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NUTRIENTS UPTAKE AND YIELED OF ONION PLANT AS AFFECTED BY NITROGEN FERTILIZATION, IRRIGATION WATER SALINITY, IRRIGATION WATER SAR AND THEIR INTERACTION IN SANDY SOILS .

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ABSTRACT

A pot experiment was performed at Soils Department, Faculty Of Agriculture Mansoura University during 2002 growing season, to study the effect of nitrogen fertilization (0.606,0.909 and 1.212 g nitrogen pot^{-1} , irrigation water salinity levels (0.4, 1.0, 2.0 and 3.0 dSm^{-1}) , water sodium adsorption ratio values (3.5, 7.0 and 14.0) and their interaction on nutrients uptake and yield of onion plant .

The obtained results showed that.:

Under the experimental conditions, the relative bulbs fresh weight was decreased by 62.76% whenever the irrigation water salinity was increased from 0.4 dSm^{-1} (control) to 3.0 dSm^{-1} . Also , raising the irrigation water SAR value from 3.5 to 14.0 decreased the bulbs fresh weight by 31.19 % . The bulbs fresh weight was increased as nitrogen fertilization dose increased at any level of irrigation water salinity and / or irrigation water SAR value , and the positive effect of 1gm nitrogen addition pot^{-1} is equal to the negative effect of raising irrigation water salinity by 1.412 dSm^{-1} or raising SAR of the irrigation water by 13.851 .

The bulbs fresh weight return was increased as a result of increasing the nitrogen applied dose, from N1 to N3 with increasing the irrigation water SAR up to the highest level was used under the lowest level of irrigation water salinity ,while , under the highest one , the adverse trend was obtained with the same raising of both N fertilization and irrigation water SAR .

Raising the nitrogen fertilization dose , reduced the culls dry weight / bulbs +culls dry weights ratio in contrary to the effect of the higher irrigation water salinity and /or irrigation water SAR.

Within the studied range , increasing the nitrogen applied dose led to improve the nitrogen distribution pattern among the plant parts against to the effect of higher salinity and / or sodicity of irrigation water.

The relative phosphorus use efficiency , was increased by 50.48 % with increasing the nitrogen applied dose, from N1 to N3 at the first level each, irrigation water salinity and irrigation water SAR. Increasing the irrigation water salinity increased from 0.4 to 2.0 dSm^{-1} , beside increasing the N applied dose from N1 to N 3 the relative phosphorus use efficiency was increased by 15.797% . Raising the irrigation water SAR from 3.5 to 14.0 beside the previous increase in both N fertilization , and irrigation water salinity reduced the relative phosphorus use efficiency by 22.417 %

The highest irrigation water salinity and /or irrigation water SAR decreased the potassium uptake by bulbs more than in other parts, and nitrogen increased the potassium uptake by bulbs more than in other parts .

The multi linear regression equations revealed that ,raising the irrigation water SAR by unity caused a negative effect approximately equal to that of 1/10 dSm^{-1} with respect of fresh or dry matter production , and equal to that of 2/10 dSm^{-1} with respect of total nitrogen, phosphorus and potassium uptake . Hence raising irrigation water SAR within the studied range affected nutrients uptake rather than fresh or dry matter production .

INTRODUCTION

The shortage of good quality irrigation water quantity necessitates the use of drainage water (4.7×10^9 m^3 in Nile Delta ,0.095×10^9 m^3 in Fayoum and 1.15×10^9 m^3 in upper Egypt , Abou –Zeid 1992) , and huge amount of ground water. Such waters in most cases, are characterized by high salinity . The drainage water salinity differs from time to time, and from source to another. The ground water salinity of Nile valley increased in the east and west directions (ranging between 500-3000 ppm) , so the ground water salinity in Nile delta increases in the east and north direction due to sea water intrusion, also increases in western direction of desert fringes (ranging between 1500-5000 ppm) , Hefny (1992) . values of sodium adsorption ratio in these water sources are also higher than that is in Nile water . These two parameters are dominant factors affecting plant growth under Egyptian conditions.

Onion is one of the main Egyptian crops grown in the new reclaimed desert soils, which is served by the reused water, shallow ground water aquifers or by Nile – drainage water mixture .

The present work was held to evaluate the effect of raising the nitrogen applied dose, under different levels of irrigation water salinity associated with different values of sodium adsorption ratio, on onion productivity and nutrients uptake (N, P, and K), under conditions dose not permit leaching the accumulated salt.

MATERIALS AND METHODS

The present experiment was conducted at the Soils Dept. Fac. Of Agric. Mansoura Univ. in winter 2002, to study the interaction effect of nitrogen fertilization, and different values of each irrigation water salinity and sodium adsorption ratio on onion plant .

Closed plastic pots were filled with sandy soil (7 kg for each) having pH value of 7.4 , EC of paste extract 2.4 dSm^{-1} and total carbonate of 0.4% (soil properties were determined according to Jackson,1967) .

The pots of 18 cm diameter were arranged to be in split-split plot design with three replicates .

Four levels of water salinity: control of EC 0.4 , 1.0, 2.0 and 3.0 dSm^{-1}, combined with three values of sodium adsorption ratio , 3.5, 7.0 and 14.0 to form 12 water treatments , such treatments were prepared as described by Labeeb (2002). Three levels of nitrogen fertilization, 0.606 (N1), 0.909 (N2)and 1.212 (N3)g nitrogen pot^{-1},corresponding to 100,150 and 200 kg N fed^{-1}.

At the beginning of January(2002), the soil was moistened to reach the saturation and 5 seedlings (60 days old) of onion, var. Giza 20 were transplanted . After 15 days the plants were thinned to two plants in each pot. Soil water contents were adjusted to be at the field capacity (14%) every five days by weighing.

All fertilizer requirements were added to each pot as solutions. Fifty ml of a solution containing 7.5 gm P L^{-1}, 0.112 gm B L^{-1} , 0.303 gm iron in ferrous form L^{-1} , 0.299 gm Cu L^{-1}, 0.224 gm Zn L^{-1} and 0.224 gm Mn L^{-1} was added 30 days after transplanting .

Fifty ml of solution containing the half of the N dose as urea and 1.25 g of K as K_2SO4 was added twice at 30 and 70 days after transplanting .

In 28 th April, (2002) ، when about 70-80% of the tops were bent over , the soils of the pots were turned over a 2 mm sieve under slowly effluent of tap water until the roots become clean , then separated and air dried. The plants were cured at room temperature for a month, culls and bulb yields were separated and weighed .

Roots, culls and bulbs were dried at 70 °C , weighed , ground and wet ashed . N, P and K were determined in the wet ashed product as described by Cottinue et al. (1982) .

