Effect of Irrigation With Saline Water on Somaclones of *Sorghum Bicolor*, L. Moench for Some Morphological and Flowering Characters

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ABSTRACT

In the present work attempts were made to investigate the biochemical genetics back ground of sweet sorghum (*Sorghum bicolor* L. Moench), which induced, supposingly, to be tolerant salinity using *in vitro* culture technique (embryos culture). Evaluation of the effect of adding various levels of NaCl to Marashige and Skoog basal medium on different genotypes which introduced from cultivar "Tracy" via tissue calli culture was carried out. The results revealed that genotypes and medium protocols should be taken into account at the selection for caulogenesis embryogenic callus, shoot or root organogeneses as they showed, significantly, differences at *in vitro* responses.

***In vitro* salt tolerance was studied using two genotypes, i.e. "Tracy" and "MN2756", which showed the highest percentage of callus growth, shoot and root formations. In general, the results indicated that the number of caulogenesis, embryogenic callus weight (gm), shoot and root organogeneses of the two genotypes were decreased with increasing of NaCl concentration when compared with control (untreated), especially, under the highest concentration of NaCl (Ec 20 ds/m).**

The results, also, proved that genotype "MN2756" gave the highest growth response after the given treatment for most of the previously traits.

The data of *in vitro* under NaCl stress can be used as a valuable tool for wet sorghum (*Sorghum bicolor*) improvement. It can, also, help in the selection of NaCl tolerant line which can be cultured in the new dry areas in Egypt.

INTRODUCTION

In Egypt, sweet sorghum is a promising new crop has the possibility to replace sugarcane for syrup production and this will spare a large area of sugarcane preserved for this purpose, as will as it will contributes to increase sugar production and consumption (Maareg *et al.*, 1993).

Sorghum bicolor is, generally, quite sensitive to salt and acid (high aluminum) soil stresses, but quite tolerant to drought stress (Duncan *et al.*, 1995). Ludlow *et al.* (1990) suggested that plants with a capacity for high osmotic adjustment possessed different genes controlling high osmotic adjustment.

Tissue culture appeared a promising approach for increasing the diversity of source material for breeding (Kostina *et al.*, 1996). Tissue culture could be used with and without *in vitro* selection as part of a breeding program. Howevcr, selection on the callus level requires an effective system of initiating, maintaining and subsequently regenerating plants from callus. Callus induction, somatic embryogenesis and plant regeneration in *Sorghum bicolor* were studied by many investigators. The present work aims at evaluating the effect of irrigation with different levels of saline water on different genotypes which derived from cultivar "Tracy" via tissue culture technique, i.e caulogenesis.

MATERAILS AND METHODS

1-*In vivo* culture of sweet sorghum:-

Five lines (clones) of sweet sorghum were used through the present study. All lines were obtained Laboratory of Biotechnology, Sabahia, Alexandria after ensure that the morphological, flowering characters in Ro (equivalent with F1) and R1 were stable *in vivo*. Then evaluating these traits in R2 to determine the differences within genotypes. Seeds were grown in greenhouse in a randomized complete block design (R.C.B.D.) with three replicates to evaluate the salt tolerance of all lines under investigation.

2- *In vivo* salt tolerance:-

Eight seeds of each line were sown in a plastic bag. After two weeks, the seedlings were transplanted in pots with 30 cm height and 25 cm diameter and each pot contained 2.5 kg of soil.

Seeds of different lines were planted on August 2001, then thinned to three seedlings per pots after one week from seedling transplantation. Plants were irrigated with saline water every three days for 12 weeks. Three concentrations of the salt NaCI were used upon irrigation; EC=5, EC=10 and EC= 20 calculated by the following equation:-

Where (x) was the weight of salt concentration.

and meq/L= ds/m X 10.

1 ds/m= approximately 640 mg/L salt.

