TITLE: ENZYMATIC ACTIVITY OF MICRORGANISMS IN SOIL UNDER SILVIPASTORIL SYSTEM

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ABSTRACT:

Silvopastoral systems broaden, and the main benefits are sustainable yield potential, rural activity diversification, animal welfare and soil conservation, as well as favoring microbial activity and biodiversity. We aimed to evaluate the effects of silvopastoral system in the enzymes alkaline and acid phosphatases, urea and arginase in an Oxisol. Soil samples were collected on the surface (0-5 cm) and underground (60-100 cm) of the soil and at differents distances (0.5, 1.5, 3 and 7 meters) from *Eucalyptus grandis* rows. The treatments were: silvopastoral systems (SPS), eucalyptus seeded 2 x 15 m with *Urochloa brizantha* cv. Piatã deployed in 2009 with 333 trees.ha-1 (1) and with 166 trees ha-¹ (2); SPS deployed in 2011 with 333 trees.ha-¹ (3); and with 166 trees ha-¹ (4); *U. brizantha* cv. Piatã in monoculture deployed in 2009 (5); The same pasture in 2011 (6) and Cerrado (7). Conducted at Embrapa Milho and Sorgo, Sete Lagoas, MG, in a completely randomized design in split-split-plot (7x4x2). The activity of arginase (AR) and urea (UR) enzymes were obtained by the quantification of ammonium released by the hydrolysis of arginine and urea, by the colorimetric method. Acid phosphatases (FAC) and alkaline phosphatases (FAL) quantified by the Tabatabai and Bremner methods. According to ANOVA, the SNK test ($p \leq 0.05$) showed that the UR differed between the SPS, treatments 1 and 2 showed higher activity (433.68 and 367.21 μmol N-NH4 + g MF-1 H-1) in the soil surface layer (0-5 cm) than the treatments 3 and 4 (208.41 and 232.41 μmol N-NH4 + g MF-1 h-1). For AR, in the subsurface layer, silvopastoral systems did not differ, and in the surface layer SPS 1 (21.95) was superior to SPS 3 (15.73) and 4 (15.05). In the cerrado it presented activity of 226.77 μmol N-

NH4 + g MF-1 h-1 of UR. In the pasture (5), the FAL was 5.213 and 1.940 μmol NPP g MF-1 h-1 in the surface and subsurface layers. For FAC, we verified differences between the systems, distances and depths evaluated. In general, the enzymes in the surface were higher, regardless of the time of implantation and distance of rows, probably by the higher microbial biomass. On the other hand, the activity of UR and AR in relation to distances of the rows do not differ in silvopastoral systems, but only between soil layers. The enzymatic activity generates fast responses to changes in the environment and has high potential in the soil quality evaluation. SPS have a positive influence on microbiological activities.

Keywords: Soil quality, arginase, urease, phosphatase, integrated systems

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