The collected data were subjected to the statistical analysis according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Data in Table (1) revealed that irrigation water salinity , irrigation water sodium adsorption ratio, nitrogen fertilization and their interactions, affect bulbs fresh weight ,bulbs dry weight ,culls dry weight and roots dry weight .

Such data pointed out that, the relative bulbs fresh weight was decreased by 27.56, 47.14 and 62.76% ,whenever, the irrigation water salinity was increased from 0.4 dSm^{-1}(control) to 1.0 , 2.0 , 3.0 dSm^{-1} , respectively . Also , raising the irrigation water SAR value from 3.5 to 7.0 and 14.0 decreased the bulbs fresh weight by 14.08 and 31.19 % .

Bulbs fresh weight was decreased from 75.057 gm pot^{-1} to 47.589 gm pot^{-1} with increasing the irrigation water SAR from 3.5 to 14.0 at irrigation water salinity of 1.0 dSm^{-1} . It was decreased from 75.057 gm pot^{-1} ÿÿto 42.781 gm pot^{-1} , with increasing the irrigation water salinity from 1.0 to 3.0 dSm^{-1},at irrigation water sodium adsorption ratio of 3.5 .These results are in agreement with that of Stino *et al* 1972, they found a progressively reduction in onion plant organs as a result of increasing the irrigation water solution up to 6000 ppm in NaCl form . Singh and Abrol 1985, found continuous decrease in dry matter production of onion with increasing the exchangeable sodium percentage . Makary *et al.*, 1994, using salinized ,3000 ppm NaCl : CaCl2 , irrigation water compared to tap water, found reduction in bulbs yield by 26.8 and 50.6 % in both the first and second seasons , respectively ,whenever , onion was sown by sets .

Data in Table (1) showed also, that bulbs fresh weight, was increased as nitrogen fertilization dose increased, at any level of irrigation water salinity and / or irrigation water SAR value , raising nitrogen fertilization dose from N1 (0.606 gm N pot^{-1}) to N3 (1.212 gm N pot^{-1}), led to increase bulbs fresh weight by 14.434 gm pot^{-1} (27.63 %) at water salinity level of 2.0 dSm^{-1} + SAR of 3.5. The same increase in nitrogen rtilizationdose,increased the bulbs fresh weight by 8.967 gm pot^{-1} (27.56 %) , at the irrigation water treatment of 2.0 dSm^{-1} +SAR of 14.0 .

Table (1): Effect of nitrogen fertilization, irrigation water salinity, irrigation water sodium adsorption ratio and their interaction on yield component of onion

STUDIED FACTORS	WATER CHARACTER																N.T.M.
	0.4 dSm-1				1.0 dSm-1				2.0 dSm-1				3.0 dSm-1				
	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	
Bulbs fresh weight g pot																	
N1	79.967	75.100	64.567	73.211	65.467	51.500	41.400	52.789	52.233	38.100	32.533	40.955	36.900	26.967	18.233	27.367	48.581
N2	97.467	91.433	78.433	89.111	76.467	70.400	44.767	63.878	59.633	40.433	35.333	45.133	43.637	34.740	22.300	33.559	58.170
N3	103.033	101.533	96.833	100.466	83.237	81.250	56.600	73.696	66.667	50.267	41.500	52.811	47.807	36.400	26.567	36.925	65.975
I.W.S.&SAR T.M.	93 489	89.355	79.944	87.596	75.057	67.717	47.589	63.454	59.511	42.933	36.455	46.300	42.781	32.702	22.367	32.617	57:492
In.LSD								**1.485		1.975							
Bulbs dry weight g pot -1																	
N1	12.002	11.781	9.685	11.156	9.821	7.725	6.133	7.893	7.832	5.000	4.065	5.632	6.221	3.871	2.057	4.050	7.183
N2	14.627	13.717	11.316	13.230	11.474	10.550	6.497	9.507	8.940	6.063	5.187	6.730	6.523	5.013	3.577	5.038	8.624
N3	15.926	15.231	14.226	15.128	12.916	12.123	8.354	11.131	10.600	7.423	6.016	8.013	6.991	6.509	4.163	5.554	10.039
I.W.S.&SAR T.M.	14.185	13.576	11.7423	13.168	11.404	10.133	6.995	9.510	9.124	6.162	5.089	6.792	6.578	4.798	3.266	4.881	8.588
In.LSD								** 0.207		0.276							
Culls dry weight g pot -1																	
N1	4.039	3.676	3.280	3.665	3.364	3.277	2.988	3.210	2.994	2.436	2.000	2.477	2.443	2.047	1.868	2.119	2.868
N2	4.623	3.859	3.845	4.109	3.516	3.451	3.265	3.411	3.257	2.694	2.362	2.771	2.546	2.359	2.072	2.326	3.154
N3	4.909	4.603	4.257	4.590	3.773	3.498	3.414	3.562	3.489	2.968	2.630	3.029	2.761	2.464	2.253	2.493	3.418
I.W.S&SAR T.M.	4.524	4.046	3.794	4.121	3.551	3.409	3.222	3.394	3.247	2.699	2.331	2.759	2.583	2.290	2.064	2.313	3.147
In.LSD								** 0.150		0.199							
Roots dry weight g pot -1																	
N1	2.113	1.961	1.701	1.925	1.681	1.462	1.175	1.439	1.342	1.187	1.005	1.178	1.114	0.900	0.760	0.925	1.367
N2	2.261	2.112	1.753	2.042	1.801	1.717	1.465	1.661	1.431	1.215	1.170	1.272	1.186	0.921	0.773	0.960	1.484
N3	2.340	2.193	1.872	2.135	1.986	1.876	1.700	1.854	1.591	1.389	1.349	1.443	1.231	0.951	0.876	1.019	1.613
I.W.S.&SAR T.M.	2.238	2.089	1.775	2.034	1.823	1.685	1.447	1.651	1.455	1.264	1.175	1.298	1.177	0.924	0.803	0.968	1.488
In.LSD								** 0.086		0.115							

In.LSD. = The least significant difference between the studied parameter means as a result of applying the three studied factors

I.W.S.&SAR T.M. = The studied parameter means as a result of applying the irrigation water salinity and SAR levels

LSD between the studied parameter as a result of applying salinity treatment (Bulbs fresh weight 0.65....1.00 , Bulbs dry weight 0.11....0.16 , Culls dry weight 0.04 ....0.06 , Roots dry weight 0.03 ....0.05)

LSD between the studied parameter as a result of for salinity –nitrogen interaction (Bulbs fresh weight 0.90 ....1.14 , Bulbs dry weight 0.12 ....0.16 , Culls dry weight 0.09 ....0.12 , Roots dry weight 0.05 ....0.07)

LSD between the studied parameter as a result of salinity –SAR interaction (Bulbs fresh weight 0.90 ....1.14 , Bulbs dry weight 0.12 ....0.16 , Culls dry weight 0.09 ....0.12 , Roots dry weight 0.05 ....0.07)

