Short Communication

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Effect of salt stress on seed and seedling characters of tomato *(Lycopersicum esculentum)* genotypes

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To alleviate the deleterious effects of salinity, reclamation of salinized lands, improvement of irrigation with saline water and the cultivation of salt-tolerant variety have been applied. The positive changes as crop cultivars, local climate, soil nutrients, type of salt, salinity levels, irrigation methods and water management practices (Datta *et al.*, 2015). However, information on effect of salinity on seed germination, shoot length, root length, seedling length, vigour index etc. is limited. Therefore, experiment was conducted to evaluate tomato genotypes with different concentration of NaCl.

The experiment was conducted to find out the effect of salt stress on tomato (*Lycopersicum esculentum* L.) yield at HC & RI, TNAU, Coimbatore during 2018-19. The 38 genotypes were germinated under moderate salinity level of 80 mM. The highest seed germination percentage (66.66%), shoot length (6.60 cm) and root length (7.70 cm), highest seedling length (13.56) and seedling fresh weight (0.247) were observed in LE-14 respectively. The lowest seed germination and seedling parameters were recorded in Pharna Baskar under moderate saline condition. The seven level of salinity treated (0 mM to 120 mM) tomato genotypes, seed germination, seedling parameters well in moderate saline level (80 mM) and least performance were observed in 100 m and 120 mM respectively.

The germination and seedling studies were imposed under roll towel method under laboratory condition. The salt concentration levels of T_1-0 mM, T_2-20 mM, T_3-40 mM, T_4-60 mM, T_5-80 mM, T_6-100 mM and T_7-120 mM with three replication were used. Seeds were kept under different salt concentration. The observations were recorded after 15 days on seed germination and seedling parameters. The data were statistically analyzed in a randomized block design and ANOVA tables was only considered significant at $p < 0.05$.

There were significant variation in different salt concentrations in all genotypes. Seed germination ranged from 93.33% (0 mM) to 6.66% (120 mM) 50 genotypes. Nasrin and Abdul Mannan, (2019) recorded similar results among 50 genotypes only 38 genotypes were germinated under moderate salinity level of 80 mM. Highest germination was recorded (66.66%) in LE-14 followed by EC-88783 (62.22%) in 80 mM. The moderate NaCl concentrations decreased in seed germination in 12 genotypes. At higher salt concentration, only a few genotypes were able to germinate with low percentage. The seed germination percentage was high in low salt concentration and drastically declined when concentration increased. The genotypes which are least affected may be potential source of salinity tolerance for breeding. The effect of external salinity on seed germination may be partially osmotic or ion toxicity, which can alter physiological processes such as enzyme activities.

The result showed that, per se performance of shoot length LE-14 was recorded 5.67% (T_1), 7.80% (T_2), 5.83% (T_3), 6.30% (T_4), 6.60% (T_5), 4.20% (T_6) and 0.0 (T_7). Among 38 genotypes, highest shoot length (6.60 cm) was observed LE-14, followed by LE-1020 (5.67 cm) and LE-1 (4.83 cm) and the lowest shoot length was observed in Pharna Bhaskor (0.17 cm) and P-1 (0.27 cm). The combined effect of genotypes and salinity levels showed also significant variation in of shoot length. Similar results were obtained by Nasrin and Abdul Mannan, (2019). The lowest shoot length was recorded in Punjab Bagkoa (0.70 cm) in 120 mM.

The root length in LE-14 was recorded 7.77 cm (T_1), 3.07 cm (T_2), 5.50 cm (T_3), 8.57 cm (T_4), 7.70 cm (T_5), 5.97 cm (T_6) and 5.90 cm (T_7). Among 38 genotypes highest root length was observed LE-14 (7.70 cm) under moderate salinity followed by LE-1020 (7.43 cm) IIVR-

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Table 1. Salinity level of 80 mM to influence germination and seedling characters of tomato genotypes

