J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

SEED SIZE OF MAIZE HYBRIDS: I- EFFECTS ON EMERGENCE AND SEEDLING TRAITS UNDER DIFFERENT SALINITY LEVELS

M.M. SAADALLA[1], F.S. EL-NAKHLAWY[2], M.S. BADRAN[1], AND S.A. MORSY[1]

1-Dept. of Crop Science , Faculty of Agriculture , Damanhour , Alexandria University

2-Dept. of Crop Science , Faculty of Agriculture , El-Shatby , Alexandria University

ABSTRACT

There has been some concern about using small seeds that may result from seed position on the ear or poor growing conditions for seeding hybrid maize. This study was designed to investigate the effect of seeding three commercial maize crosses (Single Cross 2010, Three-Way Cross 310 and Three-Way Cross 321) with three seed sizes (large, medium and small) under seven salinity levels of irrigation water (Zero, 2500, 5000, 7500, 10000, 12500 and 15000 ppm). Emergence and seedling traits were recorded under controlled environment in a split-split plot, in a complete block design, with three replicates.The different salinity levels highly significantly affected germination (%), plumule length, radical length, plumule weight, radical weight and seedling weight. Such traits were, gradually, decreased in response to increasing NaCl concentration. Significant differences were observed in plumule length among the studied maize hybrids all over different seed sizes and salinity levels. A significant effect of interaction between salinity levels and maize hybrids was revealed for germination (%), plumule length and plumule weight. Different seed sizes of the hybrids significantly affected radical length and plumule weight. A significant interaction effect of salinity levels by seed sizes was revealed for plumule weight. There was a non-significant interaction of hybrids by seed sizes on any of the

studied traits. However, significant effects of three-way interaction (salinity x hybrids x seed size) were revealed on radical weight and seedling weight. The results suggested that sowing large seed sizes of the studied maize crosses could improve germination and seedling vigor associated with better germination vigor under high levels of irrigation water salinity.

INTRODUCTION

Maize (*Zea mays* L.) is an essential cereal crop grown in the summer and late-summer seasons in Egypt. It is essentially used as animal and poultry feed and, recently, the maize flour has been recommended to be mixed with wheat flour to overcome the shortage of wheat production in Egypt. Attempts to increase maize production could push growing maize to new areas with marginal nature. In the north-west coast of Egypt, as well as many other areas, maize could face the problem of saline irrigation water, where drainage water is mixed with fresh Nile water to be used for irrigation in such areas.

Maize is considered a moderately salt–sensitive plant (Maos and Hoffman, 1977). The major deleterious effects of salinity on plants has been attributed to direct high osmotic effects on germination and growth, consequently, inhibition of water availability and toxic effects of salt ions (Levitt, 1980). These negative effects resulted in progressive reduction in growth and grain yield (Marchner et al., 1981).

Further research is required to clarify the effects of seed size, maize hybrids, varying levels of salt irrigation water and their interactions on seed germination and other related seedlings traits.

MATERIALS AND METHEDS

The present investigation was carried out at the Crop Science Department, Faculty of Agriculture, EL-Shattby, Alexandria University, in summer 2004 under laboratory controlled environment. Three commercial maize crosses; namely, single cross2010 (SC2010), three-way cross 310 (TWC310) and three-way cross 321 (TWC321), were used in this study. Three different seed sizes; i.e., large, medium and small, were sorted out of the three crosses, based on the number of seeds per 100g, as described in Table 1.

Table (1): Average number of seeds/100g for three different sizes of three maize hybrids.

Seed size	Maize Hybrids		
	SC2010	**TWC310**	**TWC321**
Large	270	217	223
Medium	327	245	249
Small	435	302	297

The different seed sizes of the different crosses were watered with seven salinity levels; namely, zero, 2500, 5000, 7500, 10000, 12500 and 15000 ppm sodium chloride. Ten pure hybrid seeds were sown on germination paper in a sterilized Petri dish and watered with 10 ml of a sodium chloride concentration each time in four days intervals. A split-split plot arrangement, in a complete block design, with three replicates was followed, where the seven salinity levels were randomly assigned to the main plots. The three commercial maize crosses were randomly assigned to the sub-plots. The sub-sub-plot was presented by a Petri dish occupied with a seed size of the different seed sizes of a cross. The experiment was conducted under controlled environment in a germinator (Herceus, Germany) on 30/25 C^{o} day/ night temperature.