LSD between the studied parameter as a result of applying nitrogen treatments (Bulbs fresh weight 0.40 ....0.60 , Bulbs dry weight 0.06 ....0.11 , Culls dry weight 0.04 ....0.06 , Roots dry weight 0.025 ....0.033)

LSD between the studied parameter as a result of applying SAR treatments (Bulbs fresh weight 0.40 ....0.60 , Bulbs dry weight 0.06 .... 0.11 , Culls dry weight 0.04 ....0.06 , Roots dry weight 0.025 ....0.033)

LSD between the studied parameter as a result of nitrogen –SAR interaction (Bulbs fresh weight 0.74 ....1.00 , Bulbs dry weight 0.104 ....0.138 , Culls dry weight NS , Roots dry weight .... 0.433)

The effect of three factors on bulbs fresh yield under the experimental conditions can be summarized in the following equation ,

B.F.W. = 80.148 -19.666 EC(dsm^{-1}) - 2.002 SAR value +27.772 N fertilization(gm pot^{-1}) (1) .

The equation reveals the nitrogen fertilization ability to overcome the negative effect of increasing the irrigation water salinity, and / or irrigation water SAR, within the studied range , whereas , the positive effect of 1gm nitrogen addition pot^{-1} is equal to the negative effect of raising irrigation water salinity by (27.772/19.666) 1.412 dSm^{-1} or the negative effect of raising SAR of the irrigation water by (27.772/2.002) 13.851 .

The bulbs fresh weight return , as a result of increasing the nitrogen fertilization dose, from N1 to N3 was decreased, with increasing the irrigation water salinity (27.255 ,20.907 ,11.856 and 9.558 gm pot^{-1} at irrigation water salinity level of 0.4 dSm^{-1} (control) ,1.0 ,2.0 and 3.0 dSm^{-1} , respectively) .

The bulbs fresh weight return as a result of increasing the nitrogen fertilization dose from N1 to N3 was increased up to the highest level of irrigation water SAR was used , under irrigation water salinity of 0.4 dSm^{-1} (23.07, 26.43 and 32.27 gm pot^{-1} at SAR value of 3.5, 7.0 and 14.0, respectively) , while , under the second level of irrigation water salinity, it was increased by the same increase in nitrogen fertilization dose up to SAR value of 7.0, then decreased after that (17.77 ,29.75 and 15.20 gm pot^{-1} at SAR value of 3.5, 7.0 and 14.0, respectively). On the other hand , the bulbs fresh weight return as a result of increasing the nitrogen fertilization dose from N1 to N3 was decreased with increasing the irrigation water SAR up to the highest level was used at the third (14.434 ,12.167 and 8.976 gm pot^{-1} at SAR value of 3.5, 7.0 and 14.0, respectively), and the fourth (10.907 , 9.433 and 8.334 gm pot^{-1} at SAR value of 3.5 , 7.0 and 14.0 , respectively) levels of water salinity .

The bulbs fresh weight return increased with increasing SAR value of the irrigation water, at the lowest levels of salinity, could be attributed to the Viets effect (the synergistic effect of the low concentration of sodium on NH^+ and K^+ absorption , resulted in substantial plant growth increases) . The reduction in bulbs fresh weight return with increasing the SAR value at the highest levels of salinity could be attributed to the low absorption of NH^+ and K^+ due to the antagonism between the similar charge cations .

Data in Table (1) showed also, that the effect of the studied factors on the dry weight of bulbs is similar to its effect on bulbs fresh weight .

Raising the irrigation water salinity from 0.4 dSm^{-1} to 1.0 , 2.0 and 3.0 dSm^{-1} decreased the dry weight of bulbs by 27.78 , 48.42 and 62.93 % ,respectively. So using irrigation water having EC value of 2.0 dSm^{-1} under the experimental conditions led to decrease bulbs dry matter yield by 50 % (nearly) .

Table (1) showed that, the obtained dry weight of bulbs with using irrigation water having EC of 1.0 dsm^{-1} and SAR of 3.5 (11.404 gm pot $^{-1}$) nearly equals to 1.60 fold of that obtained with using irrigation water having EC of 1.0 dSm^{-1} and SAR of 14.0 (6.995 gm pot $^{-1}$) , meaning that raising the SAR value for a specific water salinity will lead to significant decrease in bulbs dry weight, as shown from Table (1).The relation between bulbs dry weight and the affecting factors under the study is B.D.W.=12.031 - 3.007 EC(dsm^{-1}) - 0.324 SAR + 4.452 N fertilization(gm pot^{-1}) (2)

Effect of factors under the study, on culls dry weight is similar to their effect on bulbs dry weight, whereas, the irrigation water salinity and the irrigation water SAR have negative effect on culls dry weight , nitrogen fertilization had a positive effect on the same parameter, even under any level of irrigation water salinity, and /or irrigation water SAR, as found in the following equation :

C.D.W. = 3.871 – 0.691 EC(dsm^{-1}) - 0.060 SAR + 0.977 N fertilization(gm pot^{-1}) (3)

Data in Table (1) revealed that, roots dry weight had the same trend of the other plant parts response to the studied factors, where , negative correlation was found between the roots dry weight and each of irrigation water salinity and / or irrigation water SAR , positive correlation was found between the roots dry weight and the nitrogen applied dose as found in the following equation :

RDW = 2.063 –0.400 EC (dSm^{-1}) – 0.035 SAR +0.381 N fertilization (gm pot^{-1}) (4) ,

so that increasing nitrogen fertilization dose, increased the nutrients absorption capacity , as shown in Tabels (3) , (4) , and (5) . Similar results were found by Asseed and warid (1977).

The relative reduction in culls dry weight as result of increasing the irrigation water salinity by one dSm^{-1}, was lower (0.691/ 3.871 = 0.18, equation (3) than that in bulbs dry weight (3.007/12.031 = 0.25 equation 2). Similar trend was also found by increasing the irrigation water SAR value, raising irrigation water SAR value by unity, caused (0.06/3.871) 0.016 reduction in culls dry weight, the corresponding reduction in bulbs dry weight is (0.324/12.031) 0.027, then culls dry weight / bulbs dry weight +culls dry weights ratio, was increased with increasing irrigation salinity and / or irrigation water SAR. These results may confirmed that of Stino *et al* (1972) and Labeeb (2002). They found that, the depression in the dry weight caused by water salinity or SAR was more pronounced in bulbs than in culls.

Nitrogen fertilization tended to increase bulbs dry weight, with a higher incremental rate (0.37), than that in culls dry weight (0.25), then, the decrease in culls dry weight / bulbs +culls dry weights value as results of increasing irrigation water salinity and / or irrigation water SAR, partially overcame by increasing the nitrogen fertilization dose as found in Table (2).

