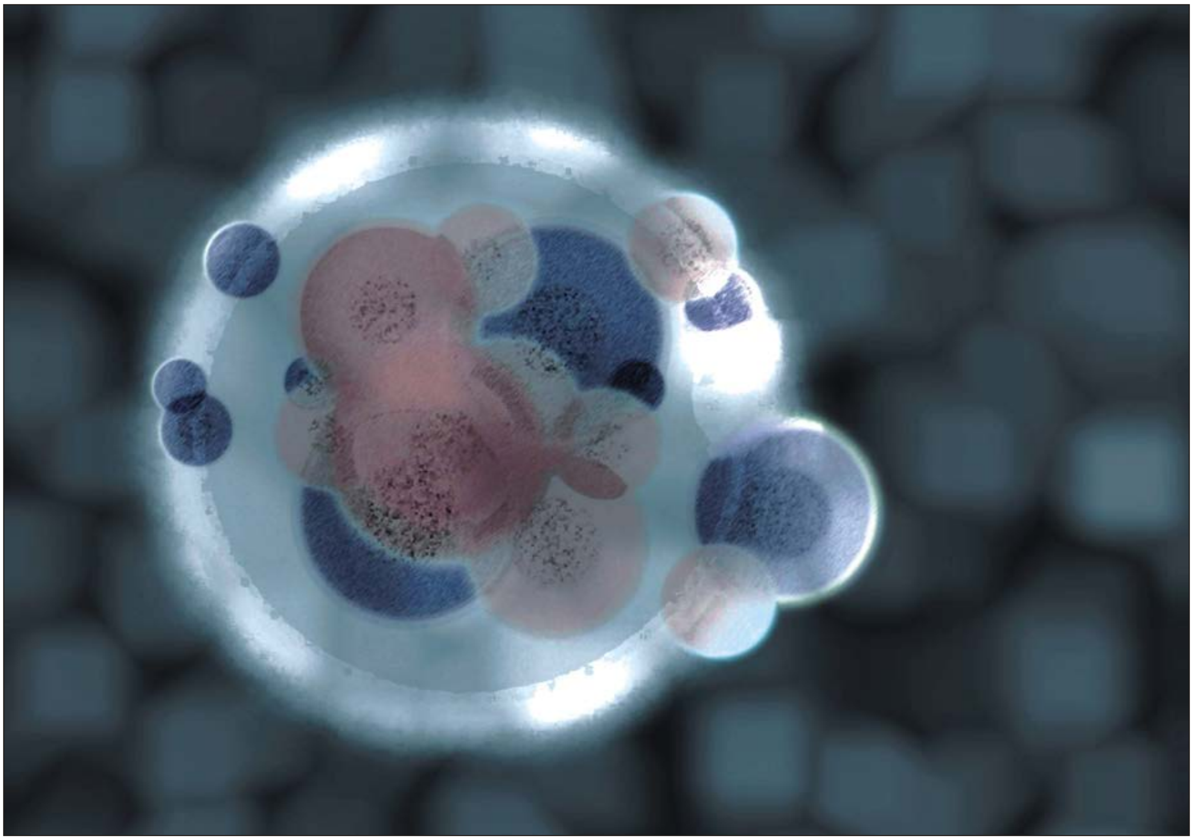

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Determination of Salinity Tolerance Levels of Melon Genotypes Collected from Lake Van Basin

[1]Suat Şensoy, [1]Önder Türkmen, [1]Turgay Kabay, [1]Çeknas Erdinç, [2]Metin Turan and [1]Mehtap Yildiz
[1]Department of Horticulture, Faculty of Agriculture, Yuzuncu Yil University, 65080, Van, Turkey
[2]Department of Soil Science, Faculty of Agriculture, Ataturk University, 25240, Erzurum, Turkey

Abstract: Salinity tolerance levels of forty-three local melon genotypes collected from Lake Van Basin were evaluated based on their seedling performances on two different salinity levels compared with the control. Seven vegetative characteristics of seedlings were measured besides some of their mineral matter contents. For the final salinity tolerance determination, the death rate, the leaf area, the dry matter content of the shoots, the Na content and the rates of K:Na and Na:Ca were employed. While the genotypes 65 EDR 03, 65 MER 01, 65 ER 14, 65 ERC 12 and 65 ERC 09 were found to be the most tolerant ones to salinity, the genotypes 65 ER 04, 65 EDR 01, 65 ERC 03, 65 ERC 16 and 13 TAT 03 were found to be the least tolerant ones to salinity.

