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**Tropical Ecology and Society
Reconciling Conservation and
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O9-05 – S9 *Retrospective analysis of the growth of trees from their anatomy and morphology (ragtag)*
Monday 20 June 20 / 11:00-15:30 – Antigone3

Studying phenology of tropical forest trees using a morphological and anatomical retrospective analysis: the case of *Moronobea coccinea* Aubl. (Clusiaceae)

HÉLÈNE MOREL¹, THOMAS MANGENET², PATRICK HEURET³, ERIC NICOLINI⁴

¹CIRAD, UMR EcoFoG, 97379, Kourou, French Guiana

²CIRAD, UMR AMAP, 34398, Montpellier, French

³INRA, UMR EcoFoG, 97379, Kourou, French Guiana

⁴CIRAD, UMR AMAP, 97379, Kourou, French Guiana

Most studies on tropical plant phenology have focused on patterns of flowering, fruiting and leaf-shedding. They are based on time-consuming continuous surveys over seasons or years and the basic considered scale is the tree integrated within a population or a community. So, the functioning of the different axis categories inside the crown of one individual have been poorly considered and studied. Here, we want to demonstrate the efficacy of a retrospective analysis based on morpho-anatomical growth markers coupled with a field survey to study phenology and growth at different scales from within-individual to populations.

In French Guiana, we collected dominant branches from 5 *Moronobea coccinea* adults, a hemi-tolerant tree of Neotropical rain forests. We identified growth markers delimiting longitudinal and radial increments. We coupled this retrospective analysis with a 30-month survey of (i) leaf-shedding and primary growth on twenty-two trees every month and (ii) for the repeated collecting of microcores from five trees every fifteen days to determine intra-annual cambial activity (i.e. formation of secondary xylem).

Successive growth units and growth rings were identifiable based on morpho-anatomical markers. These structural regularities traduce the phenological cycle defined by leaves shedding, growth-unit elongation and growth-ring formation. The retrospective analysis was few time consuming and in comparison we reconstructed the tree growth history of individual trees in only two weeks. Our study shows that retrospective analysis and field survey are two complementary approaches to understand plant phenology and to interpret morpho-anatomical structure. Dating a branch by counting the number of growth units or growth rings is possible in many years with a reasonable error. Nevertheless, estimating their precise month of formation in order to study climatic influences remains difficult if a growth monitoring isn't coupled in the same time.

The cycle of *M. coccinea* is essentially a biennial, with some slight variability: first year, the trees shed their leaf whereas the following years, trees flowers. At the population scale, trees were unsynchronized and the relationship between primary and secondary growth aren't clear. Surprisingly, we found an asynchronous phenological cycle between axes mainly due to flowering.

O9-06 – S9 *Retrospective analysis of the growth of trees from their anatomy and morphology (ragtag)*
Monday 20 June 20 / 11:00-15:30 – Antigone3

***Cordia alliodora* (Boraginaceae) as a candidate for tree plantations in French Guiana: characteristics and development of natural populations in Saül vicinity**

JULIE BOSSU¹, PATRICK HEURET², HÉLÈNE MOREL³, ERIC NICOLINI³

¹CNRS, UMR Ecofog, 97387, Kourou, French Guiana

²INRA, UMR Ecofog, 97387, Kourou, French Guiana

³CIRAD, UMR Ecofog, 97387, Kourou, French Guiana

In French Guiana, forest accounts for almost 96% of the territory, with the habitat maintaining a good state of conservation. Nonetheless, forest management in this region faces new challenging issues given the emerging and increasing demands for wood products. The present-day challenge is to develop sustainable and efficient wood production solutions, whilst preventing deforestation and reducing the current dependence on importation. Plantations of native fast-growing species here represent a real potential. *Cordia alliodora* is a long-lived pioneer species known only in French Guiana in the vicinity of the town of Saül. This species appears to match the requirements for plantation growth, in relation to its very high growth rate and good wood properties. Nevertheless, to our knowledge, no growth monitoring has been conducted in French Guiana, with little information on the performance of local populations under natural conditions. Here, we present a retrospective analysis of *C. alliodora* development (primary and secondary growth) based on anatomical and morphological markers. To achieve this work, we also describe the past development of adjacent trees belonging to the pioneer species *C. obtusa*. This last species was considered here as "standard" to (i) estimate the age of secondary forest within which both species belong, (ii) demonstrate the annual nature of growth rings in *C. alliodora* and (iii) compare the growth trajectories of the two species. We sampled 13 and 15 individuals of *C. alliodora* and *C. obtusa* trees respectively in three contrasted sites in the region of Saül. Above 10 meters in height, which is the flowering stage of *C. obtusa*, our results show that *C. obtusa* and *C. alliodora* have a competitive growth in height despite two contrasted growth strategies (continuous growth vs. polycyclic rhythmic growth). Beyond this point, *C. alliodora* becomes dominant in the stand. Strong differences were observed in *C. alliodora* growth trajectory depending on the studied site, demonstrating a high phenotypic plasticity (*latu sensu*). We also estimate that under good growth conditions, this species is able to reach a productivity of 11 m³/ha/years and enable rotations in less than 30 years. From these promising results we can consider that *C. alliodora* is a good contender as an alternative timber productive system in French Guiana, provided it is accompanied by other species, such as *C. obtusa*, to encourage straight and rapid growth without bole defects.