J. Plant Production, Mansoura Univ., Vol. 6 (3):271 -285 , 2015

IMPACT OF PRIMING IN SALTY SOLUTIONS ON GERMINATION AND SEEDLING VIGOR OF SOME WHEAT CULTIVARS UNDER SALINITY CONDITIONS

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ABSTRACT

Laboratory experiments were conducted at the laboratory of Seed Technology Research Section, Mansoura during 2013 and 2014 years to study the effect of soaking wheat seed of. Misr 1, Misr 2 and Gemmiza 10 cultivars in six salty solutions i.e. $CaCl_2$ 2%, $CaCl_2$ 4%, KH_2PO_4 1%, KH_2PO_4 2 %,KCL 2 %, KCL 4% and in addition to water and dry seed on germination percentage, seed and seedling vigor as well as seedlings chemical measurements under salinity conditions (0, 5 and 10 dS/m). The results revealed that: Increasing salinity levels not only reduced seed germination but also decreased seed vigor measurements which measured by (speed germination index, germination rate and co-efficient of germination). Seedlings measurements at the highest salinity levels (10 dS/m) were most weakness comparing (0 and 5 dS/m). Cholorophll a , b, carotenoids , K^+ content and K/ Na ratio decreased at high salinity levels. Misr 2 wheat cultivar showed superiority and recorded the highest values of water uptake %, seed and seedling vigor, chemical measurements and lowest Na^+content .While, Gemmiza 10 wheat cultivar was the lowest of all studied measurements and the highest of Na^+ content. The highest values of seed, seedling vigor, chemical measurements (cholorophll a, b, carotenoids, K^+ contents, and K/Na ratio) and lowest Na^+ content in seedlings were obtained by wheat priming in KH_2PO_4 1%solution.

In general, under salinity conditions, It could advised sowing seed of Misr 2 wheat cultivar and treated with KH_2PO_4 1%solution to improved seed germination, seedlings vigor and mitigation the harmful effect of salinity according to the obtained results in this investigation.

INTRODUCTION

Nearly 20% of the world's cultivated area and nearly half of the world's irrigated lands are affected by salinity (Zhu, 2001). Egypt is one of the countries that suffer from severe salinity problems. For example, 33% of the cultivated land, which comprises only 4% of total land area in Egypt, is already salinized (Ghassemi, *et al*., 1995).Wheat is commonly classified as a moderately salt tolerant crop , the threshold value for wheat is about 7dS/ m corresponding to 4480 mg/l. (Mass and Hoffman, 1977). High levels of soil salinity can significantly inhibit seed germination and seedling growth, due to the combined effects of high osmotic potential and specific ion toxicity, seed germination and early seedling growth are the most sensitive stages to salinity stress (Muhammad & Hussain, 2010).

The identification of genotypes having potential salt tolerance is an effective approach to solve the problems of saline soils (Pervaiz, *et al*., 2007). Screening for salt tolerant wheat germplasm is important to determine whether there is a genetic basis for selection and breeding purposes and to whether there are useful genotypes or new genes for tolerance to salt stress. Differences in salt tolerance exist not only between species but also amongst genotypes within species (Khan, *et al*., 2008).

Wheat seeds subjected to 50 mM $CaCl_2$. $2H_2O$ had significantly longer shoot length, heavier fresh and dry weight of seedlings than those treated with control (Afzal, *et al*.,2007). There was an increase in the shoot and root length with the application of external K. The increase was more pronounced under control than under saline conditions (Shirazi, *et al*., 2005).Rice seed priming with $CaCl_2$ at (1.00 MPa) followed by (1.25 MPa) gave the highest values of germination percentage, speed of germination index, germination rate, germination co-efficient, germination energy %,seedlings length, seedlings dry weight, water uptake % and decreasing mean germination time as well as time to 50 % germination compared with control (distilled water) under salinity stress (Yousof, 2013). Jabbarpour, *et al.*,(2014) reported that salt priming of seeds also enhanced seedling emergence percentage in the field. In most cases, no significant differences between KNO3 and KH2PO4 priming were found. Therefore, both priming techniques can improve seedling vigor and field establishment of wheat.

The purpose of this investigation was to study the effect of using seed treatment technique with salty solutions for enhancement wheat seed and seedling vigor under salinity stress.

MATERIALS AND METHODS

This study was carried out during 2013 and 2014 years at the Laboratory of Seed Technology Research Unit, Mansoura, Egypt, to study the effect of wheat seed priming of Misr 1, Misr 2 and Gemmiza 10 cultivars with solutions of $CaCl_2$ 2%, $CaCl_2$ 4%, KH_2PO_4 1%, KH_2PO_4 2 %, KCL 2 %, KCL 4% and distilled water in addition to dry seed under salinity conditions (0, 5 and 10 dS/m). The seed were obtained from Central Administration of Seed (CAS). Wheat seeds were soaked in previous solutions under study for 2 h. Germination tests were carried out in 400 seeds of each treatment in sterilized Petri dishes (150 × 15 mm) covered at the bottom with two sheets of Whatman No.1 filter paper that had been autoclaved. Each dish included 50 seeds and moistened with 10 ml of salinity solutions (0, 5 and 10 dS/m). and incubated in growth chamber at 20 ± 2 ^{o}C and germination was observed daily to study the following measurements:

I- Seed and seedlings measurements:

1- Water uptake: according to (Rahman, *et al*., 2008).

$$\textbf{Water uptake \%} = \frac{W2-W1}{W1}$$

W1 = Initial weight of seed.