Data illustrated in Table (3) revealed that most of absorbed nitrogen by onion plant attained in bulbs (79.29 %) , followed by culls (13.97 %) and roots (6.75 %).

Raising the EC value of irrigation water from 0.4 dSm^{-1} to 1.0 , 2.0 and 3.0 dSm^{-1} significantly decreased the nitrogen uptake by onion plant organs (in bulbs by 22.7 %,41.1 %and 52.9%,in culls by 5.7 %, 17.3 %and 26.3, respectively). The decrease in nitrogen uptake by onion plant organs can be arranged in the following order , bulbs > roots > culls .

Data also indicated that, raising irrigation water SAR value, under any irrigation water salinity level, significantly decreased the nitrogen uptake by onion plant organs, as shown the following equations:-

N.U.B.=186.750 – 47.391 EC(dsm^{-1}) - 9.909 SAR + 155.114 N fertilization(gm pot^{-1}) (5)

N.U.C.= 31.327 – 3.716 EC(dsm^{-1}) - 0 805 SAR+13.019 N fertilization(gm pot^{-1}) (6)

N U.R = 17.921 – 3.503 EC(dsm^{-1}) - 0.448 SAR + 6.443 N fertilization(gm pot^{-1}) (7)

Table (2) : Effect of nitrogen fertilization , irrigation water salinity , irrigation water sodium adsorption ratio and their interactionon culls /(bulbs +culls) ratio

STUDIED FACTORS	WATER CHARACTER																N.T.M
	0.4 dSm^{-1}				1.0 dSm^{-1}				2.0 dSm^{-1}				3.0 dSm^{-1}				
	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	
	Culls dry weight/ (Bulbs dry weight +Culls dry weight) %																
N1	25 179	23 782	25 299	24.753	25 415	29 785	32.760	29.320	27 656	32 760	32 976	31.131	28 197	34 589	47 592	36.793	30.499
N2	24 016	21 956	25 361	23 060	23 456	24 648	33.446	27.183	26.607	30 764	31 289	29.553	28 074	31 999	36 679	32.251	28.012
N3	23 561	23 208	23 032	23 267	22 608	22 393	29 011	24.671	24 764	28.563	30 419	27.915	28 312	27 460	35.115	30.296	26.537
I.W.S %SAR T.M	24 252	22 982	24 564	23.693	23.826	25.609	31.739	27.058	26.342	30.696	31.561	29.533	28.194	31.349	39.795	33.113	28.349

Table (3) : Effect of nitrogen fertilization, irrigation water salinity , irrigation water sodium adsorption ratio and their interaction on nitrogen uptake by onion plant

STUDIED FACTORS	WATER CHARACTER																N.T.M.
	0.4 dSm-1				1.0 dSm-1				2.0 dSm-1				3.0 dSm-1				
	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	
N uptake by bulbs mg pot^{-1}																	
N1	234.523	184.737	113.480	177.580	182.153	136.583	88.750	135.829	134.417	92.383	82.693	103.164	115.793	81.047	49.857	82.232	124.701
N2	314.217	244.743	155.337	238.099	222.727	185.863	120.077	176.222	195.797	125.487	92.867	138.050	150.967	125.503	61.236	112.569	166.235
N3	358.883	294.387	265.753	306.341	304.820	273.743	158.730	245.764	268.320	168.587	115.127	184.011	187.767	154.693	93.900	145.453	220.393
I.W.S.&SAR T.M.	317.430	257.837	214.995	263.421	263.931	228.023	135.403	209.119	223.686	143.186	104.316	157.062	163.776	130.144	79.219	157.062	188.495
In LSD								** 41.422		31.144							
N uptake by culls (mg pot^{-1})																	
N1	33.123	29.573	23.077	28.591	31.717	29.377	22.957	28.017	30.890	24.677	16.595	24.054	25.627	23.810	18.983	22.807	25.867
N2	40.133	34.577	27.160	33.957	36.680	34.083	27.047	32.603	32.447	28.073	23.233	27.918	29.163	25.240	20.627	25.010	29.872
N3	47.597	40.123	33.037	40.252	40.527	36.157	32.140	36.275	37.343	33.563	28.303	33.070	32.563	28.583	22.767	27.971	34.392
I.W.S.&SAR T.M.	40.284	34.758	27.758	34.267	36.308	33.206	27.381	32.298	33.560	28.771	22.710	28.347	29.118	25.878	20.792	25.263	30.044
In LSD								yyyy	** 2.315	1.741							
N uptake by roots (mg pot^{-1})																	
N1	19.663	17.611	14.513	17.262	16.993	13.850	12.080	14.308	12.950	10.767	9.003	10.907	10.033	8.220	5.853	8.035	12.628
N2	21.297	19.353	15.712	18.787	18.850	16.843	13.920	16.538	14.307	12.757	11.027	12.697	11.497	9.990	7.027	9.505	14.382
N3	23.303	20.977	16.937	20.406	20.770	19.330	16.220	18.773	17.503	15.660	13.083	15.415	13.787	11.443	8.890	11.373	16.492
I.W.S.&SAR T.M.	21.421	19.314	15.721	18.814	18.871	16.674	14.073	16.540	14.920	13.061	11.038	13.006	11.772	9.884	7.257	9.638	14.501
In LSD									* 0.894								
Total N uptake by onion plant (mg pot^{-1})																	
N1	287.309	231.921	151.070	223.433	230.863	179.81	123.787	178.153	178.257	127.827	108.291	138.125	151.453	113.077	74.693	113.074	163.197
N2	375.647	298.673	198.209	290.843	278.257	236.789	161.044	225.363	242.551	166.317	127.127	178.665	191.627	160.733	88.890	147.083	210.489
N3	429.783	355.487	315.727	366.999	366.117	329.230	207.090	300.812	323.166	217.810	156.513	232.496	234.117	194.719	125.557	184.798	271.276
I.W.S.&SAR T.M.	379.135	311.908	258.474	316.506	319.110	277.903	176.858	257.957	272.166	185.018	138.064	198.416	204.666	165.906	107.268	159.280	233.040
In LSD								**19.978		26.567							

In.LSD. = The least significant difference between the nitrogen uptake means as a result of applying the three studied factors

I.W.S.&SAR T.M. = The nitrogen uptake means as a result of applying the irrigation water salinity and SAR levels

LSD between the nitrogen uptake means as a result of applying salinity treatment (by Bulbs 8.50....13.00 , Culls 0.50 ....0.80 , Roots 0.30 ....450 , Onion plant 7.50 ....11.40)

LSD between the nitrogen uptake means as a result of for salinity --nitrogen interaction (by Bulbs 18.00.... 24.00 , Culls 1.00 .... 1.40 , Roots 0.50 .... 0.70, Onion plant 11.50 ....14.90)

