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RESEARCH ARTICLE

Optimizing salinity threshold for screening salt tolerance in sponge gourd (*Luffa cylindrica* L.) genotypes at seedling stage

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Abstract

Screening of larger genotypes for salinity tolerance at the seedling stage offers an economical and time-saving approach to alleviate salt stress. The present study was planned to find out the optimum threshold concentration of NaCl for screening salt tolerance in 228 sponge gourd genotypes. The threshold concentration was achieved using the salt injury index (SII) by analysing the effects of NaCl-induced salinity on eight key morpho-physiological traits. The genotypes of sponge gourd were exposed to six NaCl salt concentrations, 25, 50, 75, 100, 125 and 150 mM/L, along with a control treatment. Germination percentage (GP), shoot length (SHL), root length (RL), seedling length (SL), seedling fresh weight (FW), seedling dry weight (DW), and vigour indices I and II (VI-I and VI-II) were recorded up to the 14th day. Salt injury index (SII) was calculated based on morph-physiological traits, revealing that a single concentration of NaCl was not reliable for 50% reduction. Therefore, multiple regression analysis of the salt injury index (SII) conducted and the values were 139 mM/L for GP, 96 mM/L for RL, 90 mM/L for SHL, 92 mM/L for SL, 97 for FW, 133 mM/L for DW and 118 and 133 mM/L for VI-I and VI-II, respectively were able to cause 50% reduction (mean 105.68 mM/L), hence NaCl concentration of 125 mM/L was identified as optimal concentration of NaCl to evaluate salt tolerance, offering standardized *in-vitro* screening protocol in sponge gourd genotypes for salt tolerance breeding program.

Keywords: Salinity stress, NaCl salt tolerance, Salt tolerance index, Sponge gourd and multiple regression analysis.

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Introduction

Soil salinity is the most critical environmental challenges in modern agriculture for vegetable production (Singh et al., 2021). Globally, salinity causes an estimated annual loss of around USD 12 billion in agricultural production (Hossain, 2019). Approximately 10% of the world's land area (950 mha), 20% of cultivated land (300 mha), and nearly half of irrigated land (230 mha) are affected by high salinity (Abiala et al., 2018). Salinity causes substantial yield losses in major crops during both vegetative and reproductive stages. Yield losses can be severe; for instance, cabbage (*Brassica oleracea* var. *capitata*) shows up to 62% yield reduction at 8 dS m^{-1}, and similar declines are reported in tomato and broccoli (Parvin et al., 2015a; Parvin & Haque, 2017).

Seed germination and seedling establishment are highly sensitive to salinity stress, which reduces soil osmotic potential, restricts water uptake, delays germination, and impairs seedling growth (Munns, 2002; Munns et al., 2020). Excess Na^+ and Cl^- ions disrupt metabolic processes, reduce α-amylase activity, and limit energy availability for embryo development (EL Sabagh et al., 2021). Salinity also induces oxidative stress through reactive oxygen species, causing cellular damage and reducing seedling vigor (Hasanuzzaman et al., 2021). Since genotypic variation exists in salinity tolerance, screening germplasm for germination and early seedling performance is essential for identifying salt-tolerant genotypes adapted to saline environments.

Sponge gourd (*Luffa cylindrica* L. Roem.), a member of the Cucurbitaceae family, is an important vegetable crop widely cultivated in tropical and subtropical regions. It is valued for its tender edible fruits as well as its mature fibrous fruits, which are used as natural sponges (Annigeri et al., 2024). The potential of *L. cylindrica* as a salt-tolerant species has been documented in several studies (Li et al., 2014; Liu et al., 2016; Guo et al., 2023), highlighting its value as a promising rootstock for cucurbit crop improvement. However, the criteria for evaluating salinity tolerance and the underlying physiological mechanisms governing stress adaptation remain insufficiently understood. Since germination and early seedling establishment are the most sensitive stages of plant development, assessing salinity tolerance during these phases is essential. Evaluation based on key morpho-physiological parameters such as germination percentage, germination index, mean germination time, seedling vigor index, root length, shoot length, seedling fresh and dry weight, relative water content, chlorophyll content, and membrane stability can provide valuable insights into the tolerance mechanisms operating under salt stress conditions. Chartzoulakis & Klapaki (2000) demonstrated that salinity disrupts early seedling establishment by reducing water availability, leading to poor germination rates and weak seedlings. As plants mature, Na^+ and Cl^- accumulation inhibits photosynthesis, reduces shoot biomass, and impairs fruit set, significantly reducing yield (Kaya et al., 2006). Screening for salinity at the field level has proven difficult due to practical limitations imposed by soil heterogeneity and environmental factors. Therefore, laboratory (*in-vitro)* screening during germination and early stages is time-efficient and reliable over field screening (Ali et al., 2014). Therefore, an experiment was conducted to evaluate an optimum salt concentration for assessing salinity tolerance. Reliable and useful criteria for screening *L. cylindrica* species genotypes are provided by evaluating germination behavior and seedling growth under varying salt concentrations. In addition to supporting breeding efforts targeted at enhancing salinity tolerance, early detection of tolerant germplasm helps to guarantee steady production in salt-affected areas.