W2 = Weight of seed after absorbing water in a particular time.

2- Germination percentage (G%) : It was calculated by counting only normal seedlings 8 days after planting according to (ISTA rules , 1999).

3- Speed germination index (SGI): It was calculated as described in the Association of Official Seed Analysis (AOSA,1983) .
4- Germination rate (GR): It was defined according to Bartllett, (1937).
5- Co-efficient of germination (CG) was calculated according to (Bewley and Black 1994).
6- Seedlings length (cm): It was measured of ten normal seedlings 8 days after planting.
7- Seedlings dry weight (g): Ten seedlings were dried in hot-air oven at 85 ^{o}C for 12 hours and weighted 8 days after planting.
8- Seedling vigor index: It was calculated as described of (ISTA rules, 1999).

I I - Chemical contents:

Chemical contents were determined8 days after planting**.**

1- Chlorophyll concentrations (mg/ g fresh weight) were determined at 645, 663 and 450 nm for chlorophyll a (Chl a), chlorophyll b (Chl b) and carotenoids, respectively and estimated by the equations of(Witham *et al.,* 1971).
2- K^{+} and Na^{+}(mg/dry weight) were determined according to (Jackson,1973).

All obtained data of measurements and measurements were subjected to the statistical analysis according to the technique of analysis of variance (ANOVA) of completely randomized design of three factors in four replicates, as described by Gomez and Gomez (1984).

RESULTS

Results of water uptake %, germination %, speed germination index, germination rate, co-efficient of germination, seedlings length, seedlings dry weight and seedling vigor index of wheat cultivars as affected by salinity levels are presented in Tables (1 and 2). Significant negative effects for salinity levels on seed or seedlings vigor measurements were observed as shown in Tables (1and 2). A gradual decrease in germination percentage with increasing salinity levels, sowing wheat seed in high salinity levels alike 5, and 10 dS/m decreased the germination percentage to 87.5 and 83.1% comparing 90.5 % for first season and 86.2 and 81.4 % compared 88.9 % in the second season (Table 1).Also the same effects for increasing salinity levels was observed on the other measurements such water uptake %, speed of germination index and germination rate. From Table 2, co-efficient of germination and seedlings vigor measurements as seedling length, seedling dry weight and seedlings vigor index significantly affected with increasing salinity levels. The highest co-efficient germination (70 .0 and 68.9), longest seedlings (15.4 and 13.9 cm), heaviest seedlings dry weight (0.239 and 0.233g) and the highest mean of seedlings vigor index (1402 and 1242) were produced from the check treatment (0 dS/m) in the first and second seasons, respectively .On contrast, the lowest co-efficient germination (53.6 and 52.0).the shortest seedlings length (11.4 and 10.2 cm), slight seedlings dry weight (0.176 and 0.170 g) and lowest seedling vigor index (952 and 835) were obtained from the salinity level 10 dS/m in the first and second seasons, respectively.

Table (1): Effect of salinity levels and salty solutions on water uptake %, germination % and seed vigor measurements of some wheat cultivars during seasons (2013& 2014).

Treatments \ Measurements	Water uptake %	Germination %	Speed germination index	Germination rate	Water uptake %	Germination %	Speed germination index	Germination rate
	2013				2014			
A. Salinity levels (dS/m)								
0	8.6	90.5	71.5	0.77	7.3	88.9	71.4	0.70
5	7.1	87.5	64.4	0.70	5.9	86.2	64.2	0.61
10	5.9	83.1	54.3	0.57	4.3	81.4	54.0	0.49
F. Test	**	**	**	**	**	**	**	**
LSD at 5 %	0.1	0.7	0.4	0.01	0.1	0.5	0.3	0.01
B. Cultivars								
Misr 1	7.4	88.7	66.1	0.71	5.9	86.9	659	0.62
Misr 2	7.5	89.4	66.4	0.72	6.1	87.9	663	0.65
Gemmiza 10	6.8	83.1	57.7	0.62	5.5	81.8	57.5	0.53
F. Test	**	**	**	**	**	**	**	**
LSD at 5 %	0.1	0.7	0.4	0.01	0.1	0.5	0.3	0.01
C. Seed Treatment								
$CaCl_2$ 2%	7.2	87.2	63.6	0.68	5.7	85.6	63.5	0.60
$CaCl_2$ 4%	7.2	87.2	63.4	0.68	5.6	85.6	63.2	0.59
KH_2PO_4 1%	7.6	88.3	64.9	0.69	6.6	86.0	64.7	0.64
KH_2PO_4 2 %	7.3	87.4	63.8	0.69	5.9	86.7	63.4	0.61
KCL 2%	7.5	87.5	63.9	0.69	6.4	85.9	63.6	0.62
KCL 4%	7.2	86.4	62.8	0.67	5.7	85.6	62.9	0.59
Distilled water	7.0	86.3	62.6	0.67	5.5	85.1	62.3	0.58
Dry seed	6.8	86.2	62.3	0.66	5.3	84.9	62.1	0.57
F. Test	**	**	**	**	**	**	**	**
LSD at 5 %	0.2	0.9	0.6	0.01	0.2	0.8	0.6	0.01

AB	**	**	**	**	**	**	**	**
AC	**	**N.S**	*	**N.S**	**	**N.S**	*	**N.S**
BC	**N.S**	**N.S**	*	**N.S**	**N.S**	**N.S**	*	**N.S**
ABC	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

Table (2): Effect of salinity levels and salty solutions on Co-efficient of germination and seedling vigor measurements of some wheat cultivars during seasons (2013& 2014).

