THERMAL RESPONSE OF PHOTOSYNTHESIS IN INTACT LEAVES OF TEN EVERGREEN TREE SPECIES IN A SECONDARY TROPICAL DRY FOREST IN CENTRAL SRI LANKA

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Abstract

Global temperature has increased by 0.6 °C over the past century and is predicted to increase by 1.4–5.8°C by the end of this century. The optimum temperature for leaf photosynthesis ranges between 25°C and 35°C, but predicted increase in temperature may affect light saturated net photosynthetic rate (A_{sat}) and rates of carboxylation capacity (V_{cmax}) and electron transport (J_{max}). Estimation of these rates–largely known for temperate species–enable to model the future changes in net primary productivity of tropical forests. The aim of this study was to compare the thermal responses of leaf photosynthesis in evergreen tree species against leaf structural traits and shade conditions in a secondary tropical dry forest in central Sri Lanka. The study was conducted in Sam Popham Forest Arboretum, Dambulla. Ten leaf structural traits of 10 tree species representing the vertical stratification of the forest were measured from a minimum of three mature tree species. The *in-situ* thermal response of photosynthesis was measured for a range of 20-40°C using a portable infrared gas analyzer by climbing metal towers constructed for canopy access. Contrary to the expectations, leaf shade levels, and structural diversity did not affect the optimum temperature for leaf photosynthesis. The optimum temperature for A_{sat} ranged between 31.05±8.59°C suggesting strong biochemical control over thermal response photosynthesis than the leaf traits measured. Collection and analysis of photosynthetic data from more tropical dry forest tree species is recommended before drawing a solid conclusion.

Keywords: Carboxylation capacity, Leaf functional traits, Optimum temperature for photosynthesis, Rate of electron transport chain