Genotype	Seed germination (%)	Shoot length (cm)	Root length (cm)	Seedling length (cm)	Vigour index
LE-1	46.66	6.60	6.97	9.90	645.1
Angarlata	31.11	2.93	2.37	8.80	162.9
EC-163606	6.66	1.80	3.70	13.10	36.9
ArkaAbhay	11.11	3.50	2.63	0.00	67.3
EC-164863	4.44	1.73	2.77	13.57	30.0
LCR-2	11.11	1.23	1.93	6.00	21.1
P-1	4.44	0.27	0.17	7.97	3.1
Kashi	0.00	0.00	0.00	6.93	0.0
CLNR-2123	15.55	4.77	4.97	12.53	148.6
IIVR-DN-2016	6.66	3.27	5.53	3.40	56.9
LE-14	66.66	4.83	7.70	9.73	806.2
LE-1020	57.77	5.67	7.43	5.90	761.7
LE-411	51.11	4.33	6.50	0.00	554.4
IIVR-1740047	0.00	0.00	0.00	1.17	0.0
Swarna	6.66	1.77	3.40	8.90	34.7
H-24	26.66	3.77	5.80	7.97	250.6
LE-116	15.56	1.17	2.23	0.60	90.7
EC-63003	2.22	0.33	0.83	5.17	7.8
Pharna Bhaskor	2.22	0.17	0.43	5.17	4.0
F-7-1	0.00	0.00	0.00	5.30	0.0
IIVR-88783	62.22	3.50	7.27	10.77	671.5
LE-104	37.77	3.10	6.13	5.50	344.6
Punjab Bas	11.11	1.77	3.40	9.57	68.9
IIVR-EC-2798	28.89	2.77	6.13	3.70	260.4
PKM-1	8.88	0.50	0.70	10.83	8.0
VGR-89	11.11	1.73	2.30	5.93	53.8
EC-326146	20.00	3.00	3.07	1.20	119.8
Pb-Rathak	44.44	3.03	4.93	6.13	351.8
Azota-1	13.33	1.57	2.13	7.73	61.5
EC-164838	0.00	3.77	4.20	3.83	0.0
LE-828	0.00	0.00	0.00	6.07	0.0
LE-90	0.00	0.00	0.00	0.00	0.0
IIVR-Pb-Khogri	35.55	3.13	4.60	2.80	272.2
EC-164677	0.00	2.50	3.43	1.63	0.0
IIVR-EC-2495	57.77	4.00	5.90	4.03	577.7
Punjab Bagkoa	33.33	3.20	3.73	1.50	231.3
Pusatha-2	15.55	2.07	3.43	4.50	89.5
CH-155	0.00	0.00	0.00	0.00	0.0
LE-15	0.00	0.00	0.00	0.67	0.0
LE-470	0.00	0.00	0.00	5.50	0.0
LE-231	2.22	0.67	0.00	0.00	2.0
LE-88	0.00	0.00	0.00	9.23	0.0
IIVR-EC-163894	6.66	0.60	0.90	1.13	8.4
LE-12	17.78	1.67	2.17	3.17	58.0
EC-165690	4.44	0.53	1.10	0.00	8.9
Kasamar	4.44	1.77	4.13	0.43	38.2
LE-355	4.44	1.03	1.77	0.00	17.8
LE-70	4.44	1.97	4.03	0.00	40.9
LE-20	0.00	0.00	0.00	0.00	0.0
EC-567346	6.66	0.37	0.77	0.00	15.1
Mean	15.95	1.93	2.83	4.76	139.6
SEd	5.61	0.75	1.35	2.04	60.0
CD(0.05)	11.14	1.49	2.68	4.06	119.0

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88783 (7.27 cm) and P-1 (0.17 cm) and Pharna Bhaskor (0.43 cm). The combined effect of genotypes and salinity levels also showed significant variation in root length. The lowest root length were recorded in Punjab Bagkoa (1.10 cm) in 120 mM level of salinity. Salinity not only slows root growth, but also increases length of dead roots in those genotypes very sensitive to salt 'Neelavathi *et al.*' (2015).

The highest seedling length was observed LE-14 (13.56 cm) under moderate salinity level, followed by LE-1020 (13.10 cm) and LE-1 (12.53 cm). The combined effect of genotypes and salinity levels also highly significant variation seedling length. The highest seedling length (18.96 cm) was recorded in IIVR-Pb-Khogri with 0 mM salinity level, followed by LE-12 (18.00 cm) and Kasamer (17.66 cm). Whereas, lowest seedling length were recorded in Punjab Bagkoa (1.80 cm) in 120 mM level of salinity. Similar kind of result obtained by Kazemi *et al.* (2014), Nasrin and Abdul Mannan, (2019).

The highest vigour index was observed LE-14 (806.2) under moderate salinity level, followed by LE-1020 (761.7) and IIVR-88783 (671.5). Nasrin and Abdul Mannan, (2019), reported highest seedling vigour index in lower salt concentration and lowest seedling vigour index in higher concentration of salt. The combined effect of genotypes and salinity levels also had significant variation in vigour index. The highest vigour index (1730.0) was recorded in genotype IIVR-Pb-Khogri with 0mM salinity level, followed by LE-12 (1641.1) and Kasamer (1608.4). Similar kind of results obtained by Nasrin and Abdul Mannan, (2019), highest seedling vigour index was recorded in lowest salinity level and seedling vigour index. The lowest vigour index was recorded in Punjab Bagkoa (17.3) in 120 mM level of salinity. The result in agreement with Kazemi *et al.* (2014), Nasrin and Abdul Mannan (2019).

CONCLUSION

The highest seed germination percentage (66.66%), shoot length (6.60 cm) and root length (7.70 cm), highest seedling length (13.56 cm), seedling fresh weight (0.247 cm), seedling dry weight (0.04), highest vigour index (806.2) were observed in LE-14 respectively. The lowest seed germination and seedling parameters were recorded Pharna Baskar under moderate saline condition. LE-14 utilisation of tolerant genotypes as a donor for breeding programme

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