Treatments \ Measurements	Co-efficient of germination	Seedling length (cm)	Seedling dry weight	Seedling vigor index	Co-efficient of germination	Seedling length (cm)	Seedling dry weight	Seedling vigor index
	2013				2014			
A. Salinity levels (dS/m)								
0	70.0	15.4	0.239	1402	68.9	13.9	0.233	1242
5	62.5	13.6	0.213	1196	61.1	12.7	0.201	1101
10	53.6	11.4	0.176	952	52.0	10.2	0170	835
F. Test	**	**	**	**	**	**	**	**
LSD at 5 %	0.8	0.2	0.002	15	0.8	0.1	0.002	15
B. Cultivars								
Misr 1	64.1	14.0	0.219	1255	62.6	12.8	0.208	1122
Misr 2	65.3	14.2	0.222	1278	644	13.1	0.217	1158
Gemmiza 10	56.7	12.1	0.187	1016	55.0	10.9	0.179	898
F. Test	**	**	**	**	**	**	**	**
LSD at 5 %	0.8	0.2	0.002	15	0.8	0.1	0.002	15
C. Seed Treatment								
$CaCl_2$ 2%	61.3	13.5	0.211	1191	60.1	12.2	0.200	1054
$CaCl_2$ 4%	62.3	13.5	0.208	1185	60.5	12.2	0.201	1072
KH_2PO_4 1%	63.0	13.7	0.215	1226	61.8	12.8	0.207	1111
KH_2PO_4 2 %	62.7	13.6	0.212	1206	61.6	12.5	0.203	1082
KCL 2%	62.8	13.7	0.213	1214	61.7	12.5	0.204	1084
KCL 4%	61.7	13.3	0.207	1159	60.1	12.2	0.201	1054
Distilled water	61.5	13.2	0.206	1150	59.9	11.8	0.198	1014
Dry seed	61.2	13.0	0.202	1134	59.6	11.7	0.196	1003
F. Test	N.S	**	**	**	N.S	**	**	**
LSD at 5 %	1.4	0.3	0.003	24	1.4	0.3	0.003	24
AB	**	N.S	**	**	**	N.S	**	**
AC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
BC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
ABC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

With respect to the effect of the salinity levels on seedlings chemical measurements, results in Tables(3 and 4) cleared that increasing salinity levels significantly affected cholorophll a and b, carotenoids, K^+ contents, Na^+ content and K/Na ratio in seedlings. From Table 3, Cholorophll a , b and carotenoids content in seedlings varied according to the salinity level, the lowest content of them were (0.697 and 0.657) , (0.385 and0.355) and (0.181 and 0.161)mg/g fresh weigh were obtained from the salinity level(10dS/m) compared with the check treatment (0 dS/m) were (1.141and1.101), (0.708 and 0.678) and (0.341and 0.321) in the first and second seasons, respectively. In the Table 4 that showed the lowest K^+ contents and K/ Na ratio were obtained with salinity 10 dS/m which were(3.877and3.338mg/dry weight)and (1.192 and 1.119), in both seasons , respectively. While, seedlings Na^+ content increased to (3.271 and 3.002) compared with (2.557 and 2.672 mg/dry weight) for 0 dS/m salinity level in the first and second seasons, respectively.

With respect to cultivars effect, Misr 2 wheat cultivar showed superiority and recorded the highest values of water uptake %, seed and seedling vigor. Also, highest chemical measurements and lowest Na^+ content were obtained with Misr 2 wheat cultivar. On the contrast, Gemmiza 10 was the highest in Na^+ content and lowest of all measurements under study compared with other cultivars, as shown in Tables (1, 2, 3 and 4).

The effect of wheat seed priming in salty solutions on seed water uptake %, germination%, seed, seedling vigor and chemical measurements was significant as presented in Tables (1, 2, 3 and 4). Soaking seed before sowing in KH_2PO_4 1% solution produce the highest means of water uptake %, germination %, seed and seedling vigor followed by soaked seed in KCL 2%. Finally, the lowest means of measurements in Table 1 and 2 were obtained from the check treatment (dry seed). The effect of salty solution on chemical measurements was similar to its effects on seed and seedling vigor. The highest values of chemical measurements (cholorophll a, b, carotenoids, K^+ contents, and K/Na ratio) and lowest Na^+ content in seedlings were obtained by wheat soaking in KH_2PO_4 1%solution.

Table 3: Effect of salinity levels and salty solutions on cholorophll a, b and carotenoids of some wheat cultivars seedlings during seasons (2013& 2014).

