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## Effects of Landuse Change on Soil Chemical and Biological Properties in Teapa, Tabasco (SE-Mexico)

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### Abstract

SE Mexico has suffered in the past 60 years severe land use changes, resulting in the nearly disappearance of tropical forests and the pollution of the environment due to the intensive application of agrochemicals. We studied the effect of land use change on soil chemical and physical properties, earthworm communities, and litter decomposition in three different ecosystems: (1) banana plantations, (2) agroforestry systems, and (3) succession forests, along the floodplain of the river Teapa, Tabasco. In each site earthworms were collected (after the TSBF Methodology) and soil was sampled for further chemical analyses to determinate texture, content of nutrients, interchangeable cations, and pH value. Additionally, a litter decomposition experiment was carried out (litter bag technique) using two different leaf-litters: *Bravaisia integerrima*, a dominant tree from the original lowland riparian forests and *Musa acuminata* (banana leaves).

Soil analyses showed a significant lower content of soil organic matter and total nitrogen in managed ecosystems in comparison to the forests. Furthermore, pH values were significantly lower in two of the managed ecosystems, reflecting the adverse effect of the intensive use of ammonia fertilisers. Soils in managed ecosystems presented also high content in potassium and phosphorus, due to fertilisation of banana plants. Moreover, high content of Mn and Zn were determined in the managed systems, as a result of the intensive use of fungicides.

The study of the earthworm communities revealed higher diversity, density, and biomass of earthworms in banana plantations and agroforestry systems. However, most of these species were exotic, whereas in the forests most of the species were native, showing that the land use change had a negative effect on the local biodiversity.

Litter decomposition was not directly affected by the land use, since the activity of the soil biota was mainly determined by the microclimate within the plots. Nevertheless, banana leaves decompose much slower than the leaves from *B. integerrima*, due to content of lignin and higher C/N ratio retarding the reintegration of nutrients into the soil.

We concluded that the intensive management practice of the banana plantations in the study area did not affect soil fertility negatively.

**Keywords:** Earthworms, land use, litter decomposition, soil chemical properties, tropical Mexico