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Impact of land use on physical quality and GHG emissions in the Atlantic Forest Biome

Reginaldo Barboza da Silva¹; Marina Pedroso Carneiro¹; Ana Paula Parker²; Piero Iori³; Francisca A. Melo Silva¹

UNESP¹; EMBRAPA MEIO AMBIENTE²; UFG³

In Brazil, land use and occupation in environmentally vulnerable areas protected by law has been a recurring practice and difficult to combat. Permanent preservation areas (PPPs), especially those adjacent to the watercourses, are used by agricultural activities, causing land losses and soil degradation. The objective of this study was to assess the impact of soil use in the physical quality and emission of greenhouse gases (GHG) in PPPs of the Atlantic forest biome. The study was conducted in Haplic Cambisol (Inceptsol), located in marginal strips of vegetation (70 m) adjacent to the Ribeira de Iguape River, in Registro, a county in the South of São Paulo State, Brazil. There were identified and selected four kinds of land use in the experimental area: banana cultivation (BC), extensive pasture (EP) and native forest (NF). Physical and chemical soil analyses were carried out to assess bulk density, macro and microporosity and total porosity, total organic carbon (TOC), mean weight-diameter of soil (MWD), stability index (SI) and soil erodibility (SE). Soil analyzes were evaluated according to Embrapa (2011). The method used to capture GHG was the closed chamber. Subsequently, from GC Shimadzu® gas chromatograph model GC 2014, N₂O and CO₂ concentrations were determined by ECD (electron capture) detector, operating at 300°C, and CH₄ concentrations by type detector FID (flame ionization). The results from this study showed that, BC area had an average annual loss of 10 times greater than EP, even with higher soil organic matter and structural stability. The values for CO₂ and N₂O emission were higher in EP, probably due to the type of vegetation, presence of animals, soil exposure to solar radiation and soil compaction by animal trampling. MN area had higher CH₄ emission values, probably due to the humidity, favoring anaerobic respiration and greater presence and mineralization of soil organic matter. About soil erodibility and GHG emissions, in the BC area lowest rates of gas emissions found are due to the loss of soil physical properties related to soil structure, to the transport and eluviation of particles, and losses the chemical fertilizers in these areas.

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<https://www.21wcsc.org>
21wcsc@21wcsc.org
commercial@21wcsc.org