Do we expect formation of annual rings on species with reverse phenology?

A. Gebrekirstos¹, T. Beedy²

World Agroforestry Centre, United Nations Avenue, Gigiri, P. O. Box 30677, Nairobi Kenya

Introduction and Objectives

- *Faidherbia albida* is one of the most important species among the deciduous leguminous trees, and widely distributed in sub-Saharan Africa.

- Distinctive phenology: it bears leaves and flowers during the dry season and sheds its leaves during the rainy season. Due to its reverse phenology the species is commonly used and promoted in agroforestry. For instance Ethiopian government has initiated a *Faidherbia* Program (to establish 100 million *Faidherbia albida* trees on cereal cropland during the next four years).

- The objectives are: a) to understand climate growth relation ships and evaluate the long term performance of the species under a changing climate b) to asses water use and source of water and C) to make informed decision in tree planting efforts

Methods

*F. albida* samples collected from Malawi, southern Africa (Fig 1),

- Thin sections were analyzed. Stem disks polished and tree ring width measured (Fig 2),

- Intra-annual δ¹⁸O series measurements were done (Fig 4) powder sample preparation to proof the annual nature of the rings with mass spectrometry.

Results

*F. albida* (Fig 3) forms growth boundaries characterised by marginal parenchyma bands, density differences between early and late wood (Fig 4), and depleted δ¹⁸O values at the beginning of the growing season (Fig 5).

*F. albida* is fast growing tree. The annual growth rate varies considerably between years ranging from 1.37 mm to 17.72 mm with a mean growth of 9.34 mm.

Conclusions

The study is still on-going and it will strive to answer the climate growth relation ships, climatic factors that trigger formation of rings and some insight for its reverse phenology.

Outlook and call for collaboration

We know very little about African species: age - growth and climate-growth relationships, eco-physiology, adaptation to climate variability, climate information and so on. My organisation have realised the potential of dendrochronology in the tropics and I am happy to share with you that I have established a state of the art laboratory at the World Agroforestry Centre (ICRAF), in Nairobi. We are working in 22 countries in Africa (East, south and west), South Asia, Latin America. We believe in partnership and will be happy to collaborate!

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