Key words: Melon, salt tolerance, genotypes

INTRODUCTION

Soil salinity is one of the major limiting factors affecting soil fertility. In non-irrigated soils of arid and semi-arid regions, soil salinity occurs due to the inadequate washing salts from soil. In other regions, soil salinity might occur because of unequal irrigation, inadequate drainage, poor quality of irrigation water, or imbalanced plant nutrition practices. Especially in protected cultivation, soil salinity is becoming an even more important problem[1,2].

Plants go into stress and the plant growth is negatively affected as they cannot adequately utilize from the soil water because of the increasing osmotic potential and as the toxic effects of increasing concentrations of Na^+ and Cl^-[3]. The other reason for the growth and yield reductions in crops is the inhibition of uptake, transportation and usage of plant nutrients[4].

Several measurement such as soil wash, increasing organic matter content, choosing salinity tolerant species and cultivars, or application of some plant nutrients lessening the salt toxicity in plants could be employed in order to increase the productivity in soils having salinity problems. Although there have been some cultural practices against the soil salinity[5,6], it is essential to use salt tolerant cultivars as a more radical solution[7,8]. It is important that salinity tolerance level in seedling period of a plant should be taken into the consideration because if plants are sensitive to salinity in their late growing periods, they are most probably sensitive to salt in their seedling periods[9].

Salinity is becoming an important problem increasing the cost and deteriorating the growth in melon production. Although melon is a medium level salt tolerant crop, its production in arid or semi-arid climates and Mediterranean coastal region where water is scare or problematic for salinity comes across with salinity drawbacks such as retardation in the growth (decrease in shoot weight, leaf area and plant height), abnormalities in metabolic processes (reduction in stomatal conductance, water potential and osmotic potential) and declines in fruit yield and quality[1,2,6,7,10,11]. The levels of problems caused by salinity in melon production might vary based on melon cultivar as well as the salinity doses, the exposure time to salinity and the growth period[1,2,7]. For example, the salinity damages encountered in early stages such as emergence and seedling period might cause much more detrimental effects than those encountered in fruit development period[1,12].

It was reported that the salt (NaCl) application increased the Na^+ concentration in plants, but decreased the K^+ and Ca^{++} concentrations[6]. This increase in Na^+ level causes to hyper osmotic stress, ionic imbalances and toxicity, the most important one[1]. Moreover, salinity affects both the K:Na ratio, effective on the use of metabolic energy and the Na:Ca ratio, effective on the membrane permeability[6]; therefore, cell growth is hindered. It is noticed in some literature that the K:Na ratio has being widely used selection criterion in the salinity tolerance determination of many crops[13,14].

It was stated in a research studying on Revigal melon cultivar that leaf area in the seedling period could be an

Corresponding Author: Dr. Suat Şensoy, Department of Horticulture, Faculty of Agriculture, Yuzuncu Yil University, 65080, Van, Turkey Tel: 90(0) 536 269 52 20

important salinity tolerance selection indicator in melon[15]. The six melon cultivars with three doses of salinity were studied and reported that there was a highly significant correlation (r=0.99) between the leaf area and the fruit yield in salty conditions and the leaf area was recommended as an early selection criterion[8].

Priming is one of the methods increasing the salinity tolerance level of melon[6]. Priming applications in Hasanbey and Kirkagac melon cultivars increased the salinity tolerance. Moreover, the single genes acting important roles in salinity tolerance have been transformed into melon from the other salinity tolerant plants or microorganisms[16]. However, when we consider that the salinity tolerance is a quantitatively inherited complex trait[17], at the present moment, it should be wise to employ classical breeding strategies for the improvement of this trait. The previous studies revealed that there were significant differences among the melon genotypes for salinity tolerance levels and these observed and determined variances might be adequate for the selection studies[7,8,10,17,18].

