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Genotype-environment interaction in wood basic density of *Eucalyptus camaldulensis* and its four inter-specific hybrid clones

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Eucalyptus species are native to Australia but grown extensively worldwide as hardwoods for a variety of products. The productivity of *Eucalyptus* plantations in India has increased dramatically in the last few decades, from 5-10 m^3|ha|year in the 1990s to current levels of 20-25 m^3|ha|year. This was possible through the rapid development of clonal forestry, which led to the adoption of full-scale clonal programs in the 1990s. The clonal forests have been fundamental in sites with larger water and nutrient restrictions. *Eucalyptus camaldulensis* is widely planted in the tropics under intensive short-rotation management. To meet the growing raw material demands of the pulp and paper industry, there is continuous pressure to reduce the harvesting age from the currently accepted age of 8-9 years. However, these plantations are low in productivity (<10 m^3 ha-1 year1) compared with *Eucalyptus* plantations in other countries (>30 m^3 | year). To increase the productivity of *Eucalyptus* plantation inter-specific hybrids of *E. camaldulensis* were planted by TSFDC (Telangana State Forest Corporation Ltd.). In the present study, we aimed to identify the wood technology traits that could be used as the criteria for direct and indirect selection of eucalyptus genotypes with a high density of wood and for growth traits at half rotation age of 3.5 years. Four inter-specific hybrid *Eucalyptus* clones were evaluated against their parent *E. camaldulensis* in a completely randomized design with five replications spread in five geographical locations. Within-clone variation in basic density was low. Variance analysis showed significant differences in basic density and growth traits between clones and sites, and that the clone × site interaction was also significant. Regression analysis was used to examine the stability of clones over environments. Identifying clones that produced wood of consistently high or low basic density was possible on the five test sites. Selection for growth should be regionally based to maximize selection gain whereas clonal rankings for density will change little across regions.

Keywords: Eucalyptus, clone, wood density, inter-specific hybrids, genotype

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