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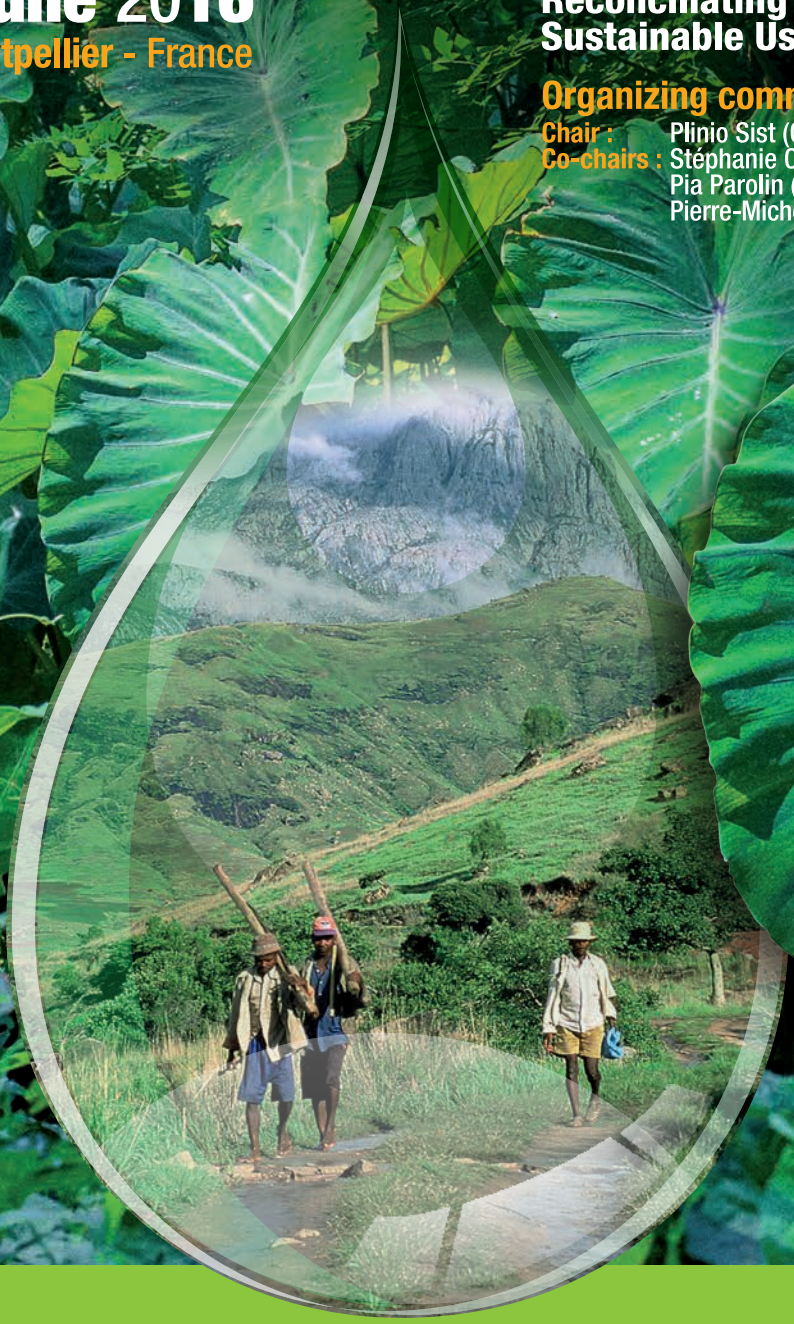

PROGRAM & ABSTRACTS

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O71-05 – S71 *Functional traits in tropical agroecology*
Thursday 23 June / 10:30-12:00 – Barthez

Effect of simplification/complexification on functional features of associated trees community in cocoa based agroforestry systems

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Africa's cocoa producing countries are challenged to identify sustainable cropping models to replace the currently prevailing monoculture systems. In this context, cocoa-based agroforestry systems (c-AFS) from Central Cameroon could represent an initial model from which to work on as they are able to support many ecosystem services and maintain a sound cocoa production on the long-term. In Talba, an old pioneer front, various cocoa systems cohabit for about 40 years. Some are very simple, close to the conventional model, while others are rather complex and contain many associated tree species. Such circumstances represent an opportunity to check for differences in their functioning and management in very similar pedoclimatic and ecological conditions.
In this study, we focused on functional features of associated trees community (AT) within a set of 3 types of c-AFS. We studied 54 plots of 800m² and setup 3 groups according to their AT density (ind.ha-1): low (< 50), medium (50 to 99), high (≥ 100). The systems studied ranged from 5 to 64 years old. We used 5 forest plots as controls. We characterized AT' species diversity, leaf-life span strategy, succession guild, N-fixation and wood specific gravity (WSG). We measured cocoa and AT basal area (BA) and height.
In total, 695 associated trees and 64 species were assessed. Diversity indices and mean WSG increased with AT density. Mean height canopy was found higher at low AT density than in forest. Basal area of non-pioneer light demander, shade tolerant and evergreen species increased with AT density. Basal area of N-fixers was poorly affected by AT density. Cocoa BA steadily increased while AT density decreased. Ageing significantly affected cocoa and AT densities but did not change the relative BA shares between functional features for the groups tested.
The study of AT functional "profiles" shows that farmers' c-AFS management differs according to AT density and affects c-AFS structures and functioning whist making them significantly different from forest. Modelled shifts in AT densities consistently reduce or increase several functional features of the studied c-AFS. This shows that farmers actually manage AT according to some of these features. In the simplest systems AT are solely used for shading and cocoa population favoured. In more complex systems, regularly less input-intensive, associated trees have multiple uses and farmers seem to willingly accept trades-off with cocoa trees development.

O71-06 – S71 *Functional traits in tropical agroecology*
Thursday 23 June / 10:30-12:00 – Barthez

Functional trait-based agroecology: progress and prospects for quantifying trait variation in crops.

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Studies focused on plant functional traits have been critical for understanding ecological patterns and processes in natural tropical plant communities. However to date, functional trait-based approaches have not been widely used in tropical agroecological research, policy, or practice. While there is a long history of evaluating the causes and consequences of variation in crop "agronomic" or "domestication" traits, few tropical agroecological studies have focused on functional plant traits as commonly envisioned in the ecology or evolutionary biology literature. Here, we will concisely review the potential applications of functional-trait based approaches to agroecological research. We then focus two important knowledge gaps that currently confront trait-based agroecology: 1) limited representation of crops in global functional trait databases, and 2) limited generalized understanding of how key functional traits vary within crop species. We conclude by arguing that crop trait data consolidation initiatives, coupled with field studies designed to capture intraspecific trait variation, are critical in advancing trait-based research in tropical agroecology.