After 90 days of transplanting the following morphological, flowering, and biochemical characters were estimated:-

1. Plant height (cm), 2. stem diameter (cm), 3. leaf length (cm),

$$(\bar{x})\ \text{gm}\ /\text{L} = \frac{\text{Equivalent weight gm/ L X meq/ L}}{\text{1000 meq/ L (IN)}}$$

4. rate of dry leaf (number of dry leaves/ total number of leaves),
5. inflorescence length (cm).

RESULTS AND DISCUSSION

1- Evaluation of somaclones of *Sorghum bicolor* for some morphological and flowering (yield component) characters in the field:-

The analysis of variances Table (1) shows that, all morphological and flowering characters (plant height, inflorescence length, stem diameter and number of tillers) differed, significantly, in the studied five genotypes. This results agreement with Maralappanavar *et al.* (2000) who reported that the analysis of variances showed that there was significant difference between and within families of *Sorghum bicolor* characters which obtained from tissue culture for most of the quantitative and qualitative characters.

1-1 Plant height (cm):-

Results in Table (2) show that comparison between all genotypes values indicate that genotype TR-1 gave the highest value of plant height (391.1±0.57 cm) and, significantly, differed from other genotypes. Meanwhile, there were no significant differences among the other genotypes. The lowest plant height average was recorded for TR-4, its value was 211.4±3.47 and, significantly, differed from all of other genotypes.

1-2 Inflorescence length (cm):-

Comparison between all genotypes average values of inflorescence length is illustrated in Table (2). It is obvious that the average of the genotype "TR-1" was 44.0 ± 0.9 cm which differed, significantly, from all of other genotype's average and it was the highest value recorded for this character. No significant differences among TR-2, TR-3, TR-4 and TR-5 were observed. The values of inflorescence length averages in these genotypes subsequently were 38.4±2.02, 37.0±2.06, 36.0±2.23 and 39.0±1.19 cm.

1-3 Stem diameter (cm):

Results in Table (2) shows that, the genotype (TR-1) had highest (TR-1) had the highest value of stem diameter (3.6±0.73cm) and significantly differed from other genotypes. While no significant differences was observed between the genotypes TR-4 and TR5 which

had the lowest average values of stem diameter 1.3±0.53 and 1.4±0.51 respectively.

1-4 Number of tillers:-

Results in Table (2) show that, the genotype (TR-3) had the highest average values for this character (3.7±0.9 cm) and was significantly differed from other genotypes. While no significant differences was observed between the genotypes TR-2, TR-4 and TR-5. The lowest value of number of tillers was recorded for TR5.

The previous data indicate that the genotype TR-1 had the highest average values for all yield component except for number of tillers. While, TR-4 genotype had the lowest values of the above mentioned characters except for number of tillers.

From all above results, it was found that differences were observed in the previous characters between all genotypes. Although these clones were obtained from one genotypes "Tracy" via caulogenesis expressing the somaclonal variation. These results are in agreement with those of Raveendran *et al.*, (1998) who reported that somaclones showed variations for all traits of *Sorghum bicolor* including number of tillers, leaf length/ breadth (l/b) ration, stem girth and height. Likewise, Wang *et al.*, (1997a) transplanted Ro plants which obtained from tissue culture, later they noticed some significant variations in the plot from (R1) generation. A similar results were obtained by Wang et *al.*, (1996) who observed on 166 R< sub (1) plants derived from tissue culture of 9 sorghum genotypes during 1990-94 showed that there was considerable variation in plant height, growth period and plant type. Also, Maralappanavar *et al.*, (1995) who reported that SCI plants were regenerated from well-established callus of two popular rabi sorghum varieties: M 35-1 and A-1. SC2 populations were evaluated under field conditions for somaclonal variation with respect to both morphological and quantitative characters. From total number of the 76 M35-1 families, 9 showed morphological variation for such characters as chlorophyll and leaf arrangement. Statistically significant variances were found within and between SC families.