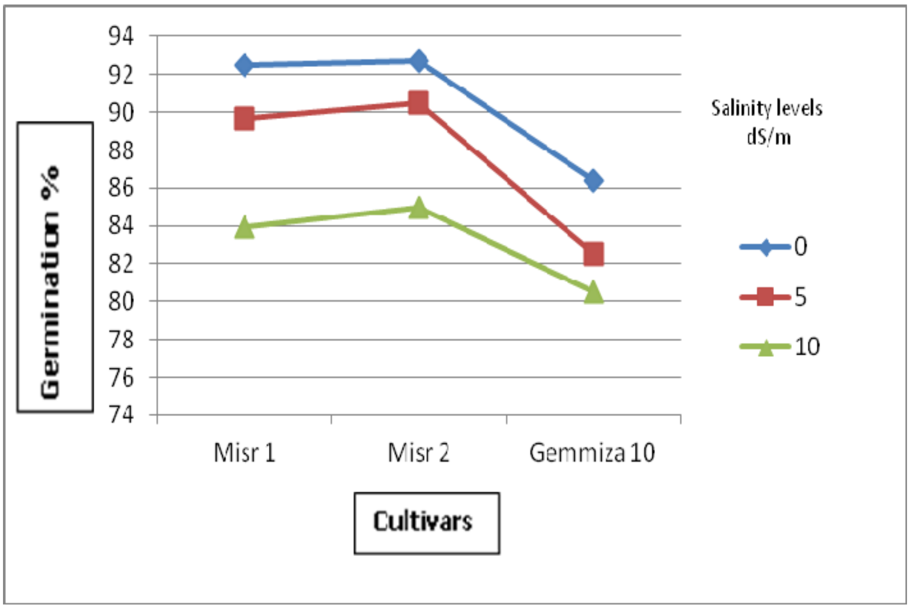
Treatments / Measurements	Chl a (mg/g fresh weight)	Chl b (mg/g fresh weight)	Carotenoids (mg/g fresh weight)	Chl a (mg/g fresh weight)	Chl b (mg/g fresh weight)	Carotenoids (mg/g fresh weight)
	2013			2014		
A. Salinity levels (dS/m)						
0	1.141	0.708	0.341	1.101	0.678	0.321
5	0.954	0.498	0.240	0.914	0.468	0.220
10	0.697	0.385	0.181	0.657	0.355	0.161
F. Test	**	**	**	**	**	**
LSD at 5 %	0.017	0.011	0.008	0.016	0.011	0.008
B. Cultivars						
Misr 1	0.940	0.532	0.265	0.900	0.503	0.245
Misr 2	0.992	0.571	0.279	0.953	0.541	0.259
Gemmiza 10	0.859	0.489	0.218	0.819	0459	0.198
F. Test	**	**	**	**	**	**
LSD at 5 %	0.017	0.011	0.008	0.016	0.011	0.008
C. Seed Treatment						
$CaCl_2$ 2%	0.930	0.533	0.259	0.890	0.503	0.239
$CaCl_2$ 4%	0.908	0.520	0.251	0.868	0.490	0.231
KH_2PO_4 1%	1.059	0.606	0.291	0.019	0.576	0.271
KH_2PO_4 2 %	0.958	0.550	0.266	0.918	0.520	0.246
KCL 2%	1.029	0.586	0.282	0.989	0.556	0.262
KCL 4%	0.901	0.511	0.241	0.861	0.481	0.221
Distilled water	0.886	0.496	0.237	0.846	0.466	0.217
Dry seed	0.774	0.442	0.208	0.734	0.412	0.188
F. Test	**	**	**	**	**	**
LSD at 5 %	0.027	0.017	0.013	0.025	0.016	0.012
AB	**	**	**	**	**	**
AC	**	**	*	**	**	*
BC	**	**N.S**	**N.S**	**	**N.S**	**N.S**
ABC	**	**N.S**	**N.S**	**	**N.S**	**N.S**

Table 4: Effect of salinity levels and salty solutions on Potassium, sodium content and K/ Na ratio of some wheat cultivars seedlings during seasons (2013& 2014).

Measurements / Treatments	K^+ content (mg/dry weight)	Na^+ content (mg/dry weight)	K/ Na ratio	K^+ content (mg/dry weight)	Na^+ content (mg/dry weight)	K/ Na ratio
	2013			2014		
A. Salinity levels (dS/m)						
0	5.508	2.557	2.239	4.968	2.672	2.288
5	4.679	2.996	1.572	4.139	2.288	1.529
10	3.877	3.271	1.192	3.338	3.002	1.119
F. Test	**	**	**	**	**	**
LSD at 5 %	0.125	0.084	0.090	0.121	0.084	0.112
B. Cultivars						
Misr 1	4.758	2.917	1.724	4.218	2.648	1.716
Misr 2	4.761	2.853	1.754	4.221	2.584	1.739
Gemmiza 10	4.546	3.054	1.524	4.006	2.785	1.480
F. Test	**	**	**	**	**	**
LSD at 5 %	0.125	0.084	0.090	0.121	0.084	0.112
C. Seed Treatment						
$CaCl_2$ 2%	4.711	2.525	1.625	4.171	2.698	1.591
$CaCl_2$ 4%	4.633	2.396	1.578	4.093	2.731	1.539
KH_2PO_4 1%	5.100	2.750	2.082	4.560	2.420	2.142
$KH_2PO_4$2 %	4.789	2.975	1.748	4.249	2.587	1.730
KCL 2%	4.989	2.937	1.889	4.449	2.520	1.890
KCL 4%	4.567	3.075	1.534	4.027	2.775	1.491
Distilled water	4.384	3.250	1.479	3.844	2.775	1.431
Dry seed	4.333	3.225	1.403	3.793	2.872	1.348
F. Test	**	**	**	**	**	**
LSD at 5 %	0.205	0.143	0.147	0.196	0.145	0.196
AB	**	N.S	**	**	N.S	**
AC	N.S	N.S	**	N.S	N.S	**
BC	N.S	N.S	N.S	N.S	N.S	N.S
ABC	N.S	N.S	N.S	N.S	N.S	N.S

Interactions effect between salinity levels and cultivars on germination % , speed germination index and seedling dry weight are presented in Figs. 1,2,3.Misr 2 recorded the highest values of previous measurements through all salinity levels under study compared with other cultivars. But Gemmiza 10 wheat cultivar was the lowest and more weakness under 5 and 10 dS/m.

