

Effect of Drought Stress on Gas Exchange Variability in Eight Clones of *Eucalyptus*

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Abstract—Plants are often subjected to adverse environmental variations resulting in stressed conditions which have a detrimental effect on their growth and survival. The response of plants to these adverse conditions can often become a key factor in the selection of species for a particular location. Effects of drought stress on physiological parameters like CO₂ assimilation rate and water use efficiency along with cell growth parameters can help us in identifying desirable plants/clones suitable for arid/semi-arid regions. The intensity and duration of stress play a major role in determining a plant's response i.e. whether acclimation and adaptation to the stress are possible or not. In this study, eight commercial clones of *Eucalyptus* were subjected to water deficient conditions and their physiological responses were studied in early stages of stress induction. Drought stress induced a significant decrease in gas exchange parameters and chlorophyll content when compared to well-irrigated plants (control). A strong correlation between photosynthesis rate and stomatal conductance showed stomatal limitations to photosynthesis were in operation in most of the clones. An increase in intrinsic water use efficiency was also observed in the clones marking an initial adaptation to drought stress. Chlorophyll a/b ratio did not show significant deviation in treated and control plants thereby proving the limited role of chlorophyll b in stress adaptation. The degree to which the photosynthetic machinery can recuperate dictates recovery of the carbon balance of stressed plants. Therefore the degree and duration of stress determine the ability of a plant to sustain its growth after alleviation of the stress. Gas exchange parameters along with adaptations of the plant w.r.t cell growth could become potential criteria for selection of drought-tolerant plants.