Lake Van is the largest lake of Turkey and is the fourth largest unconnected lake of the world with 3.713 km^{-2} of area with an interior basin[19]. In Lake Van Basin, besides many agricultural crops and some commercial melon cultivars, many melon landraces are produced significantly. Turkey, the second biggest melon producer in the world, is in the secondary gene center of melon[20]. Lake Van Basin is the origin of cantaloupe melon. Zhukovsky[21] and Günay[22] reported that melon had been brought to Europe from Anatolia; especially cantaloupes, largely produced in France, Germany and Italy, had been taken from Lake Van Basin by Roman missioners.

A study has been carrying out in order to collect and select promising melon genotypes for yield, quality and disease purposes by our team. It is also possible that there are very different melon genotypes for salinity tolerance among the collected ones from Lake Van Basin. Therefore, this study aimed to determine the most tolerant and susceptible melon genotypes to salinity in order to utilize them in the future melon breeding and genetic studies.

MATERIALS AND METHODS

The study was conducted in the growth chamber of Horticulture Department from September to November in 2004. Forty-three melon genotypes collected from Lake Van Basin and having adequate seed number for the replicated trials were used as plant materials in this study evaluating their salt tolerance levels. The study was designed as Completely Randomized Factorial Block Design with three replications each having ten plants in a pot having a mixture of soil, sand and manure in equal amounts as the optimum growth condition has been found to be suitable in salinity screenings in melon[23]. Fifteen seeds of each genotype were sown into the pots, each having 1 L of capacity and then seedlings were thinned to ten after the emergence. Pots were placed in a growth chamber at 28±2°C by day and 20±2°C by night, with 12 h fluorescent light having 8000 lux illumination. The growth medium used had pH 7.7 and contained 0.85% salt, 12.8% orgamic matter, 0.64% N, 17.45 mg P kg^{-1} and 237 mg K kg^{-1}.

Differences in the seedling developments were determined between two doses of NaCl applications (50 and 100 mM) and the control. Salt diluted in the 100 mL of distillated irrigation water was applied at five times (in every three days) in equal amounts (either 10 or 20 mM) after the seedling emergence and the study was ended when the seedlings were 40 day old age. At the end of the study, the death rate, shoot length, fresh shoot weight, dry shoot weight, leaf area, leaf number and stem diameter of seedlings were measured. Moreover, some mineral matter contents (N, P, K, Ca, Mg, S, Na, Fe, Mn, Zn and Cu) and some related proportions (Na:Ca and K:Na ratios) were analysed and calculated in shoots. Mineral contents of plant shoots and roots were also determined. Plants samples were oven-dried at 68°C for 48 h and were then ground. Potassium, Ca and Mg were determined after wet digestion of dried and ground sub-samples in a H_2SO_4-Se-salisilic acid mixture. In the diluted digests, P was measured spectrophotometrically by the indophenol-blue method and after reaction with ascorbic acid. Potassium and Ca were determined by flame photometry, Mg, Cu, Fe, Na, Mn and Zn by atomic absorption spectrometry using the method of AOAC[24]. For the final salinity tolerance determination, the death rate, the leaf area, the dry matter content of the shoots, the Na content and the rates of K:Na and Na:Ca were employed.

Values of observed traits were compared between the salt applications and their control counterparts and their percentage values were determined. The experimental data was analysed by the SAS statistical program and significantly different means numbered according to Duncan's Multiple Range Test[25].

RESULTS AND DISCUSSION

Although the decrease in the mean fruit weight has been utilized in the determination of salt tolerance in field studies[7], as seen from the present study, the fast screening of the numerous genotypes for salt tolerance with time and cost efficiencies has been also performed in the seedling stage of the plants[8].

