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RESPONSE OF SOME OLIVE CULTIVARS TO POTASSIUM LEVELS UNDER SALINITY CONDITIONS IN HYDROPONICS SYSTEM

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ABSTRACT

A study was carried out for the effect of different levels of salinity i.e. (0,60 and 120mM (Nacl) and potassium levels i.e 0 and 30mM (k_2So_4) on growth and chemical composition of seedlings of two olive cultivars karotina and picwal during 2009 and 2010 seasons at Inshas Research Station, El-Sharkia Governorate, Water Management Research Institute, Egypt. The seedlings were grown in hydroponics system (nutrient film technique NFT). Results revealed that, increasing salinity levels caused a gradually decrease in plant height, stem diameter, number of leaves/plant, number of branches/plant, N, P and K percentages, while Na ,Ca and Mg percentages were increased gradually with increasing of salinity levels.

Potassium addition increased in plant height, stem diameter, number of leaves /plant, number of branches / plant, N, P and K percentages, while Na, Ca and Mg percentages were decreased. The results revealed the necessity of potassium fertilizer to reduce negative effects of salinity on plant growth.

Karotina cultivar gave the highest values of previous parameters than picwal cultivar and seems to be more than tolerate salinity compared with picwal cultivar.

Keywords: Salinity – Karotina – Sharkia – Hydroponice – Potasium

INTRODUCTION

Efforts have been done to develop hydroponics systems for using in propagation by cutting (Soffer and Burger (1988), Bertram (1991), and Tawfik (2001). These techniques have many advantages vis availability of high oxygen concentration which stimulate root initiation and development, facilitating of water influx to the cutting, simplicity and low cost.

In Egypt, wide areas of newly reclaimed lands are to be planted with different fruit trees using different water recourse such as from wells and drainage water. These resources may contain different levels of salinity. Fruit species, for example olive trees and even varieties exhibit different tolerance to level and kind of salinity (El-Saidi et al., 1988).

In most area where some fruit trees are irrigated with saline water enough for measurable effect on growth and yield, the main salts causing injury are chlorides (Abou - Rayya et al., 1988). Several researchers have investigated the effect of salinity on the growth of different species of mainly plants and they reported that, salinity conditions usually reduced plant growth according to type of salt and its concentration. In this respect. Downton (1977). explained this effect was a result of increasing level of chloride in the leaves which decreased the rates of Co_2 fixation. The reduction in photosynthesis could be attributed to increased residual (mesophyll) resistance to Co_2 fixation. El-Deen et al (1979). studied the effect increasing concentration of salinity levels from 0.0 to 4000 ppm on seedlings of olive (Shamlaliy cv) they found that plant height, number of leaves and leaf area index were reduced with sharply as a result to increase salinity levels. Patil and Waghmare (1983). who mentioned that all indices that were studied on pomegranate plants such as plant height, number of leaves, stem diameter, plant spread, leaf area decreased with increasing salinity. Hassan et al (1986). reported that olives appear to have medium salt tolerance. Hanafy (1989). on Majarana hortensis plants found that most salinity levels caused a clear reduction in N,K and Ca percentages while Sodium percentage increased progressively as Nacl levels increased. Shehata and El-Tantawy (1994). on Melia azederach stated that the high levels of salinity reduced the fresh and dry weight of plants. El- Said et al (1995) studies on the susceptibility of six olive cultivars to salinity, they found that increasing of concentration of salts led to a decrease in plant height, stem diameter, leaves number/plant leaf area and total fresh and dry weight. They added that arrangement cultivars in tolerance to salinity were Meshan, kornaki, Tofahi, Manzanelo, Agizi, picwal, Ferdal, Hamedd, respectively. Azza and El-Mesiry (2000). on Sesbania aegvptiaca stated that increasing the salinity levels caused reduction in N and P contents while increased K content levels (250,500,1000 and 1500ppm). El-Ward et al (2004). Studied the effect of different salinity on growth of olive seedlings cv. "Khodiery". They found that the highest values of plant height, number of leaves/plant, number of branches/plant, stem diameter, length of root, fresh weight and dry weight of leaves and roots produced from control treatment in the two seasons while the lowest values of all previous characters produced from irrigation with saline water at the high level (1500ppm) and all the previous characters gradually decreased with increasing salinity concentration in the two seasons in most cases. Abd-Rabou, Farida et al (2008). Reported that increasing of concentration of salts led to a decrease in plant height, stem diameter, leaves number/plant, leaf area and total fresh and dry weight on Jackfruit and papaya seedlings.

