Abstract

The germination and early growth of Australian rainforest cabinet timber species were examined. The species were chosen from shade sensitive early secondary to shade tolerant climax successional groups. The germination of 35 Queensland rainforest timber species and effectiveness of pre-germination treatments were studied. Five distinct patterns of germination are outlined and linked to fruiting season and geographic location. Twenty Queensland cabinet timber species seedlings were subsequently grown in three light regimes and two nutrient treatments. Growth and photosynthetic responses to light and nutrient treatments were examined. The quantity and quality of solar radiation were altered by the use of painted polyfilm in order to simulate natural rainforest light regimes. Growth responses were variable across treatments and between species. A factorial analysis of variance was conducted to evaluate the effects of light (high-80% full sunlight and R:FR 1.01, low-8% full sunlight and R:FR 0.63), nitrogen (control, added nitrogen) and successional status (early secondary, late secondary, climax). Under high light conditions the cabinet timber species significantly increased their total number of leaves, branching, rate of photosynthesis, transpiration and stomatal conductance. Under low light conditions a significant increase in internode length, single leaf area, leaf blade length, slenderness (height/diameter ratio) and relative crown depth was observed. The light treatments did not have a significant effect on stem elongation rate, relative stem elongation rate or total leaf area. The added nitrogen treatment produced a significant increase in stem elongation rate, relative stem elongation rate, internode length, single leaf area, total leaf area, leaf blade length and relative crown depth. Additional nitrogen did

not have a significant effect on slenderness (height/diameter ratio), branching, rate of photosynthesis and stomatal conductance. The combination of high light conditions and added nitrogen treatment significantly increased diameter increment rate, relative diameter increment rate and water use efficiency in the species being trialed. Low light conditions combined with added nitrogen significantly increased specific leaf area.

Early secondary species exhibited the greatest stem elongation rate, relative stem elongation rate, diameter increment rate and relative diameter increment rate compared to late secondary and climax species. Early secondary species had the lowest total number of leaves at the end of the experiment. Climax species had significantly lower stem elongation rate, relative stem elongation rate, diameter increment rate, relative diameter increment rate, leaf blade length and height/diameter ratio than secondary species. Under low light conditions, early secondary species exhibited the highest mean specific leaf area whilst climax species had the lowest specific leaf area.

The potential application of these findings to rainforest cabinet timber farm forestry is discussed.

Aspects of Seed Germination and Early Growth in Rainforest Cabinet Timber Species

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to

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List of Tables and Figures

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Declaration

I hereby declare that the main text in this thesis is an original work and no part of this thesis has been previously submitted for the award of any other degree.
I also declare that to the best of my knowledge any assistance I received in the experimentation presented in this thesis and all sources of information used in this thesis have been acknowledged.

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