2-Effect of irrigation with saline water on different lines of *Sorghum bicolor* derived from callus culture:

The same clones were used to study their salt tolerance. The statistical analysis of variances for the previous morphological characters are presented in Table (3). Results indicated that the tested treatments, genotypes, and their interactions exerted significant effects on the studied characters. These results are compatible, more or less, with those obtained by Garg and Gupta, (2000) who found significant

varietal differences in their salt tolerance on germination between genotypes, and between types of salinity under salt stress.

2.1. Plant height (cm):-

Results in Table (4) indicated that, the mean values of plant height (cm) of all genotypes were reduced after irrigation with different concentrations of saline water at different rates when compared with untreated ones. For instance, line (TR-1) was the most affected and sensitive to salt stress than any genotypes else. For example, the mean values of plant height were sharply reduced from 115±2.66 cm after irrigation with normal water (control) to reach 25.83±1.71 cm after irrigation with saline water EC= 20 ds/m. while the two lines; TR-2 affected at EC=20 ds/m. all of the genotypes were hardly affected after irrigation with saline water EC=20 ds/m.

The reduction rate of plant height reached 77.64, 60.72, 55.3 and 75.3% of TR-1, TR-3, TR-4 and TR-5 respectively. On the other hand, the average of plant height of the line TR-2 was reduced by 19.01% after irrigation with the same concentration of NaCl at EC=20 ds/m.

Regarding the effect of the low concentration of saline water of saline water on the mean value of plant height, results showed that both lines TR-2 and TR-5 showed remarkable tolerance. Their mean values were reduced by only 3.5 and 4.06% when compared with control (untreated).

Dose dependent effects are clearly noticed. Increasing the concentration of NaCI in water cause decreasing in the mean value of plant height as shown in Table (4).

2.2. Inflorescence length (cm):-

The L.S.D. tests as shown in Table (5) indicated that the inflorescence length character of all genotypes was, significantly, reduced after irrigation with different concentrations of saline water.

With respect to the applied low dose saline water, results show that lines TR-1, TR-2 and TR-4 were moderately affected. Both lines of TR-3 and TR-4 which gave highly relative rate to control 78.34 and 85.03%, respectively. Mean value of inflorescence length of TR-1, TR- and TR-4 were reduced from 9.5±0.84, 8.7±1.03 cm and 8.82±1.16 cm of the control to reach 4.97±0.88, 4.5±0.84 cm and 4.18±0.79 cm, respectively after irrigation with saline water (EC=20 ds/m). Both lines TR-3 and TR-4 were highly tolerant to salinity more than previously lines after irrigation with high concentration of saline water EC= 20 ds/m.

2.3. Stem diameter (cm):

The L.S.D. tests as shown in Table (6) indicated that the stem diameter character of all genotypes was, significantly, reduced after

irrigation with different concentrations of saline water. For the TR-3 line was highly tolerant to, salinity when compared with other genotypes after irrigation with high concentrations of saline water i.e. EC=10 and 20 ds/m. the mean value of stem diameter of this genotype was reduced from 0.71±0.17 as control to reach 0.36±0.25 cm after irrigation with saline water EC=20 ds/m. On the other hand, TR-1, TR2, TR-4 and TR-5 showed different rates of tolerance after irrigation with saline water EC=5 and 10 ds/m. However, the TR-1 exhibited highly tloerance to salinity at EC=5 ds/m the relative value to control was 88.54% TR-4 and TR-5 were moderately sensitive to salinity at EC=10 ds/m.

2.4. Leaf length (cm):

The L.S.D. tests as shown in Table (7) indicate that the leaf length character of all studied genotypes was, significantly, reduced after irrigation with different concentration of saline water. For example, line "TR-1" was affected and showed high sensitivity to salinity more than the other genotypes. Mean value of leaf length character, sharply, reduced from 41.83±1.44 cm of the control plants to reach 22.63±0.77, 18.65±0.85 and 8.7±1.3 cm after irrigation with saline water EC=5, 10 and 20 ds/m each in order.