Potassium (k^+) is considered to be one of the osmoregulating elements in plant cell especially in sugar storing plants. Frantzeskakis et al (1967) found that the potassium suppling power of highly calcareous soils was low when exchangeable K was less than 100 ppm under these conditions; it is highly probable that K deficiency symptoms will occur in olive trees. Rains and Epstein (1965) stated that potassium which is an essential cytoplasmic element, because of its involvement in osmotic regulation and it competitive effect against Na^+. Yassoglou and Gavalas (1979) found a significant positive correlation between exchangeable soil K and leaf K of Olive under nonsalin conditions. Awad and Rehm (1985). Found that application of high level of potassium significant increased the dry matter yield and some mineral contents of purple nutsedge plant. Kandil (1993). Suggested the increased K fertilization may be required under salinity conditions to contract the competitive effects of high concentrations of cations such as Ca^{2+} and Na^{+}. Youssef and Saleh (1994). reported that K^{+} is Known to counter act the harmful effects of Na. the increase in Na^{+} and Cl^{-} and decrease in K^{+} in different tissues of bean plants under salinity can be directly related to the reduction in the dry matter. Also salinity caused a reduction in total dry weight which was associated with increasing levels of sodium and chloride in plants and decreasing level of potassium uptake. And they added that the necessity of potassium fertilizer to reduce negative effects of salinity on plant growth. Many researchers reported that irrigation with saline sea water had a clear effect on decreasing plant growth. Hassan (1995). Reported that the under saline irrigation water use condition K deficiency systems can be disappeared through salinity hazard on leaves which led to dry out of the edges of leaves. Kandeil and El-Maddah (1997). reported that potassium addition generally increased the dry weight of leaves, stems and roots in bean plant at moderate rate (2000ppm) than the control one. And they found that potassium supply increased its content of been plant- Also, sodium content has increased up to application of 300ppm K-level and then decreased.

The objective of this work was to determine the effect of different levels of salinity as well as potassium levels on some growth and chemical content of two olive cultivars in hydroponics system.

MATERIALS AND METHODS

This investigation was conducted during the two successive seasons, 2009&2010 at Enshas Research Station, of Water Requirements Research El- Sharkia Governorate, Water Management and Irrigation Systems Research Institute (National Water Research Center), which is located in East Nile Delta region in Egypt. The site is located at 30º-24' N. and 31 º -35' E. longitude of with an elevation of about 25.5 meters above sea level.

The experiments were performed to study the effect of different salinity treatments as a form (NaCl) with or without addition of potassium element as a form Potassium Sulphate (K_2SO_4) under hydroponics system (nutrient film technique NFT). on the growth and chemical composition of some olive cultivars under lath-house conditions.

Hydroponics units were designed by using 6 plastic pipes. Each one pipe with 8 inches diameter and 6 m long with upper 18 holes every 30 cm with 10 cm diameter for putting olive seedlings were covered with a sheet of plastic for protective from direct of sunrays.

The pipes were putting up carriers with height 1 m made of galvanized iron with a gentle slope 1 cm/1m so that solution could be flowed under the influence of gravity. Each pipe was contact with tank of plastic contained 20 liters of solution. Each tank is equipped with small electrical pump for solution pumped in P.V.C hose (0.5 inch diameter) from the tank to higher end of pipe on shape film. Solution was flowed to lower end of pipe and accumulated in the tank with continuous recirculation.

