowest value of 24.03 leaf.plant^{-1}.As for the bi-interaction between the cultivar and the salinity treatment, the Aswed Diyala cultivar treated with a concentration of 0.4 ml L^{-1} of the salinity treatment was excelled 36.16 leaf.plant^{-1}.It is noted from the results of the bi-interaction between the cultivars and the salinity of the irrigation water that the Aswad Diyala cultivar + control treatment of salinity levels excelled by giving the highest value of 34.23 leaf.plant^{-1}compared to the White Adriatic cultivar irrigated with water with electrical conductivity 6 dSm^{-1}, which gave the lowest value of 19.63 leaf.plant^{-1}.As for the bi-interaction between the Clean Salt treatment and the salinity levels, the plants treated with a concentration of 0.4 ml L^{-1} of the salinity treatment + the control treatment of the salinity of the irrigation water excelled and gave the highest value of 36.93 compared to the plants not treated with the salinity treatment and irrigated with water with electrical conductivity 6 dSm $^{-1}$, which gave the lowest value of 15.43 leaf.plant^{-1}.

ISSN 2072-3875

Table (4) The effect of the Clean Salt treatment, the salinity of the irrigation water and the cultivar and their interactions on the number of leaves (leaf.plant^{-1})

Interaction between cultivars and salinity processor	The salinity of the irrigation water (ds.m-1(			Clean Salt (ml.L-1(	cultivars
	6	3	0		
20.99	15.98	20.68	26.31	**0**	**Aswad Diyala**
30.12	20.76	31.88	35.72	**0.2**	
36.16	29.96	37.87	40.65	**0.4**	
18.04	14.87	17.82	21.42	**0**	**White Adriatic**
24.68	19.51	25.63	28.91	**0.2**	
29.39	24.51	30.44	33.21	**0.4**	
1.505	N.S			**L.S.D 0.05**	
cultivars average					
29.09	22.9	30.14	34.23	**Aswad Diyala**	**Effect of interaction between cultivars and salinity of irrigation water**
24.03	19.63	24.63	27.84	**White Adriatic**	
0.869	1.505			**L.S.D 0.05**	
average salinity processor					
19.52	15.43	19.25	23.87	**0**	**The effect of the interaction between the salinity treatment and the salinity of the irrigation water**
27.41	21.14	28.76	32.32	**0.2**	
32.78	27.24	34.16	36.93	**0.4**	
1.064	1.843			**L.S.D 0.05**	
	21.27	27.39	31.04	**Average salinity of irrigation water**	
	1.064			**L.S.D 0.05**	

Leaf area (cm^2 plant^{-1}) :-

The results in Table (5) showed that there was a significant difference in the leaf area when adding a Clean Salt treatment with a concentration of 0.4 ml L^{-1}, which gave the highest value of 1089.56 cm^2 compared to the "no-addition" treatment, which gave the lowest value of 250.25 cm^2. The results of the same table indicate that the salinity level of 6 dSm m^{-1} caused a decrease in the leaf area of 418.01 cm^2 compared to the control treatment, which gave the highest value of 895.41 cm^2. As for the cultivar, the Aswed Diyala cultivar excelled by giving the highest rate of 788.08 cm^2 compared to the White Adriatic cultivar, which gave the lowest average of 518.80 cm^2. The bi-interaction between the cultivars and the salinity treatment showed a "significantly excelled in the leaf area, where the Aswed Diyala cultivar + concentration 0.4 ml L^{-1} gave the highest value of 1279.06 cm ^{2} compared to the White Adriatic cultivar + the control treatment of the Clean Salt treatment, which gave the lowest value of 194.58 cm^2.The bi-interaction between the cultivars and salinity levels showed a "significant" effect, as the "Aswad Diyala" cultivar + the control treatment excelled on the salinity levels by giving the highest value of 1111.37 cm^2 compared to the "White Adriatic" cultivar + the salinity level of 6 dSm^{-1}, which gave the lowest value of 352.68 cm^2. It was noted that there was a significant difference between the two interactions between the salinity treatment

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and the salinity levels, where the treatment (concentration 0.4 ml L^{-1} of the salinity treatment + the control treatment of the salinity of the irrigation water) was excelled by giving the highest percentage of 1388.62 cm^2 compared to (the control treatment of the salinity treatment + the salinity level of 6 $ds.m^{-1}$) gave the lowest value of 138.49 cm^2.As for the triple interaction between the cultivar and the Clean Salt treatment and the salinity of the irrigation water, the treatment (Black Diyala cultivar + the control treatment of salinity levels + concentration of 0.4 ml L^{-1} of the salinity treatment) excelled by giving the highest value of 1648.76 cm^2 Compared with the treatment (White Adriatic cultivar + 6 dSm m^{-1} salinity level + control treatment of Clean Salt), it gave the lowest value of 102.16 cm^2.