On the other hand lines(TR-2 and TR-3) showed tolerance to salinity after irrigation with different concentration of saline water. Except TR-3 and TR-5 were moderately affected at EC=20 ds/m. the relative value to control were 49.2 and 52.35% respectively. The average values of leaf length of the genotypes TR1 sharply reduced at different rates to reach 8.7±1.3 cm for the genotypes TR-1.

3-Evaluation of total soluble solids of the five genotypes regenerated from caulogenesis of cv. "Tracy"-

The analyses of variances of results elicit in Table (8) show that all of the means of T.S.S%, significantly, differed among the five genotypes. However, these results are in agreement with Maralappanavar *et al.* (2000) who reported that the analyses of variances showed that there was significant difference between and within families of *Sorghum bicolor* characters which obtained from tissue culture for most of the quantitative and qualitative characters.

Results in Table (9) show that comparison between all genotypes means indicated that the genotype "TR-3" gave the highest mean value of total soluble solids 17.3 ±1.51% and was. Significantly, differed with "TR-2" and "TR-5" genotypes. While, insignificant difference was existed between genotypes "TR-2 and TR-5". However, the lowest mean value of total soluble solids was recorded from both genotypes TR-2 and TR-5, its mean values were 14.4 ± 1.21% and 14.0 ± 1.19,respectivaly.

Previous studies have revealed that some difference between T.S.S. was obtained from different five somaclones introduced from the cultivars "Tray" namely, TR-1, TR-2, TR-3, TR-4 and TR-5. These results cope with Raveendran *et al.*, (1998) who reported that somaclones showed such variations for all traits of *Sorghum bicolor* including number of tillers, leaf length/breadth (i/b) ratio, total soluble solids, stem girth and height.

4- Effect of irrigation with saline water on chlorophyll content (mg/kg) on different somaclones of *Sorghum bicolor* drives from their calli:-

The statistical analyses of variances for the chlorophyll content are presented in Table (10). These results are compatible, more or less, obtained by Garg and Gupta, (2000), who found significant varietal differences in their salt tolerance on germination between genotypes, and between types of salinity under salt stress.

Results in Table (11) show both that lines "TR-1 and TR-4" were affected by salinity more than the other genotypes. The mean values of chlorophyll contents were reduced from 21±1.62 and 23.07±1.66 mg/l after irrigation with normal water (Control) to reach 20.37±1.34 and 20.50±0.92 mg/I after irrigation with saline water (EC=20 ds/m), respectively. While the same two lines showed, moderately, tolerance to salinity in other morphological characters after irrigation with different concentrations of saline water (EC=10 ds/m). However, lines "TR-5" was, highly, tolerant to salinity than the other genotypes. The mean values of chlorophyll contents were increased from 20.60± 1.49 mg/I after irrigation with fresh water to reach 23.97±1.43 mg/I and after irrigation with saline water (EC=20 ds/m). However, the "TR-3" and "TR-4" lines were, moderately, affected after irrigation with different concentrations of saline water.

In general, the obtained results indicate that, salinity factor can inhibit the chlorophyll synthesis which decreased translocation of photosynthesis products from leaves to grains i.e.; line "TR-1" the chlorophyll content decreased from 23.07±1.66 mg/l in control to reach 18.63±1.47 mg/l after irrigation with saline water (EC=20) ds/m. this result agreement with Garg and Gupta, (2000) who reported that salinity was affected of photosynthetic rate due to stomatal closure, inhibition of chlorophyll synthesis and decreased activities or ribulose-bisphosphate carboxylasis besides decreasing the translocation of photosynthesis from leaves to grains.

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Table (1): Mean squares of plant, inflorescence length, stem diameter and number of tillers of different of somaclones derived from the cultivars "Tracy".