The solutions were continuously aerated and were maintained at a pH of 6.5-7 by means of Hcl or NaoH. The solution was renewed twice-weekly, in order to avoid a significant reduction in concentration of nutrients.

Standard nutrient solution (S.N.S)

Standard nutrient solution (C.F. Douglas 1987) was used. It was component of commercial fertilizers (Macroelements) g/100 liter water and microelements mg/100 liter water as shown in Table (1) to given the following concentration of essential nutrient elements for seedlings of olive as a shown in Table (2).

Table (1). Amounts of Macro. and Microelements for Standard Nutrient Solution (S.N.S)

No	Macronutrient elements	g/100L water	No	Micronutrient elements	mg/100 L water
1	Urea $Co(NH_2)^2$	30	1	Iron Sulphate ($FeSO_4$).	6000
2	Calcium super phosphate $Ca(H_2PO_4)_2$.	40	2	Magnesium Sulphate ($MgSo_4$).	600
3	Potassium Sulphate (K_2SO_4).	60	3	Copper Sulphate ($CuSO_4$).	40
4	Calcium Nitrate ($Ca\ No_3$).	59	4	Zinc Sulphate ($ZnSO_4$).	40
5	Magnesium Sulphate ($MgSO_4$).	36	5	Boric acid (H_3BO_3).	180
6	Calcium Sulphate ($Ca\ SO_4.2H_2O$).	20	6	Ammonium Molubedate $(NH_4)6\ MO_7O_2$.	40
	Total weight	245		Total weight	6900

Table (2). Concentrations of Essential Nutrient Elements for Seedlings of Olive.

No	Element	mM/L	mg/L	No	Element	mM/L	mg/L
1	Nitrogen (N)	14.9	208	7	Iron (Fe)	0.218	12
2	Phosphorus (P)	2.4	75	8	Manganese (Mn)	0.036	2
3	Sulpher (S)	6.6	211	9	Zinc (Zn)	0.002	0.1
4	Calcium (Ca)	4.4	176	10	Copper (Cu)	0.002	0.1
5	Potassium (K)	7.5	294	11	Boron (B)	0.028	0.3
6	Magnesium (Mg)	2.0	50	12	Molybdenum (Mo)	0.002	0.2

Ten – months old seedlings of two Olive cultivars with height of 25 ± 2 cm, 0.4 cm stem diameter at the base and carry 30 ± 5 leaves were transferred to plastic pipes which designed for hydroponics system (N.F.T.) on Feb. 15 for both seasons and the seedlings were adapted on the new technique, up to March 15 by addition (SNS) only.

From March 15 up to June 15 the seedlings were received (SNS) in addition Nacl and K_2So_4 levels according to the treatments whereas salinity levels were increasing by 20mM each 15 days to avoid plants sock. SNS was checked twice a week and correct properly. The experiment continued for 6 successive months and ended on December 15 for two seasons respectively. The experiments were laid out in a split plot design with three replicates. Each replicate consists of 3 seedlings. The combinations of salinity and potassium levels were arranged in the main plots, while the sub plots received olive cultivars. The experiment consisted of 108 seedlings with the same age, length and number of leaves approximately. (6 treatments X 2 cultivars X 3 replicates X 3 seedlings equal to 108 seedlings.

The combinations of Nacl X K_2SO_4 treatments under the standard nutrient solutions (S.N.S) were as follow.

1- Salinity (S) and Potassium (K) treatments:

T1: S1+ K1	T4: S2 + K2
T2: S1+ K2	T5: S3 + K1
T3: S2+ K1	T6: S3 + K2

Where: S_1 = 0.0mM (Nacl), S_2= 60mM (Nacl) and S_3=120mM (Nacl)

K_1= 0.0mM (k_2S_{04}) and K_2= 30mM(k_2S_{04})

2- Olive cultivars (C):

1-C_1: Picwal. 2- C_2: Karotina.

Each treatment arranged in one plastic pipe 8" diameter with 6m long.