Table (5) The effect of the Clean Salt treatment, the salinity of irrigation water and the cultivar and their interactions on the leaf area (cm^2 $plant^{-1}$)

Interaction between cultivars and salinity processor	The salinity of the irrigation water (ds.m-1(			Clean Salt (ml.L-1(	cultivars
	6	3	0		
305.91	174.82	243.82	499.10	**0**	**Aswad Diyala**
779.29	402.74	748.86	1186.26	**0.2**	
1279.06	872.44	1315.98	1648.76	**0.4**	
194.58	102.16	169.29	312.30	**0**	**White Adriatic**
461.78	310.79	476.97	597.57	**0.2**	
900.06	645.10	926.59	1128.48	**0.4**	
41.32	58.25			**L.S.D 0.05**	
cultivars average					
788.08	483.33	769.55	1111.37	**Aswad Diyala**	**Effect of interaction between cultivars and salinity of irrigation water**
518.80	352.68	524.28	679.45	**White Adriatic**	
21.21	38.47			**L.S.D 0.05**	
average salinity processor					
250.25	138.49	206.56	405.70	**0**	**The effect of the interaction between the salinity treatment and the salinity of the irrigation water**
620.54	356.77	612.92	891.92	**0.2**	
1089.56	758.77	1121.29	1388.62	**0.4**	
29.71	35.13			**L.S.D 0.05**	
	418.01	646.92	895.41	**Average salinity of irrigation water**	
	29.71			**L.S.D 0.05**	

Discussion:-

The main effect of the cultivar indicates that the Aswed Diyala cultivar excelled on the White Adriatic cultivar in the vegetative growth traits, which may be due to the differences between the genetic factors of each cultivar. The inhibition of growth traits due to these high levels of salinity may be due to the high concentrations of salinity in the irrigation water and its effect on growth inhibition, especially photosynthesis processes.The main

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reason for the increase in vegetative growth (number of leaves, leaf area and other growth traits) when adding a salinity treatment is due to its content of 63% organic matter, where it is a good source of nutrients of both small and large types and an increase in its availability in the soil. The organic matter improves the chemical properties of the soil through its role in the decomposition of organic compounds and the liberation of some organic acids such as humic and fulvic acid, which have an effective effect in increasing plant growth as well as its role in reducing soil PH, which increases the readiness of nutrients such as nitrogen, potassium and phosphorous.Nitrogen increases the vegetative growth of the plant through the formation of amino acids, proteins, nucleic acids, DNA and RNA, and the protoplasmic structure necessary for cell division and increasing their number and expansion, which leads to the construction of new tissues. Synthesis of chlorophyll pigment: Nitrogen is an essential element in the construction of the amino acid tryptophan, the main initiator in the construction of auxins that work on cell division and elongation and the construction of new tissues, which leads to increased vegetative growth ((19). The excelled of the salinity treatment is due to the mechanism of action of this substance, which works to break the bonding of sodium and replace it with calcium, which facilitates the process of washing the elements. the following equation

$$Ca(Clay)+2Na^{+} \longleftrightarrow Na_2(Clay)+ Ca^{+2}$$

In addition, it contains organic matter that improves soil properties by reducing bulk density, improving soil structure, reducing salt accumulation and increasing soil moisture content, in addition to considering it as an "additional" store of nitrogen, phosphorous and potassium, and stimulating the activity of microorganisms in the soil (20).

References

1- Al-Tahafi, Sami Ali Abdel Majid, Abdel Sarab Abdel Hussein, Hamed Ajeel and Nima Hadi Azab (2015). Response, growth and yield of Gujarat (Hibiscus sabdariffa L.) to the addition of a salinity treatment (Clean Salt) and spraying with organic fertilizer (Humic Aljohata) in highly saline soils. Kufa Journal of Agricultural Sciences, 7(1): 73-93.