S.O.V / Characters	Plant height (cm)	Inflorescence length (cm)	Stem diameter (cm)	No. of tillers
Replicates	9.6	13.27	0.07	0.15
Genotypes	12142.9*	27.*	2.6*	2.73*
Error	38.1	4.35	0.4	0.05

Significance at 0.05 level of probability.

Table (2): Mean values of some morphological flowering in different somaclones introduced from the cultivar "Tracy".

Characters / Genotypes	Plant height (cm)	Inflorescence length (cm)	Stem diameter (cm)	No. of tillers
	$\bar{X} \pm Sx$	$\bar{X} \pm Sx$	$\bar{X} \pm Sx$	X ± Sx
TR-1	391.1±0.57c	44.0±0.90b	3.6±0.73d	2.4±0.9e
TR-2	298.4±2.02b	38.4±2.02a	2.8±0.64c	1.7±0.9a
TR-3	307.2±3.26b	37.0±2.06a	2.20.61b	3.7±0.9b
TR-4	211.4±3.74a	36.4±2.23a	1.3±0.53a	1.7±0.9a
TR-5	305.3±2.66b	39.01.19a	1.4±0.51a	1.4±0.9a
L.S.D.	11.62	3.80	0.43	1.20

Values with the same letter do not differ significantly from each other.

Table (3): Mean squares of some morphological and flowering characters after irrigation with different concentration of saline water.

S.O.V	d.f	Plant height (cm)	Inflorescence length (cm)	Stem diameter (cm)	Leaf length	Rate of dry leaves
Replicates	2	2.99	0.02	3.86	2.9	14.7
Treatment	3	6228.16**	36.62**	1.01**	642.4**	2348.8**
Genotypes	4	1455.78**	2.33**	0.05**	55.2**	1627.9**
Treatment x Genotypes	12	748.84**	1.40**	0.03**	71.2**	161.1**
Error	38	7.74	0.27	4.51	3.6	6.3

Significance at 0.05 level of probibility.

Table (8): Mean squares in total soluble solids for different somaclones derived from caulogenesis of cultivars " Tracy".

S.O.V.	Replicates	Genotypes	Error
M.S.	4.9	5.6*	11

*** Significant at 0.05 level of probability.**

Table (9): The mean values of total soluble solids (%) in different somaclones introduced from the cultivars Tracy by tissue culture after 90 days of culture in file.

Genotypes	TR-1	TR-2	TR-3	TR-4	TR-5
X± Sx (g/L)	15.0±1.68ab	14.0±1.21a	17.3±1.51b	15.0±1.21ab	14.0±1.19a

L.S.D. 0.05=1.99

Values with the same letter do not differ significantly from each other.

Table (4): Mean values of plant height (cm) of the five genotypes of *sorghum bicolor* obtained from variety Tracy after irrigation with different concentration of NaCl during 90 days after planting.

Treatments	Genotypes										Means
	TR-1		TR-2		TR-3		TR-4		TR-5		
	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	
Controls	115±2.66	100	42.33±1.87	100	87.43±1.81	100	86.15±2.11	100	73.78±2.36	100	80.96d
EC=5	43.87±2.25	38.14	40.83±2.01	96.45	81.50±1.88	93.32	62.37±1.70	72.41	70.87±1.89	95.94	59.98c
EC=10	40.53±2.41	35.52	36.33±1.21	85.82	73.17±1.97	83.69	41.67±1.71	48.37	44.00±1.68	59.57	47.14b
EC=20	25.83±1.71	22.46	34.27±0.59	80.96	35.50±2.38	40.6	34.73±0.59	40.31	31.50±1.18	46.7	32.97a
Means	**56.30b**		**38.44 a**		**69.40c**		**56.23b**		**55.93b**		

L.S.D.0.05 (Genotypes)= 2.03

L.S.D.0.05 (Treatments)= 2.06

Values with the same letter do not differ significantly form each other.

