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SCREENING AND BIOCHEMICAL PROFILING OF BRINJAL GERMPLASM FOR SALINITY TOLERANCE

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ABSTRACT

An experiment was conducted at the Central Instrumentation Facility (CIF), Post Graduate Institute for Horticultural Sciences, Sri Konda Laxman Telangana State Horticultural University, Mulugu, Siddipet, Telangana, India; during November 2025 to evaluate the effect of salinity on seed germination and early seedling growth of twelve brinjal germplasm lines. The seeds were subjected to four NaCl salinity levels 0 (control), 4, 8 and 12 dS m^{-1} in a Factorial Completely Randomized Design with two replications. Increasing salinity significantly delayed seed germination and reduced plumule length, plumule length stress tolerance index, radicle length, radicle fresh weight and radicle length stress tolerance index. The inhibitory effects were more pronounced at higher salinity levels, particularly at 12 dS m^{-1}. Significant variation in salinity tolerance was observed among the germplasm, indicating the presence of useful genetic variability. IC 618029 (*Solanum torvum* Sw.) exhibited the highest tolerance by maintaining better germination and seedling growth under saline conditions, followed by *Solanum sisymbriifolium* Lam. and *Solanum virginianum* L., whereas CHMB-17 was the most susceptible. The study highlights the potential of tolerant wild germplasm as valuable genetic resources for screening, rootstock development and breeding programmes aimed at improving salinity tolerance in brinjal.

Key words : Brinjal germplasm, Salinity stress, Seed germination, Plumule length, Radicle length, Stress tolerance index, *Solanum torvum*.

Introduction

Salt stress poses a significant threat to sustainable agricultural practices, particularly in arid and semi-arid regions, where it endangers crop productivity and overall agricultural sustainability. Gruda *et al*., 2024. (Hopmans *et al*., 2021) Climate change, characterized by temperature fluctuations and water scarcity, is exacerbating soil salinity, thereby impairing crop growth and productivity (Khondoker *et al*., 2023). Plant growth is significantly hampered by extreme environmental conditions such as water scarcity, elevated salinity, heavy metal contamination, and temperature extremes (Arnell *et al*., 2019). These abiotic stressors not only reduce crop productivity but also impose substantial economic losses on the agricultural sector.

Eggplant (*Solanum melongena* L.), locally known as brinjal, is one of the high-value horticultural crops playing a significant role in increasing the income of farming communities of the tropics and sub-tropics. It is an herbaceous plant with broad, lobed leaves and purple flowers. The fruit is a berry, highly variable in shape, size, and colour ranging from purple and green to white and striped. (Sahu *et al*., 2022). Eggplant is a nutrient-rich vegetable with exceptionally low calories, making it one of the healthiest dietary choices. It is packed with essential vitamins, minerals, and beneficial bioactive compounds that contribute positively to human health. Docimo *et al*., 2016; Plazas *et al*., 2014; Raigón *et al*., 2008. Eggplant growth has been shown to be sensitive or moderately sensitive (Uddina *et al*., 2016) to salinity

depending on varieties or cultivars and environmental conditions.

Akinci *et al*. (2004) observed that eggplant growth is adversely influenced by elevated salt levels during both germination and seedling development. The degree of salt tolerance differs among varieties, with some showing greater resilience than others. Salt stress disrupts plant physiology by lowering water potential and inducing ion imbalance and toxicity. Sodium chloride (NaCl) inhibits seed germination (Kaveh *et al*., 2011). This stage is often the most decisive in determining whether a plant exhibits resistance or susceptibility, as it directly influences seedling establishment, the production of high quality seeds, and the successful completion of the plant's life cycle. A wide range of cultivated brinjal germplasm lines and wild *Solanum* species are available for both farming and breeding purposes. Yet, their tolerance to salinity during germination has not been thoroughly assessed. salt tolerant germplasm at the early growth stage is crucial for developing resilient rootstocks and enhancing productivity in salt affected soils. With this objective, the present study aimed to evaluate twelve brinjal germplasm lines for salinity tolerance under controlled petri plate conditions during germination.

