A MODEL OF NITROGEN USE IN TROPICAL FOREST TREES: NEW TOOL FOR EVALUATION OF THE RESPONSE TO ATMOSPHERIC NITROGEN DEPOSITION

Theme: Impacts of Local and Global Changes on the Atlantic Rain Forest

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Biodiversity reflects in part the diversification of life histories. A species' life history considered as a set of evolved strategies, including physiological adaptations, influences survival and reproductive success. Constraints on adaptive responses are established by the allocation of time, energy and nutrients among competing functions and physiological functions mediate the relationship of the organism to its environment by defining its performance and population life table. Nitrogen (N) is one of the most important element controlling plant growth and limiting primary production in most terrestrial systems. Plants depend on and drive N relations in their habitat and the competition for N has resulted in the evolution of diverse strategies for acquisition and use of N. Atmospheric N deposition has caused severe alteration and loss of habitats across the globe. The most damaging effects occur in typically nutrient-poor ecosystems where the additional N can dramatically alter species composition and impact ecosystem function through influencing nutrient cycling which leads to the loss of carbon from soil. It is therefore vital that effective methods are in place to monitor and analyse detrimental impacts from atmospheric N deposition. Despite the importance of Brazilian Atlantic Forest (a hotspot for biodiversity conservation), N metabolism characteristics of their tree species have received little attention. Predictions indicate that the Atlantic Forest will have by 2050, an average deposition greater than 20 kg N ha^{-1} yr^{-1}, a rate in excess of many critical loads set for sensitive ecosystems in northern Europe. This lack of empirical field studies in the area means that the sensitivity and response of vegetation remains unknown. This work presents: a) a validation of the model for nitrogen use along succession in Atlantic Forest trees: pioneer species respond to the increase in soil N availability (especially nitrate) and transport manly asparagine in the xylem fluid. In contrast, late secondary species are less responsive to increased soil N availability but rather recycle N internally (arginine). Early secondary species exhibited a less uniform behaviour, with one sub-group showing similar N traits as pioneer species and another sub-group resembling late secondary species; and b) an experimental design in order to evaluate the plant response to N deposition in Caraguatatuba, Serra do Mar State Park, where a new gas treatment unit (UTGCA – PETROBRAS) is being built. The UTGCA is expected to emit by the ground flare alone approximately: 6,3 ton NO_x day^{-1}; 35,0 ton CO day^{-1}; and 13,1 ton HC day^{-1}