# EVALUATION OF MICROBIAL BIOMASS CARBON IN INTEGRATED SYSTEMS AND MONOCULTURE PASTURES

## AVALIAÇÃO DO CARBONO DE BIOMASSA MICROBIANA EM SISTEMAS INTEGRADOS E MONOCULTURA DE FORRAGEM

Eduardo Affonso de Faria*[1]; Camila Eduarda Souza de Sousa[1]; Beatriz Moretto[1]; Francisco Paulo Amaral Junior[1]; Ana Cláudia Ruggieri[1]; Abmael da Silva Cardoso[2]; João Carlos de Carvalho Almeida[3]

[1]Paulista State University, Animal Science Department, Jaboticabal - SP, Brazil;
[2]University of Florida, Animal Science Department, Ona - FL;
[3]Federal Rural University of Rio de Janeiro, Animal Science Department, Seropédica - RJ, Brazil.
*Corresponding author: eduardo.affonso@unesp.br

**Abstract**

Integrated production systems can stimulate the growth and reproduction of soil microbiota responsible for nutrient cycling. The use of quality indicators such as soil microbial biomass carbon (SMBC) can help formulate strategies that preserve organic matter and enable more sustainable production systems. The objective of this study was to evaluate soil microbial biomass carbon in integrated production systems, a monoculture system of pasture, and native Cerrado forest. Undeformed soil samples were collected 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, formed by treatment 1: monoculture to pasture (MP) of *Urochloa decumbens* cv. Basilisk; treatment 2: combination of legumes and grasses (CLG) composed of *Urochloa decumbens* cv. Basilisk and *Arachis pintoi* cv. Amarillo, with a history of conventional cultivation; treatment 3: silvopastoral system (SSP), composed of *Urochloa decumbens* cv. Basilisk and *Eucalyptus urophylla*; and treatment 4: native forest (NF) of the Cerrado biome, with 37 years of regeneration. To determine the carbon in the biomass, the fumigation-extraction method proposed by Vance et al. (1987) was applied, with fumigation and the addition of chloroform (without alcohol) in the sample, as suggested by Brookes et al. (1982) and Witt et al. (2000). The experimental design was completely randomized, with five replications in each treatment. The data obtained were submitted to statistical analysis using the Kruskall-Wallis test and Dunn's test. The microbial biomass carbon reached the lowest level in CLG and highest in FN, with statistical differences in the deeper layers and no statistical difference just in the surface layer (0-5cm). MP and SSP treatments did not differ from FN. In the CLG system, the results found corresponded to 153.1, 152.9, 132.6, 91.3 in layers 0-5, 5-10, 10-20 and 20-30 respectively, while in the FN system, the values were 295. 7, 265.5, 235 and 235 in the corresponding layers. The CLG system contained on average 49% less carbon in the microbial biomass compared to NF, while the silvopastoral system averaged 8%, and the pasture monoculture had a 12% difference. The higher carbon content of the microbial biomass in the areas of native vegetation, silvopastoral system and monoculture pasture may be a reflection of the continuous supply of organic materials from the litter and rhizosphere, associated with the absence of soil disturbance, constituting a favorable factor for survival and growth of different groups of microorganisms; while the low SMBC in CLG can be explained by the rapid decomposition of organic matter, which has low C:N ratio, and also can be associated with lower litter deposition, limiting microbial activity. Since there was no difference in CBMS between treatments in the 0-5 cm layer, where there is a greater predominance of *Arachis pinto*i roots, we infer that the fibrous root component present in SSP, MP and NF substantially contributed to the growth of microbial biomass in the subsurface soil layers, providing these systems with better nutrient cycling.

**Keywords:**

Cerrado biome, grass, microbial biomass, native forest.