

ROOT-SHOOT HYDRAULIC CONDUCTANCES OF THREE *Eucalyptus* SPP. CLONES TO DIFFERENT WATERING REGIMES

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The fast growth of *Eucalyptus* spp. commercially used for wood and wood products in the forestry industry in South Africa. On the other hand, *Eucalyptus* plantings, which are believed to reduce the underground water supplies while, consume large quantities of water, perhaps the main factor limiting forestry expansion too. South African forestry industries are concern for improving silvicultural practices by selecting water use efficient *Eucalyptus* clones that would not only restrict water utilization, but to be optimum productive. Recently, three *Eucalyptus* spp. clones namely *Eucalyptus grandis* x *camaldulensis* (GC550), *Eucalyptus grandis* x *urophylla* (GU210) and a pure *Eucalyptus grandis* (TAG14) were introduced to study the responses to water availability. Three *Eucalyptus* clones of GC550, GU210 and TAG14, each with six replicates were randomized and grown for 21 months in 85 l pots. Water availability of high and low as per a rainfall simulation was assessed in terms of hydraulic architecture of root, shoot and whole plant hydraulic characteristics. Hydraulic conductance was measured on roots and shoots using the high-pressure flow meter (HPFM). HPFM measures maximum root-shoot conductances by transient and steady state methods. Root data were expressed per unit root dry mass ($K_{r/trdw}$) and per unit leaf areas ($K_{r/LA}$), shoot data expressed per unit shoot dry mass ($K_{S/tsdw}$) and per unit leaf area ($K_{S/LA}$), and whole plant conductance was expressed per unit leaf area ($K_{P/LA}$). $K_{r/LA}$ was higher in high watered plants than those receiving low water, and clonal differences were observed in $K_{r/trdw}$. There was no treatment effect in $K_{S/LA}$ and $K_{S/tsdw}$, but a clonal effect was apparent. $K_{P/LA}$ was significantly different between treatments, and was reduced by low water in two clones of GC550 and GU210, and increased by this in TAG14. Reduced water availability increased root resistances ($1/K_{r/LA}$), except in TAG14 where treatment had no effect. GU210 had the highest root resistances under both treatments. Reduced water availability reduced biomass production, with a greater effect on roots than shoots, such that low watering reduced root: shoot ratios.

Keywords: *Eucalyptus* spp. clones, water supply, high-pressure flow meter, root-shoot hydraulic conductances.