Table 1: Average proportional differences in some seedling traits among the melon genotypes collected from Lake Van Basin after growing them in salty conditions (the mean values of 50 and 100 mM were compared together with the control)

Genotype	DR[a]	DMC	FMC	SL	LN	LA	SD
65 ER 01	40.37	115.95	93.91b-g**	60.42d-f	72.95c-I	50.38de	92.75c-e
65 ER 02	35.19	446.83	98.24b-g	68.57b-f	82.45b-I	73.96b-e	109.11b-d
65 ER 03	30.93	173.43	116.48b-g	50.13f	59.96i	69.00b-e	109.27b-d
65 ER 04	37.14	97.41	57.90g	61.39d-f	79.11b-I	69.00b-e	79.76e
65 ER 05	38.01	96.26	68.63e-g	76.16b-f	78.04b-I	40.43e	102.3c-e
65 ER 07	41.02	245.24	148.96bc	106.86ab	122.88a	118.75a	121.22ab
65 ER 10	33.94	163.93	132.21b-g	68.29b-f	86.37b-I	71.11b-e	111.74b-d
65 ER 12	18.28	169.78	133.05b-g	81.66b-f	78.47b-I	70.72b-e	109.32b-d
65 ER 13	27.87	111.00	62.14f-g	56.05ef	71.61d-I	47.39de	95.67b-e
65 ERC 01	8.82	63.47	74.23d-g	71.64b-f	69.22f-I	56.47de	102.46b-e
65 ERC 03	40.02	103.19	88.53b-g	85.29a-f	89.59b-g	64.32e	106.52b-e
65 ERC 04	32.55	86.86	73.74d-g	107.15ab	69.43f-I	49.54de	96.26b-e
65 ERC 05	29.33	113.08	93.07b-g	106.14a-c	106.6ab	78.84b-e	106.74b-e
65 ERC 06	32.41	91.40	66.95e-g	59.29ef	65.22g-I	45.83de	108.23b-d
65 ERC 07	28.60	94.35	86.45b-g	76.23b-f	87.00b-I	56.82de	94.5b-e
65 ERC 09	34.26	165.24	119.74b-g	75.06b-f	84.39b-I	72.76b-e	92.88c-e
65 ERC 10	28.52	78.09	63.94e-g	66.11d-f	73.08c-I	46.24de	96.29b-e
65 ERC 11	22.88	88.44	67.48e-g	99.26a-d	96.53b-f	72.11b-e	92.21c-e
65 ERC 12	39.47	154.65	125.15b-g	83.66b-f	100.72a-d	72.31b-e	105.57b-e
65 ERC 13	18.90	64.83	57.94g	78.39b-f	65.72g-I	40.06e	87.02de
65 ERC 14	16.27	115.02	84.22b-g	72.73b-f	82.22b-I	72.89b-e	92.02c-e
65 ERC 15	26.30	119.48	95.38b-g	78.13b-f	68.47f-I	62.06e	91.95d-e
65 ERC 16	30.19	103.64	81.81c-g	61.98d-f	70.45e-I	49.87de	111.19d
65 ERC 19	41.68	140.58	93.47b-g	69.04b-f	88.3b-I	70.96b-e	95.69b-e
65 MER 01	16.56	167.27	92.73b-g	67.28c-f	71.26e-I	73.78b-e	92.79c-e
65 MER 02	13.00	209.56	136.96b-e	82.38b-f	89.28b-I	76.51b-e	98.42b-e
65 MER 03	26.00	140.23	104.67b-g	92.67a-e	93.72b-g	102.53a-c	100.4b-e
65 MER 04	19.77	127.49	92.95b-g	56.98ef	63.78hi	88.08a-d	110.59b-d
65 ER 14	24.01	185.85	145.07b-d	64.23d-f	87.02b-I	111.19ab	100.38b-e
65 MER 05	36.90	334.47	218.78a	91.38a-e	99.42a-e	118.21a	135.95a
65 EDR 01	52.52	168.94	99.61b-g	45.83f	63.16h-I	43.99e	95.98b-e
65 EDR 02	31.56	130.89	97.79b-g	71.74b-f	90.76b-g	68.49c-e	119.74a-c
65 EDR 03	28.28	189.55	130.39b-g	64.05d-f	75.04c-I	71.74b-e	105.14b-e
65 EDR 04	44.72	176.14	110.84b-g	62.62d-f	72.50c-I	50.95de	96.92b-e
65 EDR 05	24.77	104.80	104.31b-g	77.46b-f	77.75b-I	57.39de	103.3b-e
65 EDR 06	31.71	148.40	156.03b	121.58a	101.38a-c	72.76b-e	87.74de
65 MUR 01	38.70	120.10	81.19c-g	63.14d-f	73.68c-I	55.37de	92.08c-e
13 TAT 01	44.64	154.01	136.92b-e	74.93b-f	70.17e-I	55.19de	99.95b-e
13 TAT 02	30.83	94.01	81.14c-g	75.35b-f	75.83c-I	61.38c-e	105.33b-e
13 TAT 03	41.66	100.05	88.98b-g	79.09b-f	78.09c-I	60.2c-e	106.09b-e
13 TAT 04	24.67	109.02	82.88c-g	60.25d-f	61.83hi	39.08e	92.85c-e
13 TAT 05	17.50	83.46	69.48e-g	91.24a-e	84.20b-I	61.37c-e	90.41d-e
65 MER 07	41.51	109.79	98.36b-g	74.25b-f	84.67b-I	73.34b-e	113.01a-d
Average values for salt doses							
50 mM NaCl	19.43B	151.45	109.81A**	84.08A	89.05A	76.01A	103.48
100 mM NaCl	43.34A	130.01	89.54B	64.91B	70.78B	56.19B	99.49

