EVALUATION OF SOIL C:N RATIO IN INTEGRATED SYSTEMS AND GRASS IN MONOCULTURE IN THE BRAZILIAN CERRADO

AVALIAÇÃO DA RELAÇÃO C:N DO SOLO EM SISTEMAS INTEGRADOS E FORRAGEM EM MONOCULTURA NO CERRADO BRASILEIRO

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Abstract

The carbon (C) and nitrogen (N) contents of the soil, when associated through the C:N ratio, make it possible to obtain indices that reveal the quality of soil organic matter (OM), as well as the decomposition efficiency, conversion efficiency of carbon and organic nitrogen into their mineral forms, and the dynamics of these nutrients in the soil. According to the literature, the C:N ratio can be between 30 - 100 in native forest areas and 20 - 30 in cultivated areas. The objective of this work was to evaluate the relationship between soil carbon and nitrogen in integrated systems, monoculture pasture, and native Cerrado forest. Undeformed soil samples were collected once at a site located in the municipality of Barbacena, MG, at depths 0-5 cm, 5-10 cm, 10-20 cm and 20-30 cm in four distinct areas, designated as treatment 1: pasture monoculture (MP) of *Urochloa decumbens* cv. Basilisk with 27 years of plantation; treatment 2: grass-legume combination (GLC), composed of *Urochloa decumbens* cv. Basilisk and *Arachis pintoi* cv. Amarillo with 25 years of plantation; treatment 3: silvopastoral system (SSP), composed of *Eucalyptus urophylla* planted 13 years ago in an area where *Urochloa decumbens* cv. Basiliskwas was already established for 14 years; and treatment 4: native forest (NF) of the Cerrado biome with 37 years of regeneration. The quantification of total organic C was performed according to the method proposed by Yeomans and Bremmer (1988); and the determination of total N was performed as proposed by Bremner and Mulvaney (1982) and adapted by Mendonça and Matos (2005). The experimental design completely randomized, with five replications in each treatment. The data were submitted to statistical analysis using the Kruskall-Wallis test and Dunn's test. The NF system showed the highest C:N ratio at all evaluated depths (32.3 – 40.6), being statistically similar to MP (30 – 37) and SSP (25.5 – 28.5). The CGL system did not show statistical similarity with MP and FN, but it was equal to SSP ($p<0.05$). The higher C:N ratio found in the native forest may be an inherent factor of the diversity of species in this system, which contains higher levels of compounds such as lignin and polyphenols that decompose slowly. When evaluating the C:N ratio in integrated systems, the lower C:N ratio in CGL can be explained by the presence of the legume, which produces residues with a low carbon:nitrogen ratio in the soil due to the high availability of N in its biomass. In SSP, the C:N ratio found between 25 and 28.5 indicated that the presence of the tree component favored the entry of nitrogen into the soil when compared to forage in monoculture. The C:N ratio in SSP and CGL indicated that these nutrients did not undergo immobilization in the soil, or excessive mineralization, causing a balance between C input and output, favoring nutrient cycling and OM mineralization. The data from this study indicate that integrated systems are capable of promoting better soil conditions for the decomposition of organic matter and nutrient cycling in comparison with the non-integrated systems.

Keywords

Organic matter, nutrient cycling, integrated systems.