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Total organic carbon in caatinga area under different land uses in the municipality of Sertânia, Pernambuco.

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The dynamics of total organic carbon (TOC) are influenced by various elements, such as climatic conditions, soil composition, vegetation, and primarily, the land management practices employed. Evaluating TOC can demonstrate how different land use practices impact the quantity and distribution of carbon in the soil. In light of this, the objective was to quantify the total organic carbon of the soil under different land uses in the Caatinga biome. Soil samples were collected from permanent plots of long-term ecological studies by the INCT - National Observatory of Water and Carbon Dynamics in the Caatinga Biome - located at the experimental station of the Agronomic Institute of Pernambuco, in the municipality of Sertânia. Each plot area included the following types of vegetation cover, used for livestock purposes in the Caatinga Biome: closed caatinga (CF); open caatinga (CA); and pasture (PA), determined by their vegetation stratum. In each land use system, two plots of 25 x 25 m (625 m²) were delimited, with a useful study area of 20 x 20 m (400 m²), and each plot was surrounded by a border of five meters in width along the entire perimeter. Samples were collected from the border of each plot, consisting of six simple soil samples (0-20 cm), in which the total organic carbon content was quantified. TOC determinations were performed according to the procedure proposed by Embrapa 2019. The data were subjected to ANOVA and Tukey's test at 5% significance level. The plots with CF and CA vegetation did not differ from each other, with 13.82 g.Kg⁻¹ in CF and 15.65 g.Kg⁻¹ in CA, differing from PA, where the content was 11.63 g.Kg⁻¹. The results revealed significant variations in TOC content among different vegetation covers. In CA and CF areas, vegetation in different stages of succession was identified, presenting a wide variety of medium and large-sized species. This scenario contributed to greater litter deposition in the soil and consequently higher levels of TOC compared to PA, which has a lower variety of species and pioneer vegetation. These findings highlight the importance of plant diversity and sustainable cultivation practices in increasing and maintaining soil carbon, emphasizing the need to preserve and reforest areas with native vegetation, contributing to the mitigation of climate change effects and the production of ecosystem services.

Keywords: soil management, land use practices, total organic carbon dynamics.

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