After fifteen days from sowing, the following data were collected:

1- Germination (%): As a percentage number of normal seedlings to total sown seeds on a Petri dish basis.
2- Plumule length (cm): Length of plumule for five normally germinated seedlings of each Petri dish.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

3- Radical length (cm): Average length of radical and secondary roots for five normal germinated seedlings of each Petri dish.
4- Plumule weight (g): Average fresh plumule weight of normally germinated seedlings on a Petri dish basis.
5- Radical weight (g): Average radical weight of normal seedling on a Petri dish basis.
6- Seedling weight (g): Average whole fresh weight of normally germinated seedlings on a Petri dish basis.

Analyses of variance were performed on the studied traits following the split-split plot model, using the GLM procedures of SAS (SAS Institute Inc. 2000). The differences among means of various traits were tested according to the least significant difference test ($Lsd_{0.05}$), as stated by Steal and Torrie (1984).

RESULTS AND DISCUSSION

Analyses of variance for the effects of NaCl concentration, maize crosses, seed sizes and their interactions on the germination percentage and the studied seedling traits are presented in Table 2.

1- Germination (%) :-

Salinity levels of irrigation water highly significantly affected germination percentage (Table 2). 0n the other hand, there were non-significant effects of the hybrids and seed size on germination. However, the interaction between salinity levels and hybrids had a highly significant effect, while, the other two and three-way interactions (among salinity level, hybrids and seed size) did not significantly affect germination (Table 2).

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

Table (2): Mean squares of germination percentage and seedling traits as affected by salinity levels, hybrids and seed sizes.

Sources of variance	df	Germination (%)	Plumule length (cm)	Radical length (cm)	Plumule weight (g)	Radical weight (g)	Seedling weight (g)
Replications	2	1820.6	63.39	136.47	0.005	0.015	1.14
Salinity levels (S)	6	13018.3**	2691.96**	115.58**	0.558**	0.268**	6.68**
Error "a"	12	1984.2	31.07	20.63	0.006	0.020	0.20
Hybrids(H)	2	344.4	40.20**	16.70	6.002	0.004	0.002
S X H	12	2252.5**	23.60**	7.58	0.011**	0.008	0.005
Error "b"	28	1031.5	7.59	6.39	0.003	0.004	0.007
Seed sizes (Z)	2	144.4	12.31	10.67*	0.005**	0.002	0.002
S X Z	12	48.8	2.35	3.81	0.003**	0.004	0.005
H X Z	4	41.3	3.50	2.96	0.001	0.004	0.002
S X H X Z	24	101.2	7.50	1.85	0.001	0.008**	0.008*
Error "C"	84	123.8	4.42	2.18	0.001	0.003	0.004

***, ** = Significant at 0.05 and 0.01 levels of probability, respectively.**

Figure (1) shows a progressive declining germination for all hybrids with ascending salinity level of irrigation water. Mean germination percentages, as affected by salt concentrations, maize hybrids and their interaction are summarized in Table 3. The hybrid SC2010 had the highest germination mean (98.8%) under distilled water, while both hybrids SC2010 and TWC321 had the lowest germination mean (22.3%) under the highest concentration of salinity (15000 ppm).

The deleterious effect of salinity on germination was confirmed by previous researchers; such as Chandru *et al*. (1993), Katerji *et al*. (1994), Begum *et al*. (1996), Atta and Leilah (1999), Kara and Keser (2001) and Ashrafuzzaman *et al*. (2002).

