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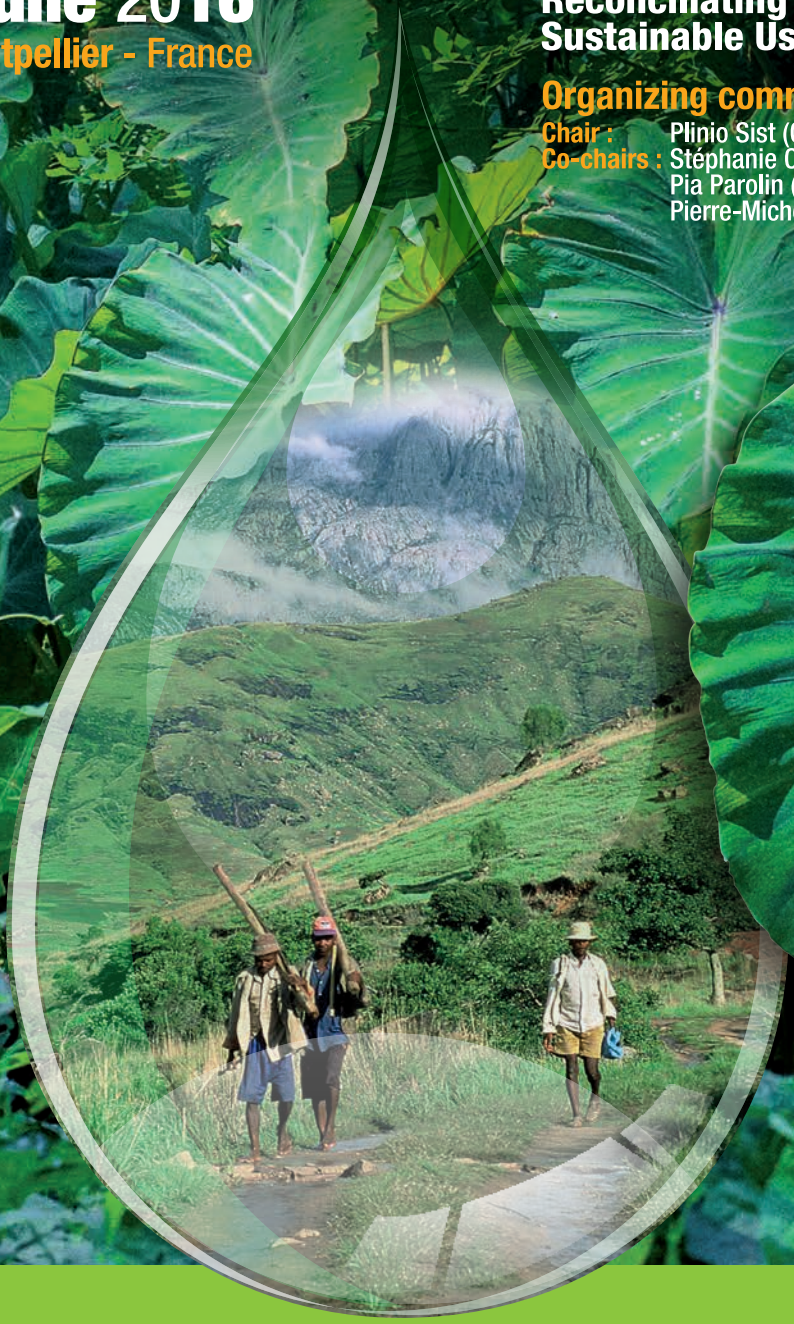

PROGRAM & ABSTRACTS

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O71-03 – S71 *Functional traits in tropical agroecology*
Thursday 23 June / 10:30-12:00 – Barthez

Adult tree abundances and plant traits can help predict tree species' natural regeneration and delivery of ecosystems services in agricultural landscapes