LSD between the nitrogen uptake means as a result of salinity –SAR interaction (by Bulbs 18.00.... 24.00 , Culls 1.00 .... 1.40 , Roots 0.50 .... 0.70, Onion plant 11.50 ....14.90)

LSD between the nitrogen uptake means as a result of applying nitrogen treatments (by Bulbs 8.90....12.00 , Culls 0.50 .... 0.70, Roots 0.26 ....0.34 , Onion plant 5.80 .... 8.00)

LSD between the nitrogen uptake means as a result of applying SAR treatments (by Bulbs 8.90....12.00 , Culls 0.50 .... 0.70, Roots 0.26 ....0.34 , Onion plant 5.80 .... 8.00)

LSD between the nitrogen uptake means as a result of nitrogen –SAR interaction (by Bulbs 15.60....20.70 , Culls 0.87 ....1.16 , Roots 0.45 ....0.60 , Onion plant 10.00.... 13.30)

Table (4) :Effect of nitrogen fertilization, irrigation water salinity , and irrigation water sodium adsorption ratio and their interaction on phosphorus uptake by onion plant

STUDIED FACTORS	WATER CHARACTER																N.T M
	0 4 dSm⁻¹				1 0 dSm⁻¹				2.0 dSm⁻¹				3.0 dSm⁻¹				
	3 5	7 0	14 0	Mean	3 5	7 0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7 0	14.0	Mean	
P uptake by bulbs (mg pot⁻¹)																	
N1	25 217	26 833	20 633	24.228	26 517	21 323	16 483	21.441	23 360	17 093	17 747	19.400	19 043	12 970	11.673	14.562	19 908
N2	37 150	41 420	24 777	34.449	32 807	34 710	16 507	28.008	27 533	22 613	18 830	22.992	26 497	23 763	11 633	20.631	26 520
N3	43 350	49 177	46 230	46.252	36 970	33 503	28 400	32.958	36.987	33.487	26 713	32.396	28 670	29 277	20.487	26.145	34 438
I W S &SAR T M.	35 239	39.143	30.547	34 976	32 098	29.845	20 463	27.469	29.293	24.398	21.097	24.929	24.737	22 003	14.598	20.446	26 955
In LSD								** 4 173		3 138							
P uptake by culls (mg pot⁻¹)																	
N1	3 200	2 900	2 700	2.933	2 700	2 600	2 300	2.533	2 800	2 200	1 400	2.133	2 100	2.000	2 100	2.067	2 417
N2	3 700	3 200	3 000	3.300	3 100	3 000	2 500	2.867	2.700	2 300	2.200	2.400	2 500	2 100	1 600	2.067	2 658
N3	3 900	3 800	3 700	3.800	3 300	3 100	3 000	3.133	3 100	2 500	2 200	2.600	2 300	2 200	1 500	2.000	2 883
I W S.&SAR T M	3.600	3.300	3.133	3 344	3.033	2.900	2.600	2.844	2.867	2.333	1.933	2.378	2.300	2 100	1.733	2.044	2.653
In LSD								** 0.034		0 025							
P uptake by roots (mg pot⁻¹)																	
N1	4 230	4 870	3 497	4.199	3 647	3 510	2 547	3.235	2.970	3 263	2 560	2.931	3 230	2 380	1 727	2.446	3 203
N2	4 090	5 043	3 843	4.325	4 383	4 233	3 297	3.971	3 297	3 197	2 877	3.124	2.690	2 337	1 893	2.307	3 432
N3	4 057	5 550	3 910	4.506	4 487	5 160	4 403	4.683	3 283	3 277	3.453	3.338	2.483	2 140	1 833	2.152	3 670
I W S &SAR T.M	4 126	5.154	3 750	4.343	4.172	4.301	3.416	3.963	3.183	3.246	2.963	3.131	2.801	2.286	1.818	2.301	3 435
In LSD								** 0.440		0 331							
P uptake by onion plants (mg pot⁻¹)																	
N1	32 647	34 603	26 830	31.360	32 864	27 433	21 330	27.209	29 130	22 556	21.707	24.464	24 373	17 350	15 500	19.074	25 527
N2	44 940	49 663	31 620	42 074	40 290	41 943	22 304	34.846	33 530	28 110	23 907	28.516	31 687	28 200	15 126	25.004	32 610
N3	51 307	58 527	53 840	54.558	44 757	41 763	35 603	40.774	43 370	39 264	32 366	38.333	33 453	33 617	23 820	30.297	40 991
I W S.&SAR T.M	42 965	47 598	37.430	42 664	39.304	37 046	26 479	34.276	35 343	29 977	25.993	30.438	29.838	26 389	18.149	24.792	33.043
In LSD								** 4.853		3 656							

In.LSD. = The least significant difference between phosphorus uptake means as a result of applying the three studied factors

I.W.S.&SAR T.M. = The phosphorus uptake means as a result of applying the irrigation water salinity and SAR levels

LSD . between phosphorus uptake means as a result of applying salinity treatments (by Bulbs 1.50 . 2.20 , Culls 0.0005 . 0.0006 , Roots 0.23 . 0.34 , onion plant 1.60 . 1.80)

LSD between phosphorus uptake means as a result of applying salinity –nitrogen interaction (by Bulbs 1.80 . 2.04 , Culls 0.0014 . 0.002 , Roots 0.20 . 0.26 , onion plant 2.10 . 2.08)

LSD between phosphorus uptake means as a result of applying salinity –SAR interaction (by Bulbs 1.80 . 2.04 , Culls 0.0014 . 0.002 , Roots 0.20 . 0.26 , onion plant 2.10 . 2.08)

LSD between phosphorus uptake means as a result of applying nitrogen treatments (by Bulbs 0.09 .1.20 , Culls 0.0009 . 0.001, Roots 0.096 0.13 , onion plant 1.10 . 1.40)

LSD between phosphorus uptake means as a result of applying SAR treatments (by Bulbs 0.09 . 1.20 , Culls 0.0009 . 0.001 , Roots 0.096 . 0.13 , onion plant 1.10 . 1.40)

LSD between phosphorus uptake means as a result of applying nitrogen –SAR interaction (by Bulbs 1.57 . 2.09 , Culls 0.0014 . 0.0019, Roots 0.166 0.220 , onion plant 1.830 . 2.43)

Table (5) :Effect of nitrogen fertilization, irrigation water salinity , irrigation water sodium adsorption ratio and their interaction on potassium uptake by onion plant

