Effects of Water and Nutrient Treatment on Gas Exchange and Water Relations of Two *Casuarina equisetifolia* Clones

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Key words : *Casuarina equisetifolia* , nutrient treatment , water relations , gas exchange

Introduction The relative success of a plant , both in an evolutionary sense and in terms of biomass productivity , depends on its ability to sequester and efficiently utilize soil resources that often are scarce . Nitrogen (N) and water are considered to be the resources most often limiting survival , reproduction , or growth , although macro-or micro-nutrients , oxygen , physical space , or other soil factors also may be important in some circumstances . The ecophysiological responses of plants to fluctuations in available water and N , therefore , have been and will continue to be important subjects of research (Evans , 1989) .

Methods Two *Casuarina equisetifolia* clones (CH and TCR) were grown in the pots and the pots received two different nitrogen treatments and water treatments starting from July to December 2000 . Photosynthesis and WUE of the clones were measured seasonally and diurnally to determine different response of the clones .

Results and discussion Photosynthesis and stomatal conductance were well correlated in our study in both clones (Figure 1) ; r-values were in excess of 0. 5 . The slopes and intercepts of the two linear regressions were nearly identical . However , the data set for TCR contained more values in the upper range of photosynthesis (A) and stomatal conductance (g) . The results showed that physiological processes in foliage of the Casuarina clones respond differently to water stress . Genotypic and population level difference in photosynthetic rate and water relations have been reported within hardwood genera or species (Abrams and Knapp 1986 ; Furukawa et al ., 1990) . Based on the earlier reports and from the present study , it can be concluded that high intrinsic rates of photosynthetic rate , light control of stomatal water loss , high WUE , and osmotic adjustment to cellular desiccation are all very desirable for the growth of the tree species . The physiology of CH appears to be more susceptible to extreme drought than does that of TCR . These results could lead to the conclusion that TCR would be a better choice for high biomass production under non irrigated in grassland ecosystem condition than CH .

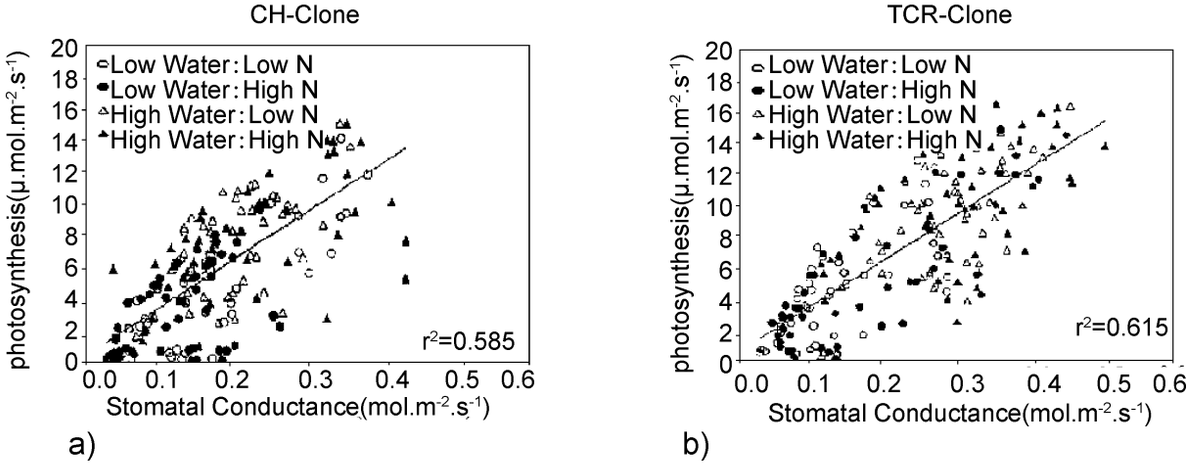

Figure 1 *Linear regression of photosynthesis (A) vs . stomatal conductance (g) for a) CH and b) TCR clones of* Casuarina equisetifolia *.Data from all treatment combination and from seasonal and diurnal measurements .*

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