Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Changes in Soil Characteristics of A Calcisol under Different Land Use Systems in Northeastern Mexico

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Abstract

The changes in land use cause variations in the physical and chemical characteristics of soil, especially in the content of the organic matter. The present study aims to quantify the changes in the physicochemical characteristics of a Calcisol in three land uses in the Northeast of Mexico: Native Vegetation Area (AVN), Cropland Area (AA) and Livestock Area (ASP). Four composite soil samples were taken at 0–5 and 5–30 cm depth from each land use plot. The variables Bulk density, Texture, Mechanical resistance to penetration, Organic matter, pH and Electrical conductivity were determined. The analysis of variance showed differences ($p \leq 0.05$) in the organic matter with values of 4.2 % for AVN, 2.08 % for ASP and 1.19 % and for AA. The texture was classified as clay loam for AA, silty loam for ASP and loam for AVN showing differences ($p \leq 0.05$). The soil under the three types of land use presented low salinity (70.2 to 396.0 μS cm^{-1}) showing differences ($p \leq 0.05$) at both depths. The soil hardness showed differences ($p \leq 0.05$) between plots. The AA showed lower values (0.78 kg cm^{-2}), contrasting with the values obtained for ASP (2.98 kg cm^{-2}) and AVN (3.10 kg cm^{-2}). The pH and bulk density did not show differences ($p > 0.05$); the pH was classified as moderately alkaline (7.3 and 8.0). On the other hand, the decrease of the soil's organic carbon in the first 5 cm depth was up to 71.6 % when cultivating an area over a period of 60 years that was originally a thornscrub. Furthermore, the abandonment of the cropland for the establishment of a grazing system in a period of 15 years led to a re-accumulation of organic matter up to 21.2 %.

Keywords: Calcisol, land use systems, Northeastern Mexico, organic matter, physicochemical characteristics

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