**: There were significant differences among the different letter(s) at $p<0.01$ level, [a]: DR = Death Rate; DMC = Dry Matter Content in shoots; FMC = Fresh Matter Content in shoots; SL = Shoot Length; LN = Leaf Number; LA = Leaf Area; SD = Stem Diameter

Increasing doses of NaCl negatively affected most of the seedling traits and mineral matter contents (Table 1 and 2). These findings were in agreement with those of other studies[3,5,26-30]. Interestingly, while the fresh matter contents of shoot decreased with salt applications as in some studies[2,11,12], the dry matter contents of shoots increased similar to the trends in soluble solid content of fruit found in some studies[7,11,12].

There was no significant difference for the death rate among the melon genotypes grown in salty condition, but the application of 100 mM NaCl caused to more deaths than the application of 50 mM NaCl as 43.3 and 19.4%, respectively. Although there was no significant difference for the dry matter proportion of shoots among melon genotypes grown in salty condition and the salt applications, the application of 100 mM NaCl caused significant decrease (10.5%) in fresh shoot weight compared to the control and there were significant differences for the fresh shoot contents among melon genotypes (Table 1).

There were significant differences for the shoot length among the melon genotypes grown in salty condition and the applications of 100 and 50 mM NaCl decreased the shoot lengths compared to the control as 35.09 and 15.92%, respectively. Similarly, there were significant differences for the leaf number among the

Table 2: Average proportional differences in some mineral matter contents of shoots among the melon genotypes collected from Lake Van Basin after growing them in salty conditions (the mean values of 50 and 100 mM were compared together with the control)