STUDIED FACTORS	WATER CHARACTER																N.T.M
	0.4 dSm⁻¹				1.0 dSm⁻¹				2.0 dSm⁻¹				3.0 dSm⁻¹				
	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	3.5	7.0	14.0	Mean	
	K uptake by bulbs (mg pot⁻¹)																
N1	230 553	175 237	121 340	175 710	192 013	156.123	112.927	153.688	171 260	105 150	80 380	118.930	131.327	78.937	50 950	87.071	133 850
N2	285 957	236 180	155 357	225 831	231.560	187 250	120 847	179.886	211 407	139 073	91 233	147.238	174 047	121 730	69.247	121.675	168 657
N3	308 190	262 590	210 957	260 579	261 283	214 220	146 683	207.395	217 067	151 617	104 430	157 705	194 573	136.143	78 660	136.459	190 534
I.W.S &SAR T.M.	274 900	224 669	162 551	220 707	228 285	185.864	126 819	180 323	199 911	131 947	92 014	141 291	166 649	112 270	66.286	115.068	164.347
In.LSD	** 10.782	8.107															
	K uptake by culls (mg pot⁻¹)																
N1	50.450	44 147	35 153	43.250	42.570	39 927	34 110	38.869	38 793	32 050	26 220	32 354	32 360	26.283	17.840	25.494	34 992
N2	55 097	46.227	39 380	46 901	46 170	42.577	36.020	41.589	41 393	35.313	29 033	35 246	35.387	29.613	21.190	28.730	38 117
N3	59.453	49 157	40 103	49.571	47 927	45 967	38.407	44.100	45.707	38.550	32 800	39.019	38 557	31,313	25 943	31.938	41 157
I.W.S &SAR T.M.	55 000	46 510	38 212	46 574	45.556	42.824	36.179	41.519	41.964	35.304	29.351	35.540	35.435	29.070	21.658	28.721	38.089
In.LSD	** 2.718	2.044															
	K uptake by roots (mg pot⁻¹)																
N1	17 963	15 080	13 570	15 538	14 493	12.687	9.023	12.068	13.120	9 790	8 723	10.544	10.383	8 200	6 353	8.312	11 615
N2	20 243	16 987	15 257	17 496	16.897	14.127	11.300	14.108	14.843	10 803	9 457	11.701	11.840	9.420	6.913	9.391	13 174
N3	22 477	19 347	17 310	19711	17 497	16.210	12.050	15.252	15.267	12 013	10 323	12.532	12.737	9.977	7.637	10.117	14 404
I.W.S &SAR T.M.	20 228	17 139	15 379	17 581	16.296	14.341	10.791	13.809	14.410	10.869	9 501	11.593	11.653	9.199	6.968	9.273	13,064
In.LSD	** 1 214	0.913															
	K uptake by onion plants (mg pot⁻¹)																
N1	298 966	234 464	170 063	234 498	249 076	208 737	156.060	204.624	223 173	146.990	115 323	161.829	174.070	113.420	75.143	120.878	180 457
N2	361 297	290 394	209 994	290.228	294 627	243 954	168 167	235.582	267 643	185.189	129 723	194.185	221.274	160.763	97.350	159.796	219 948
N3	390 120	331 094	268 370	329 861	326 707	276.397	197 140	266.748	278.041	202 180	147 553	209.258	245 867	177 433	112 240	178.513	246 095
I.W.S &SAR T.M	350 128	288 369	216 142	284 862	290 137	243 029	173.789	235.651	256.286	178 120	130 866	188 424	213 737	150.590	94.911	153.062	215.500
In.LSD	**17.911	13 467															

In.LSD. = The least significant difference between potassium uptake means as a result of applying the three studied factors

I.W.S.&SAR T.M. = The potassium uptake means as a result of applying the irrigation water salinity and SAR levels

LSD between potassium uptake means as a result of applying salinity treatment (by Bulbs 2.10....3.20 , culls 0.80....1.20 , Roots 0.22....0.33 , onion plant 5.10 ...7.70)

LSD between potassium uptake means as a result of for salinity –nitrogen interaction (by Bulbs 4.70 ....6.30, Culls 1.20 ....1.60, Roots0.50 ....0.07 onion plant 7.50 ....10.2)

LSD between potassium uptake means as a result of salinity –SAR interaction (by Bulbs 4.70 ....6.30, Culls 1.20 ....1.60, Roots0.50 ....0.07 onion plant 7.50 ....10.2)

LSD between potassium uptake means as a result of applying nitrogen treatments (by Bulbs 2.30 ....3.10, Culls 0.60....0.80, Roots 2.60 ....0.033 onion plant 3.90 . 5.20)

LSD between potassium uptake means as a result of applying SAR treatments (by Bulbs 2.30 ....3.10, Culls 0.60....0.80, Roots 2.60 ....0.033 onion plant 3.90 . 5.20)

LSD between potassium uptake means as a result of nitrogen –SAR interaction (by Bulbs 5.04 .... 5.40 , culls NS, Roots 0.46 .0.610 , onion plant 6.73....8.96

The above mentioned equations revealed that, the negative effect of increasing the irrigation water SAR by unity was higher in bulbs (9.909 /186.850 =0.053) followed by that in culls (0.805 / 31.327 =0.026), the lesser was in roots (0.448 / 17.921 =0.025). Increasing the applied nitrogen dose by 1 gm N pot^{-1}, increased the nitrogen uptake by the plant organs under any values of both irrigation water EC and SAR, the ability of nitrogen fertilization to increase the nitrogen uptake was higher in bulbs (0.831) followed by culls (0.416) and roots (0.359)

The previous discussion revealed that, application of nitrogen fertilization to somewhat may alleviate the deterioration effect of irrigation water salinity and / or irrigation water SAR on nitrogen uptake.

Increasing the applied nitrogen dose, led to improve the nitrogen distribution pattern among the plant parts, whereas, raising the nitrogen applied dose from N1 to N3 at salinity level of 0.4 dSm^{-1}, increased the nitrogen uptake by bulbs by 3.99 % of total nitrogen uptake, on the account of the nitrogen uptake by culls and roots. At the highest salinity level, the same increase in nitrogen dose, led to increase the nitrogen uptake by bulbs by 5.985 % of the total nitrogen uptake.

At the lowest level of irrigation water sodium adsorption ratio (3.5), raising the nitrogen applied dose from N1 to N3, led to increase the nitrogen uptake by bulbs from 73.724 %to 82.680% of the total nitrogen uptake, the same rising in nitrogen applied dose, at the highest level of irrigation water SAR (14), increased the nitrogen uptake by bulbs from 71.554 to 78.708 %of the total nitrogen uptake.

The multi linear regression between the nitrogen uptake by onion plant and the studied factors is,

T.N.U.= 235.266 – 54.385 EC(dsm^{-1}) - 11.331 SAR + 175.850 N fertilization(gm pot^{-1}) (8)

The mean nitrogen use efficiency was reduced from 36.9 to 30.3 %, with increasing the nitrogen applied dose, from N1, (0.606gm pot^{-1}) to N3 (1.212 g pot^{-1}), at irrigation water salinity of 0.4 dSm^{-1}, whenever, at the highest irrigation water salinity level (3.0 dSm^{-1}) these values were decreased from 18.7 to 15.3%. The mean nitrogen use efficiency, was also decreased from 35.3 to 18.9 % as a result of increasing the nitrogen dose from N1 to N3 (0.606 to 1.212 g pot^{-1}) at the lowest irrigation water SAR, and from 27.9 to 16.6 % at the highest irrigation water SAR. These data confirm that of Salo (1999) who outlined that, the apparent recovery of nitrogen fertilization was increased by reducing the N rates. Leo – cox and syvertsen (1993) they mentioned that the nitrogen use efficiency was reduced by using salinized irrigation water.

