Growth and physiological responses of Shorea materialis Ridl. seedlings to various light regimes and fertilizer levels under nursery condition

ABSTRACT

Relative light intensity (RLI) is one of the most significant factors that affect plant growth by controlling physiological traits of plants in terms of photosynthesis, respiration, stomatal conductance, and chlorophyll synthesis, among others. An experiment was conducted in the shade house and open area to determine the effect of three light intensities, viz. 30%, 50% and 100% RLI, and three levels of NPK fertilizer, viz. 0,1 and 2 g. plant-1 month-1 on the growth and physiological traits of Shorea materialis seedlings. During the six-months study period, survival percentage, growth performance and chlorophyll content of the species were monitored every three months, while other physiological parameters, such as photosynthetic rate, stomatal conductance, and stomatal density were recorded at the end of the experiment. The results showed that survival percentage of the seedlings was not significantly affected by different light conditions and fertilizer levels, and it was 100% for all treatment combinations. On the other hand, growth and physiological properties except stomatal density were significantly affected by both the above factors. The seedlings growing under 30% to 50% RLI were significantly better than those under full sunlight, in terms of height increment, diameter increment, leaf number increment, chlorophyll content, photosynthetic rate and stomatal conductance. In addition, the seedlings treated with 1 g NPK were significantly better than the control for photosynthetic rate and stomatal conductance. However, the seedlings fertilized with 2 g NPK were significantly greater than the control, in the matter of height increment, leaf number increment, chlorophyll content. Generally, the species should be planted under 30 to 50% RLI with 1 to 2 g of NPK (monthly) to produce a healthy and high growth of the species.

Keyword: Shorea materialis; Shade-tolerant; Light intensity; Fertilizer; Growth; Physiology