Similar results supporting the present ones of the non-significant effects of seed size on germination were reported by Graven and Carter (1990), and Nafziger (1992). While, Munchene and Gerogean (1997), Mazur and France (1994), Abou-Bakr and Abou-Sitta (1995) and Kanta *et al*. (2002) reported significant effects of seed sizes on germination percentage. However, these contrasting results among researchers could due to different maize germplasm under varying environmental factors

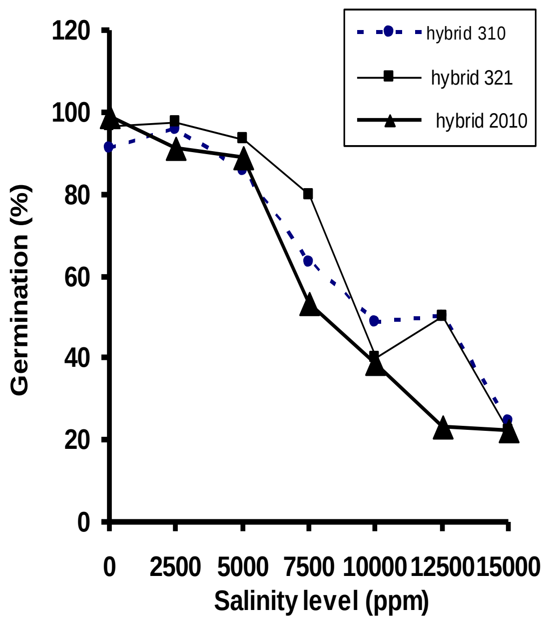

Figure (1): Effects of salinity levels and maize hybrids on germination.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

Table (3): Mean germination (%) and plumule length (cm) as affected by salinity levels, maize hybrids and their interaction over seed sizes.

Trait	Salinity level (p.pm)	Maize hybrids			Salinity levels means
		SC 2010	TWC 310	TWC 321	
Germination (%)	0.00	98.8	91.1	96.6	95.5a[1]
	2500	91.1	95.6	97.8	94.8a
	5000	88.9	85.6	93.4	89.3ab
	7500	53.4	63.4	80.0	65.6bc
	10000	38.9	48.9	40.0	42.6cd
	12500	23.4	50.0	50.0	41.1cd
	15000	22.3	24.5	22.3	23.0d
	Hybrids mean	59.5a	65.6a	68.6a	
	$Lsd_{0.05}$ for interaction = 20.4%				
Plumule length (cm)	0.00	19.5	17.5	21.0	19.3a
	2500	14.1	14.7	15.7	14.8b
	5000	6.3	9.5	8.2	8.0c
	7500	4.6	6.0	5.6	5.4cd
	10000	3.6	3.6	4.4	3.9de
	12500	3.2	3.4	3.4	3.3de
	15000	1.6	2.2	1.9	1.9e
	Hybrids mean	7.6b	8.1ab	8.6a	
	$Lsd_{0.05}$ for interaction = 4.65 cm				

([1]) Means for each factor, for each trait, followed by the same letter(s) are not significantly different at 0.05 level of probability.

2- Plumule length:

Analysis of variance (Table 2) shows highly significant effects of salinity levels, hybrids and their interaction on the plumule length.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

However, seed size and its two-way interactions with hybrids and salinity levels had non-significant effects on plumule length. Furthermore, the three-way interaction did not significantly affect plumule length.

The plumule length consistently decreased for all hybrids in response to increasing salinity levels (Fig. 2), where the mean of such length was the highest (19.3cm) under distilled water and the lowest (1.9 cm) under 15000 ppm level (Table 3). Three-way cross 321 had significantly longer plumule length (8.6cm) than Single Cross 2010 (7.6cm); while, three-way cross 310 had an intermediate plumule length (8.1cm) and was non-significantly different from both TWC321 and SC 2010 (Table 3).

The significant interaction of hybrids with salinity levels explains different response of hybrids under the different salinity levels, where the longest plumule was for TWC321 (21.0cm) when treated with distilled water, while the shortest plumule (1.6 cm) was that of SC2010, when treated with 15000 ppm of NaCl.