Total nitrogen uptake means, between every tow levels of each factor, is significant , while , the difference between total nitrogen uptake means as a result of applying the treatment of N1+ irrigation water salinity of 0.4 dSm^{-1} + irrigation water SAR of 14.0, and the treatment of N2 + irrigation water salinity of 3.0 dSm^{-1} + irrigation water SAR of 7.0, was not significant .Multi linear regression equation, revealed such complication by, the positive effect of both increasing the nitrogen applied dose from N1 to N2, and reducing the irrigation water SAR, from 14.0 to 7.0, is nearly equal to the negative effect of increasing the irrigation water salinity from 0.4 dSm^{-1} to 3.0 dSm^{-1}.

Data illustrated in Table 4 revealed that, raising the EC value of irrigation water from 0.4 to 1.0 , 2.0 and 3.0, decreased phosphorus uptake by bulbs (by 20.463 , 28.725 and 41.543 %) , culls (14.925 , 28.888 and 38.876 %)and roots (by 8.750 , 27.907 and 47.018 %) . These results are in agreement with that of El-Agrodi and Abou EL-Soud (1988), they found that , phosphorus uptake by rice plant was decreased by increasing the irrigation water salinity from 0.4 dSm^{-1} to 7.0 dSm^{-1}) . Raising SAR value of irrigation water under any specific EC value, led to a decrease in phosphorus uptake by onion plant organs

Data in table (4) also showed contrary effect of nitrogen fertilization to the effect of raising the irrigation water salinity, and / or its SAR value regarding to phosphorus uptake. The relative phosphorus use efficiency was increased by 50.48 %% with increasing the nitrogen fertilization dose from N1 to N3 at the first level of each , irrigation water salinity and irrigation water SAR ,raising the irrigation water salinity from 0.4 to 2.0 dSm^{-1}, besides the same increase in N fertilization dose, reduced such increase to 15.797 %, raising the irrigation water SAR from 3.5 to 14.0, besides the previous increase in both N fertilization and irrigation water salinity, reduced the relative phosphorus use efficiency by 22.417 %, as shown in the following equation:-

P.U.B. = 24.037 - 5.320 EC(dsm^{-1}) - 0.883 SAR + 20.554 N fertilization(gm pot^{-1}) (9)

P.U.C. = 3.119 - 0.471 EC(dsm^{-1}) - 0.059 SAR + 0.826 N fertilization(gm pot^{-1}) (10)

P.U.R. = 4.427 - 0.802 EC(dsm^{-1}) - 0.034 SAR + 1.178 N fertilization(gm pot^{-1}) (11)

T.P.U. = 31.804 - 6.610 EC(dsm^{-1}) - 1.031 SAR + 22.399 N fertilization(gm pot^{-1}) (12)

Data in Table (5) showed, the interaction effect of irrigation water salinity, irrigation water SAR and nitrogen fertilization, on potassium uptake by plant. High significantly decreases in potassium uptake by onion plant organs, were resulted from raising the irrigation water salinity value, the decreasing value was maximized when higher irrigation water salinity was combined with the highest irrigation water SAR value. Increasing the irrigation water salinity from 0.4 to 3.0 dSm^{-1}, led to decrease the potassium uptake by 47.864 % in bulbs, 38.333 % in culls and 47.255 % in roots. these results are in agreement with that of EL-Agrodi and Abou EL-Soud (1988), they mentioned Potassium uptake by rice plant was decreased by increasing the irrigation water salinity from 0.4 dSm^{-1} to 7.0 dSm^{-1}.

Raising the irrigation water SAR from 3.5 to 14.0 and irrigation water salinity from 0.4 to 3.0 dSm^{-1} led to decrease total potassium uptake by 72.89 %.

Nitrogen application had positive effect on potassium uptake by onion plant, and reduced the deterioration effect of the highest irrigation water salinity and / or irrigation water SAR. Raising both irrigation water salinity from 0.4 to 3.0 dSm^{-1} and irrigation water SAR from 3.5 to14.0 at N1 led to decrease the total potassium uptake by 77.9% ,while at N3 the same raising in both irrigation water salinity and its SAR led to decrease the total uptake of potassium by 74.48%. These results are in agreement with those of Rostamfrodi *et al* (1999). They found a greater K absorption by onion plant resulted from increasing the Urea-N applied dose up to 200 Kg/ ha.

Data also revealed that, the relative potassium use efficiency was decreased by 10.454 , 26.133 and 39.909%, as result of irrigation water salinity increased from 0.4 to 1.0, 2.0 ,and 3.0 dSm^{-1}, and by 17.37 and 40.316 % with increasing the irrigation water SAR from 3.5 to 7.0, and 14.0 respectively, whenever it was increased by 20.70 and 37.39 % with increasing the nitrogen applied dose from N1 to N2 and N3 , respectively .

The relations between the studied factors and potassium uptake by onion plant organs are summarized in the following equations :

B.K.U. = 218.927 - 39.309 EC(dsm-1) - 9.764 SAR + 96.262 N fertilization(gm pot^{-1}) (13)

C.K.U. = 50.069 - 6.647 EC(dsm-1) - 1.215 SAR + 9.496 N fertilization(gm pot^{-1}) (14)

R.K.U. = 17.956 - 3.069 EC(dsm-1) - 0.427 SAR + 4.325 N fertilization(gm pot^{-1}) (15)

T.K.U. = 286.953 - 49.025 EC(dsm^{-1}) - 11.452 SAR + 110.082 N fertilization(gm pot^{-1}) (16)

Equations revealed that, raising irrigation water salinity and /or irrigation water SAR, decreased potassium uptake by bulbs more than in other parts, nitrogen fertilization increased potassium uptake by bulbs more than in other parts. The relative effect of the studied factors, i.e irrigation water salinity, irrigation water SAR and nitrogen fertilization on potassium uptake by bulbs were - 0.179, -0.044 and +0.440 ; by culls were -0.133 , -0.024and +0.180 ;in roots -0.171, -0.024and +0.241 , respectively .