Genotypes	Ca	Cu	Fe	K	Mg	Mn	N	P	S	Na	Zn	K:Na	Na:Ca
65 ER 01	81.2	70.00b-e**	69.2	72.9	69.5	72.0	83.7	85.47b*	72.50d-f**	161.1	64.0	56.5	198
65 ER 02	81.1	68.18b-e	74.0	66.1	66.6	72.4	83.9	84.84b	71.33d-f	188.3	80.7	48.0	232
65 ER 03	79.2	61.11b-e	74.5	76.1	65.5	69.8	85.4	79.43b	73.61c-f	176.8	99.1	47.7	223
65 ER 04	82.1	55.38b-e	71.2	96.6	70.0	73.1	78.8	84.07b	81.74b-f	208.7	90.4	42.7	254
65 ER 05	88.3	52.78b-e	74.0	84.6	69.7	67.9	84.8	85.13b	71.80d-f	180.0	84.0	49.2	204
65 ER 07	84.2	63.64b-e	70.7	77.9	74.3	60.9	80.4	88.77b	69.14ef	184.9	68.5	49.5	219
65 ER 10	84.0	54.76b-e	69.2	70.0	66.6	56.8	81.2	89.05b	83.33b-f	207.7	64.4	45.0	247
65 ER 12	81.8	52.56b-e	70.7	87.3	76.5	63.5	79.2	88.06b	70.67d-f	216.8	61.5	43.1	265
65 ER 13	77.9	79.63a-e	76.7	82.0	69.3	68.2	78.6	86.75b	102.63ab	182.0	71.7	51.0	234
65 ERC 01	80.0	108.33a	67.8	76.5	60.7	70.0	83.7	84.32b	108.33a	184.1	78.7	48.4	230
65 ERC 03	81.9	65.45b-e	75.3	63.7	63.3	61.0	81.1	82.80b	83.33b-f	198.7	72.6	43.0	243
65 ERC 04	87.0	77.78a-e	68.0	64.7	57.4	79.0	82.7	86.31b	88.10a-e	187.3	73.2	48.6	215
65 ERC 05	82.0	49.02c-e	76.6	66.1	59.7	68.8	81.3	90.50b	97.50a-c	181.6	73.2	52.4	221
65 ERC 06	78.3	50.00b-e	71.0	60.5	65.3	71.5	78.4	89.13b	102.11ab	174.6	98.9	55.0	223
65 ERC 07	81.3	47.78c-e	75.1	66.1	61.4	69.3	82.4	86.58b	90.15a-e	193.4	115.6	47.7	238
65 ERC 09	82.8	69.23b-e	67.1	75.4	60.4	62.9	84.3	86.62b	75.20c-f	179.0	104.4	52.1	216
65 ERC 10	79.1	66.15b-e	72.6	66.0	55.7	75.1	78.9	91.54b	76.67c-f	196.3	90.0	49.0	248
65 ERC 11	80.7	58.33b-e	79.6	76.3	68.5	77.9	83.0	91.50b	75.46c-f	186.0	98.3	52.4	230
65 ERC 12	79.7	89.09ab	77.8	86.9	70.2	70.6	81.5	87.88b	77.39c-f	169.0	105.7	54.4	212
65 ERC 13	90.6	55.95b-e	75.1	69.2	57.9	65.9	84.0	84.57b	73.61c-f	185.3	125.5	48.2	205
65 ERC 14	83.5	47.06c-e	69.2	66.1	63.8	65.7	80.7	85.24b	81.75b-f	188.4	105.7	47.7	226
65 ERC 15	85.9	48.89c-e	69.1	64.1	70.7	63.4	80.1	82.77b	83.33b-f	194.5	95.2	44.6	226
65 ERC 16	83.7	50.00b-e	81.3	70.6	66.2	58.6	77.2	82.88b	84.09b-f	200.8	85.9	43.0	240
65 ERC 19	83.6	59.62b-e	102.2	71.6	80.0	75.9	84.8	85.37b	71.74d-f	185.6	97.6	49.0	222
65 MER 01	87.7	75.00a-e	96.5	78.1	71.5	68.1	83.7	88.72b	69.79ef	187.0	108.7	49.5	213
65 MER 02	84.0	56.25b-e	67.9	70.1	69.8	63.6	79.0	88.71b	69.32ef	201.8	81.2	45.4	240
65 MER 03	84.3	51.43b-e	61.2	54.8	68.4	54.1	78.8	84.97b	75.00c-f	209.8	78.9	42.2	249
65 MER 04	83.3	77.27a-e	68.2	60.6	64.2	60.6	85.4	89.73b	70.67d-f	194.2	88.3	49.1	233
65 ER 14	80.9	53.13b-e	72.3	69.5	65.1	72.5	82.5	89.29b	78.79b-f	186.4	95.7	50.5	230
65 MER 05	79.8	50.00b-e	59.6	63.3	56.9	57.3	79.8	85.28b	60.00f	197.4	88.8	45.9	247
65 EDR 01	78.5	42.86e	58.9	52.8	52.0	59.5	83.5	80.35b	76.39c-f	196.8	76.4	43.7	251
65 EDR 02	86.4	66.67b-e	74.6	63.3	62.0	75.6	78.6	85.66b	77.78c-f	182.3	86.9	50.3	211
65 EDR 03	88.2	71.21b-e	72.0	62.2	60.4	74.0	83.9	104.28a	75.36c-f	184.6	83.7	60.1	209
65 EDR 04	92.0	82.50a-e	68.9	69.7	64.6	82.5	84.3	108.69a	80.68b-f	179.0	90.9	63.5	195
65 EDR 05	84.2	84.44a-d	66.5	70.7	61.5	67.6	81.2	89.75b	85.71a-e	182.7	97.7	52.7	217
65 EDR 06	82.3	69.70b-e	72.5	80.2	69.2	76.4	86.1	89.49b	65.28e-f	191.0	97.0	49.0	232
65 MUR 01	85.5	64.58b-e	83.4	80.0	69.8	73.1	85.7	89.98b	76.14c-f	170.1	103.0	55.9	199
13 TAT 01	84.2	45.31de	71.7	74.0	61.9	57.6	82.2	87.06b	77.38c-f	191.4	90.4	48.1	227
13 TAT 02	78.1	67.50b-e	67.4	56.6	60.9	60.7	83.8	84.33b	81.25b-f	186.9	103.9	48.8	239
13 TAT 03	77.3	85.19a-c	78.8	53.8	69.7	54.5	88.1	84.91b	68.06ef	190.4	115.5	47.0	246
13 TAT 04	89.2	66.67b-e	78.8	60.0	69.2	68.5	87.1	87.39b	89.00a-e	187.5	130.0	49.1	210
13 TAT 05	87.9	73.21a-e	87.2	68.3	67.7	69.7	88.9	88.84b	94.74a-d	173.8	130.8	52.8	198
65 MER 07	77.6	49.33c-e	79.4	62.0	67.1	62.3	80.8	84.86b	87.78a-e	190.4	98.3	47.2	245
Average values for NaCl doses													
50 mM	83.9	66.69	77.6A**	69.4	71.50A**	72.74	84.48A**	189.39	87.93	82.89A**	99.02A**	49.9	235
100 mM	82.2	60.72	69.4B	70.5	59.80B	62.12	80.24B	187.40	86.87	77.33B	88.77B	48.5	234

