



Influence of land use changes on soil physical, chemical and biological attributes in a family farming settlement in Eastern Amazon, Brazil

Miguel Cooper (1), Selene Cristina de Pierri Castilho (1), José Camilo Bedano (2), Anahi Dominguez (2), Laura Fernanda Simões da Silva (1), and Mariana Nascimento Delgado Oliveira (1)

(1) Universidade de São Paulo, Escola Superior de Agricultura “Luiz de Queiroz”, Piracicaba - SP, Brazil (mcooper@usp.br),
(2) Universidad Nacional de Río Cuarto, Río Cuarto, Córdoba, Argentina (jbedano@exa.unrc.edu.ar)

Soil knowledge and the changes in its attributes due to land use modifications in the Amazon region is important for decision making by family farmers. These farmers have to choose sustainable land use management practices for their survival in the region and, for soil and forest conservation. The study area is located in the Piranheira Prá-ialta Agroextrativist Settlement Project in the county of Nova Ipixuna, Pará, Brazil. The objective of this research is to understand the relations between soil physical, chemical and biological attributes, and how these relations change with modifications in land use. This information is important for defining best management practices for family farming in the region. Two toposequences were chosen, one under native forest and the other under pasture. 40 cm pits were opened with five replicates in three landscape positions (upslope, midslope and downslope). Sampling periods were July/2012 (dry season); January/2013 (beginning of rainy season) and march/2013 (rainy season). Samples were taken for soil particle size analysis, bulk density, particle density, moisture, porosity, water retention, chemical, litter dry matter and macrofauna analysis. Statistical analysis techniques were performed uni and multivariate. No significant differences were observed in the particle size distribution of the studied soils. The soils presented sandy surface horizons with an increase of clay in depth in both land use systems. Soil bulk density values were higher in the surface horizons and, in general, in the pasture toposequence. Differences were also observed in the soil moisture content and litter dry matter which were higher under the native forest, and in the pH and organic matter values which were higher in the pasture. Higher water retention capacity was observed in the surface horizons of the forest when compared to the pasture, corroborating the higher values of macroporosity observed in the forest soils. Due to higher moisture content, litter dry matter, water retention capacity and macropores present in the soils under native forest, a higher diversity and richness of macrofauna species was observed in the forest soils when compared to the pasture. Apart from the higher diversity, exclusive species and individuals with a larger body diameter were also found in the forest. A more detailed analysis of the earthworms, indicates a higher quantity of individuals under pasture, but these have smaller body diameters than the individuals found under the forest. The presence of individuals with larger body diameters influences the development of macropores in the forest surface horizons. Analyzing the influence of macrofauna on the different soil attributes, few changes were observed in the superficial horizons in relation to soil bulk density and total porosity in both land use systems. On the other hand, differences in the size and distribution of pores by the macrofauna were observed. These changes influence directly the soil water dynamics altering, sometimes irreversibly, the soil functioning in different land use systems.