Materials and Methods

The present investigation was carried out at the Central Instrumentation Facility (CIF), Post Graduate Institute for Horticultural Sciences, Sri Konda Laxman Telangana State Horticultural University, Mulugu, Siddipet, Telangana, India, during November 2025. A total of twelve brinjal germplasm lines comprising cultivated genotypes and wild *Solanum* species, namely CHMB-4, CHMB-8, CHMB-9, CHMB-12, CHMB-13, CHMB-16, CHMB-17, *Solanum gilo*, *Solanum sisymbriifolium* Lam., *Solanum incanum* L., IC 618029 (*Solanum torvum* Sw.) and *Solanum virginianum* L., were evaluated for their salinity tolerance at the germination stage. To assess the response of the germplasm to salinity stress, four salinity levels *viz*., 0 dS m^{-1} (control), 4 dS m^{-1}, 8 dS m^{-1} and 12 dS m^{-1} were imposed using sodium chloride (NaCl) solutions. The seeds of all germplasm lines were obtained from the Department of Vegetable Science, College of Horticulture, Rajendranagar, Hyderabad, and were used for the experiment after selecting healthy and uniform seeds.

The experimental data obtained from different experiments were statistically analyzed by adopting appropriate analysis of variance (ANOVA) techniques suitable for Factorial Completely Randomized Design (FCRD) and Factorial Randomized Block Design (FRBD). all the observations were carried out with two replications and the results are presented in Standard error of mean [SE(m)], Critical Difference (CD) and Coefficient of Variation (CV%) were calculated treatment effects were found significant.

Results and Discussion

Statistically significant variations among the twelve germplasm, four salinity levels and their interactions for germination, radicle and plumule length, and fresh weight and stress tolerance indices for radicle and fresh weight of eggplant.

Days taken for germination

Days taken for germination increased significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_{11} [IC 618029 (*Solanum torvum* Sw.)] required the maximum time for germination (13 days), followed by G_{12} (*Solanum virginianum* L.) (12 days), whereas the minimum was recorded in G_4 [CHMB-12 (*Solanum melongena* L.)] (5.90 days). Among the salinity treatments, N_4 (12 dS m^{-1}) recorded the maximum days to germination (9 days), followed by N_3 (8 dS m^{-1}), while the minimum was observed under the control (N_1, 0 dS m^{-1}) (7 days). The interaction between germplasm and salinity was significant. G_1 [CHMB-4 (*Solanum melongena* L.)] exhibited the least delay in germination (6 days under N_1 to 7 days under N_4), whereas G_4 [CHMB-12 (*Solanum melongena* L.)] showed the greatest delay (4 days under N_1 to 7.5 days under N_4), indicating a stronger effect of salinity on germination.

Seed germination under salinity stress is a key indicator of genotype establishment. In this study, higher NaCl concentrations progressively delayed germination due to osmotic stress limiting water uptake and ionic toxicity disrupting metabolic activity. Excessive Na^+ accumulation further impaired membrane integrity and ion balance, intensifying the delay.Similar observations have been reported by Zafar *et al*. (2015), Bolton and Simon (2019) and Ratnakar and Rai (2013), who observed that increasing salinity significantly reduced germination and delayed seedling establishment in different crop species, Mallick *et al*. (2025).

Plumule length (cm)

Plumule length decreased significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_{11} [IC 618029 (*Solanum torvum* Sw.)] recorded the maximum plumule length (5.84 cm), followed by G_{12} (*Solanum virginianum* L.) (5.82 cm), while the minimum was observed in G_7 [CHMB-17 (*Solanum*

Table 1 : Effect of germplasm, salinity levels and their interaction on days taken for germination in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	6	6	6	7	6.58
CHMB-8 (*Solanum melongena* L.)	5	5	6	7	6.17
CHMB-9 (*Solanum melongena* L.)	4	6	6	7	6.24
CHMB-12 (*Solanum melongena* L.)	4	5	6	7	5.89
CHMB-13 (*Solanum melongena* L.)	6	6	6	8	6.94
CHMB-16 (*Solanum melongena* L.)	5	6	7	8	6.89
CHMB-17 (*Solanum melongena* L.)	6	6	7	8	7.07
Solanum gilo	9	10	11	11	10.84
Solanum sisymbriifolium Lam.	11	10	11	12	11.59
Solanum incanum L.	10	10	12	12	11.30
IC 618029 (*Solanum torvum* Sw.)	12	13	14	13	13.70
Solanum virginianum L.	11	12	12	13	12.45
Mean N	**7**	**8**	**9**	**9**	

Factors	C.D.@5%	SE(m)±	cv
Factor(G)	0.374	0.131	4.20
Factor(N)	0.216	0.076	
Factor (G X N)	0.747	0.262	

*Two replications were performed.

