



## Physiological Response of Tropical Tree Species to Elevated CO<sub>2</sub> Levels at Seedling Stage

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**Abstract:** The increasing CO<sub>2</sub> concentration in the atmosphere levels often stimulates the photosynthesis and biomass. However, the duration and magnitude of this stimulation on physiological processes of tropical tree species is unknown. The objective of this experiment was to examine the physiological response of four commercially important tropical tree species to elevated CO<sub>2</sub> levels. *Tectona grandis* (teak), *Azadirachta indica* (neem), *Ailanthus excelsa* (maharukh) and *Bambusa bambos* (bamboo) seedlings were exposed to ambience (380 ppm) or elevated CO<sub>2</sub> (600 and 900 ppm) levels using an automated open top chamber (AOTC). The seedlings were exposed to elevated CO<sub>2</sub> levels for 180 days. Leaf gas exchange characters were measured in the second or third fully expanded leaves of the seedlings with a portable infra-red gas analyser (Li-Cor 6400XT) at the end of the study period. The elevated CO<sub>2</sub> levels significantly affected the physiological processes and did not show identical response in the studied tree species. Maharukh and bamboo plants were recorded optimistic response in terms of photosynthesis under elevated CO<sub>2</sub> even up to 900 ppm. Teak also registered a high photosynthesis up to 600 ppm level of CO<sub>2</sub>, but it showed a decreased photosynthetic rate under 900 ppm of CO<sub>2</sub>. Contrary to these three species, neem showed a negative response to the elevated CO<sub>2</sub> at both 600 and 900 ppm levels. The response of the species on transpiration (E) mmol m<sup>-2</sup>s<sup>-1</sup> was similar to that of the photosynthetic rate (Pn). This study recommend that we should not generalise the response of tropical tree species to elevated CO<sub>2</sub>. However, the commercially important tropical tree species should be assessed individually for the physiological functions to elevated CO<sub>2</sub>.

**Key Words:** Automated open top chamber, Li-Cor, photosynthesis, CO<sub>2</sub>, transpiration, tree physiology, neem, maharukh, teak, bamboo