Equations from 1 to 16 revealed that ,raising the irrigation water SAR by unity caused negative effect approximately equal to that of 1 /10 dSm^{-1} with respect of fresh or dry matter production, (2.002 /19.666 for bulbs fresh weight ,0.324 /3.007 for bulbs dry weight ,0.06/0.691 for culls dry weight and 0.035/0.40 for roots dry weight) and equal to that of 2/10 dSm^{-1} with respect of total nitrogen (11.331/54.358), phosphorus (1.031/6.610) and potassium (11.452/49..025)uptake. In other ward, raising irrigation water SAR, within the studied range, affected nutrients uptake rather than fresh or dry matter production. These results are in coincidence with that of Mansour *et al* (1998), they reported that, the perturbation of the plasma membrane by NaCl is essentially due to the ionic component rather than to osmotic activity, and nitrogen fertilization decreased the hazardous effect of irrigation water salinity and / or irrigation water SAR, hence, increased the threshold value of irrigation water salinity and SAR.

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تأثير التسميد النيتروجيني وملوحة ماء الري ونسبة إدمصاص الصوديوم لهذا الماء على إمتصاص العناصر والإنتاجية لمحصول البصل فى الأراضي الرملية

جمعة لبيب
قسم الأراضي - كلية الزراعة - جامعة المنصورة

أقيمت تجربة أصص بقسم الأراضي بكلية الزراعة جامعة المنصورة خلال الموسم الشتوي لعام ٢٠٠٢ لدراسة التأثير المشترك لكل من التسميد النيتروجيني (٠,٦٠٦ و٠,٩٠٩ و١,٢١٢ جرام نيتروجين لكل إصيص) و ملوحة ماء الري (٠,٤ ، ١ ، ٢ ، ٣ ملليموز /سم) و قيم نسبة إدمصاص الصوديوم (٣,٥ و٧,٠ و١٤,٠) فى ماء الري علي المحصول وامتصاص وتوزيع العناصر الغذائية (النيتروجين والفوسفور والبوتاسيوم) بين أجزاء نبات البصل المختلفة :

وأوضحت النتائج ما يلي:-

تحت ظروف التجربه قل المحصول النسبى للأبصال الطازجة بما يعادل ٦٢,٧٦ % نتيجة لزيادة ملوحة ماء الرى من ٠,٤ ملليموز /سم إلى ٣,٠ ملليموز /سم وكذلك أدى رفع قيمة نسبة إدمصاص الصوديوم من ٣,٥ إلى ١٤ إلى خفض المحصول النسبى للأبصال الطازجه بما يعادل ٣١,١٩ % . بينما أدت زيادة التسميد النيتروجيتى إلى زيادة محصول الأبصال الطازجه تحت أى مستوى من مستويات ملوحة الماء او قيمة نسبة إدمصاص الصوديوم لها وكانت الزيادة الناتجة في محصول الأبصال الطازج نتيجة إضافة ١ جم نيتروجين / إصيص مساوية لكمية النقص في المحصول الناتجة عن زيادة ملوحة ماء الري بما يعادل ١,٤ ملليموز/سم أو النقص الناتج عن زيادة قيمة SAR لماء الري بما يعادل ١٤.

عند أقل مستوى ملوحه وجد أن العائد فى محصول الأبصال نتيجة زيادة التسميد النيتروجينى يزداد بزيادة قيمة نسبة إدمصاص الصوديوم حتى أقصى قيمه تحت الدراسه وعند أعلى مستوى ملوحه ظهر الاتجاه العكسي تحت نفس الظروف.

أدت زيادة التسميد الأزوتى فى نطاق الدرا سه إلى تقليل نسبة العروش : الأبصال + العروش ضد التأثير السلبى لكل من ملوحة ماء الرى أو قيمة نسبة إدمصاص الصوديوم فى ماء الرى أو كليهما على هذه القيمه

تحت نطاق الدراسه أدت زيادة التسميد النيتروجينى إلى تحسن في نسب توزيع النيتروجين بين أجزاء النبات المختلفه ضد التأثير السيىء للقيم العالية لملوحة ماء الرى أو قيمة نسبة إدمصاص الصوديوم في ماء الرى أو كليهما

الكفاءه النسبيه لإمتصاص الفوسفور زادت بما يعادل ٥٠,٤٨ %نتيجة زيادة التسميد النيتروجينى من ٠,٦٠٦ إلى ١,٢١٢ جرام /إصيص عندما كانت ملوحة ماء الرى و قيمه نسبة إدمصاص الصوديوم لكل منهما عند أقل مستوى مدروس وعندما زادت ملوحة ماء الرى بجانب نفس الزياده فى مستوى التسميد النيتروجينى نقصت قيمة الزياده في الكفاءه النسبيه لامتصاص الفوسفور إلى ١٥,٧٩٧ % وعندما زادت قيمة نسبة إدمصاص الصوديوم لماء الرى من ٣,٥ إلى ١٤,٠ ابجانب نفس الزياده السابقه فى كل من ملوحة ماء الرى و مستوى التسميد النيتروجينى انخفضت الكفاءة النسبيه لامتصاص الفوسفور بما يعادل ٢٢,٤١٧ %

قللت زيادة كل من ملوحة ماء الرى وقيمة SAR أو كليهما معا إمتصاص نبات البصل للبوتاسيوم والبوتاسيوم المأخوذ بواسطة الأبصال كان أكثر تأثرا كما أن زيادة التسميد النيتروجينى أدت إلى زيادة كمية البوتاسيوم الممتص بواسطة نبات البصل والبوتاسيوم المأخوذ بواسطة الابصال كان اكثر تأثرا. فى نطاق الدراسه أوضحت معادلات الارتباط أن تأثير زيادة قيمة نسبة إدمصاص الصوديوم فى ماء الرى بما يعادل الوحدة كان مساو تقريبا للتأثير الناتج عن زيادة قيمة ملوحة ماء الري بمقدار عشر الوحدة(ملليموز/سم). وذلك فيما يتعلق بإنتاج النبات للأبصال الطازجة والمادة الجافة الخام (أبصال - قشور -جذور) أما تأثير زيادة قيمة نسبة إدمصاص الصوديوم فى ماء الرى بمقدار الوحدة علي امتصاص العناصر (نيتروجين ،فوسفور ،بوتاسيوم) فإنه يعادل التأثير الناتج عن زيادة قيمة ملوحة ماء الري بما يعادل خمس الوحدة (ملليموز/سم). ومن هذا يتضح أنه في مدي الدراسة كان تأثير قيمة نسبة إدمصاص الصوديوم علي امتصاص العناصر أكبر منه علي إنتاجية المادة الجافة. وتأثير النيتروجين مضاد للتأثير السيئ الناتج عن زيادة ملوحة أو قيمة نسبة إدمصاص الصوديوم لماء الرى. أو بعبارة أخرى فإن التسميد النيتروجيني يمكن أن يرفع الحد الحرج لتحمل نبات البصل لملوحة ماء الرى وقيمة نسبة إدمصاص الصوديوم لهذا الماء.