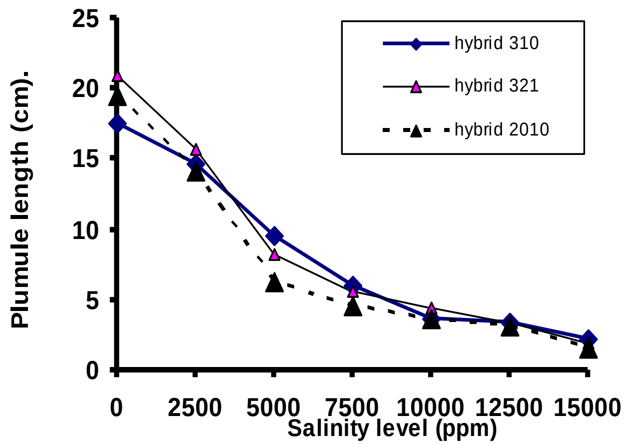

Figure (2): Effect of salinity levels and maize hybrids on plumule length.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

3- Radical length:-

Analysis of variance (Table 2) further indicates significant effects of salinity levels (at 0.01 probability level) and seed size (at 0.05 probability level) on radical length. However, all first-order and second-order interactions among hybrids, salinity levels and seed sizes did not significantly affect radical length.

Figure (3) illustrates an evident decline in radical length with increasing salinity levels. Mean radical length ranged from 31.6 cm (for hybrid 310) under distilled water to 2.2 cm for both hybrid 2010 and hybrid 310 under 15000 ppm salinity level. Furthermore, Figure 3 shows a similar response of the three studied hybrids under the increasing salinity level, which coincided with the results of Table (2), where non-significant differences were evident among the hybrids in their response to salinity.

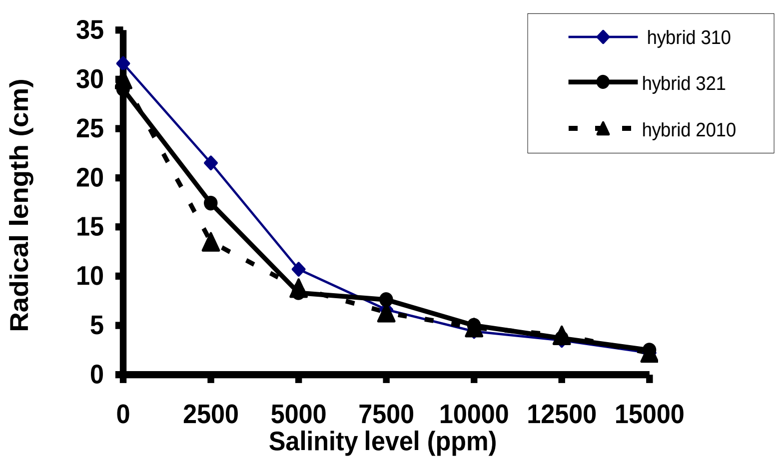

Figure (3): Effect of salinity levels on radical length of different hybrids.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

4- Plumule weight:

Analysis of variance (Table 2) reveals highly significant effects of salinity levels and seed size on plumule weight. Furthermore, the two-way interactions (salinity X seed size) and (salinity X hybrids) had highly significant effects on plumule weight.

Figure (4) shows that the plumule weight was markedly decreased in response to increasing salinity levels for all seed sizes. However, the prominent decline in plumule weight, with ascending salinity, was not associated with significant differences among hybrids (Table 2).

Table (4) indicates that TWC310 had the lightest plumule (0.39g) under distilled water, while it had the heaviest plumule under the most stressful salinity level (0.04g), which could be in agreement with a significant hybrid x salinity interaction (Table 2). Additionally, TWC321 had the highest plumule weight (0.51g) under distilled water, while SC2010 had the lowest (0.03g) under 15000 ppm of salinity level (Table 4).

In General, Figure (4) illustrates heavier plumule for large size of seeds all over salinity levels. Moreover, Table (5) illustrates the plumule weight of the different seed sizes under different NaCl levels where the large seed size had the highest plumule weight (0.50g) under distilled water, while the three sizes had the same plumule weight (10.04g) under the most stressful level of salinity (1500 ppm).