(Hydroponics System) which consisted of 6 P. pipes. One P. pipe for one treatment. Whereas each one pipe consisted of 18 holes with 10 cm diameter and per each hole was putting one seedling and fixed. The holes from 1^{st} to 9^{th} were grown seedlings of picwal cultivars (C_1) then from the holes number 10^{th} to 18^{th} were grown seedlings of karotina cultivars (C_2). And thus the same arrangement with other pipes. A stander nutrient solution (S.N.S) was used in order to achieve the nutrient needs of olive cultivars. A split split plot design with three replicates was used. The data were subjected sharing the same letter were not statistically significant according to L.S.D test (Snedecor and Cochran (1974).

1- Measurements and observations for all treatments in this study data were recorded and estimated as followes.

1- Plant height (cm).
2- Number leaves /plant.
3- Number of brunches/plant.
4-Stemdiameter (mm).

2- Chemical analysis:

The chemical analysis was done on full expanded leaves. The total N concentration was measured using the kjeldahle's method, (Allen, 1959). Phosphorus was determined colorimetrically with spectrophotometer and magnesium and calcium in leaves deremined by atomic absorption (Jackson, 1962), potassium and sodium were determined by means of Flame Photometer (piper, 1950).

RESULTS AND DISCUSSION

Height of seedling

Data presented in Table (3) show the effect of salinity treatments on two olive cultivars under two different levels of potassium on seedling height during two successive seasons and combined. The data indicated that salinity levels had significant effect on olive cultivars as expressed here in seedling height in the two seasons and combined. The data also height seedling decreased with increasing salinity levels. The reduction value in seedling height was about 9.59% in treatment S_3 (120mM of Nacl) compared with treatment S_1 (control). Meanwhile the treatment S_2 reduced 4.18% of seedling height. These results are in line with those found by Abd El-Aziz et al (1985) on mango, El-Ward et al (2004) on olive and Abd–Rabou Farida et al (2008) on jackfruit and papoya seedlings.

The negative effect of salinity on growth characters was reported by Sameni and Bassiri (1982) who reported that highly soluble salts in the root zone cause physiological scarcely of water to plant by raising the osmotic pressure in the soil solution. Thus the availability of water may become so critically low and in turn growth parameters are inhibited. This might be attributed to the harmful effect of salts on water and nutrient absorption, which was necessary for the metabolic process and dry matter production (Saleh et al 1993).

Whereas, treating the seedlings with K_2So_4 a concentration of 30Mm improved the plants resistance for salt tolerance. The increases in the percentage of seedling height due to application of K_2So4 were 3.1% as average for the two seasons. This increase reached the significant range. This might due to the enhanced effect of K level on the growth, increasing the photosynthetic capacity and finally assimilation. These results might be confirmed by those of (Rains and Epstein (1965), Downton (1977) and Hassan (1995).

There were significant differences in seedling height value among the studied cultivars in the two seasons and combined. karotina cultivar was significantly superior to picowal cultivar in seedling height. The difference among the two studied cultivars could be attributed to their different genetic constitutions as well as, their response to the prevailing environmental conditions. A similar varietal difference in growth of olive was reported by El-Said et al (1995).

Seedling diameter (mm)

Data recorded in Table (3) show that irrigation with salin water especially with the high levels S_3 treatment significantly deceased stem diameter in the two seasons and combined. The control gave the thicknesses seedlings, while the thinnest seedlings were obtained from using high salinity level. Similar effects wer found by Azza and El-Mesiry (2000) on sesbania and aegvptiaca, Patil and Waghmare (1983) on Pomegranate, El-Ward et al (2004) on olive and Abd –Rabou, Farida et al (2008) on Jackfruit and papoya seedlings.

