50. Matching uses and functional traits of companion trees in cocoa agroforests: a win-win scheme toward resilient systems

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Africa's cocoa producing countries are currently challenged to design climate-smart cropping models that would satisfy both growers and manufacturers. In this context, Cameroon's cocoa-based agroforestry systems (c-AFS), could serve as a model. Compared with prevailing monoculture systems, these c-AFS significantly support biodiversity conservation and C storage while providing farmers with sustainable low-but-steady cocoa yields. Such a result largely relies on farmers' use of tree diversity since, for example, these c-AFS are not fertilized. We herein check for a putative method helping to better understand the functioning of these very complex systems while including farmers' multiple use of tree diversity.

We studied 58 1000m² c-AFS plots across Central Cameroon. We surveyed farmers' use of companion trees and grouped them in 4 categories: (a) wood- or (b) food production, (c) assumed agronomical support to cocoa growing, (d) other /unknown use. We further checked for 5 functional traits (i) N-fixation, (ii) shade tolerance, (iii) strata, (iv) wood specific gravity; (v) leaf life-span strategy. Out of the 1258 trees recorded, 688 individuals from 50 species could be used to run Multiple Correspondence Analysis (MCA). MCA distinguished between three groups: (1) trees used for their wood appeared to be mainly dominant, of hard wood, and deciduous; (2) pioneer and light wood trees were mainly used to support cocoa growth; (3) food producing trees were mainly evergreen and belonged to the same dominated strata as cocoa.

It appears that such clustering helps gauging tree diversity contribution to cocoa yield and shows trades-off or synergies within the system per se as well as between growers' various objectives. Hence, it should help designing/enhancing c-AFS that inherently consider farmers' objectives and local tree species. Furthermore, such method allows climate-smart modelling of c-AFS thanks to the management of ecological functions supported by its tree component.