Table 2 : Effect of germplasm, salinity levels and their interaction on plumule length (cm) in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	6.39	6.07	4.33	2.91	**4.92**
CHMB-8 (*Solanum melongena* L.)	6.57	5.61	4.26	3.63	**5.01**
CHMB-9 (*Solanum melongena* L.)	6.78	5.27	4.67	2.83	**4.89**
CHMB-12 (*Solanum melongena* L.)	7.21	6.4	4.7	3.49	**5.45**
CHMB-13 (*Solanum melongena* L.)	7.85	6.43	4.59	3.7	**5.64**
CHMB-16 (*Solanum melongena* L.)	6.595	5.35	4.6	3.3	**4.96**
CHMB-17 (*Solanum melongena* L.)	6.8	4.31	3.73	2.17	**4.25**
Solanum gilo	6.54	6.18	5.42	4.14	**5.57**
Solanum sisymbriifolium Lam.	7.03	6.39	5.34	4.11	**5.71**
Solanum incanum L.	6.41	5.76	5.39	4.07	**5.41**
IC 618029 (*Solanum torvum* Sw.)	6.82	6.49	5.51	4.55	**5.84**
Solanum virginianum L.	7.66	6.18	5.35	4.06	**5.81**
Mean N	**6.88**	**5.87**	**4.82**	**3.58**	

Factors	C.D.@5%	SE(m)±	CV
Factor(G)	0.239	0.084	4.471
Factor(N)	0.138	0.05	
Factor (G X N)	0.478	0.167	

*Two replications were performed.

melongena L.)] (4.25 cm). Among the salinity treatments, the highest plumule length was recorded under the control (N_1, 6.89 cm), followed by N_2 (5.87 cm), whereas the lowest was observed under N_4 (12 dS m^{-1}) (3.58 cm). The germplasm × salinity interaction was significant. G_{11} [IC 618029 (*Solanum torvum* Sw.)] exhibited the least reduction in plumule length (6.83 cm under N_1 to 4.55 cm under N_4), whereas G_7 [CHMB-17 (*Solanum melongena* L.)] showed the greatest reduction (6.80 cm under N_1 to 2.18 cm under N_4), indicating greater susceptibility to salinity stress.

Plumule length was more severely affected than radicle length as salinity increased, indicating that shoot tissues are more sensitive to osmotic and ionic stress. The reduction in plumule elongation may be associated with Na^+ and Cl^- toxicity, which suppresses cell division and elongation in shoot tissues. Salinity-induced hormonal imbalances, including increased abscisic acid and reduced gibberellin levels, further inhibit shoot growth. Comparable results have been reported by Kaur *et al.* (2023), Munns and Tester (2008), Iqbal and Ashraf (2007), Hassen *et al.* (2014), Asgharipour and Rafiei (2011), and Bhati and Garg (2020), who observed greater inhibition of plumule growth than radicle growth under saline conditions.

Table 3 : Effect of germplasm, salinity levels and their interaction on plumule length stress tolerance index (%) in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	100	95.00	70.48	38.19	**75.92**
CHMB-8 (*Solanum melongena* L.)	100	85.38	62.50	53.26	**75.28**
CHMB-9 (*Solanum melongena* L.)	100	85.30	68.95	33.78	**72.01**
CHMB-12 (*Solanum melongena* L.)	100	89.2	66.88	42.29	**74.59**
CHMB-13 (*Solanum melongena* L.)	100	81.97	59.04	47.14	**72.03**
CHMB-16 (*Solanum melongena* L.)	100	82.20	69.76	50.04	**75.50**
CHMB-17 (*Solanum melongena* L.)	100	63.39	54.88	31.99	**62.56**
Solanum gilo	100	89.96	84.18	63.59	**84.43**
Solanum sisymbriifolium Lam.	100	94.52	75.47	63.31	**83.32**
Solanum incanum L.	100	91.25	71.41	58.76	**80.35**
IC 618029 (*Solanum torvum* Sw.)	100	95.11	80.74	66.68	**85.63**
Solanum virginianum L.	100	87.32	78.09	62.38	**81.95**
Mean N	**100**	**86.71**	**70.20**	**50.95**	

