Session 32 : Diversité fonctionnelle : principes et patrons

Environmental determinants of species and trait distributions in tropical forests

Adeline Fayolle *- Sylvie Gourlet-Fleury - Bettina Engelbrecht*

The composition and diversity of tropical tree communities vary with environmental factors, however, the factors shaping distribution patterns at a regional scale remain poorly understood. This study aimed to identify the environmental determinants of the distribution of tree species and their key functional traits in the tropical semi-evergreen forests of Central Africa. We asked two questions. (1) Which environmental factors shape the distribution of the dominant tree species? (2) Do species with similar distribution patterns share the same set of traits – reflecting similar environmental requirements? The distribution of 31 tree species was analyzed in an area of more than 7 millions hectares, crossing the borders of the Central African Republic, Cameroon and the Republic of Congo, the Sangha River Interval. We examined the relation between species distribution patterns and environmental variations through multivariate analyses. Spatial variations of environmental factors pertaining to climate, topography and geology were quantified from maps and satellite records. Species traits shade tolerance, wood density, leaf phenology, maximal diameter and annual growth rate were calculated or extracted from the literature. A correlated gradient of geology and geomorphology was of major importance for the distribution of the studied species while climate had little impact. Species were mainly divided into a group associated with a central sandstone plateau in the area, and species avoiding this plateau. One abundant species, *Lophira alata*, showed a separate pattern suggesting an affinity of this taxon for wet conditions. The pattern of species distribution was significantly related to a set of functional traits, with species associated with the sandstone plateau characterized by slow growth rates, high wood density and evergreen leaves. This is consistent with a strategy of conservative resource use on nutrient poor and dry sandy soils. The relationships between plant traits and species distribution we identified are of major importance for the ecology and conservation of tropical forests, especially in the African forest where little is known. In addition, knowledge of tree species distribution and its determinant factors is indispensible for the sustainable management of tropical forests.

Contact : Adeline Fayolle - CIRAD - Montpellier - adeline.fayolle@cirad.fr