Table (5): Mean values of inflorescence length (cm) of the five genotypes of *sorghum bicolor* obtained from variety Tracy after irrigation with different concentration of NaCl during 90 days after planting.

Treatments	Genotypes TR-1 $\overline{X}\pm Sx$	TR-1 Relative values to control %	TR-2 $\overline{X}\pm Sx$	TR-2 Relative values to control %	TR-3 $\overline{X}\pm Sx$	TR-3 Relative values to control %	TR-4 $\overline{X}\pm Sx$	TR-4 Relative values to control %	TR-5 $\overline{X}\pm Sx$	TR-5 Relative values to control %	Means
Controls	9.50±0.84	100	8.70±1.03	100	6.60±0.92	100	8.82±1.16	100	7.50±0.64	100	8.29d
EC=5	6.47±1.01	68.11	6.50±0.84	74.71	5.17±0.64	78.34	7.50±0.64	85.03	5.33±0.90	71.07	6.13c
EC=10	5.50±0.85	57.89	5.50±0.84	63.21	5.17±0.63	78.34	4.92±0.45	55.78	5.33±0.63	71.07	5.29b
EC=20	4.97±0.88	52.32	4.50±0.84	51.72	4.90±0.71	74.24	4.18±0.79	47.39	5.13±0.48	68.4	4.74
Means	**6.61c**		**6.30bc**		**5.46a**		**6.27bc**		**5.91b**		

L.S.D.0.05 (Genotypes)= 0.43

L.S.D.0.05 (Treatments)= 0.27

Values with the same letter do not differ significantly form each other.

Table (6): Mean values of stem diameter (cm) of the five genotypes of *sorghum bicolor* obtained from variety "Tracy" after irrigation with different concentration of NaCl during 90 days after planting.

Treatments	Genotypes										Means
	TR-1		TR-2		TR-3		TR-4		TR-5		
	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	
Controls	0.96±0.24	100	0.95±0.27	100	0.71±0.17	100	1.16±0.48	100	0.96±0.23	100	0.95d
EC=5	0.84±0.27	88.54	0.61±0.39	64.21	0.66±0.19	92.96	0.60±0.38	51.72	0.66±0.28	68.75	0.68c
EC=10	0.63±0.34	65.63	0.61±0.33	64.21	0.43±0.19	61.56	0.41±0.36	35.34	0.41±0.09	42.71	0.50b
EC=20	0.37±0.29	38.54	0.36±0.28	37.91	0.36±0.18	50.7	0.36±0.25	31.03	0.29±0.65	30.2	0.34a
Means	**0.71c**		**0.63b**		**0.63a**		**0.63b**		**0.58b**		

L.S.D.0.05 (Genotypes)= 1.6
L.S.D.0.05 (Treatments)=1.4
Values with the same letter do not differ significantly form each other.

Table (7): Mean values of leaf length (cm) of the five genotypes of *sorghum bicolor* obtained from variety "Tracy" after irrigation with different concentration of NaCl during 90 days after planting.

Treatments	Genotypes										Means
	TR-1		TR-2		TR-3		TR-4		TR-5		
	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	
Controls	41.83±1.44	100	19.98±0.80	100.00	27.52±0.92	100	25.97±1.91	100	29.57±0.79	100	8.97d
EC=5	22.63±0.77	54.11	17.58±1.45	87.99	24.57±0.88	89.30	20.04±2.08	77.17	25.67±1.94	86.81	2.11c
EC=10	18.65±0.85	44.59	16.81±1.40	84.13	21.20±1.16	77.03	16.02±1.29	61.69	15.67±1.97	52.99	7.66b
EC=20	8.70±1.30	20.81	16.44±1.49	82.31	13.54±2.14	49.20	14.37±1.77	55.33	15.48±1.88	52.35	4.31a
Means	**22.95c**		**17.72a**		**21.71c**		**19.10b**		**22.35c**		

L.S.D.0.05 (Genotypes)= 0.06
L.S.D.0.05 (Treatments)= 0.05
Values with the same letter do not differ significantly form each other.