Material and Methods

Experimental materials

Seeds of 228 diverse germplasm of sponge gourd were used in the present investigation (S1). Out of these, initially only 10 genotypes were studied for dose optimization for salt stress tolerance. Experiments were conducted during the 2024–2025 in the Seed Science and Technology Laboratory at ICAR-Indian Institute of Vegetable Research, Varanasi, following a completely randomized design (CRD) to ensure unbiased treatment allocation. Before the experiment, seeds were surface-sterilized using a 0.5% sodium hypochlorite (NaOCl) solution for 2 minutes to minimize microbial contamination. Seed viability was evaluated using the standard germination test protocol to confirm uniformity and quality before initiating experimental treatments.

Salt stress treatments and germination assay

Salt stress was imposed using six Sodium chloride concentrations (25, 50, 75, 100,125 and 150 mM), with double distilled water serving as the control (Table 1). For each *L. cylindrica* genotype,10 uniform and healthy seeds were placed in 15 cm petri dishes with double layers of filter paper, pre-moistened with 15 mL of the corresponding NaCl solution. Each treatment was replicated three times to ensure statistical reliability. The petri dishes were incubated in a germination chamber maintained at 25 ± 2°C and 70% relative humidity. Seed germination was assessed by monitoring radicle emergence, defined as radicles reaching or exceeding 2 mm in length. Germination percentage was calculated after 14 days based on the number of normal seedlings, following the International Seed Testing Association (ISTA) guidelines (ISTA, 2025).

Seedling growth measurements

Five seedlings per replicate were randomly selected for the measurement of shoot length, root length and fresh weight. Dry weight was determined after drying the seedlings in a hot air oven at 70°C for 48 hours. These data were used to compute seedling vigor indices *(Abdul-Baki & Anderson, 1973).*

Establishment of appropriate concentration of salt concentration

To determine the optimal salt concentration for assessing salt tolerance, the salt injury index (SII) was calculated in conjunction with the salt tolerance index (STI) for each measured trait. The STI represents the ratio of the trait value under saline conditions to that under control conditions. In

Table 1: Salinity levels and corresponding NaCl concentrations

S.N.	*Salinity level*	*Concentration of sodium chloride (mM)*	*ppm*	*dSm^{-1}*
1	S0	0	0	0
2	S1	25	1461	2.2825
3	S2	50	2922	4.565
4	S3	75	4383	6.8475
5	S4	100	5844	9.13
6	S5	125	7305	11.4125
7	S6	150	8766	13.695

ppm = mM × molecular weight (g/mol)