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Capacity to naturally regenerate (CNR) is an ecological property of the species in plant communities that is key to conserve the decreasing fraction of local diversity remaining in agricultural lands and associated processes. A reduction of tree cover diversity can negatively affect present and future delivery of ecosystem services (ES). Plant traits (PT) can help predict these effects if they are associated with CNR after land use change. We propose to use the relationships between PT and tree species demography to evaluate the potential changes in ES on the basis of current adult tree composition and management in tropical agroecosystems.
Our methodology uses the abundance of tree species at different development stages (adults, saplings and seedlings) to evaluate their contribution to CNR under disturbances generated by agricultural management. In addition, we propose the use of 17 PT related to three main trait dimensions (leaf, whole plant and reproductive), which are highly relevant to tree species tolerance of disturbance. The key PT are i) leaf area, specific leaf area, leaf dry matter content, carbon, leaf phosphorus and nitrogen content, foliar tensile strength; ii) wood density, maximum tree height, leaf phenology; and iii) fruit and seed mass, volume, shape and dispersal mode.
This PT methodological approach allows us to correlate variation in functional characteristics with variation in species' CNR in agricultural lands. Research in active pasturelands in Central America show that tree cover diversity is dominated by species with different characteristic to those with low CNR, highlighting how the impact of current management on tree regeneration can affect current and future ecosystem functioning. Changes of litter decomposition and associated nutrient cycling in active pasturelands for example, can possibly emerge depending on the relationships among leaf traits, litter decomposition rates and CNR. We conclude that both sets of information, tree species' (a) adult abundance and population structure and (b) plant traits, can help us to predict tree species' CNR and their capacity to deliver ES in agricultural systems like active pasturelands. Ecosystem functioning will be affected as a consequence of the limited CNR of some tree species with particular PT under current conventional livestock management practices common over all Central American agricultural landscapes.

O71-04 – S71 *Functional traits in tropical agroecology*
Thursday 23 June / 10:30-12:00 – Barthez

Can functional traits explain the dynamic of undesirable species in tropical grasslands?

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In wet tropical conditions, the improved pastures are usually implanted after deforestation and most times with a single forage grass (mainly C4 and exotic grasses) and more rarely with legumes.
These artificial grasslands ecosystems are more unstable than native pastures. Grasslands can be degraded by the colonization of "undesirable" plants. These species are unpalatable and so reduce the production of the grasslands ("agronomical impact"). Some of these species are also invasive and colonize also the natural forests ("ecological impacts").
Understand the dynamics of undesirable species regarding the climate, soil, management and the vegetation is the key to propose sustainable management of tropical grasslands.
The studies of undesirable plants are generally using species approaches within one region. Considering the diversity of tropical area, the undesirable species may differ from one region to another. These species approaches limit the generality of the results of these studies.
The objective of this work is to test the use of functional trait approach for the understanding of the dynamics of undesirables' species. We used datasets from three different tropical regions: the Reunion Island in Indian Ocean New Caledonia Island in the Pacific Ocean and the French Guyana in the Amazonian region. The islands are biodiversity hotspots threaten by biological invasion. The grassland ecosystems studied are a major element of plants invasion process. In the French Guyana the grassland are implanted after deforestation of Amazonian forest.
In each region, the grassland botanical composition and the dynamic of undesirable species were monitored during several years: 1994,1995,1996,2001 and 2004 for the Reunion, from 1999 to 2005 for New Caledonia and from1997 to 2000 and from 2010 to 2013 for the Guyana.
The trait values of 84 functional traits were extracted from the TRY database (www.try-db.org) from the 367 species presented in the surveys. We imputed some of the missing value using different methods.
Our first step was to compare the functional traits of the different undesirables to see if we can identify common functional strategies along the three regions. Secondly, we try to understand the dynamics of these different groups and the effect of management and climate on the different undesirable strategies.
In conclusion, we discuss the interest and the limits of using functional traits for the understanding and the mangement of undesirable species.