Table (3): Effect of salinity and potassium levels on seedling height, seedling diameter No. of leaves /seedling and No. of branches/seedling of two olive cultivars in the two growing seasons and combined.

	seedling height (cm)			seedling diameter (mm)			No. of leaves /seedling			No. of branches/seedling		
	2009	2010	combined	2009	2010	combined	2009	2010	combined	2009	2010	combined
Salinity levels (S): S1: Control	84.06	76.80	80.43	9.16	8.78	8.97	94.65	93.83	94.24	2.38	2.24	2.31
S_2: 60mM (Nacl).	80.55	73.63	77.09	7.04	6.82	6.93	75.73	73.75	74.74	1.89	1.72	1.81
S_3: 120mM (Nacl).	76.00	70.55	73.28	5.63	5.29	5.46	60.26	57.96	59.11	1.45	1.34	1.40
LSD 0.05	2.15	2.80	2.96	0.12	0.25	0.42	3.12	2.35	3.60	0.06	0.29	0.23
Potassium levels(K): K_1 : O mM (K_2So_4).	79.36	72.88	76.12	7.13	6.85	6.99	75.23	73.93	74.58	1.82	1.64	1.73
K_2: 30mM (K_2So_4).	81.05	74.43	77.74	7.42	7.08	7.25	78.33	76.43	77.38	1.98	1.89	1.94
LSD 0.05	1.53	1.42	1.47	0.17	0.23	0.35	1.86	2.28	2.60	0.07	0.27	0.24
Cultivars (C): C_1: Picwal	77.05	70.98	74.02	6.95	6.61	6.78	73.32	71.88	72.60	1.82	1.67	1.75
C_2: Karotina	83.35	76.33	79.84	7.60	7.32	7.46	80.24	78.48	79.36	1.98	1.85	1.92
LSD 0.05	4.15	4.80	4.74	0.25	0.33	0.38	1.48	2.38	3.25	0.13	0.16	0.21
Interactions: SK	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
SC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
KC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
SKC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Also treating the seedlings with 30mM (K_2 So_4) had thicker than the control in the two seasons and combined. These results agreed with those obtained by Thalooth et al (1990) who reported that potassium fertilization increased photosynthetic pigments content in sugar beet plant leaves. The positive effect of K^+ for increasing chlorophyll content in plant leaves may be due to the indirect role for K^+ element. In this respect pissark (1973) reported K-deficiency resulted in a collapse of chloroplasts in spring rape leaves.

Concerning the differences among cultivars regarding the stem diameter reached the significant level in two seasons and combined Table (3). The karotina cultivar had the thickest stem diameter and out yielded picwal by 9.11% these results, are in harmony with obtained by El-Said et al (1995).

No. of leaves/seedling

Data in Table (3) clearly show that the all salinity levels caused a reduction in No. of leaves/seedling compared with the control in the two seasons and combined. These results were emphasized by many investigators such as El-Deen et al (1979), Shehata (1992) on cupressus semperivens and Eucalyptus camaldulensis, Shehata and El-Tantawy (1994) on Melia azederach and El-Ward et al (2004) on olive as all of them stated that the high levels of salinity reduced the No. of leaves/seedlings.

For the effect of K levels on No. of leaves/seedling Data in Table (3) show clearly that it increased with increasing K concentration. These results are in agreement with those reported by kandil (1993), Hassan (1995).

There were significant differences in No. of leaves /seedling among the studied cultivars in the two seasons and combined. Karotina cultivar had the highest No. of leaves / seedling and out yielded picwal cultivar by 9.30% as average of the two seasons. Similar results were obtained by Hassan et al (1986), El-Said et al (1995).

No. of branches/seedling

The results listed in Table (3) showed that the values of No. of branches were least due to the increase in salinity levels and the decrease was significantly in the two seasons and combined.

This reduction in No. of branches/seedling were 21.65, and 39.40% at S_2 and S_3 respectively compared with the control S1 treatment as average of the two seasons. Similar results reported by El-Ward et al (2004). These results are in agreement with those findings of Pearson and Hayward (1957) they found that, irrigation of grapefruit trees with a mixture of Nacl and $Cacl_2$ caused defoliation and die back. Also, the plants differed in degree of leaf burn and defoliation according to the water and soil salinity.