Factors	C.D.@5%	SE(m)±	CV
Factor(G)	3.76	1.31	4.84
Factor(N)	2.17	0.76	
Factor (G X N)	7.52	2.63	

Table 4 : Effect of germplasm, salinity levels and their interaction on radicle length (cm) in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	5.42	4.17	4.09	3.08	**4.19**
CHMB-8 (*Solanum melongena* L.)	5.18	4.1	4.48	3.19	**4.23**
CHMB-9 (*Solanum melongena* L.)	5.83	4.37	4.28	3.1	**4.39**
CHMB-12 (*Solanum melongena* L.)	5.64	4.42	4.17	3.09	**4.33**
CHMB-13 (*Solanum melongena* L.)	6.55	4.54	4.76	3.74	**4.90**
CHMB-16 (*Solanum melongena* L.)	6.61	5.43	4.28	3.22	**4.88**
CHMB-17 (*Solanum melongena* L.)	5.65	2.86	1.90	1.8	**3.05**
Solanum gilo	6.04	5.71	4.80	3.24	**4.95**
Solanum sisymbriifolium Lam.	6.38	5.36	4.77	3.09	**4.90**
Solanum incanum L.	5.22	5.07	4.39	4.01	**4.67**
IC 618029 (*Solanum torvum* Sw.)	5.27	4.94	4.76	4.65	**4.90**
Solanum virginianum L.	5.77	4.49	4.75	4.22	**4.81**
Mean N	**5.79**	**4.62**	**4.289**	**3.371**	

Factors	C.D.@5%	SE(m)±	CV
Factor(G)	0.225	0.079	4.946
Factor(N)	0.13	0.046	
Factor (G X N)	0.45	0.158	

*Two replications were performed.

Plumule Length Stress Tolerance Index (PLSTI)

Plumule Length Stress Tolerance Index (PLSTI) decreased significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_{11} [IC 618029 (*Solanum torvum* Sw.)] recorded the highest PLSTI (85.64%), followed by G_8 (*Solanum gilo*) (84.44%), while the lowest was observed in G_7 [CHMB-17 (*Solanum melongena* L.)] (62.57%). Among the salinity treatments, the highest PLSTI was recorded under the control (N_1, 100.00%), followed by N_2 (86.72%), whereas the lowest was observed under N_4 (12 dS m^{-1}) (50.95%). The germplasm × salinity interaction was significant. G_{11} [IC 618029 (*Solanum torvum* Sw.)] exhibited the least reduction in PLSTI (100.00% under N_1 to 66.69% under N_4), whereas G_7 [CHMB-17 (*Solanum melongena* L.)] showed the greatest reduction (100.00% under N_1 to 31.99% under N_4), indicating its higher susceptibility to salinity stress.

The Plumule Length Stress Tolerance Index (PLSTI) declined progressively with increasing salinity, indicating a reduced capacity of seedlings to maintain shoot and root growth under salt stress. Germplasm with higher PLSTI values maintained better seedling growth, reflecting greater tolerance to salinity. Similar reductions in stress tolerance indices under increasing salinity have

been reported by Marium *et al*. (2019) in cucumber, suggesting that stress tolerance indices are effective indicators for identifying salt-tolerant germplasm during early seedling growth.

Radicle length (cm)

Radicle length decreased significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_8 (*Solanum gilo*) recorded the maximum radicle length (4.95 cm), followed by G_{11} [IC 618029 (*Solanum torvum* Sw.)] (4.91 cm), while the minimum was observed in G_8 [CHMB-17 (*Solanum melongena* L.)] (3.06 cm). Among the salinity treatments, the highest radicle length was recorded under the control (N_1, 5.80 cm), followed by N_2 (4.63 cm), whereas the lowest was observed under N_4 (12 dS m^{-1}) (3.37 cm). The germplasm × salinity interaction was significant. G_{11} [IC 618029 (*Solanum torvum* Sw.)] exhibited the least reduction in radicle length (5.28 cm under N_1 to 4.65 cm under N_4), whereas G_7 [CHMB-17 (*Solanum melongena* L.)] showed the greatest reduction (5.65 cm under N_1 to 1.80 cm under N_4).