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

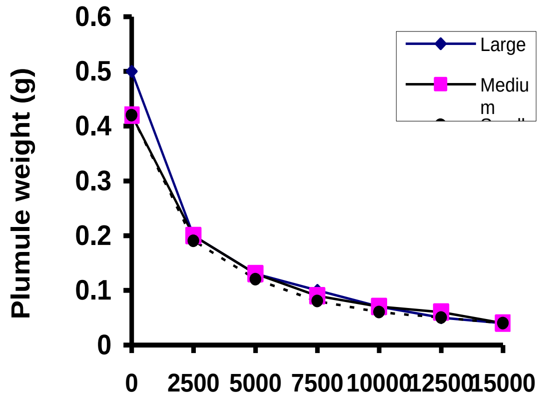

Figure (4): Effects of salinity levels and seed size on plumule weight.

Table (4): Mean plumule weight (g) as affected by salinity levels, maize hybrids and their interaction.

Salinity level (ppm)	Maize hybrids			Salinity levels means
	SC2010	TWC310	TWC321	
0.00	0.44	0.39	0.51	0.45a[1]
2500	0.14	0.27	0.18	0.20b
5000	0.13	0.13	0.12	0.13c
7500	0.10	0.10	0.09	0.10cd
10000	0.07	0.06	0.06	0.06de
12500	0.05	0.06	0.05	0.05e
15000	0.03	0.04	0.04	0.04e
Hybrids mean	0.14a	0.15a	0.15a	
$Lsd_{0.05}$ for interaction = 0.043g				

([1]) Means for each factor followed by the same letter/s are not significantly different at 0.05 level of probability.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

Table (5): Mean plumule weight (g) as affected by salinity levels, seed size and their interaction.

Salinity level (ppm)	Seed Size			Salinity levels means
	Large	Medium	Small	
0.00	0.50	0.42	0.42	0.45a[1]
2500	0.20	0.20	0.19	0.20b
5000	0.13	0.13	0.12	0.13c
7500	0.10	0.09	0.08	0.10cd
10000	0.07	0.07	0.06	0.06de
12500	0.05	0.06	0.05	0.05e
15000	0.04	0.04	0.04	0.04e
Hybrids mean	0.16a	0.14b	0.14b	
$Lsd_{0.05}$ for interaction = 0.035g				

([1]) Means for each factor followed by the same letter/s are not significantly different at 0.05 level of probability.

5- Radical weight:

Analysis of variance (Table 2),also resulted in a significant effect (at 0.01 probability level) for both salinity levels and the second degree interaction of salinity x hybrids x seed size on radical weight. None of the other main factors or interactions had a significant effect on such trait.

Figure (5) illustrates a prominent oppositional effect of ascending salinity levels on radical weight. Mean radical weight dramatically declined from 0.40g, under distilled water, to 0.11g under the stressful salt water of 15000 ppm.

Means of radical weight, as influenced by salinity levels, hybrids and seed size, are summarized in Table 6. The heaviest radical was that of

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

large seed sizes of TWC310 and TWC321 under distilled water (0.42g), while, the medium size of TWC310 and TWC321 had the lightest radical (0.07g) under 7500 ppm and 1500 ppm, respectively. These contrasting results were evident for highly significant second-order interaction among salinity levels, hybrids and seed size.

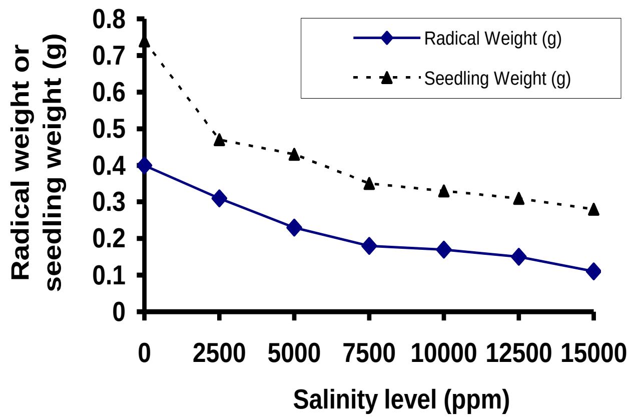

Figure (5): Effect of salinity levels (ppm) on radical weight (g) and seedling weight (g).

