



Soil biodiversity and soil physical properties in a banana-based agroforestry system

A. Transitioning to Healthy Soils

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Faced with the reduction of natural resources and climate changes, the development of agroecological practices reducing the dependence to chemical input is becoming urgent. Banana-based agroforestry system could be interesting for improving soil carbon storage, reducing erosion and promoting soil biodiversity. In Martinique, innovative banana farmers already started to grow banana for exportation in agroforestry systems. The aim of this study is to evaluate the effect of tree introduction on soil inveterate communities and the soil ecosystem services associated in real condition of production. To this purpose, three banana-based agroforestry fields were compared to three conventional banana fields (without tree). All fields had the same date of plantation, the same agronomic practices and the same soil type to avoid confounding factors. Abundance, biomass and biodiversity of soil macrofauna were measured annually during three years. The last year, soil infiltration rate, soil carbon storage, soil micro- and macro-porosity were measured. Biodiversity results from the first year show a contrasted response of each invertebrate taxa: Isopods, spiders and earwigs abundance were more impacted than other groups and showed a marked increase in agroforestry system. Earthworms abundance was not impacted but there was an increase the epigeic functional group observed only in agroforestry system probably due to an increase of standing litter mass. These trends were mirrored by a slight increase in porosity in the agroforestry systems, that was mostly attributed to changes in micro and mesoporosity. This led to slightly higher water retention capacity and lower soil bulk density in agroforestry systems. Contrastingly, macroporosity and infiltration rates did not change with the system.