Results in Table (3) showed the applied of K_2 (30mM K_2S0_4) increased the No. of brunches/seedling by 9.70% compared with control. K1 treatment (0.0 mM K_2So_4). as average in the two seasons.

Effect of interactions:

The interactions between Salinity treatments, potassium treatments and cultivars were not significant in both seasons and combined for all traits (Table 3).

2. Chemical Composition

Data in Table (4) show the effect of k. levels and salinity levels on N, P, K, Na, Ca and Mg contents in the leaves of two olive cultivars. It is evident that salinity levels caused an increase in N content in the leaves. A Clear effect on reduction in N, P and K percentages as compared with the control Plants. In this respect, Hassan *et al* (1970) found a decrease of P uptake with increasing salinity, Also the decrease of phosphate translocation with high chloride supply was observed with sunflower. Ashour *et al* (1970), kandiel and El-Maddah (1997).

This result may indicate that the change in the balance between K and Na in the tissues may affect nucleic acid synthesis (Conway and lipman 1964). At the same time Na, Ca and Mg percentages increased as salinity level increased in the two seasons and their averages. The control plants gave the highest percentages of (N, P, K), while the lowest percentages of (N, P, K), were obtained from the plants treated with the highest salinity levels (120mM Na Cl) in the two seasons and their averages. The highest Na, Ca and Mg percentages resulted from the seedlings treated with highest salinity level (120mM Na Cl), while the lowest percentages Na, Ca and Mg percentages were obtained from control treatment in the two seasons and their averages.

These results were in agreement with those obtained by Hanafy (1989). on Majorona hortensis who stated that most salinity levels caused a clear reduction in N, K and Ca percentages while Na percentage increased progressively as NaCl levels increased in both seasons. These results are in agreement with those of Hanafy (1994) on Fennel. The obtained results were similar to those obtained by Salem et al (1998). on Dodonaea viscose, Azza and El-Mesiry (1999) on leuccana leucocephala, Azza and El-Mesiry (2000) on Sesbania eagvptioca and Azza (2001) on Casuarinas glauca

As for K levels data presented in Table (4) indicated that, ther were a gradual increased the percentages of N, P and K ions in the olive leaves with increased K level up to 30mM (K_2 SO_4), While decreased the percentages of Na, Ca and Mg ions. The obtained results are parallel with the finding of Rains and Epstein (1965), Frantzekakis et al (1967), Yassoglou and Gavalas (1979), Awad and Rehm (1985), Kandel (1993"), Youssef and Saleh (1994), Hassan (1995) and Kandilel and El-Maddah (1997). The contents of the elements N, P, K, Na, Ca and Mg in the cultivars of olive as affected by potassium and salinity treatments presented in Table (4).

Table (4): Effect of Salinity X K- Levels on Chemical Composition of Dry Leaves of Two Olive Cultivars (Average of Two Growing Seasons.

