Diurnal and seasonal patterns of leaf water relations in spontaneous and enriched secondary vegetation components: tools to understand water vapor exchange and water stress behavior

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The assessment of daily and seasonal patterns of water relation variables (e.g. stomatal conductance, g_s, and leaf water potential, R) on species components of secondary vegetation under fallow offers indications on their behaviour to water availability and about their contribution to the overall water vapour exchange being useful to identify functional groups and to guide efforts to manipulate the vegetation. During the last five years much work has been directed towards monitoring stomatal conductance and leaf water potential on common species in chronosequences of secondary vegetation under fallow in Northeastern Pará State (mainly concentrated on seven species: *Phanakospermun guyannense*, *Davilla rugosa*, *Banara guianensis*, *Lacistema pubescens*, *Myrcia bracteata*, *Cecropia palmata* and *Vismia guianensis*), and, more recently, on enriched fallow plots (using the fast growing leguminous trees: *Inga edulis*, *Acacia mangium*, *Clitoria racemosa*, *and Sclerolobium paniculatum*). Controlled environment studies recently started mainly focusing on indigenous fallow as well as planted species response to water stress will also provide guidance to the design of improvements in the system. The results from the chronosequence survey indicated that: i) for most of the studied species there is a tendency for decreasing g_s values along the time; ii) the diversity of responses of g_s and R found under a wide range of meteorological conditions suggests that these species take advantage of different physiological mechanisms to couple with limiting environmental conditions; iii) the g_{smax} values found in some of these indigenous species exceeded 1,000mmol m^{-2} s^{-1}, being comparatively high considering those found in tropical forests; and iv) most of the studied species did not reach R values lower than -2.0MPa, even during relatively dry spells. The results from the enriched fallow plots reveals that among the fast growing leguminous species *Acacia mangium* exhibited under all studied conditions higher g_s values than the other planted species and than the indigenous species, suggesting that planting this species to enrich fallow may result in considerable change in water vapour exchange regimes in this vegetation..

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