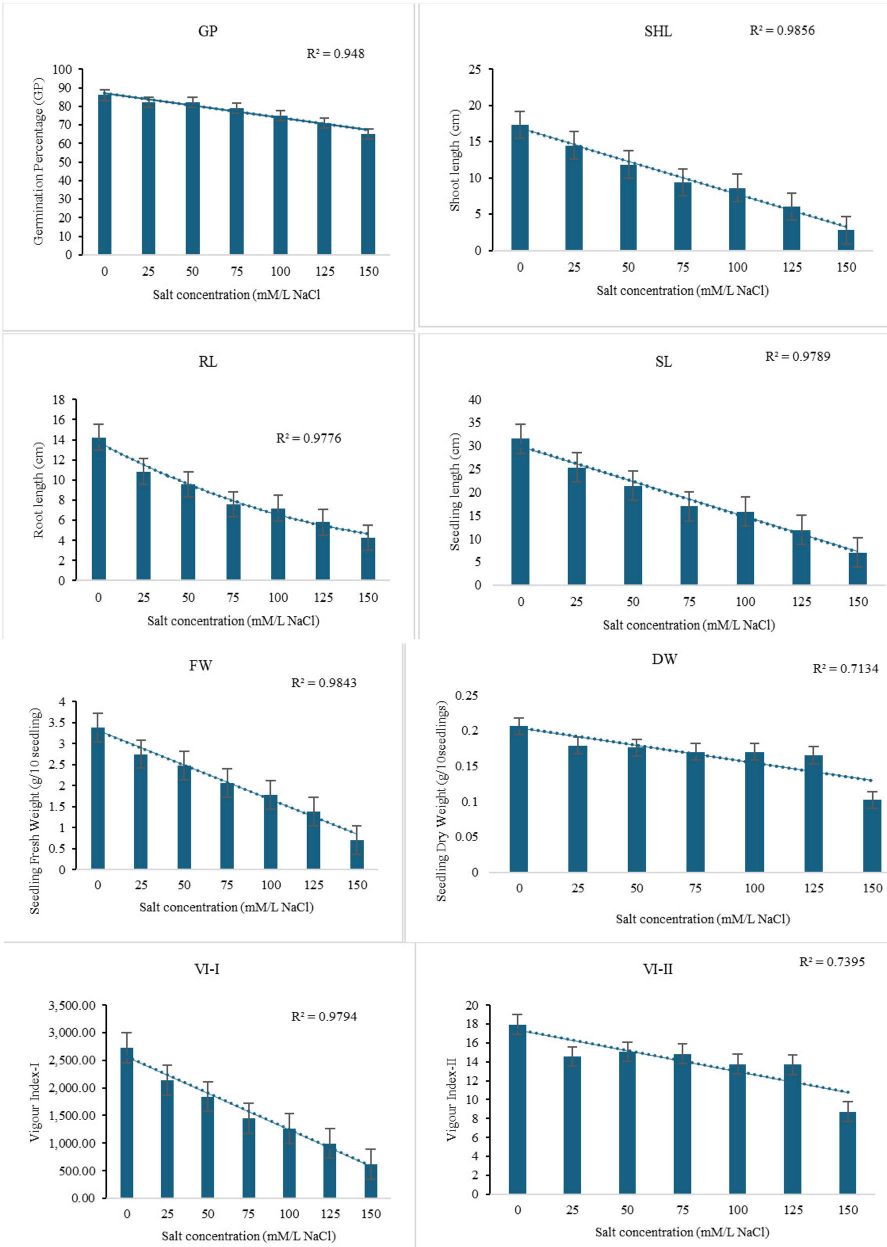

Figure 1: Mean performance of sponge gourd genotypes for eight morpho-physiological traits at different NaCl concentrations (mM/L)

contrast, the SII indicates the degree of damage caused by salt stress, with values approaching 1 reflecting more severe injury (Wu et al., 2019; Agrawal et al., 2024). The STI and SII for each trait were calculated using the following formulas

Where; STI=Salt tolerance Index, SII = Salt injury index

The salt concentration at which the SII reached 50% of the control was identified as the threshold for optimal salt stress, beyond which significant injury to the seedlings occurred.

Statistical analysis

Data were analyzed using SPSS software (version 16.0). Linear regression analysis was performed based on the SII values of different traits to optimize the salinity concentration (IBM Corp., 2007), to determine salt tolerance and analyze the association between salinity levels and seedling performance.

Results

Effect of different concentration of NaCl solution on germination and seedling growth

To determine an appropriate screening concentration for salinity tolerance, ten sponge gourd genotypes were evaluated under 7 NaCl levels (0–150 mM). Germination and seedling growth traits, including germination percentage, root length, shoot length, seedling length, fresh and dry

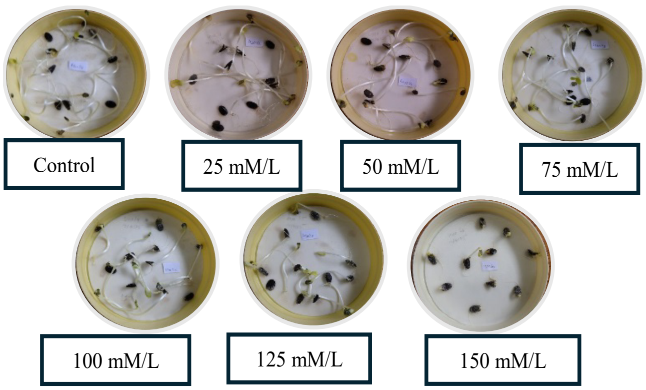

Figure 2: Visual representation of impact of NaCl-induced salinity on morpho-physiological traits in sponge gourd genotypes at different concentrations.

