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"Reconcile land system changes
with planetary health"

Evaluation of cultivation strategies for *Acrocomia aculeata*, a versatile species from the neotropics

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Abstract

Macaúba (*Acrocomia aculeata*), also known as macaw palm, is a versatile, multipurpose palm species, endemic to Latin America. This species easily adapts to a wide range of environments outside tropical rainforests, even in dry or marginal land and is, hence, an alternative feedstock to palm oil and additionally a promising source for proteins and fibers. Macaúba, however, is still semi-domesticated. This study was carried out within the AcroAlliance project, a Brazilian-German research cooperation to foster the sustainable use of local biodiversity in the bioeconomy. The study aims to evaluate and understand the impact of crop management on growth and performance of macaúba under various management options. Cropping scenarios focused on developing sustainable production systems, e.g., macaúba alley cropping with annual and perennial crops or silvopastural systems, and macaúba sole cropping. The Water, Nutrient, Light Capture in Agroforestry Systems (WaNuLCAS) model was used to evaluate the performance and productivity of macaúba in various cropping scenarios. The model was parametrized, using literature data for tree growth, as well as climate and soil data typical for areas where macaúba is endemic. Macaúba was modelled as sole crop and under alley cropping with maize, cassava and *brachiaria* grass. Various tree planting densities were tested to optimise resource use under sole and alley cropping. The model gave promising results with regard to growth performance of macaúba in general. Under alley cropping, lower planting densities allowed higher light capture by the companion crops. This allowed identifying optimal planting densities which can be tailored to farm-specific needs. The model also provided information on the magnitude of additional benefits, such as carbon sequestration in silvopastural systems and/or the simultaneous production of food and cash crops for peasant farmers. In conclusion, WaNuLCAS is able to identify suitable growing areas and site-specific requirements of macaúba. It allows improving crop and tree management under various site conditions. The model showed that macaúba grows with decent productivity, even in drier and less fertile environments, where oil palm and coconut usually fail. This is a clear win-win situation for both, farmers and nature.

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