2- Halfy, Muhammad Amin. (2015). Modern methods of disposal of chemical fertilizers. Second Edition . Arab House for Publishing and Distribution. The Egyptian Arabic Republic .

3- Al-Hayani, Ali Muhammad Abd, Diaa Abd Muhammad Al-Tamimi and Nasreen Muhammad Al-Hathal (2016), the effect of spraying with humic acid on the tolerance of Cleopatra seedlings to salinity of irrigation water. Basra Journal of Agricultural Sciences 29 (2): 474-461.

4- Al-Zubaidi, Ahmed Haidar and Shatha Majid Al-Rubaie. 2002. Potassium thermodynamics in Iraqi soils. Jerash for Research and Studies. 7(1):23-32.

5- Abd al-Wahed, Aqil Hadi (2012). The effect of salt stress on the content of date palm seedling leaves, Phoenix dacttylifera L., from substances similar to plant hormones. Basra Journal of Agricultural Sciences. 38 (1): 79-72.

6- Morsi, Mustafa Ali, Abdel-Gawad, Abdel-Azim Tawfiq, and Hassan Ali (1968). Fundamentals of Agricultural Research, Anglo-Egyptian Library - Cairo - Egypt.

7- Abdel, C.G. and Al-sabari M.R., 2009. Production of well irrigated radishes *(Raphanus sativus* L.): 3- The influence of naphthalene-3- acetic acid (NAA) on growth and yield of furrow cultivated Local black radish cultivar. Babylon Education Journal, 1(5), pp. 98-106 .

8- Al-Ailaf, I. H. I. 2015. Agriculture, Service and Production, Fruit, Fig. University of Mosul,College of Agriculture and Forestry –

9-Ayers, S. R. & Westcost, W. D.(1976). Water quality for agriculture, FAO Irrigation and Drainage Paper 29. Food and Agriculture Organization of the United Nations. Rome, Italy.

10- Bachir Bey M. and Louaileche H. 2015. A comparative study of phytochemical profile and in vitro antioxidant activities of dark and light dried fig (Ficus carica L.) varieties. J. Phytopharmacol. 4 (1):41-48.

11- Ben-Ahmed, C. Ben-Rouina, B.; Athar, H. and Boukhriss, M .(2006). Olive tree(Olea europea L.). cv. Chemlali-under salt stress , water relations and ione content, Pak. J.Bot, 38:1477-1484 Demiral, M.(2005).Comparative response of two olive (Olea europea L.)cultivars to salinity .Turk. J.Agric. 29:267-274.

12- Chesa ,I. 2000 . Fig . Chapter II . p.p. 245 – 269. In S. M. Miler. Post harvest physiology and storage of tropical and subtropical fruits . CAP. International

13- FAO ,2019. http://www.fao.org/home/en/

14- Harrison, R. D.(2005). Figs the university of Tropical rain forests. Bio scince. 55 : 1053 – 1064.

15- Isaac , O. ,(2000) . Die Ringeblume awell known medicinal herb under newst considerations .Hippokartes verlag Gmbh , Stuttgart . PP : 138-142

16- Khairuddin, M., Haron, H., Yahya, H. & Che Malek, N. 2017. Nutrient compositions and total polyphenol contents of selected dried fruits available in Selangor, Malaysia. Journal of Agricultural Science 9(13): 41-49.

17- Mars, M., K. O. Chatti, , Saadoud, , A.Salhi – Hanna Chi, , M.Trifi, and M.Marrachi, (2008) Fig Cultivation and genetic resources in Tunisia . An overview. Actuator. 798 : 27 – 32.

18- McCauley, A. ; Jones, C. and Olson-Rutz, K. (2017). Soil pH and organic matter. Nutrient Management Module, No. 8.

19- Taiz,L.and Zeiger ,E.(2006).plant physiology.4th edition ,Sinauer Assuciates,inc.USA.

20- Van Breusegem, F. ; Vranová, E. ; Dat, J. F. and Inzé, D. (2001). The role of active oxygen species in plant signal transduction. Plant Science, 161(3): 405-414.

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