weight, and vigour indices (VI-I and VI-II), were recorded 14 days after sowing. Mean responses across genotypes revealed a progressive, concentration-dependent decline in all measured parameters with increasing salinity (Figure 1). The results clearly demonstrate the adverse effects of salt stress on germination and early seedling development and provide a basis for identifying suitable salinity levels for screening tolerant genotypes (Figure 2).

Germination response

Germination percentage (GP) declined progressively with increasing NaCl concentration. Under non-saline control conditions (0 mM/L), seeds exhibited maximum germination (86%), indicating high seed viability and optimal environmental conditions. However, exposure to slightly higher concentrations (25 mM/L and 50 mM/L) resulted in a reduction of germination (82%), representing an approximate 4.0% decrease relative to the control. However, at 75 mM/L NaCl, germination declined further to 79%, followed by 75% at 100 mM/L and 61% at 125 mM/L. The most pronounced inhibition was observed at 150 mM/L NaCl, where germination decreased sharply to 65%, representing a significant reduction over the control. This marked decline at higher salinity indicates that severe osmotic and ionic stress substantially impaired the germination process.

Seedling growth

The inhibitory effects of salinity were more severe during the vegetative growth stage and were not observed at the germination stage. The root length (RL) was strongly affected by increasing NaCl concentration, showing a consistent decline across treatments. Under non-saline conditions (0 mM NaCl), the average root length was 14.24 cm. Gradual reduction was observed at higher NaCl concentrations: 25, 50, 75, 100 and 125 mM/L, which were 23.9, 32.9, 46.6, 49.4 and 59.2%, respectively. However, at 150 mM NaCl, root length reached a minimum of 4.28 cm, representing a nearly 70% reduction relative to the control. Similarly, shoot length (SHL) was also affected by the salinity stress imposed by NaCl solutions in different concentrations. In non-saline conditions, in seedlings, the average shoot length was 17.31 cm, which showed a reduction of 16.2, 31.5, and 45.9% at 25, 50, and 75 mM/L NaCl concentrations, respectively. Moderate reduction in shoot length was observed at 100 mM/L NaCl concentration (8.61 cm) with 50.3% reduction percentage, which further reduced to 6.07 cm (64.9% reduction) at 125 mM/L NaCl concentration and declined dramatically to at 125 mM and 2.78 cm (83.9%) at 150 mM/L NaCl concentration. In response to salt stress on root and shoot length, a combined detrimental effect was shown in seedling length (SL). Total seedling length, hence, showed a reduction of 19.7, 32.2, 46.3, 49.9, 62.4, and 77.6% at 25, 50, 75, 100, 125 and 150 mM/L NaCl concentrations, respectively, compared to non-saline conditions (31.55 cm).

Seedling biomass

Biomass accumulation during the early growth stage is crucial for plant establishment and productivity. Fresh and dry weights at the seedling stage are important indicators of tolerance under stress conditions. Fresh biomass accumulation decreased steadily with increasing salinity, as reductions in fresh weight (FW) were 18.9, 26.9, 39.5, and 47.5% at 25, 50, and 75 mM/L NaCl concentrations, respectively. Fresh weight decreased to 1.36 g/10 seedlings at 125 mM/L NaCl concentration, showing a reduction of 59.9%, which further decreased to 0.70 g/10 seedlings at 150 mM/L NaCl concentration with a drastic reduction of 80.5% in comparison to the fresh weight of seedlings under

Table 2: Salt injury index (SII) of eight morpho-physiological traits in sponge gourd genotypes at gradient NaCl concentrations.

