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Spatial and temporal variations of soil water in an integrated crop-livestock-forestry system

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Introduction The reduction in water availability in soil adversely affects the growth and development of plants. Thus, the productivity of an integrated crop-livestock-forestry system (iCLF) is also directly influenced by available soil water (Sinclair et al., 1986). This study aimed to monitor the spatial and temporal variations of water tension in the soil in an iCLF in the Cerrado.

Material and Methods The study was conducted in a iCLF deployed in a clayey Rhodic Ferralsol (Oxisol) located within the city limits of Cachoeira Dourada, GO, Brazil (18°27'43"S, 49°35'58"W). The period of Dec. 2012 to July 2013, including part of the rainy and dry seasons, was evaluated when the system was in its 4th year of establishment, having trees (*Eucalyptus urograndis*) and pasture (*Urochloa brizantha*). The iCLF was established planting the trees in triple rows spacing 2 m between plants and 3 m between rows. The spacing between the triple rows was 14 m. To monitor the water tension in the soil three tensiometer sets were used in three monitoring sites. Water tension was measured in the tree line (0.0 m) and 3.0 and 6.0 m off this line towards the middle of the pasture at three depths (0.10, 0.40, and 0.80 m), totaling 27 tensiometers. Readings were taken every 48 hours using a digital tensiometer, until the tensiometer stopped working due to the drying of the water column in it. To monitor the rainfall a rain gauge was installed near the experiment.

Results and Conclusions Figure 1 demonstrates that from the beginning of December to the beginning of April (rainy season), the soil moisture did not vary with the position of the sampling points and the surface soil layer contained more water than the subsurface soil. From the month of April, there was a reduction in precipitation and, consequently, a reduction in soil moisture, which was more pronounced near the tree rows in all soil layers, which is explained by the different consumption of water by the trees and the pasture.

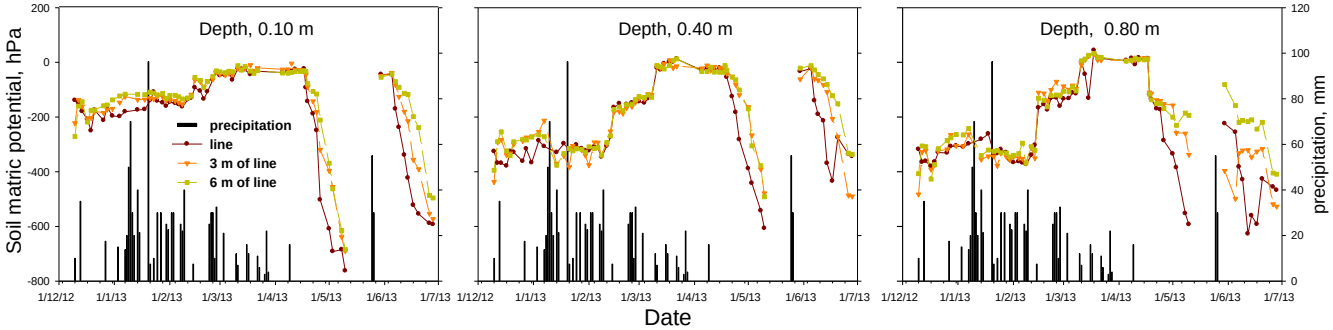

Figure 1. Soil matric potential and precipitation in an integrated crop-livestock-forestry system

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