Radicle growth under salinity stress serves as a key marker of tolerance since roots are the first organs exposed. In this study, radicle length declined progressively with increasing NaCl, though less severely than plumule length. Salinity restricted root elongation by impairing cell division, membrane integrity, and water/nutrient uptake. Prior studies (Kaur *et al*., 2023; Ahire and Nikam, 2011; Basma *et al*., 2014; Bhati and Garg, 2020; Hassen *et al*., 2014) support these findings, while Devi and Arumugam (2019) noted stronger inhibition of roots than shoots. Reduced radicle growth may also stem from salt induced metabolic changes that limit cell wall extensibility and turgor driven expansion (Ali *et al*., 2004).

Radicle fresh weight (mg)

Radicle fresh weight declined significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_{11} [IC 618029 (*Solanum torvum* Sw.)] recorded the highest radicle fresh weight (13.56 mg), followed by G_2 [CHMB-8 (*Solanum melongena* L.)] (13.28 mg), whereas the lowest was observed in G_7 [CHMB-17 (*Solanum melongena* L.)] (10.29 mg). Among the salinity treatments, the highest radicle fresh weight was recorded under the control (N_1, 15.39 mg), followed by N_2 (13.20 mg), while the lowest was observed under N_4 (12 dS m^{-1}) (9.13 mg). The germplasm × salinity interaction was significant. G_{11} [IC 618029 (*Solanum torvum* Sw.)] exhibited the least reduction in radicle fresh weight (15.96 mg under N_1 to 10.70 mg under N_4), whereas G_7 [CHMB-17 (*Solanum melongena* L.)] showed the greatest reduction (15.22 mg under N_1 to 7.05 mg under N_4).

Table 5 : Effect of germplasm, salinity levels and their interaction on radicle fresh weight (mg) in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	5.78	4.37	3.09	2.60	**3.96**
CHMB-8 (*Solanum melongena* L.)	5.59	3.26	3.51	3.2	**3.89**
CHMB-9 (*Solanum melongena* L.)	6.67	3.50	3.14	2.485	**3.95**
CHMB-12 (*Solanum melongena* L.)	8.13	4.68	4.28	3.15	**5.06**
CHMB-13 (*Solanum melongena* L.)	4.81	3.2	3.16	2.87	**3.51**
CHMB-16 (*Solanum melongena* L.)	5.71	4.38	3.46	2.225	**3.94**
CHMB-17 (*Solanum melongena* L.)	5.74	4.48	3.19	2.025	**3.86**
Solanum gilo	5.62	4.55	4.18	3.065	**4.35**
Solanum sisymbriifolium Lam.	5.18	4.48	3.79	3.15	**4.15**
Solanum incanum L.	5.26	4.82	4.265	3.67	**4.50**
IC 618029 (*Solanum torvum* Sw.)	4.69	4.22	3.46	3.12	**3.87**
Solanum virginianum L.	6.775	4.58	3.155	3.08	**4.39**
Mean N	**5.831**	**4.212**	**3.558**	**2.887**	

Factors	C.D.	SE(m)	CV
Factor(G)	0.18	0.063	4.327
Factor(N)	0.104	0.036	
Factor (G X N)	0.36	0.126	

*Two replications were performed.

Radicle fresh weight decreased significantly with increasing salinity, indicating reduced root biomass accumulation under salt stress. The decline in fresh weight is mainly due to reduced water uptake resulting from lower osmotic potential, ionic toxicity and impaired nutrient absorption, which collectively restrict root growth. Similar reductions in root fresh weight under saline conditions have been reported by Ahire and Nikam (2011), Hamid *et al.* (2010) and Qayyum *et al.* (2007).

Table 6 : Effect of germplasm, salinity levels and their interaction on radicle length stress tolerance index (%) in brinjal germplasm under salinity stress.