NaCl concentration (mM/L)	SII_{GP}	SII_{RL}	SII_{SHL}	SII_{SL}	SII_{FW}	SII_{DW}	$SII_{VI\text{-}I}$	$SII_{VI\text{-}II}$	SII_{Mean}
25	0.155	0.239	0.162	0.197	0.189	0.132	0.234	0.173	0.185
50	0.155	0.329	0.315	0.322	0.269	0.147	0.353	0.187	0.260
75	0.186	0.467	0.459	0.463	0.394	0.174	0.506	0.241	0.361
100	0.227	0.494	0.503	0.499	0.475	0.178	0.563	0.283	0.403
125	0.371	0.592	0.649	0.624	0.598	0.199	0.689	0.339	0.508
150	0.505	0.700	0.840	0.776	0.806	0.505	0.831	0.608	0.696
Mean	0.266	0.470	0.488	0.480	0.455	0.223	0.530	0.305	0.402

non-saline conditions (3.39 g/10 seedlings). Dry weight (DW) showed a less dramatic decline at lower salinity but was significantly affected at higher concentrations. The maximum dry weight of 0.206 g in control seedlings decreased to 0.179 g (13.2% reduction) at 25 mM/L NaCl concentration and showed further reductions of 14.6, 17.5, 18.0, and 19.9% observed at 50, 75, 100, and 125 mM/L NaCl concentrations, respectively. However, a sharp decline was observed at 150 mM NaCl, where it dropped to 0.103 g (50.0%), indicating severe limitation of structural biomass accumulation under extreme salinity.

Seedling vigour

The combined effects of salinity stress can be evaluated by assessing seedling vigour at the early stage of plant development. Early vigour varies among genotypes and plays a key role in plant establishment, growth, and development. Vigour indices, *viz.* Vigour Index-I (VI-I), integrating germination percentage (GP) and seedling length (SL), declined progressively with increasing salinity. In VI-I, a progressive reduction of 21.56, 32.53, 47.05, 63.44, 68.9, and 77.5% was observed at 25, 50, 75, 100, 125, and 150 mM/L NaCl concentrations, respectively. Similarly, Vigour Index-II (VI-II), which combines GP and DW, decreased progressively and showed reductions of 18.81, 16.01, 17.27, 23.45, 23.74 and 51.36% at respective concentrations. However, variability in the extent of inhibition across traits and genotypes on average were 12.01% (GP), 22.16% (DW), 25.11% (VI-II), 45.13% (FW), 47.02% (RL), 47.99% (SL), 48.81% (SHL) and 49.37% (VI-I), indicated that relying solely on these averages might overgeneralize the optimal concentration, requiring a more precise and consistent approach.

Establishment of optimum concentration of salt stress using salt injury index (SII)

To address the limitations associated with interpreting raw percentage reductions and to establish a reliable screening concentration, the salt injury index (SII) was calculated for eight morpho-physiological parameters to quantify the extent of salt-induced damage relative to the non-saline control (Table 2). The salt injury Index provides a standardized measure for evaluating the effect of salinity stress on germination and seedling growth by expressing the relative reduction in different morphological and physiological traits. It is the threshold at which 50% plant population began to show reduction in germination and seedling growth parameters from salinity stress. In our study, the concentration at which SII is 0.50 is assumed as optimal concentration of NaCl salt concentration and will be utilized as a salinity tolerance characterization in sponge gourd genotypes.

Based on the earlier recorded parameters *viz.* GP, RL, SHL, FW, DW, SDL, and VI-I and VI-II, the SII was calculated across a range of NaCl concentrations (Table 2). The SII increased progressively with rising NaCl concentrations, indicating a gradual intensification of salinity-induced damage to germination and seedling growth traits. At 25 and 50 mM NaCl, SII values remained low across all parameters, suggesting minimal to mild stress effects (mean SII 0.18 and 0.26 at 25 and 50 mM/L, respectively). A noticeable increase in SII was observed at 75 mM NaCl, particularly for root length, shoot length, seedling length, and vigour indices, indicating the onset of significant growth inhibition (mean SII 0.36). At 100 mM NaCl, several traits, including shoot length, seedling length, and vigour index-I, increased progressively (mean SII 0.40). At 125 mM/L NaCl, several traits, including shoot length, seedling length, and vigour index-I, increased and reached the threshold level of 0.5 (mean SII), suggesting that approximately 50% of the potential growth reduction had occurred. At 150 mM NaCl, resulted in substantially higher SII values (mean SII 0.69), reflecting severe impairment of seedling growth, biomass accumulation, and vigour.

