

Investigating the Effects of Salinity Stress on the Vegetative Growth of *Salicornia Brachiata*

Senarathna, K. D. M. H.¹, Sandamali, B. N.¹, Perera, D.^{1*}

¹Department of Bioprocess Technology, Faculty of Technology, Rajarata University of Sri Lanka.

*dperera@tec.rjt.ac.lk

Salicornia brachiata, a resilient halophyte, thrives in saline environments with diverse applications. A research gap exists in understanding how different salinity levels impact the vegetative growth of *S. brachiata*. This study aims to investigate key parameters such as shoot and root growth, chlorophyll content, and salt accumulation, addressing this knowledge gap. *S. brachiata* seedlings underwent varied salinity treatments (0, 150, 250, 350, and 500 mM NaCl) in hydroponics with three replicates. Analysis using SAS® OnDemand for Academics and one-way ANOVA revealed non-significant differences ($p > 0.05$) in final shoot height (12.75 cm) observed in the control (0 mM NaCl), while final root length significantly differed ($p < 0.001$), with the highest mean (16.13 cm) recorded at 500 mM NaCl. Shoot dry weight decreased at 500 mM NaCl (0.35 g) compared to the control (0.42 g). Additionally, root dry weight was significantly higher in the control (0.21 g) than at 350 and 500 mM NaCl (0.13 and 0.12 g, respectively; $p = 0.0005$). The stable chlorophyll content across salinity levels ($p > 0.15$) indicates *S. brachiata*'s adeptness in adapting to salt stress. Notably, NaCl content significantly increased with salinity, showcasing efficient accumulation (reaching up to 35.35% at 500 mM NaCl; $p < 0.0001$). *S. brachiata* shows strong tolerance to salinity, with resilient root growth even at higher levels. The ideal salinity for improved shoot and root growth is approximately 250 mM NaCl, suggesting applications for sustainable agriculture in marginal environments, showcasing the plant's adaptability.

Keywords: Chlorophyll; Halophyte; NaCl tolerance; Plant growth; Salinity stress