Table (10): Mean squares for the chlorophyll content after irrigation with different concentrations of saline water.

S.O.V.	R.	T.	G.	T.xG.	Error
M.S.	57.42*	62.28**	52.16**	12.48**	1.24

Mean squares obtained from analysis of variance

* * Highly significat at 0.05 and 0.01 levels of probability.

Table (11): The mean values of chlorophyll content (mg/l) of the five genotypes of *sorghum bicolor* derived from calli of variety "Tracy" after irrigation with different concentrations of NaCl for 90 days after planting.

	Genotypes										
	TR-1		TR-2		TR-3		TR-4		TR-5		
Treatments	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	$\bar{X}$± Sx	Relative values to control %	**Means**
Controls	21.33±1.62	100	19.80±0.65	100	22.6±1.22	100	23.07±1.66	100	20.60±1.49	100	21.48a
EC=5	20.27±1.97	95.03	20.33±1.62	102.53	27.0±1.28	119.51	18.63±1.47	80.75	26.33±2.27	127.82	22.52b
EC=10	24.63±2.33	115.47	23.50±2.22	118.69	26.2±1.40	115.93	23.63±1.09	102.43	31.20±1.25	151.51	25.97c
EC=20	20.37±1.34	95.51	21.50±1.57	108.59	23.4±1.37	103.54	20.50±0.92	88.86	23.97±1.43	116.36	21.95ab
Means	**21.65 a**		**21.3a**		**24.97b**		**21.46a**		**25.53b**		

L.S.D.0.05 (Genotypes)= 0.43

L.S.D.0.05 (Treatments)= 0.27

Values with the same letter do not differ significantly form each other.

الملخص العربى

تأثير الرى بالمحلول الملحى على بعض الصفات المورفولوجية والتزهير لبعض سلالات الذرة السكرية

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الهـدف مـن البحث هو دراسة الخلفية الوراثية للطبيعة الكيميوحيوية لبعض سلالات الـذرة السـكرية المنتخـبة باستخدام تكنيك زراعة الانسجة النباتية لتقيمها من حيث تحملها للملوحـة لزراعتها فى الاراضى الجديدة المستصلحة وذلك معمليا باضافة تركيزات مختلفة من كلوريد الصوديوم الى البيئة المستخدمة MS وحقليا من خلال تقييم بعض النباتات الناتجة مـن زراعة الانسجة النباتية وريها بمحلول ملحى يحتوى على تركيزات مختلفة من كلوريد الصـوديوم. وذلـك دراسة تأثير التركيزات المختلفة من كلوريد الصوديوم لبعض الصفات المورفولوجـية والبيوكيميائـية (تقديـر الكلوروفيل) على خمسة سلالات ناتجة من زراعة الانسجة النباتية لمعرفة اكثرهم تحملا للملوحة. فقد اوضحت النتائج للنباتات المنزرعة حقليا (TR1, Tr2, TR3, TR4 and TR5) انه بزيادة تركيز المحلول الملحى يقل طول النبات وسـمك العود وطول الورقة وكذلك طول النورة ويزداد نسبة عدد الورق الجاف . ووجد ان الصنف (TR3) اكثرهم تحملا للملوحة فى معظم الصفات المدروسة.

كذلك اوضحت دراسة النباتات التى تم ريها بالتركيزات المختلفة من كلوريد الصوديوم ان هناك زيادة فى معدل انتاج الكلوروفيل فى معظم الاصناف بعد المعاملة بالملح.

وقـد اوضـحت دراسة النباتات المنزرعة حقليا والتى تم الحصول عليها من زراعة الصنف Tracy بواسطة تكنيك زراعة الانسجة ان هناك فروق معنوية فى التحليل الكيميائى للعناصر الذائبة .T.S.S (المواد الصلبة الذائبة الكلية)