The 50% reduction level for each parameter was estimated using the salt injury index (SII = 0.5) by comparing values across NaCl treatments and applying linear regression analysis for each trait (Figure 3). Root length (RL) reached the 0.50 measure of SII at approximately 96.0 mM/L NaCl solution. Similarly, for SL and SDL, the SII of 0.50 was recorded at 90.0 mM/L NaCl solution. Further, for FW, VI-I, VI-II and GP, the SII of 0.50 was recorded at salt concentrations of 96.5, 81.0, 118.0 and 139.0 mM/L, respectively. The 0.50 average SII of all the studied germination and seedling traits was recorded at 105.68 mM/L. Therefore, 125 mM/L NaCl solution treatment may be considered as optimum salt stress concentration.

Discussion

Salinity poses a major threat to global agriculture by adversely affecting crop growth and productivity. Vegetable crops, particularly sponge gourd (*L. cylindrica* L.), are vulnerable to salinity stress. Harnessing genotypic variation for salt tolerance is therefore a crucial and cost-effective approach for identifying tolerant genotypes that can be utilized in breeding programs within a relatively short period. The categorization of genotypes for salt tolerance requires a standardized screening method with an optimal concentration of NaCl that induces significant damage to seeds and seedlings. Such a protocol can be effectively employed for high-throughput *in-vitro* screening of a large number of genotypes under controlled environmental conditions. This study aimed to assess the salt tolerance of 228 genotypes of sponge gourd under varying NaCl concentrations during the germination and seedling stages. The results provide a comprehensive evaluation of the impact of increasing salinity on important morpho-physiological traits, including germination percentage, shoot length, root length, seedling length, dry weight, and vigour indices. The study elucidates the adverse effects of

