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Basis for a Sustainable Use of the Amazon Floodplain Forest

JÜRGEN KERN¹, HEIDI KREIBICH¹, ASSAD DARWICH²

¹*Institute of Agricultural Engineering (ATB), Germany*

²*Instituto Nacional de Pesquisas da Amazonia (INPA), Brasil*

Abstract

The Amazon floodplain (*várzea*) is characterised by nutrient rich water and fertile soils due to the input of nutrients by the river. This periodically flooded fringe of the Amazon has already been used by the indigenous population before the European colonisation started.

How far sustainable agriculture and agroforestry may be intensified in this region depends on the supply and the consumption of nutrients. Particularly the floodplain forest with its high number of mostly nodulated legumes is suggested to be an important source of biologically fixed nitrogen.

Therefore, the focus of the study was to calculate the extent of plant N derived from atmosphere by the use of the ¹⁵N natural abundance method. $\delta^{15}\text{N}$ values of legumes ranged from 1.4‰ to 5.1‰ in contrast to non-legumes with $\delta^{15}\text{N}$ values between 3.2‰ and 6.8‰. Considering the importance value index of the legume species, then between 4 % and 5 % of the bulk plant N of the *várzea* forest derives from symbiotic N₂ fixation. Leaf $\delta^{15}\text{N}$ did not differ between the aquatic and the terrestrial period, pointing to an adaptation of the nodulated legumes to this extreme environment. Thus, symbiotic N₂ fixation in the floodplain forest is a continuous process that is not affected by the flood pulse.

The N gain via N₂ fixation is clearly higher compared to the loss by denitrification. If we compare all the known input and output paths of nitrogen, then we obtain a positive N balance. Therefore, we suggest a long-term retention and an accumulation of N within the *várzea* forest.

Keywords: Amazon, floodplain forest, legume trees, nitrogen fixation