Treatment	$N_1$0 (ds/m)	N_2 (4 ds/ m)	N_3 (8 ds/ m)	N_4 (12 ds/ m)	Mean G
CHMB-4 (*Solanum melongena* L.)	100	77.015	75.565	40.285	**73.216**
CHMB-8 (*Solanum melongena* L.)	100	79.145	86.48	61.675	**81.825**
CHMB-9 (*Solanum melongena* L.)	100	74.97	73.52	53.19	**75.42**
CHMB-12 (*Solanum melongena* L.)	100	78.455	74.025	53.79	**76.568**
CHMB-13 (*Solanum melongena* L.)	100	69.38	72.765	57.165	**74.828**
CHMB-16 (*Solanum melongena* L.)	100	82.15	64.78	48.69	**73.905**
CHMB-17 (*Solanum melongena* L.)	100	50.715	33.72	31.86	**54.074**
Solanum gilo	100	94.645	79.795	53.805	**82.061**
Solanum sisymbriifolium Lam.	100	84.095	74.84	49.43	**77.091**
Solanum incanum L.	100	97.235	84.215	76.82	**89.568**
IC 618029 (*Solanum torvum* Sw.)	100	93.66	90.255	88.155	**93.018**
Solanum virginianum L.	100	77.935	82.29	73.24	**83.366**
Mean N	**100**	**79.95**	**74.354**	**57.342**	

Factors	C.D.@5%	SE(m)±	CV
Factor(A)	2.435	0.854	3.098
Factor(B)	1.406	0.493	
Factor (A X B)	4.869	1.707	

*Two replications were performed.

Radicle Length Stress Tolerance Index (RLSTI)

Radicle Length Stress Tolerance Index (RLSTI) decreased significantly with increasing salinity levels in all brinjal germplasm. Among the germplasm, G_{11} [IC 618029 (*Solanum torvum* Sw.)] recorded the highest RLSTI (93.02%), followed by G_{10} (*Solanum incanum* L.) (89.57%), whereas the lowest was observed in G_7 [CHMB-17 (*Solanum melongena* L.)] (54.07%). Among the salinity treatments, the highest RLSTI was recorded under the control (N_1, 100.00%), followed by N_2 (79.95%), while the lowest was observed under N_4 (12 dS m^{-1}) (57.34%). The germplasm × salinity interaction was significant. G_{11} [IC 618029 (*Solanum torvum* Sw.)] exhibited the least reduction in RLSTI (100.00% under N_1 to 88.16% under N_4), whereas G_7 [CHMB-17 (*Solanum melongena* L.)] showed the greatest reduction (100.00% under N_1 to 31.86% under N_4), indicating its higher susceptibility to salinity stress.

Radicle Length Stress Tolerance Index (RLSTI) declined progressively with increasing salinity, indicating a reduced capacity of seedlings to maintain shoot and root growth under salt stress. Germplasm with higher RLSTI values maintained better seedling growth, reflecting greater tolerance to salinity. Similar reductions in stress tolerance indices under increasing salinity have been reported Marium *et al.* (2019) in cucumber, suggesting that stress tolerance indices are effective indicators for identifying salt-tolerant germplasm during early seedling growth.

Conclusion

Salinity stress significantly affected seed germination and early seedling growth of all twelve brinjal germplasm, with the adverse effects becoming more severe as NaCl concentration increased from 0 to 12 dS m^{-1}. Increasing salinity delayed germination and reduced plumule length, radicle length, radicle fresh weight, Plumule Length Stress Tolerance Index (PLSTI) and Radicle Length Stress Tolerance Index (RLSTI). Considerable genetic variation in salinity tolerance was observed among the germplasm. IC 618029 (*Solanum torvum* Sw.) consistently maintained superior seedling growth and the highest stress tolerance indices under saline conditions, followed by *Solanum sisymbriifolium* Lam. and *Solanum virginianum* L., whereas CHMB-17 was the most susceptible. These findings demonstrate that wild *Solanum* species, particularly IC 618029 (*Solanum torvum* Sw.), possess excellent potential as donor material and rootstocks for developing salinity-tolerant brinjal cultivars and can be effectively utilized in future breeding programmes.

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