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

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1. Background

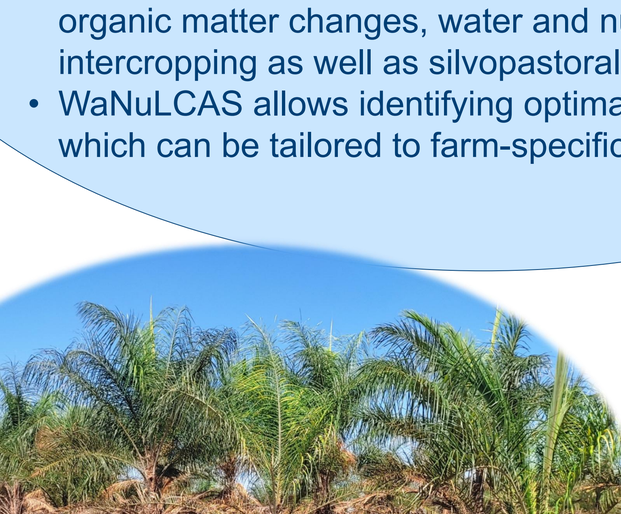
Macaw palm (*Acrocomia aculeata*) also known as macaúba is a versatile, multipurpose palm species from the neotropics. It is a promising source for oils, proteins and fibers. Additionally, it grows in a wide range of environments outside of tropical rainforests, even dry, marginal lands, hence, an alternative feedstock to palm oil. Macaúba is semidomesticated and its cultivation is in an early stage in Brazil.

2. Objective

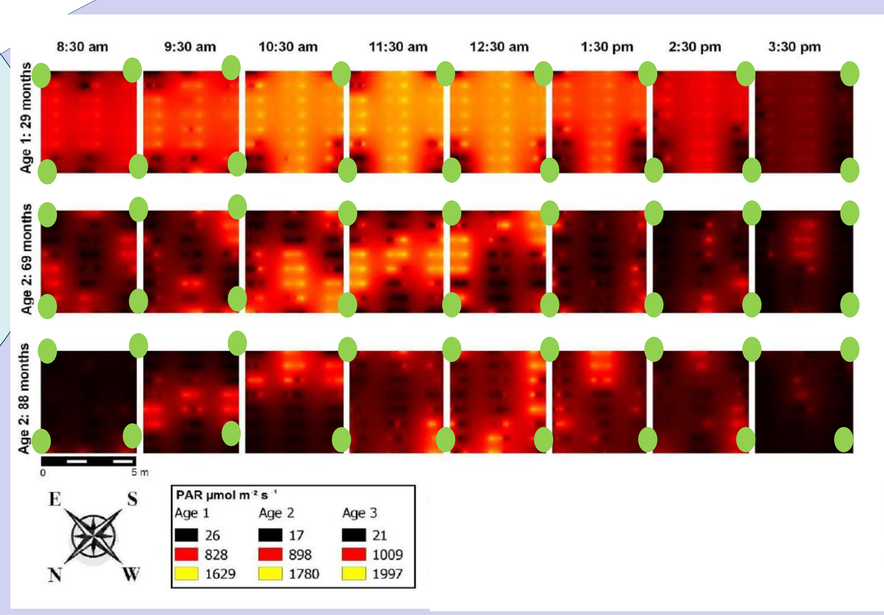
To understand the impact of crop management on growth and performance of macaúba in various cropping scenarios, particularly sole cropping, alley cropping and silvopastoral systems.

3. Methods

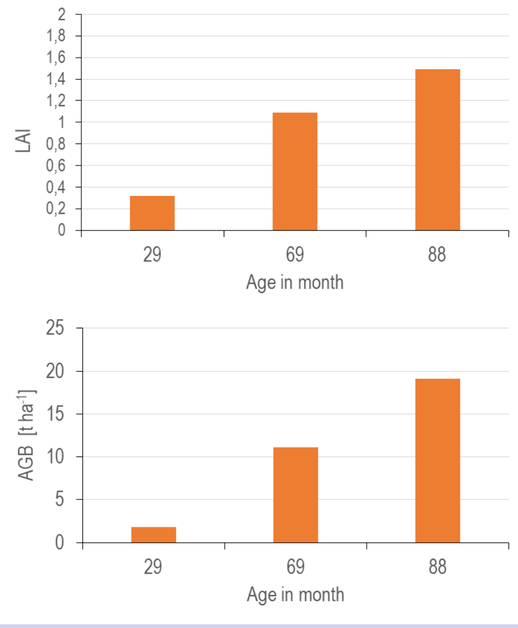
- Crop modelling with the **Wa**ter, **Nu**trient and **L**ight **C**apture in **A**groforestry **S**ystems.
- Field and literature data for model parametrization and calibration (dry matter; LAI, PAR, rooting pattern, allometric equations).
- Scenario testing.