Regarding to interactions effect between salinity levels and soaking solutions on speed germination index and Chl a. Results in Figs.4,5 showed that soaking wheat seed with KH_2PO_4 1%solution was the best compared other soaking treatments and higher than seed soaked in distilled water.



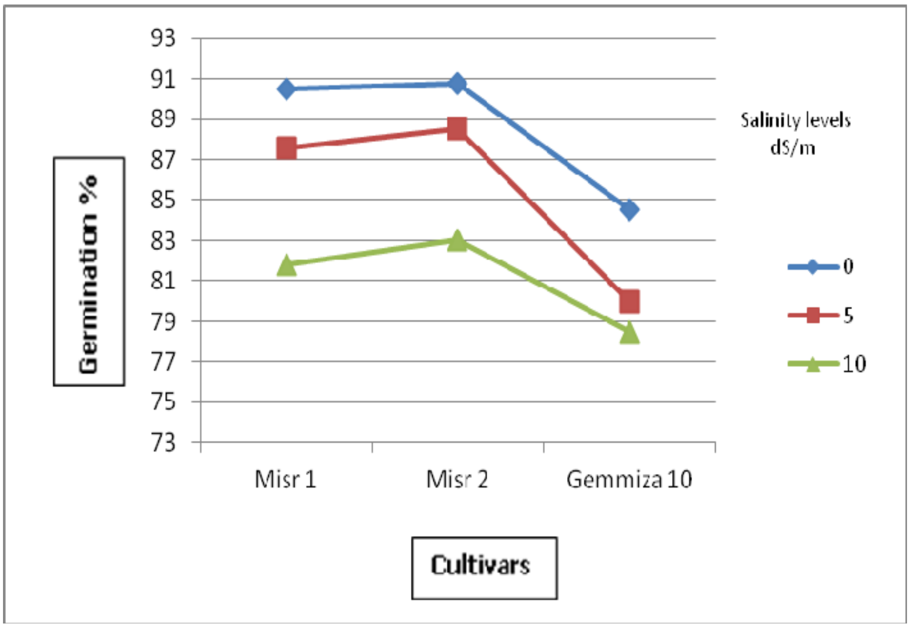


Fig.1.Effect of interactions between salinity levels and wheat cultivars on germination % during seasons (2013& 2014).

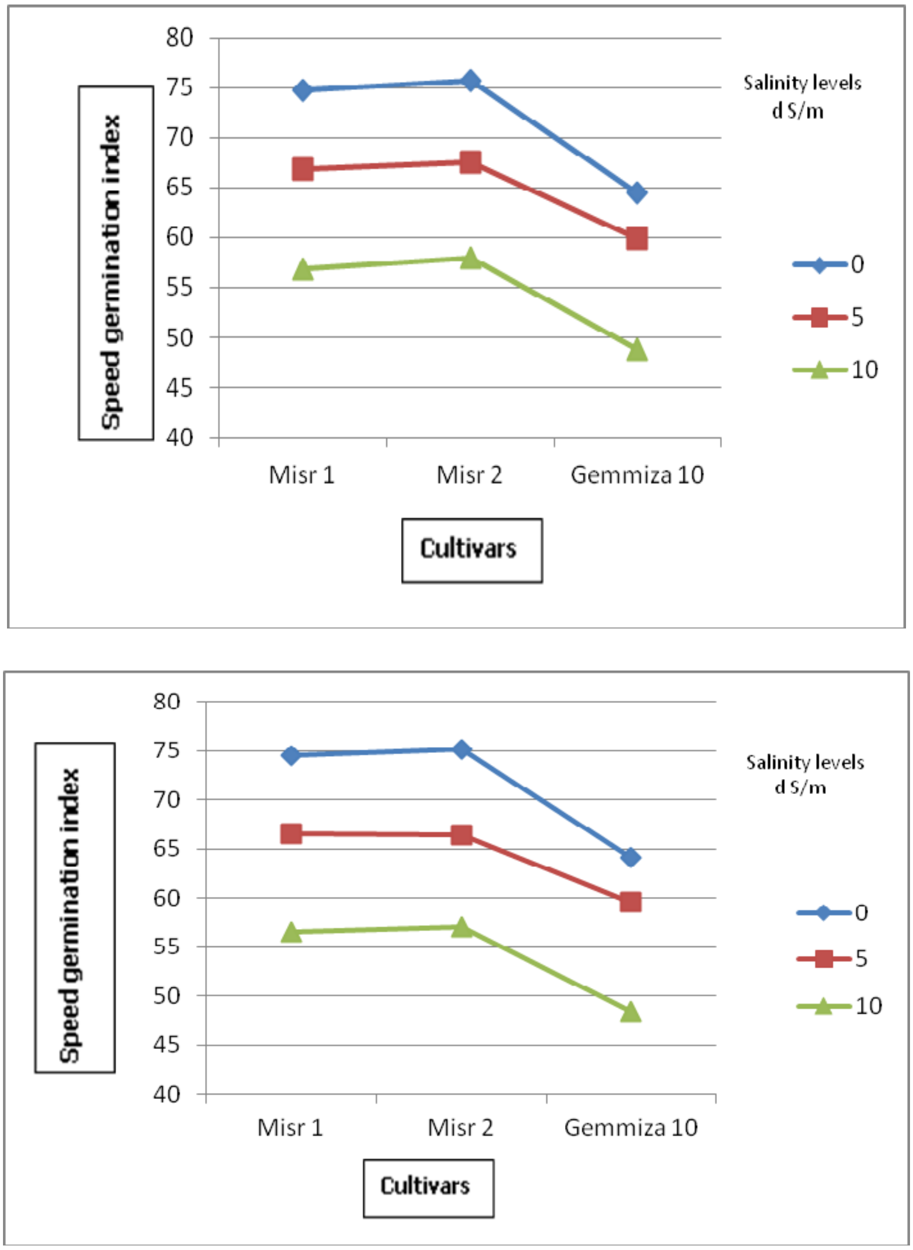
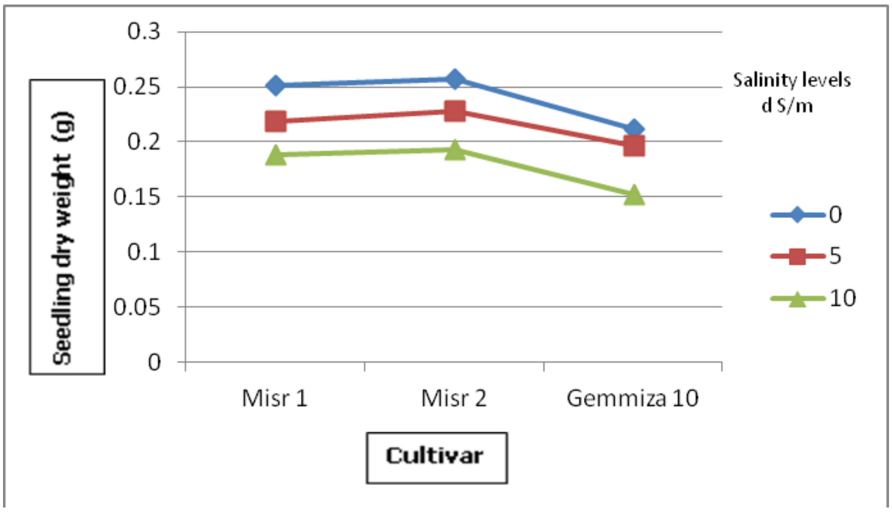