6- Seedling weight:

Analysis of variance (Table 2) reveals a further significant influence (at 0.01 probability level) of salinity levels and the second-order interaction of salinity, hybrids and seed size (at 0.05 probability level) on seedling weight. Neither the main effects (of hybrids and seed size) nor the two-way interactions among the three factors significantly affected the seedling weight.

Table (7) shows that the small seed size of TWC321, under distilled water, had the highest mean seeding weight (0.85g), while, the small seed size of TWC 310 had the lowest mean seedling weight (0.27g) under the highest salt concentration of 15000 ppm. These mean differences are in agreement with the significant three-factor interaction (Table 2).

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

Table (6): Means of radical weight (g) as affected by salinity level, hybrids and seed size interactions.

Salinity level (ppm)	Hybrid	Maize hybrids		
		Large	Medium	Small
0.00	TWC310	0.42	0.39	0.39
	TWC321	0.42	0.39	0.40
	SC2010	0.41	0.38	0.34
2500	TWC310	0.24	0.26	0.18
	TWC321	0.26	0.25	0.23
	SC2010	0.22	0.22	0.25
5000	TWC310	0.19	0.14	0.20
	TWC321	0.17	0.21	0.19
	SC2010	0.17	0.14	0.17
7500	TWC310	0.10	0.07	0.11
	TWC321	0.10	0.13	0.12
	SC2010	0.09	0.13	0.18
10000	TWC310	0.23	0.30	0.22
	TWC321	0.32	0.42	0.31
	SC2010	0.35	0.27	0.40
12500	TWC310	0.20	0.18	0.11
	TWC321	0.18	0.17	0.15
	SC2010	0.20	0.19	0.19
15000	TWC310	0.10	0.14	0.31
	TWC321	0.17	0.07	0.10
	SC2010	0.26	0.14	0.09

$Lsd_{0.05}$ between different salinity under the same or different hybrids = 0.065g.
$Lsd_{0.05}$ between different salinity under the same or different seed size = 0.063g.
$Lsd_{0.05}$ between the same salinity and the same hybrid under different seed size= 0.063g.
$Lsd_{0.05}$ between the same salinity and the same seed size under different hybrids=0.07g.
$Lsd_{0.05}$ between the same hybrid and the same seed size under different salinity = 0.082g.

Figure (5) illustrates a prominent decline in seedling weight as an effect of increasing salinity levels. Mean seedling weight dramatically declined from 0.74g, under distilled water, to 0.28g under the most stressful salt concentration of 15000 ppm.

The results of the present study had the same trend of the salinity effects on seedling traits obtained by many other researchers. Such results are in agreement with those of Yermanos *et al*. (1964), Ghorashy *et al*. (1972), Gramer *et al*. (1990), Evlagon *et al*. (1990), Chandru *et al*. (1993), El-Sayed and Migahid (1993), Katerji *et al*. (1994), Abou-Bakr and Abou-Sitta (1995), Begum *et al*., (1996), Izzo *et al*. (1996), Ashrafuzzaman *et al*. (2002) and Kaya *et al*. (2003).

Table (7): Means of seedling weight (g) as affected by salinity level, hybrids and seed size interactions.

Salinity level (ppm)	Hybrid	Maize hybrids		
		Large	Medium	Small
0.00	TWC310	0.83	0.71	0.68
	TWC321	0.78	0.64	0.85
	SC2010	0.79	0.80	0.63
2500	TWC310	0.45	0.62	0.47
	TWC321	0.47	0.50	0.48
	SC2010	0.43	0.39	0.47
5000	TWC310	0.44	0.44	0.43
	TWC321	0.42	0.41	0.38
	SC2010	0.41	0.44	0.48
7500	TWC310	0.32	0.33	0.31
	TWC321	0.37	0.38	0.37
	SC2010	0.34	0.37	0.38
10000	TWC310	0.31	0.31	0.32
	TWC321	0.32	0.35	0.31
	SC2010	0.29	0.30	0.32
12500	TWC310	0.29	0.31	0.32
	TWC321	0.36	0.33	0.32
	SC2010	0.39	031	0.30
15000	TWC310	0.28	0.28	0.27
	TWC321	0.29	0.28	0.28
	SC2010	0.28	0.28	0.28