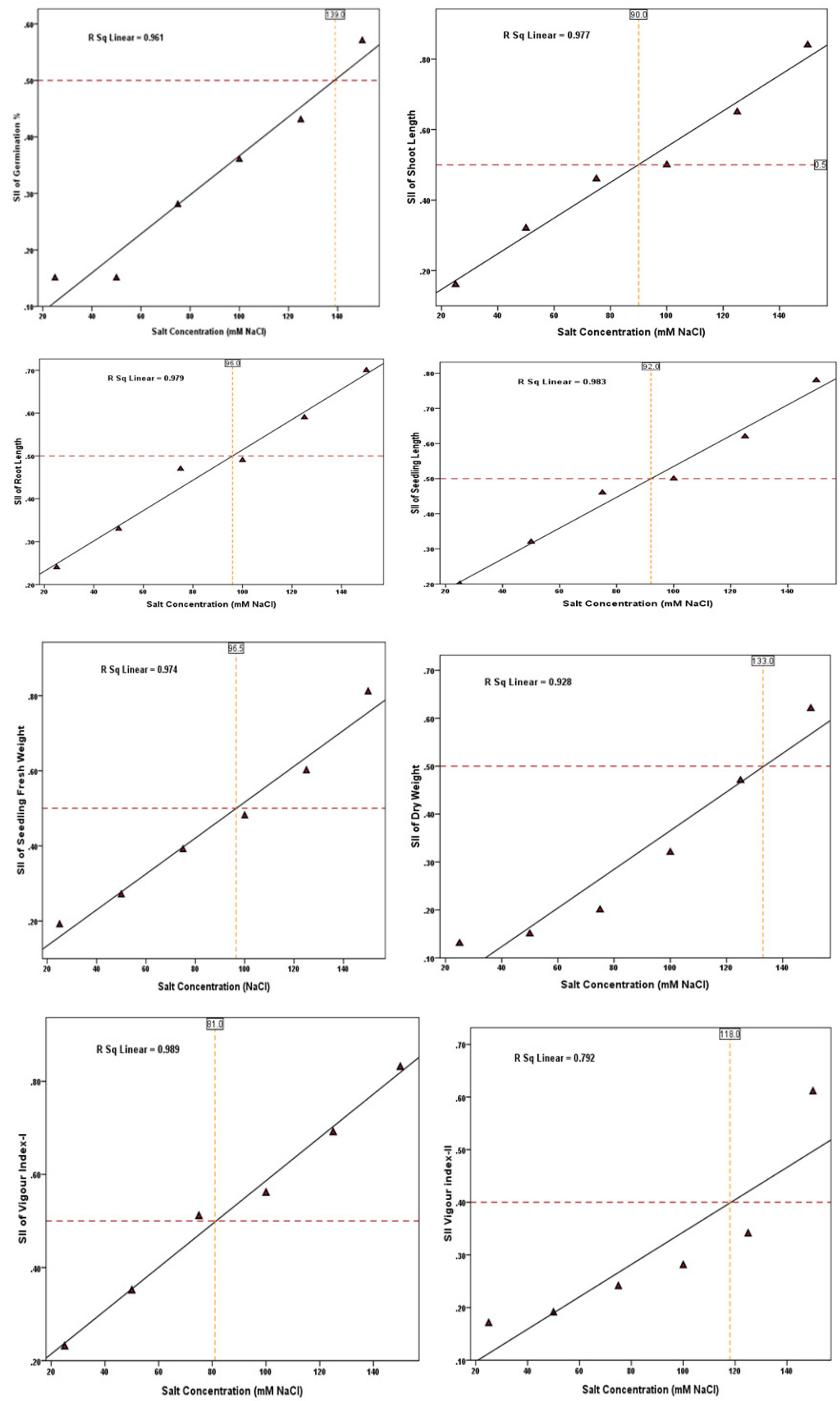

Figure 3: Identification of the optimal NaCl concentration for screening salt tolerance in sponge gourd genotypes, defined by a 50% reduction in the salt injury index (SII) from control conditions. The figure shows linear regression relationships between SII values and NaCl concentrations for each parameter

salinity on sponge gourd growth and identifies the optimal NaCl concentration for screening salt tolerance, along with the critical threshold of salinity-induced damage based on the salt injury index (SII).

Impact of salt stress on seed germination and seedling growth

Sponge gourd seedlings showed a progressive decline in germination, growth, biomass, and vigour with increasing NaCl concentrations. Seed germination is a complex developmental process regulated by internal and external factors. Salinity stress significantly impairs germination, seedling establishment, and subsequent plant growth by lowering soil osmotic potential, thereby restricting water uptake during imbibition (Munns et al., 2020). Under control conditions, seed germination was achieved up to 86%, which was reduced slightly when exposed to 25 to 50 mM/L NaCl concentration, declined to 71% at 125 mM/L and reduced to 65% at 150 mM/L NaCl. Reduced α-amylase activity under salinity limits sugar mobilization essential for embryo development (Uçarlı, 2020). Moreover, excessive accumulation of Na^+ and Cl^- ions adversely affect embryo viability even after germination (El Sabagh et al., 2021).

Similarly, seedlings grew optimally, with high root and shoot lengths (14.24–17.31 cm), seedling length (31.55 cm), fresh and dry weights (3.39 and 0.206 g) under non-saline conditions. At 75–100 mM/L NaCl, growth inhibition became more pronounced: roots and shoots shortened further (7.20–7.60 cm and 8.61–9.36 cm), seedling length dropped to 15.81–16.96 cm, and fresh and dry weights declined, reflecting moderate-to-severe stress. Further, high salinity (125–150 mM/L NaCl) severely restricted seedling growth. Root and shoot lengths fell to 4.28–5.81 cm and 2.78–6.07 cm, seedling length to 7.05–11.88 cm, and fresh and dry weights were markedly reduced, demonstrating extreme sensitivity. Salinity affects plants through osmotic stress, ion toxicity, and nutrient imbalance. Excess Na^+ and Cl^- accumulation causes reduced shoot length and stunted shoot and root growth (Behra et al., 2022 and Guo et al., 2023).

The dry weight (DW) of seedlings also progressively decreased as salinity levels increased, reflecting the negative impact of salt stress on metabolic processes involved in biomass accumulation. High Na^+ also competes with and reduces uptake of essential ions such as K^+, Ca^{2+} and Mg^{2+} (Munns et al., 2020), causing significant disruption of ion homeostasis, photosynthesis, biomass accumulation, and source–sink relationships (Khataar et al., 2018). Vigour indices, which provide a composite measure of seedling growth and health, also showed a significant decline with increasing NaCl concentrations. Under non-saline conditions, the highest vigour indices (V-I = 2732.74, V-II = 17.93) were achieved, which were reduced and severely impacted at a higher concentration of 150 mM/L NaCl, which were 612.6 and 8.7 for V-I and V-II, respectively. These declines highlight the overall negative impact of salinity on sponge gourd growth, indicating that high NaCl concentrations severely hinder seedling establishment and early development (Namisy et al. 2025). These results highlight that sponge gourd seedlings are moderately susceptible to salinity, as lower concentrations had not shown severe reduction in morpho-physiological parameters, especially germination percentage (GP); moderate concentration levels affected early growth, while higher concentrations caused severe stunting and loss of vigour.