**: There were significant differences among the different letters at p<0.01 level * : There were significant differences among the different letter(s) at p<0.05 level

melon genotypes grown in salty condition and the applications of 100 and the 50 mM NaCl decreased the number of leaves compared to the control as 29.22 and 10.95%, respectively. Similarly, there were also significant differences for the leaf area among the melon genotypes grown in salty condition and the applications of 100 and 50 mM NaCl decreased the leaf area compared to the control as 43.81 and 23.99%, respectively. Although the salt doses did not caused significant difference for the stem diameter, there were significant differences for this criterion among the melon genotypes grown in salty condition (Table 1).

For the investigated mineral matter contents, the salt applications caused negative impacts; the contents of most mineral matters decreased except for Na content. However, decreases in only Fe, Mg, Mn, P and S contents were significantly different between the salt doses. There were also significant differences only for the contents of Cu, Na and P contents and the K:Na ratio among the melon genotypes grown in salty condition (Table 2).

For the final salinity tolerance determination, the death rate, the leaf area, the dry matter contents of the shoots, the Na content and the rates of K:Na and Na:Ca were employed. The genotypes were sorted from the

Table 3: For the final salinity tolerance determination based on the death rate, the leaf area, the dry matter contents of the shoots, the Na content and the rates of K:Na and Na:Ca

