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## Screening of *Eucalyptus camaldulensis* clones for enhancing productivity and sustainability in problematic soils of Southern India

Mathew, R. <sup>1</sup>; Saxena, M. <sup>1</sup>; Gurumurthy, D. S. <sup>1</sup>

<sup>1</sup> ITC Lifesciences and Technology Centre, Bengaluru, India

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Correspondence

Roby Mathew,  
roby.mathew@itc.in

Among the various challenges faced by eucalyptus plantations in the Indian pulp industry, one of them is the development of resilient clones adaptable to saline soils. Large genetic diversity exists in *E. camaldulensis* because of high out-crossing rates and is expected to pass traits into the new developed clones. We used a salt injury score, survival percentage and proline content as a screening criterion to select new clones tolerant to high salt levels in soils. Proline has been identified as a beneficial solute in plants under stress caused by high salinity. Three months old clones of eleven new eucalyptus genotypes were transplanted in pots with free-draining coarse river sand. Four treatments comprising control, high Salt, High Salt + High pH and High pH were arranged in a randomised block design. Common salt (NaCl) was used for regulating salt concentrations while sodium bicarbonate (NaHCO<sub>3</sub>) was used for regulating the pH of the solutions. NaCl concentrations were increased every third day until the final concentration of 150 mM was reached. Similarly, pH of the solutions was also gradually increased till final pH of 10 was attained. Each treatment solution was delivered through automated drip delivery. Salt injury scores based on symptoms were positively correlated (0.812) with survival percentage and proline content. Eucalyptus genotypes were classified into five salt tolerant groups: tolerant (T), moderately tolerant (MT), moderately sensitive (MS), sensitive (S), and highly sensitive (HS). The mean values of proline content in leaves were different among the five groups, indicating that the proline content is a reliable marker for identifying salt tolerance. Proline contents in stressed seedlings were significantly different between the tolerant and highly sensitive groups, but the difference among the intermediate groups (MT, MS and S) was not significant. As the stress levels of salt and pH were increased, the sensitive hybrid clone tested showed very poor growth, which was also negatively correlated with the proline content in its leaves. Combination of high salt and high pH was also found to be correlated with reduced proline content, poor growth and survival among sensitive genotypes. In addition to the commonly used sodium and pH induced symptoms, proline content is suggested to be another useful criterion to differentiate salt-tolerant from salt-sensitive genotypes. This study helped in classification of genotypes with different levels of salt and pH tolerance, which may be used for deployment of genotypes according to changing edaphic conditions for sustainability of eucalyptus plantations.

**Keywords:** proline, salinity, salt tolerance, growth, stress score