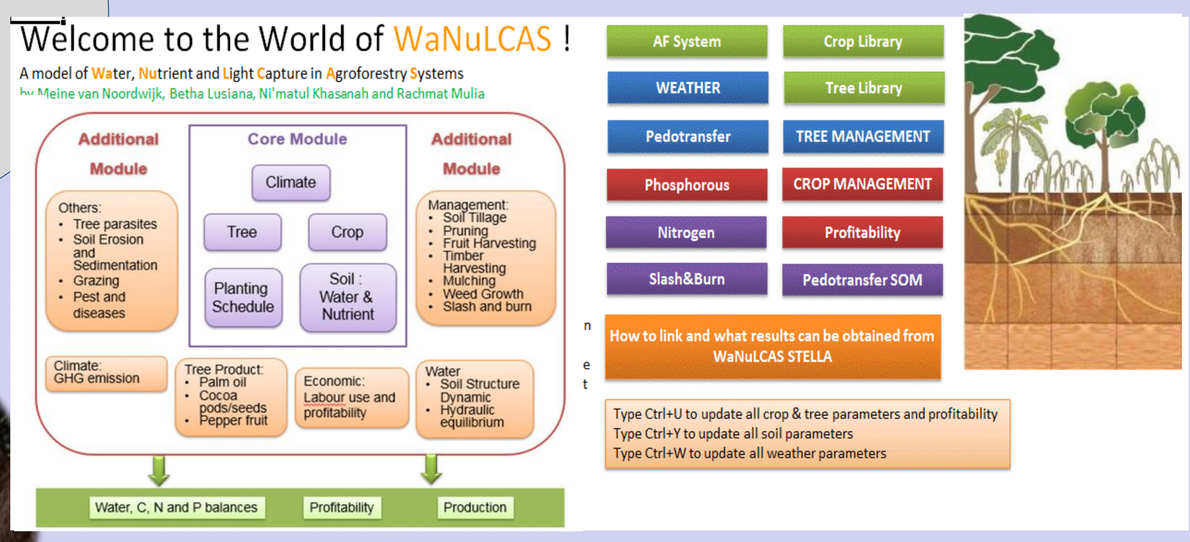
4. Results



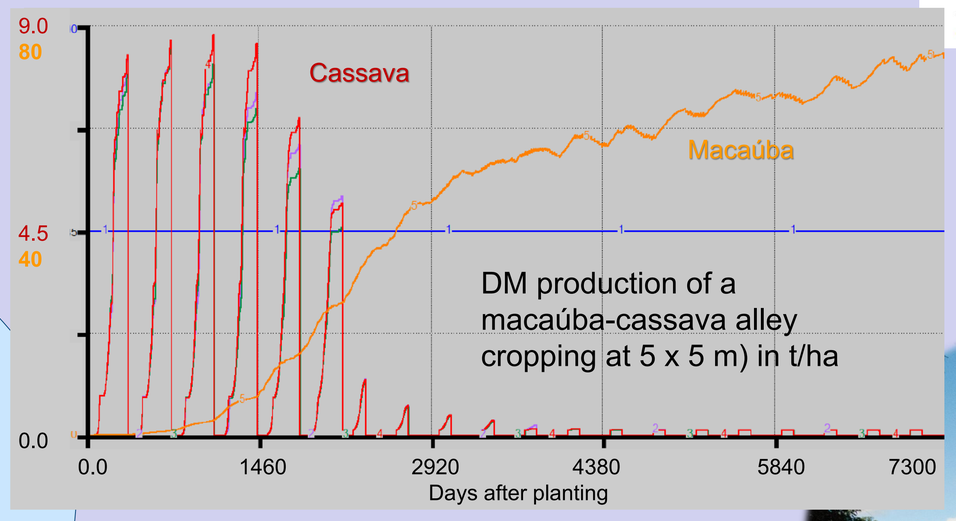
Distribution of photosynthetic active radiation (PAR) between 8.30 a.m. and 3.30 p.m. in 29-, 69-, and 88-month-old macaw palm (sole cropping). Palms were spaced at 5 x 5 m. Green dots indicate positions of palms in the field (above)

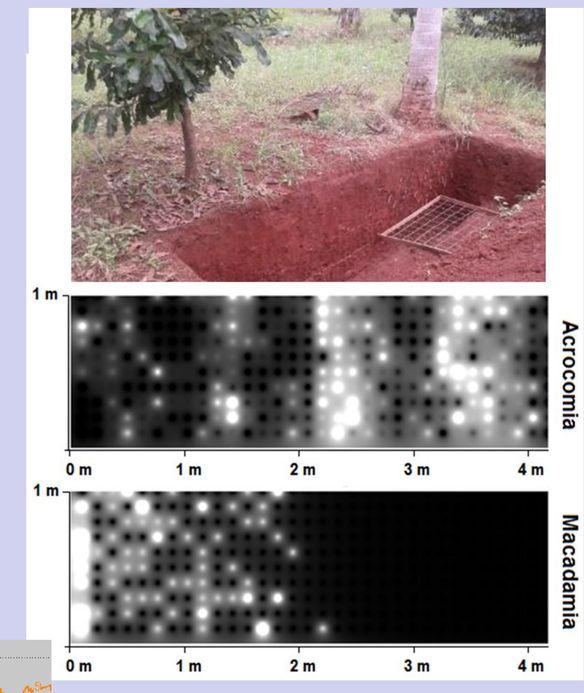


Leaf area index (LAI) (top) and above-ground biomass (bottom) of 29-, 69-, and 88-month-old macaw palm stands at a spacing of 5 x 5 m (400 palms/ha).



Model structure (above) and out put (right)





Root distribution in a macaw palm-macadamia intercropping system (above)

5. Conclusions

- WaNuLCAS showed promising results with regard to growth and dry matter allocation of macaúba in general:
  - Macaúba grew with decent DM production, even in drier (-10%) and less fertile environments (-15%), where oil palm and coconut usually fail.
  - Under alley cropping, lower planting densities allowed higher light capture by the companion crops.
- The model provided information on carbon sequestration, soil organic matter changes, water and nutrient limitations in intercropping as well as silvopastoral systems.
- WaNuLCAS allows identifying optimal planting densities which can be tailored to farm-specific needs.

6. Next steps

- Model validation using 'Goodness of Fit' statistics.
- Identification of best agronomic practices.
- Impact of environment on oil yield.
- Modelling macaúba-coffee systems.

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