Fig.2.Effect of interactions between salinity levels and wheat cultivars on speed germination index during seasons (2013& 2014).



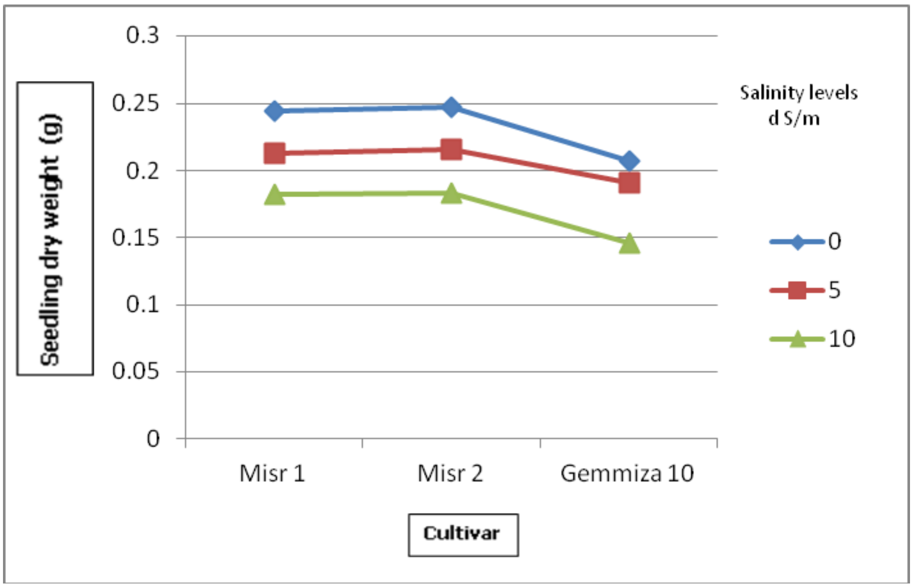
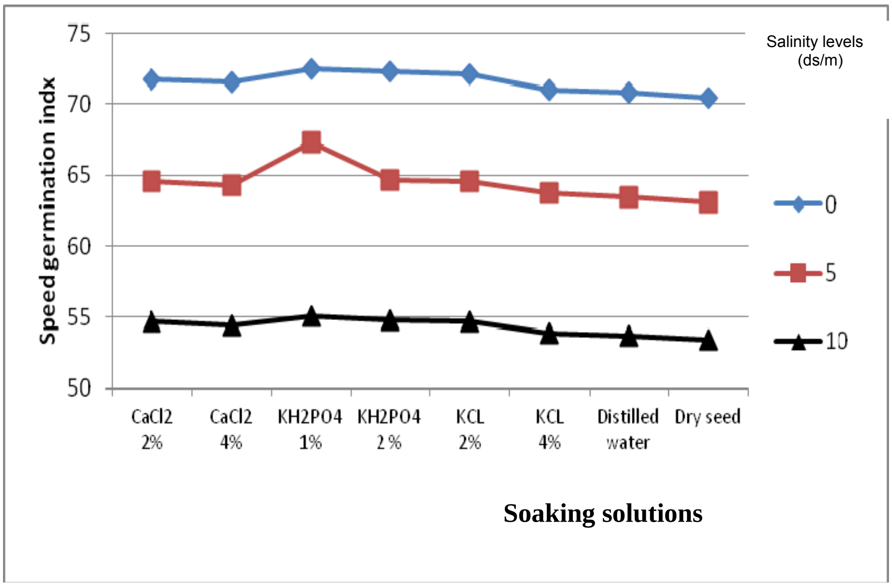


Fig.3.Effect of interactions between salinity levels and wheat cultivars on seedling dry weight (g) during seasons (2013& 2014).



