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Effect of different crops on soil organic matter and biological activity in Oxisols under three different crops

Diana Marcela Toledo (1), Silvia Arzuaga (1), Humberto Dalurzo (1), Raúl Zornoza (2), and Sara Vazquez (1)

(1) Universidad Nacional del Nordeste (UNNE), Facultad de Ciencias Agrarias. Department of Soil and Water. Soil Research Group, Corrientes, Argentina (marcelatoledo94@hotmail.com.ar) , (2) Universidad Politécnica de Cartagena, ETSIA, CYTA, Cartagena, Spain (raul.zornoza@upct.es)

The objective of this work was to evaluate changes in soil organic matter in Oxisols under different crops compared to native rainforest, and to assess if acid phosphatase activity (APA) could be a good indicator for SOC changes and soil quality. The experimental design consisted of four completely randomized blocks with four treatments: subtropical rainforest (F); yerba mate crop (I) (Ilex paraguariensis SH.); citrus crop (C) (Citrus unshiu Marc); and tobacco crop (T) (Nicotiana tabacum L.). Soil samples were taken at 0-10; 10-20 and 20-30 cm depths. The variables measured were soil organic carbon (SOC), APA, clay content, pH, total nitrogen (Nt), available phosphorus (P) and CO_2 emissions. All data were analyzed by ANOVA to assess the effects of land-use changes. The treatment means were compared through Duncan's multiple range tests ($p<0.05$). The relationship between variables was determined with a simple correlation analysis and with a multiple linear regression analysis through the stepwise method. These soils showed an acid reaction and their clay content was over 650 g kg-1 for the three depths. SOC and N contents were higher in native soils, intermediate for the citrus crop, and lower under both tobacco and yerba mate crops. CO_2 emissions were higher in the rainforest (47.32 kg ha-1 of CO_2) than in cultivated soils, which indicates that biological activity is enhanced in rainforest soils where substrates for soil biota and fauna are more readily available. The variability of 76% in APA was explained by total nitrogen, which is closely related to soil organic matter, and by available P. Conversion of subtropical rainforests into agricultural lands reduced SOC content and acid phosphatase activity, thereby lowering soil quality. In this study, acid phosphatase activity proved to be a sensitive indicator to detect changes from pristine to cropped soils, but it failed to distinguish differences among crop systems.