$Lsd_{0.05}$ between different salinity under the same or different hybrids = 0.183g.
$Lsd_{0.05}$ between different salinity under the same or different seed size = 0.180g.
$Lsd_{0.05}$ between the same salinity and the same hybrid under different seed size= 0.072g.
$Lsd_{0.05}$ between the same salinity and the same seed size under different hybrids=0.082g
$Lsd_{0.05}$ between the same hybrid and the same seed size under different salinity = 0.190g.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

REFERENCES

Abou-Bakr, Z.Y. and Y.M. Abou-Sitta. 1995. Effect of different saline solutions on seed germination, growth and chemical composition of *Zea mays* Giza 2.cv. Annals of Agric. Sci. 33:903-919. Mashtohor, Egypt.

Ashrafuzzaman, M., M.A. Khan and S.M. Shahidu-llah. 2002. Vegetative growth of maize (*Zea mays* L.) as affected by a range of salinity. Crops Res. Hisar 24:286-291.

Atta, N.I. and **A. A. Leilah. 1999.** Effect of seed size on seedling vigour of groundnut. Zagazig J. Agric. Res. 26:529-536.

Begum, F., **W. Sultana and A. Nessa. 1996.** Effect of NaCl salinity stress on seed germination and seedling growth of maize. Seed Res. 24:97-101.

Chandru, **R., N.N. Chikkadevaiah and M.N. Merwade. 1993**. Salt tolerance of sunflower hybrids during germination and seedling growth. Nat. Semin. Oil Seeds Res. and Dev. in India: Status and strategies, Aug. 2-5.

El-Sayed, H**.A. and M.M. Migahid. 1993**. Changes in organic and inorganic solutes in response to salinity in root and shoot of *Zea* mays L. Alex. J. Agric. Res. 38:231-246.

Evlagon., **D, I. Ravina and P. Neumann. 1990.** Interactive effects of salinity and calcium on hydraulic conductivity, osmotic adjustment and growth in primary roots of maize seedling. Isreal J. Botany 39:239-247.

Ghorashy**, S.R., N. Sionit and M. Kheradam. 1972**. Salt tolerance of safflower varieties (*Carthamus tinctorius* L.) during emergence. Agron. J. 64:256.

Gramer, G.**R., R. Abdel-Basset, and I.R. Seemann. 1990**. Salinity-calcium interaction on root growth and osmotic adjustment of two corn cultivars differing in salt tolerance. J. Plant Mutr. 13:1443-1462.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

Graven, L. M. and R.R. Carter 1990. Seed size/shape and tillage system effect on corn growth and grain yield. J. Prod. Agric. 3:445-452.

Izzo, R., **A. Belligno, G. Muratore and F.N. Izzo. 1996.** Seedling growth and Ca^{++}, K^{+} and Na^{+} accumulation in maize roots as affected by NaCl. Agrochimica 40:25-32.

Kanta, G., **H. B. Singh, J. K. Sharma and G.S. Sethi. 2002.** Implication of seed size and vigour on field emergence in maize (*Zea mays* L.) India J. Genet. 62:316-318.

Kara, S.M**. and S. Keser. 2001.** Effect of salinity on plant growth and mineral constituents of maize (*Zea mays* L.) India J. Agric. Sci. 71:371-374.

Katerji, **N., J.W. Van-Hoorn, A. Hamdy, F. karam and M. Mastrorilli. 1994.** Effect of salinity on emergence and on water stress and early seedling growth of sunflower and maize. Agric. Water Management 26:81-91.

Kaya, **M.D., A. I. Pek and A. Ozturk. 2003.** Effects of different soil salinity levels on germination and seedling growth of safflower (Carthamus tinctorius L.) Turk. J. Agric. 27:221-227.

Levitt, **J. 1980.** Responses of Plants to Environmental Stresses. Vol. II. Water, Radiation, Salt and Other Stresses. Academic Press. New York, London, Toronto, Sydney and San Francisco.

Maos, E.**V. and G.J. Hoffman. 1977.** Crop salt. Current assessment. ASCE, Irrig. Drain. Div. ASCE 103:115:134.