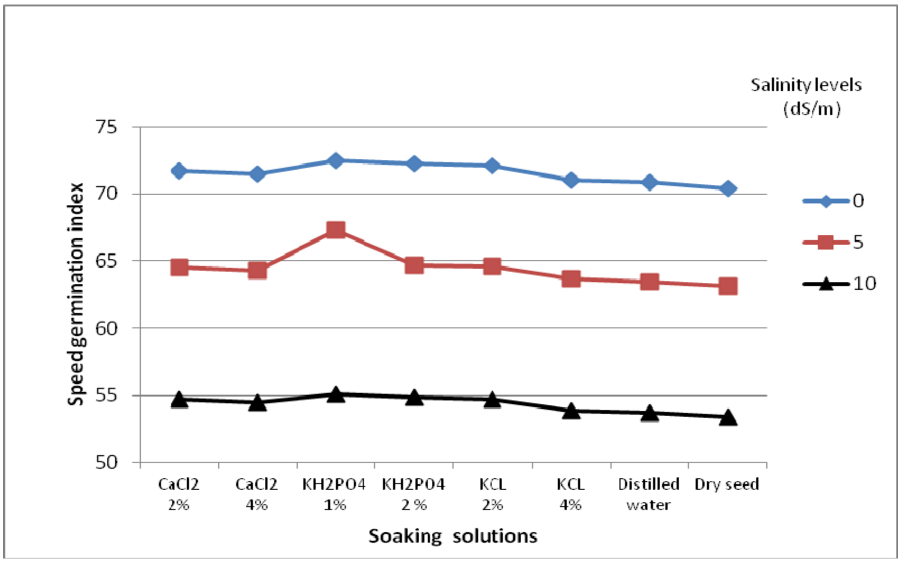
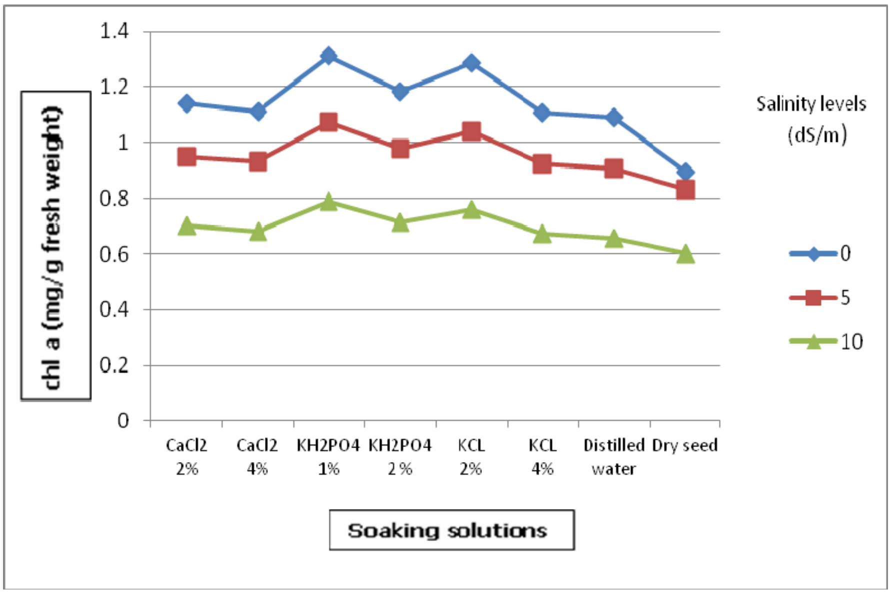


Fig.4.Effect of interaction between salinity levels and priming solutions on speed germination index of wheat cultivars during seasons (2013& 2014).



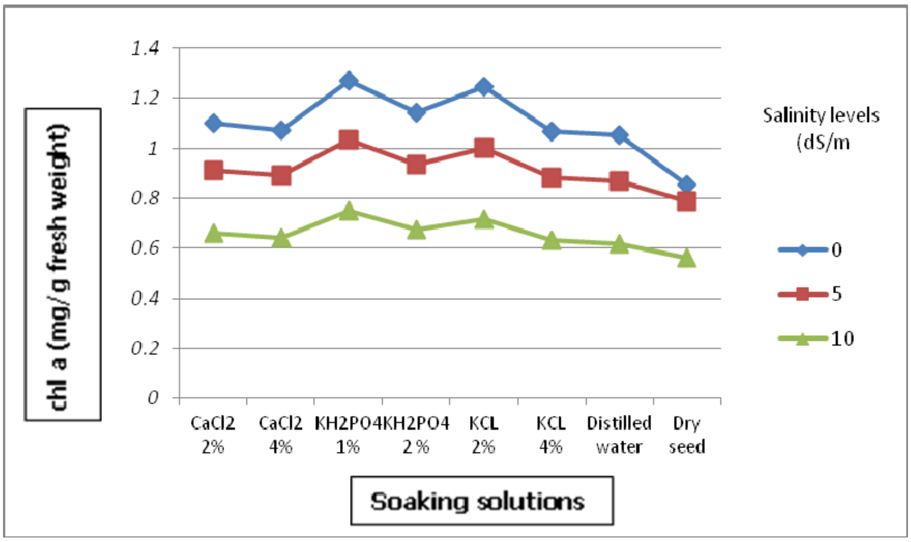


Fig.5. Effect of interaction between salinity levels and priming solutions on chl a (mg/g fresh weight) of wheat cultivars seedlings during seasons (2013& 2014).