Minerals Content in leaves		**N%**			**P%**			**K%**			**Na%**			**Ca%**			**Mg%**		
Cultivars (C)	**K- levels (mM/L) Salinity levels (mM/L)**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**	**K_1 (0.0mM/L)**	**K_2 (30.0mM/L)**	**Mean**
Picwal C_1	S1: control	3.65	3.80	3.73	0.16	0.21	0.19	1.35	1.52	1.44	0.53	0.48	0.51	0.42	0.38	0.40	0.24	0.21	0.23
	S2: 60mM (Na cl)	3.18	3.26	3.22	0.11	0.15	0.13	1.28	1.45	1.37	0.80	0.72	0.76	0.51	0.44	0.48	0.33	0.28	0.31
	S3: 120mM (Na cl)	2.71	2.96	2.84	0.09	0.12	0.11	1.15	1.37	1.26	0.98	0.86	0.92	0.67	0.52	0.60	0.36	0.33	0.35
Mean		3.18	3.34	3.26	0.12	0.16	0.14	1.26	1.45	1.36	0.77	0.69	0.73	0.53	0.45	0.49	0.31	0.27	0.29
Karotina C_2	S1: control	3.72	3.90	3.81	0.18	0.23	0.21	1.42	1.61	1.52	0.64	0.55	0.60	0.48	0.42	0.45	0.30	0.25	0.28
	S2: 60mM (Na cl)	3.21	3.33	3.27	0.15	0.19	0.17	1.37	1.53	1.45	0.88	0.80	0.84	0.55	0.51	0.53	0.41	0.33	0.37
	S3: 120mM (Nacl)	2.80	3.20	3.0	0.12	0.14	0.13	1.24	1.42	1.33	1.10	0.92	1.01	0.70	0.62	0.66	0.45	0.40	0.43
Mean		3.24	3.48	3.360	0.15	0.19	0.17	0.34	1.52	1.43	0.87	0.76	0.82	0.58	0.52	0.55	0.39	0.33	0.36
Average	S1: control	3.69	3.85	3.77	0.17	0.22	0.20	1.39	1.57	1.48	0.59	0.52	0.56	0.45	0.40	0.43	0.27	0.23	0.25
	S2: 60mM (Na cl)	3.20	3.30	3.25	0.13	0.17	0.15	1.33	1.49	1.41	0.84	0.7m	0.80	0.53	0.48	0.51	0.37	0.31	0.34
	S3: 120mM (Na cl)	2.76	3.08	2.92	0.11	0.13	0.12	1.20	1.40	1.30	1.04	0.89	0.97	0.69	0.57	0.63	0.41	0.37	0.39
Mean		3.22	3.41	-	0.14	0.17	-	1.31	1.49	-	0.82	0.mu	-	0.56	0.48	-	0.35	0.30	-

The data showed that the karotina cultivar had the highest percentages of N, P, K contents. Picwal cultivar had the highest Percentages of Na, Ca, and Mg content. In general there were different variations between potassium and salinity levels on N, P, K, Na, Ca and Mg contents of olive cultivars. These results are in agreement with those of El-Saidi *et al* (1988). And El-Ward et al (2004).

From the data illustrated in Tables (3 & 4), it can be concluded that Seedlings of two olive cultivars can tolerate chloride salt concentration up to 60mM, but increasing salt concentration to 120mM affected badly their growth and chemical properties, And consequently K application had reducing the injurious consequences of salinity on plant growth, whenever other measures are unavailable. The results revealed the necessity of potassium fertilizer to reduce negative effects of salinity on olive plant growth.

Karotina cultivar was more tolerance of salinity from picwal cultivar.

The work of the statistical analysis of the data using analysis of variance in three Ways and show off the results of statistical analysis proved a significant effect of salinity and potassium levels on the elements of dry matter in leaves of olive as proven moral statistical categories on the items in the dry article to olive leaf except for the component (N) did not demonstrate statistical moral his.

(LSD) to find differences between the salt and potassium and varieties levels have been using the separation test between the averages and the results were as described in Table (5) where it is clear that there are significant differences statistically between salinity and potassium levels on the elements of dry matter of the olive leaf as proven moral influence of varieties on the elements Article dry olive leaves except the element (N).

Table (5): The Results of Variance in Three Ways Analysis

		Sum of Square	Mean Square	DF	F	R^2
	Cult	0.0300000	0.0300000	1	70.69**	0.97
N	Salinity	1.4703500	0.73517500	2		
	Klevel	0.11603333	0.11603333	1		
	Cult	0.00240833	0.00240833	1	59.34**	0.97
B	Salinity	0.01211667	0.00605833	2		
		0.00440833	0.00440833	1		
	Cult	0.01840833	0.10840833	1	255.29**	0.99
K	Salinity	0.06615000	0.03307500	2		
	Klevel	0.09900833	0.09900833	1		
	Cult	0.0225333	0.0225333	1	136.09**	0.98
NA	Salinity	0.3492666	1.1746333	2		
	Klevel	0.0300000	0.0300000	1		
	Cult	0.00963333	0.00963333	1	44.65**	0.96
Ca	Salinity	0.08351667	0.0417583	2		
	Klevel	0.01613333	0.1613333	1		
	Cult	0.01267500	0.1267500	1	77.50**	0.97
Mg	Salinity	0.03751667	0.01875833	2		
	Klevel	0.00700833	0.00700833	1		

