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# STRONG STOMATAL CONTROL OF CANOPY TREES IN CENTRAL AMAZON DURING THE 2015 EL NIÑO DROUGHT

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Extreme droughts increase tree mortality and reduce primary productivity in tropical forests. The unusually strong 2015 El Niño was associated with profound precipitation and temperature anomalies in central Amazonia. Recent reports suggested that hydraulic failure may be the main cause of tree mortality and even wet forest ecosystems, such as the Amazonian, are susceptible to it. Stomata control is an important mechanism to prevent catastrophic xylem cavitation and thus decrease the mortality risk. Therefore, understanding hydraulic functioning of Amazonian trees is key to predict their vulnerability to drought events. Seasonal variation in leaf water potential ($\Psi_w$), photosynthesis ($A$) and stomatal conductance ($g_s$), dynamics of non-structural carbohydrates (NSC) and vulnerability to embolism/hydraulic safety margins (HSM) were evaluated for eleven mature canopy trees during the 2015 El Niño at a central Amazonian forest site (2.59° S; 60.21° W). The average $\Psi_w$ at which 50% loss of xylem conductivity occurs was lower (-3.3 ± 0.9 MPa) than the observed for other tropical forests (-2.1 ± 1.4 MPa). The average minimum $\Psi_w$ in the dry season was -1.7 ± 0.4 MPa, leading to a large HSM of 1.6 MPa. The maintenance of $\Psi_w$, despite increasing vapour pressure deficit and decreasing soil moisture, was related to a 43% reduction in $g_s$ in the peak of drought. The substantial decline in $g_s$ during the El-Nino drought led to a 40% drop in $A$ and 61% depletion of NSC pools. Altogether, our results indicate that Amazonian trees, in contrast to the observed for other tropical trees worldwide, present a conservative strategy regarding their hydraulic system. Such strategy comprises investment in xylem more tolerant to hydraulic failure and a strong stomatal regulation in order to keep $\Psi_w$ at safe levels. However, stomatal closure and reduced $A$ should negatively impact the carbon balance of these forests during extreme droughts.

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