



Clonal Variation in Gas Exchange Traits Linked to Water Use Efficiency in Eucalyptus

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Abstract: Eucalyptus is the most widely planted species around the tropics for its potential as a raw material for pulp and paper, plywood and other wood related products. With declining rate of fresh water resources around the globe and rising demand for wood and wood-related products from the industries, there is an increased need to develop genotypes or clones with higher water use efficiency (WUE) leading to enhanced biomass accumulation per unit amount of water transpired. Eucalyptus proves to be a sustainable species which could meet out the wants and needs of industrial sector in a short interval. Although Eucalyptus is known for its multifarious utility, there is a huge concern over its water use efficiency and the associated genetic resources. Against this background, fifteen superior eucalyptus clones were used to study the genetic variation in gas exchange and physiological traits linked to water use efficiency including intrinsic WUE, instantaneous WUE and intrinsic carboxylation efficiency that provides a baseline information for the selection of clones suitable for arid and semi-arid regions. Significant variation was observed for physiological traits among the fifteen clones wherein, the clone EU UG 10 was found to be superior with enhanced net photosynthetic rate (A_n) coupled with WUE, followed by the clone ET 46. Besides, it also showed higher instantaneous WUE over the other clones. Thus, identified clones will be suited for water limited condition by producing higher biomass per unit amount of water transpired. This study also demonstrated the variability among the clones for physiological traits associated with gas exchange parameters which forms basis for further advancement in the tree improvement program.

Keywords: Eucalyptus, Clonal variations, Gas exchange parameters, Water use efficiency