Genotypes	DR[a]	LA	DMC	K:Na	Na	Na:Ca	AT	RAT	RG
65 ER 01	36*	34	23	3	1	3	16.7	10.2**	65 EDR 03
65 ER 02	29	8	1	28	25	26	19.5	12.2	65 MER 01
65 ER 03	22	20	8	30	6	19	17.5	12.7	65 ER 14
65 ER 04	31	21	33	42	41	42	35.0	13.3	65 ERC 12
65 ER 05	32	41	34	17	9	5	23.0	13.8	65 ERC 09
65 ER 07	37	1	3	15	16	15	14.5	14.0	13 TAT 05
65 ER 10	27	17	13	36	40	37	28.3	14.2	65 ERC 05
65 ER 12	6	19	9	39	43	43	26.5	14.5	65 ER 07
65 ER 13	15	37	26	12	11	29	21.7	15.3	65 EDR 04
65 ERC 01	1	30	43	25	14	23	22.7	16.0	65 MUR 01
65 ERC 03	35	23	31	40	37	34	33.3	16.5	65 EDR 02
65 ERC 04	26	36	39	24	23	12	26.7	16.7	65 ER 01
65 ERC 05	19	6	25	9	10	16	14.2	17.3	65 EDR 05
65 ERC 06	25	39	37	5	5	18	21.5	17.5	65 ER 03
65 ERC 07	18	29	35	29	31	30	28.7	18.5	65 MER 04
65 ERC 09	28	12	12	11	7	13	13.8	19.2	65 ERC 14
65 ERC 10	17	38	41	21	34	39	31.7	19.3	65 ERC 11
65 ERC 11	9	15	38	10	19	25	19.3	19.5	65 ER 02
65 ERC 12	34	14	14	6	2	10	13.3	20.0	65 MER 02
65 ERC 13	7	42	42	26	17	6	23.3	21.5	65 ERC 06
65 ERC 14	3	11	24	31	26	20	19.2	21.5	65 EDR 06
65 ERC 15	14	24	22	37	33	21	25.2	21.7	65 ER 13
65 ERC 16	20	35	30	41	38	32	32.7	22.0	65 ERC 19
65 ERC 19	40	18	17	22	18	17	22.0	22.2	13 TAT 04
65 MER 01	4	9	11	16	22	11	12.2	22.7	65 ERC 01
65 MER 02	2	7	4	35	39	33	20.0	23.0	65 ER 05
65 MER 03	13	4	18	43	42	40	26.7	23.3	65 ERC 13
65 MER 04	8	5	20	18	32	28	18.5	23.7	65 MER 05
65 ER 14	10	3	6	13	20	24	12.7	25.2	65 ERC 15
65 MER 05	30	2	2	34	36	38	23.7	26.2	13 TAT 02
65 EDR 01	43	40	10	38	35	41	34.5	26.5	65 ER 12
65 EDR 02	23	22	19	14	12	9	16.5	26.7	65 ERC 04
65 EDR 03	16	16	5	2	15	7	10.2	26.7	65 MER 03
65 EDR 04	42	33	7	1	8	1	15.3	27.8	13 TAT 01
65 EDR 05	12	28	29	8	13	14	17.3	28.2	65 MER 07
65 EDR 06	24	13	16	20	29	27	21.5	28.3	65 ER 10
65 MUR 01	33	31	21	4	3	4	16.0	28.7	65 ERC 07
13 TAT 01	41	32	15	27	30	22	27.8	31.7	65 ERC 10
13 TAT 02	21	25	36	23	21	31	26.2	32.5	13 TAT 03
13 TAT 03	39	27	32	33	28	36	32.5	32.7	65 ERC 16
13 TAT 04	11	43	28	19	24	8	22.2	33.3	65 ERC 03
13 TAT 05	5	26	40	7	4	2	14.0	34.5	65 EDR 01
65 MER 07	38	10	27	32	27	35	28.2	35.0	65 ER 04

*: The best genotype for the mentioned traits were designated as 1 and the worst as 43, **: The most t tolerant genotypes had the lowest values
[a]: DR = Death Rate; DMC = Dry Matter Content in shoots; LA = Leaf Area; AT = Average Tolerance; RAT = Ranked Average Tolerance (ranked from the most tolerant to the least tolerant); RG = Ranked Genotype (ranked from the most tolerant to the least tolerant)

lowest values to the highest values for the death rate, the Na content and the rate Na:Ca and were sorted from the highest values to the lowest values for the leaf area, the dry matter content of the shoots, the Na content and the rate of K:Na (Table 3). Then the genotypes having the lowest and highest average means for the mentioned six traits were determined as salt tolerant and salt sensitive. The five genotypes were chosen as the most salt tolerant ones (65 EDR 03, 65 MER 01, 65 ER 14, 65 ERC 12 and 65 ERC 09), while the five genotypes were chosen as the least salt tolerant ones (65 ER 04, 65 EDR 01, 65 ERC 03, 65 ERC 16 and 13 TAT 03) for the future breeding and genetic studies. The chosen genotypes will have been selected for their distinctive salt responses and the biochemical and genetic basis of their salt tolerance mechanisms will have been investigated in details in the laboratory and the field conditions. Especially, the tolerant genotypes will have been utilized in the future melon breeding studies.

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