CONCLUSIONS

In Egypt, wide areas of newly reclaimed lands are to be planted with different fruit trees using different water recourse such as from wells and drainage water. These resources may contain different levels of salinity. Fruit species, for example olive trees and even varieties exhibit different tolerance to level and kind of salinity.

Potassium (k^+) is considered to be one of the osmoregulating elements in plant cell especially in sugar storing plants. The potassium suppling power of highly calcareous soils was low when exchangeable k was less than 100ppm under these conditions; it is highly probable that k deficiency symptoms will occur in olive trees.

This investigation was conducted during the two successive seasons, 2009&2010 at Enshas Research Station, of Water Requirements Research El- Sharkia Governorate, Water Management and Irrigation Systems Research Institute (National Water Research Center), which is located in East Nile Delta region in Egypt. The Seedlings were grown in hydroponics system (nutrient film technique NFT).

Results revealed that, increasing salinity levels caused a gradually decrease in plant height, stem diameter, number of leaves/plant, number of branches/plant, N, P and K percentages, while Na ,Ca and Mg percentages were increased gradually with increasing of salinity levels.

Potassium addition increased in plant height, stem diameter, number of leaves /plant, number of branches / plant, N, P and K percentages, while Na, Ca and Mg percentages were decreased. The results revealed the necessity of potassium fertilizer to reduce negative effects of salinity on plant growth.

Karotina cultivar gave the highest values of previous parameters than picwal cultivar and seems to be more than tolerate salinity compared with picwal cultivar.

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استجابة شتلات بعض أصناف الزيتون لمستويات البوتاسيوم تحت ظروف الملوحة فى نظام المزارع المائية

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أجرى هذا البحث فى محطة بحوث المقننات المائية بإنشاص – محافظة الشرقية التابعة لمعهد بحوث إدارة المياه وطرق الرى – المركز القومى لبحوث المياه خلال موسمى 2009 ، 2010 لدراسة تأثير مستويات مختلفة من الملوحة (صفر ، 60 ، 120 مللى مول من كلوريد الصوديوم (Nacl) ومستويات البوتاسيوم (صفر ، 30 مللى مول من كبريتات البوتاسيوم (K_2So_4) على بعض صفات النمو والمكونات الكيميائية على شتلات صنفين من الزيتون (بيكوال – كاروتينا).

وكانت أهم النتائج المتحصل عليها.

- زيادة مستويات الملوحة تسببت فى انخفاض تدرجى فى قيم كلاً من ارتفاع النبات ، قطر الساق، عدد الأوراق /نبات، عدد الأفرع/نبات وكذلك نسب K, P, N بينما زادت نسب كلاً من Mg , Ca , Na تدريجاً بزيادة مستوى الملوحة.
- زيادة مستويات البوتاسيوم أدت إلى زيادة قيم كلاً من أرتفاع النبات ، قطر الساق ، عدد الأوراق /نبات ، عدد الأفرع/نبات وكذلك نسب K, P, N بينما نقصت نسب كلاً من Mg , Ca , Na تدريجاً بزيادة مستوى الملوحة.
- ومن النتائج يمكن أن نستنتج أن إضافة البوتاسيوم ضرورى جداً لتقليل التأثير السلبى للملوحة على النمو والمكونات الكيميائية لصنفى الزيتون بيكوال – وكاروتينا محل الدراسة.
- أعطى الصنف كاروتينا أعلى القيم لصفات النمو السابقة وكذلك المكونات الكيميائية. هذا ويبدو أن الصنف كاروتينا أكثر تحمل لتأثيرات الملوحة عن الصنف بيكوال.