Marchner**, H., P.J.C. Kuiper and A. Kylin. 1981.** Genotypic differences in the response of sugar beet plants to replacement of potassium by sodium. Physical. Plant. 51:239-244.

Mazur, **M. and P. France. 1994.** The effect of size and shape of seed on standard emergence of maize. Ristlina Vyroba 40:179:187.

Munche**ne, S.C. and C.O. Grogan. 1997.** Effects of seed size on germination of corn (*Zea mays*, L.) under simulated water stress conditions. Can. J. Plant Sci. 57:921-932.

Nafziger, **E.D. 1992.** Seed size effects on yields of two corn hybrids. J. Prod. Agric. 5:538-4540.

SAS Institute. 2000. SAS Users Guide, Version 4.02, SAS Inst. Gary. N.C.

Steel, R.G and J.M. Torrie. 1984. Principles and Procedures of Statistic. McGraw-Hill Co. Inc, New York, U.S.A.

Yermanos, D.M., L.E. Francois and L. Bernstein. 1964. Soil salinity effects on the chemical composition of the oil and oil content of safflower seed. Agron. J. 37:53-56.

J.Agric.&Env.Sci.Alex.Univ.,Egypt Vol.6 (2)2007

الملخص العربي

حجم حبوب هجن الذرة الشامية: 1- التأثير على الإنبات وصفات البادرة تحت مستويات مختلفة من الملوحة

محمد محمد سعد الهلة[1] – فتحي النخلاوي[2] – محمد صبحي بدران[1] – صباح عبد المجيد مرسي[2]
قسم المحاصيل – كلية الزراعة بدمنهور – جامعة الإسكندرية
قسم المحاصيل – كلية الزراعة بالشاطبي – جامعة الإسكندرية

هناك اهتمام للتعرف على جدوى استخدام الحبوب صغيرة الحجم، والناتجة عن موضعها فى أطراف الكوز أو الناجمة عن ظروف نمو غير مواتية، كتقاوى لزراعة هجن الذرة الشامية. وأجريت هذه الدراسة للتعرف على تأثير استخدام حبوب متفاوتة الحجم كتقاوى لزراعة ثلاثة هجن للذرة (هجين فردى 2010 وهجين ثلاثى 310 وهجين ثلاثى 321) تحت مستويات متدرجة من ملوحة مياه الرى (0.0, 2500, 5000, 7500, 10000, 12500, 15000 ppm).

وتناولت الدراسة التأثير على إنبات الحبوب وصفات البادرة فى قطع منشقة مرتين (ثلاث مكررات) لتصميم قطاعات عشوائية كاملة. وأوضحت النتائج تأثيرا عالى المعنوية لمستويات الملوحة على كل من نسبة الإنبات، طول الريشة، طول الجذير، وزن الريشة، وزن الجذير، ووزن البادرة حيث تأثرت كل من هذه الصفات تأثرا سلبيا بتزايد تركيز الملوحة، وأتضح أن هناك اختلافات معنوية بين الهجن فى طول الريشة عبر أحجام الحبوب ومستويات الملوحة المختلفة، كما أتضح تأثير معنوى للتفاعل بين مستويات الملوحة والهجن على نسبة الإنبات وطول الريشة ووزن الريشة. وكان هناك تأثيرا لحجم الحبوب على كل من طول الجذير ووزن الريشة، كما تأثر وزن الريشة بالتفاعل بين مستويات الملوحة وحجم الحبة، بينما لم يكن هناك أى تأثير معنوى للتفاعل بين الهجن وحجم الحبوب على الإنبات أو أى من صفات المدروسة للبادرة وذلك بالرغم من تأثر كل من وزن الجذير ووزن البادرة بالتفاعل بين العوامل الثلاثة المدروسة (مستويات الملوحة والهجن وحجم الحبة).

ويستنتج من هذه الدراسة أنه يمكن تحسين نسبة الإنبات وقوة الإنبات بزراعة حبوب كبيرة الحجم من هجن الذرة الشامية تحت الدراسة وذلك تحت إجهاد ملوحة مياه الرى.