Séminaire / Seminar AMAP

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Amphi Charles Flahault, Institut de botanique, Montpellier.
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THESIS DEFENCE

Ecological strategies of Central African lianas: from macro-anatomical diversity to community patterns

presented by

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ABSTRACT

Lianas develop some of the most complex vascular organizations in plants and are an emblematic growth form in the diversity and dynamics of tropical forests. However, their ecology and especially the links between traits, anatomy and community structure remain poorly known. The goal of this thesis is to deepen our understanding of the ecological strategies of lianas, from macroanatomical diversity to community-level patterns, using both ground- and drone-based field data. The study was carried out in Northern Congo, where trees and lianas are monitored in permanent plots through time. In three independent chapters, I explore (i) the link between commonly used ground-based liana measurements and drone-based measurements of liana leaf coverage over tree crowns; (ii) the influence of local topography, forest structure, and tree composition on liana community structure and floristic and functional composition; and (iii) the strategies associated with the macroanatomical diversity of lianas, their links to the leaf economic spectrum, and their patterns across a phylogeny and environmental gradients. Most ground-derived liana metrics were significantly related to drone-derived liana leaf coverage over tree crowns. This was best predicted by liana basal area and negatively mediated by liana wood density, with a higher leaf area-to-diameter ratio for light-wooded lianas (see doi:10.3389/ffgc.2022.803194; Figure 1). Along environmental gradients, the liana community structure was mainly determined by local forest structure, with an increased abundance of small-sized lianas and basal area in open canopy areas where they competed with giant herbs. The floristic and functional composition of lianas varied marginally along these gradients. Faster acquisition strategies tended to occur in open canopy areas (low liana wood density, high specific leaf area, and $\%PO_4$). Lianas exhibited significant species-specific associations with the most common lianas and trees. Through the lens of functional ecology, liana species exhibited a large diversity of macroanatomical structures and cambial variants. These were associated with strategies ranging from hydraulic efficiency to hydraulic safety, and higher density stems in the self-supporting phase to resilience during climbing (Figure 2). Both leaf and wood strategies were significantly coupled (Figure 3) and distributed throughout the phylogeny. However, only the trade-off between acquisitive and conservative leaf strategies was significantly affected by environmental gradients, while wood strategies appeared to remain neutral. I hope that this work will contribute to a better understanding of the temporal and spatial distribution of liana species and better predict shifts under large-scale and environmental conditions.

KEY WORDS : Functional traits; woody vines; remote sensing; tropical forests; DynAfFor

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