DISCUSSION

In this study, all germination measurements decreased by increasing the level of salinity as shown in (Tables 1 and 2).Increasing salinity concentrations often cause osmotic and/or specific toxicity which may reduce germination percentage (Saboora, *et al*., 2006). According to Abogadallah and Quick (2009), salinity may affect seed germination by decreasing the ease with which the seeds take up water because the activity and events normally associated with germination get either delayed and/ or proceed at a reduced rate. Salinity (NaCl) may also affect germination by facilitating the intake of toxic ions which may change certain enzymatic or hormonal activities of the seed (Smith and Comb, 1991). The plumule and radicle growth are the most important parameters for salt stress because roots are in direct contact with soil and absorb water from soil and shoot supply it to the rest of the plant. For this reason, plumule and radicle length provides an important clue to the response plants to salt stress (Jamil, *et al*., 2006). Decreasing in measurements of wheat seedling, it may be due to that salinity suppressed both cell division and cell enlargement (Sakr, 1996).

The wheat cultivars under study showed different responses to salt stress and among the cultivars tested at salinity level (5 and 10 dS/m). Misr1 and Misr 2 cultivars appeared to be more tolerance at germination stage than Gemmiza 10 wheat cultivar. It may be due to that Misr1 and Misr 2 cultivars recorded highest value of water uptake and higher degree of osmotic adjustment through the increasing in the uptake rate of K^+ and K/Na ratio. The possible cause of varietal difference most likely evolves ion Na transport properties and cellular compartment (Munns, 1988).

Different pre-sowing treatments with various salty solutions agents improved seedling growth in both normal and saline conditions. Generally, which improves the seedling growth, particularly under saline conditions in our studies and it was also confirmed by earlier reports (Sivritepe, *et al.,* 2003*)*. The pre-sowing treatments cause initiation of the early metabolic processes and the re-drying of seeds arrest, but do not reverse, the initial stages of germination so that on the availability of suitable conditions, the time taken to germinate is reduced (Bewley and Black, 1982). Salt tolerance in the members of the family Triticeae is associated with enhanced ability to discriminate between Na^+ and K^+ in the soil solution and to preferentially accumulate K^+ and exclude Na^+ (Ali, *et al.,*2004).Calcium thus protects plants from adverse effects of salt stress and improves the growth of plants under saline conditions, greater efficiency of osmohardening with CaCl2 and KCl is possibly related to the osmotic advantage that both k^+ and Ca $^{+}2$ have an improving cell water statues, and also they acts as cofactors in the activities of numerous enzymes (Taiz and Zeiger,2002).

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تأثير التهيئة في المحاليل الملحية على إنبات و قوة البادرات لبعض أصناف القمح تحت ظروف الإجهاد الملحي

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أجريت التجارب المعملية بمعمل قسم بحوث تكنولوجيا البذور بالمنصورة في تصميم التام العشوائية ذات أربع مكررات لدراسة تأثير نقع تقاوي بعض أصناف القمح (مصر ١ ، مصر ٢ و جميزة١٠) في محاليل ملحية (كلوريد كالسيوم ٢ % ، كلوريد كالسيوم ٤ % ، فوسفات أحادي بوتاسيوم ١ % ، فوسفات أحادي بوتاسيوم ٢% ، كلوريد البوتاسيوم ٢ % و كلوريد البوتاسيوم ٤ %) بالإضافة إلى تقاوي منقوعة في ماء مقطر وتقاوي جافة على الإنبات ، حيوية التقاوي و الصفات الكيميائية للبادرات وذلك تحت إجهاد ملحي قدره (٠، ٥ و١٠ديسيسيمنز/م).

ويمكن تلخيص أهم النتائج فيما يلي :-

أدت زيادة مستويات الملوحة من ٠ إلى ١٠ ديسيسيمنز/م إلى انخفاض النسبة المئوية للإنبات و تدهور صفات حيوية البذور والتي تم قياسها بواسطة (نسبة الماء الممتص ،النسبة المئوية للإنبات ، دليل سرعة الإنبات ، معدل الإنبات ومعامل الإنبات) وقوة البادرات والتي تم قياسها بواسطة (طول البادرة ، الوزن الجاف للبادرة و دليل حيوية البادرات) و الصفات الكيميائية [كلوروفيل أ ، ب ، كاروتينيدات (ملليجرام / جم وزن طازج) و محتوى البوتاسيوم (ملليجرام / جم وزن جاف)] .

أظهرت النتائج أن الصنف مصر ٢سجل أفضل القراءات تحت الظروف والعادية والإجهاد الملحي لصفات نسبة الإنبات، حيوية التقاوي، البادرات و الصفات الكيميائية لها .

سجل تهيئة تقاوي القمح بالمحلول الملحي فوسفات أحادي البوتاسيوم ١% أعلى القراءات لصفات حيوية التقاوي والبادرات وكذلك الصفات الكيميائية.

لذلك توصي هذه الدراسة بتهيئة تقاوي القمح في محلول فوسفات أحادي البوتاسيوم ١% عند الزراعة في الظروف الملحية ، لما له من تأثير فعال في تحسين حيوية التقاوي وقوة البادرات و تخفيف الآثار الضارة المتسببة عن الإجهاد الملحي وكذلك زراعة الصنف مصر ٢ في ظروف الإجهاد الملحي لما يبديه من شدة تحمل للملوحة مقارنة بالأصناف تحت الدراسة .