

Organic carbon stock in the soil in silvipastoral system compared to adjacent areas with eucalyptus monoculture, grassland and native forest savannah, in the region of Minas Gerais, Brazil

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Introduction

The management system and type of cultivation change the soil chemical properties. The depth is related to the nutrient content available to plants, generally with a decrease of nutrients when increasing depth.

Different soil management practices influence the cycling rate and organic carbon content and N. The conversion of native forests in areas of cultivation is usually accompanied by a decrease in the amount of organic matter in the soil, caused by the increase mineralization rate.

Much of eucalyptus plantations in Brazil has been held in the cerrado region, mostly in pasture areas. However, little is known about changes in soil with the use of this practice.

The objective of this study was to evaluate the stock of total organic carbon on the soil (TOC) in silvipastoral system, with eucalyptus compared to adjacent areas of single pasture, eucalyptus monoculture, and native cerrado vegetation.

Materials and Methods

This study was conducted in Votorantim Steel Company area, Northwest region of the state of Minas Gerais, Brazil. The natural vegetation is characteristic of the cerrado biome. The soil is classified as dystrophic Dark-Red Latosol, clay texture (71.7% clay, 14.4% silt and 13.9 of sand), cerrado phase, low fertility and high acidity. The silvipastoral system was deployed in the area formerly occupied by the pasturage of *Brachiaria brizantha* (Hochst. Ex A. Rich.) Stapf cv. Marandu, maintaining the fodder and implementing hybrid clones of *Eucalyptus urophylla* in the spacing of 2x2x10 m (12 m²/tree). Eucalyptus monoculture was implemented in pension scheme after clearcutting, spaced 3x3 m. The experiment was carried out in a completely randomized design (CRD) with 4 treatments (grassland, silvipastoral system, eucalyptus and cerrado) and 3 replications. Soil samples were collected at random in each of these areas, being 12 single samples at depths of 0-20 and 20-40 cm, which were then homogenized, totaling 3 composite samples (coming 4 single samples) of each area to assess the stock of TOC. Data collection was conducted with the aid of a probe 40 cm (S-40). The TOC data at the same depth were subjected to analysis of variance, and when significant differences between treatments, by the F test, there were performed mean comparisons by the Tukey test at 5% error probability.

Results and Discussion

The average organic carbon (TOC) in soil, compared by Tukey test ($p \leq 0.05$) in 0-20 and 20-40 cm in area pasture, eucalyptus, natural vegetation of cerrado and silvipastoral system is shown in Figure 1. It was observed in the eucalyptus greater accumulation of C organic (TOC) in the two studied depths differentiating statistically of the others, as shown in Figure 1. The silvipastoral system, the six years after implantation, the depth of 20-40 cm had the upper TOC to the cerrado.

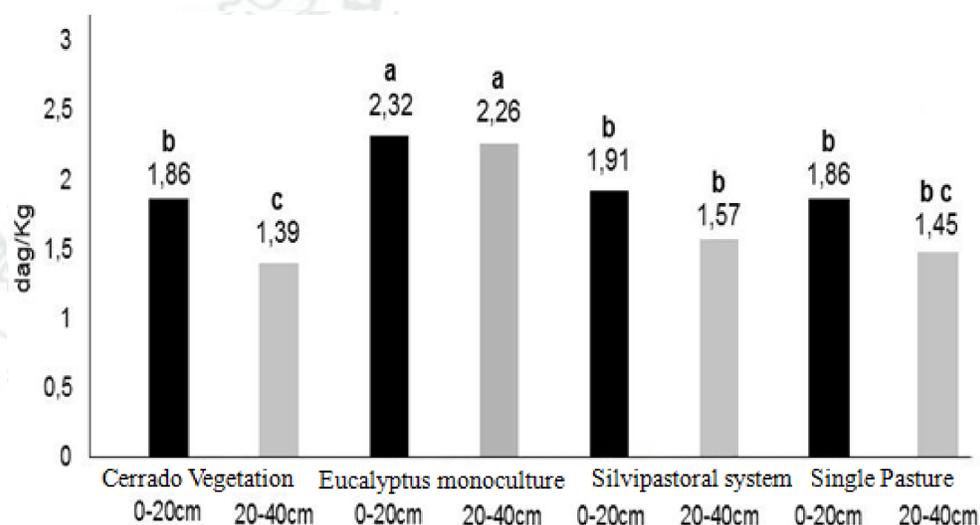


Figure 1: Total organic carbon concentration (TOC) in the depths of 0-20 cm and 20-40 cm in cerrado soil settlement, eucalyptus, silvipastoral system and pasture, in the city of Vazante - MG. Different letters in the middle of the same depth indicate significant differences by Tukey test at 5% error probability.

Final Considerations

The management and land use alter the organic carbon content and the depth is related to its concentration in certain farming systems. The highest concentrations of TOC were found in eucalyptus plantations in both depths evaluated, the silvipastoral system introduced C total soil organic depth of 20-40 cm higher than the cerrado.

Acknowledgement

Capes;
CNPq;
Federal Institute of Espírito Santo;
Federal University of Espírito Santo