Salt injury index and its role in screening salt tolerance

The salt injury index (SII) was employed to determine the optimal NaCl concentration for screening salt tolerance. As a quantitative measure of salt-induced damage across multiple growth parameters, SII provides a comprehensive assessment of salinity stress (Wu et al., 2019; Agrawal et al., 2024). In this study, SII was calculated for each trait, and regression analysis identified the NaCl concentration corresponding to SII = 0.5, which ranged from 81 to 139 mM/L NaCl, with a mean value of 105.68 mM/l NaCl. Therefore, the salt concentration of 125 mM/L NaCl was selected for optimum, which was closely aligned to key morpho-physiological traits *viz.* vigour index-II (118 mM/L) and dry weight (133 mM/L), causing optimal damage and avoiding both the extremes (139 mM/L) or minimal (81 mM/L) damage. The salt injury index (SII) is particularly advantageous as it integrates multiple physiological attributes, thereby enabling a more robust and comprehensive evaluation of salinity stress compared to individual traits. Determination of the NaCl concentration corresponding to an SII value of 0.5 facilitates the precise identification of the salinity threshold that induces substantial growth inhibition, thus optimizing the screening protocol for salt tolerance. This integrative approach is instrumental in the efficient selection of genotypes with superior performance under saline environments, especially in regions where soil salinity severely constrains agricultural productivity. Comparable investigations on the impact of soil salinity have also been reported in brinjal (Talwar et al., 2023), *Brassica* (Agrawal et al., 2024) and cowpea and chilli (Rai et al., 2025).

Conclusion

The present study demonstrated that increasing NaCl concentrations progressively reduced germination percentage, root length, shoot length, seedling length, fresh weight, dry weight, and vigour indices. Among the treatments, 125 mM/L NaCl produced approximately a 50% reduction in several key parameters, including fresh weight, vigour index, seedling growth, and germination compared to the control. This concentration therefore represents a critical threshold level of salinity stress for sponge gourd seedlings. At this level, growth inhibition becomes clearly visible, making it an effective concentration for distinguishing between tolerant and sensitive genotypes. Hence, 125 mM/L NaCl can be considered an appropriate and reliable concentration for in-vitro screening of sponge gourd genotypes for salt tolerance.

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

Funding Declaration

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सारांश

नवांकुरित अवस्था पर अधिक संख्या में जीनोटाइप्स की लवणीयता सहनशीलता की स्क्रीनिंग एक किफायती एवं समय बचाने वाली विधि है। प्रस्तुत अध्ययन में 228 स्पंज लौकी जीनोटाइप्स में लवणीयता सहनशीलता के मूल्यांकन हेतु NaCl की उपयुक्त थ्रेशहोल्ड सांद्रता निर्धारित की गई। इसके लिए सॉल्ट इंजरी इंडेक्स (SII) का उपयोग करते हुए NaCl प्रेरित लवणीयता के आठ प्रमुख मॉर्फो-फिजियोलॉजिकल लक्षणों पर प्रभाव का विश्लेषण किया गया। जीनोटाइप्स को NaCl की छह सांद्रताओं (25, 50, 75, 100, 125 एवं 150 mM/L) तथा एक नियंत्रण में उगाया गया। अंकुरण प्रतिशत, तना एवं जड़ लंबाई, बीजling लंबाई, ताजा एवं शुष्क भार तथा विगर इंडेक्स-I एवं II को 14वें दिन तक दर्ज किया गया। परिणामों से स्पष्ट हुआ कि एकल NaCl सांद्रता द्वारा 50% क्षति का विश्वसनीय आकलन संभव नहीं है। अतः SII का बहु-प्रतिगमन विश्लेषण किया गया, जिसमें 50% कमी हेतु आवश्यक सांद्रता 90 से 139 mM/L (औसत 105.68 mM/L) के बीच पाई गई। इस आधार पर 125 mM/L NaCl को लवणीयता सहनशीलता के मूल्यांकन हेतु उपयुक्त सांद्रता निर्धारित किया गया। यह अध्ययन स्पंज लौकी में लवणीयता सहनशीलता की पहचान के लिए एक मानकीकृत कृत्रिम परिवेशीय स्क्रीनिंग प्रोटोकॉल प्रदान करता है, जो प्रजनन कार्यक्रमों में उपयोगी सिद्ध होगा।