



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Developing macaúba value webs: A novel oil crop, multipurpose palm for agricultural diversification in Brazil

RICARDO VARGAS-CARPINTERO¹, THOMAS HILGER², SÉRGIO MOTOIKE³, LEONARDO PIMENTEL³, CARLOS COLOMBO⁴, ROSELI FERRARI⁵, PETER EISNER⁶, SÉRGIO TOLEDO E SILVA⁶, STEPHANIE MITTERMAIER⁶, IRIS LEWANDOWSKI¹

¹University of Hohenheim, Dept. Biobased Resources in the Bioeconomy, Institute of Crop Sciences, Germany

²University of Hohenheim, Inst. of Agric. Sci. in the Tropics, Acrocomia Hub, Germany

³Federal University of Viçosa, Dept. of Agronomy, Brazil

⁴Agronomic Institute of Campinas, Genetic Resources Center, Brazil

⁵Food Technology Institute (ITAL), Brazil

⁶Fraunhofer Institute for Process Engineering and Packaging (IVV), Germany

Abstract

The development of novel crops is a key strategy towards the diversification of agriculture and raw materials for the transition to a sustainable biobased economy. In this context, biodiversity and ethnobotanical knowledge offer a pool of genetic resources. The macaúba palm (*Acrocomia aculeata*) is an example. This plant, native to the neotropics, widely adapted to adverse ecological conditions and traditionally used by local, rural communities, can deliver multiple functions simultaneously: oils from the fruits in high quantity and quality (2,5 to 5 tons of oils ha⁻¹), residual fruit fractions for various applications, recovery of degraded landscapes and soils, carbon sequestration and biodiversity habitat. Scientific progress has allowed its initial cultivation in Brazil, facilitating the transition to a semi-domesticated phase. A systems approach is fundamental at this early stage of macaúba value web's development to achieve sustainability and successful crop introduction, integrating cultivation, processing, and products. Moreover, the involvement of different stakeholders and the consideration of contextual factors are elemental actions for shaping these systems sustainably. For instance, plant breeding needs to be aligned with industrial applications, cropping systems tailored to biophysical parameters and farmers' conditions, and biomass supply with processing demand. In the “AcroAlliance” project, we incorporate these principles and conditions in the development of macaúba value webs. By combining inter- and transdisciplinary researchers' expertise on genetics, agronomy, processing technology for fruit biorefining into high-added value products and sustainability assessment, the project aims to propose an integrated macaúba value web concept. For this, our targets are: i) advancing planting material; ii) modelling cropping systems (e.g. agroforestry) and identifying best agricultural practices; iii) improving harvest and post-harvest processes; iv) developing a biorefinery concept for the production of oils, proteins and fibres; v) testing industrial applications; vi) analysing the value web, identifying implementation strategies and setting a roadmap. Farmers and companies fostering the cultivation of macaúba and industry actors are involved in order to ensure knowledge transfer and a reflective research

process. This project contributes to the advancement of a novel crop from plant biodiversity and thus, the diversification of agricultural activities and products.

Keywords: *Acrocomia aculeata*, agricultural value chains, agroforestry, biobased value web, biodiversity, bioeconomy, biorefinery, Brazil, diversification, Macaw palm, macaúba, novel crops, oil crops, palms, sustainability