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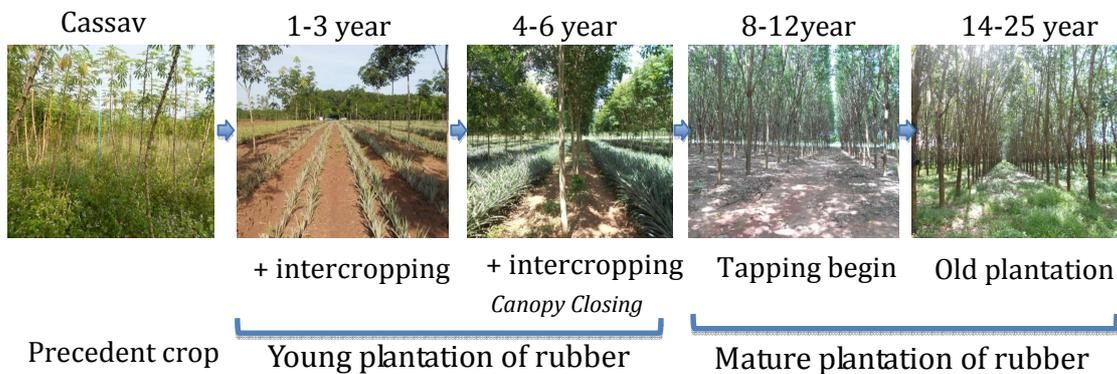
Does afforestation of arable land with rubber tree improve soil biodiversity?

A. Brauman*, M. Perawatchara, M. Lafaye De Micheaux, P. Alonso, N. suvannang, C. Choosai, D. Sebag, T. Chevalier, J. Trap, F. gay

¹IRD, UMR ECO&SOLS, Thailand, ²Land Development Department, Thailand, ³Khon Kaen University, Thailand, ⁴IRD, UMR M2C, France, ⁵IRD– UMR ECO&SOLS, France, ⁶CIRAD, UMR ECO&SOLS, Thailand

Tree plantations are often denigrated for their negative impact on natural resources particularly loss of biodiversity. This assessment is undeniable when tree plantation encroached natural forests. However, in the case of Rubber plantation, the main tree plantation in south East Asia, it often replaced intensively managed annual crops such as cassava. The impact of these land use changes on soil biodiversity remains unknown.

To address this issue, we investigated the impact of land use change from cassava to rubber trees on soil biological diversity (soil fauna, and soil microorganisms, using pyrosequencing approaches), biological activities (soil respiration and metabolic profiles) and soil organic carbon (SOC) content and quality. All these parameters were measured along a chronosequence of rubber plantations in Thailand from 1 to 25 years old compared to cassava fields, the most cultivated cash crop in the area.



Compared to cassava fields, activities and biomass of soil fauna and microbial communities showed significantly higher level in the old rubber plantations (>25 years). However, the soil species richness was lower (case of bacteria) or not significantly different (fungi and soil fauna) in older rubber plantations compared to cassava. The shift from cassava to young rubber plantations resulted in a decrease of most variables measured (activities, fauna density and diversity, SOC) except those related to bacterial and fungal diversity. The soil ecosystem started to recover from this shift after closure of the tree canopy with an important increase of earthworms unlike ants. Interestingly, soil fauna and microbial genetic structure were more impacted by the canopy closure, than by the shift from cassava to rubber plantation.

These results suggest that the replacement of a cash crop by a tree plantation like rubber trees, could represent a suitable alternative in terms of soil functional diversity and activities

Keywords: Tree plantation, Soil macrofauna, Pyrosequencing of microbial community, C sequestration