



Influence of persistent monodominance on functional diversity and functional community assembly in African tropical forests.

Elizabeth Kearsley (1,2,3), Hans Verbeeck (1), Koen Hufkens (4), Hans Beeckman (2), Kathy Steppe (1), Pascal Boeckx (3), and Dries Huygens (3)

(1) Department of Applied Ecology and Environmental Biology, Ghent University, Belgium, (2) Laboratory for Wood Biology and Xylarium, Royal Museum for Central Africa, Tervuren, Belgium, (3) Isotope Bioscience Laboratory—ISOFYS, Ghent University, Belgium, (4) Richardson Lab, Department of Organismic & Evolutionary Biology, Harvard University, US

Lowland tropical rainforest are taxonomically diverse and complex systems, although not all tropical communities are equally diverse. Naturally occurring monodominant patches of *Gilbertiodendron dewevrei* are commonly found across Central Africa alongside higher diversity forests. Nevertheless, a low taxonomical diversity does not necessarily indicate an equivalently low functional diverse system. We investigate the functional diversity and functional community assembly of mixed and monodominant tropical forests in a central region of the Congo Basin in D. R. Congo using 15 leaf and wood traits covering 95% of all species within each community. This unique dataset allows us to investigate differences in functional diversity and ecosystem functioning between mixed and monodominant forest types.

Functional richness, functional divergence and functional evenness are three functional diversity measures providing different aspects of functional diversity. The largest difference between the two forest types was found for functional richness, with a lower functional richness in the monodominant forest indicating a higher amount of niche space filled in the mixed forest. The mixed forest also had a higher species richness and Simpson diversity index, indicating that the higher species richness increases the functional niche space. Subsequently, we identified whole community trait shifts within the monodominant forest compared to the mixed forest. The dominance of *Gilbertiodendron dewevrei*, for which a distinct niche is found for most traits, presented a significant influence on the entire (trait) community expressing fundamental differences in ecosystem functioning. More detailed investigation of species unique within the monodominant forest and species occurring in both forest types provide more insight into the influence of *Gilbertiodendron dewevrei*. Both the unique and the shared species showed significant shifts in leaf nutrients, specific leaf area and water use efficiency traits away from the mean of the mixed forest in the direction of the dominant traits values. The monodominance of *Gilbertiodendron dewevrei* thus acts as an environmental filter for the establishment of other species.