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Soil Cover Plants and Physical-Hydrical Attributes of a Rhodic Haplustox in Organic Production System

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Abstract

This work had the objective to evaluate the effect of different soil cover plants on the physical and hydrical attributes of a Rhodic Haplustox in an organic production system, under two tillage systems, no-tillage (SPD) and conventional tillage (SPC). In each soil tillage system the following cover plants were evaluated: velvet bean (*Mucuna aterrima*), sunn hemp (*Crotalaria juncea*), pigeon pea (*Cajanus cajan*), sorghum (*Sorghum technicum*), and fallow. Soil physical and hydrical attributes and aggregation status was analysed in the soil layers of 0–10, 10–20, and 20–30 cm depth. The experiments were carried out at the experimental area of Embrapa Rice and Beans, in Santo Antônio de Goiás, Goiás State, Brazil. The experimental design was a randomised block, in $2 \times 5 \times 3$ factorial scheme, with four replications. The soil cover plant management was done at flowering. The cover plant straw stayed on the soil in SPD and it was incorporated at soil profile in SPC. The soil water retention, evaluated by retention curves, was affected by soil tillage systems and cover plants. In the superficial layer, 0–10 cm deep, there was higher soil water retention in no-tillage system. In this system, at 0–30 cm deep, the soil cultivated with legumes showed higher soil water retention than that cultivated with sorghum or in fallow. The soil aggregation status was influenced by soil tillage system. The percentage of aggregates with diameter higher than 2 mm and the mean weight diameter of aggregates was higher in SPD than in SPC, at 0–10 cm and 10–20 cm soil layers. A positive correlation between these variables and soil organic matter was observed in SPD. In both tillage systems, soil organic matter content decreased with soil depth.

Keywords: Leguminous, no-tillage system, soil aggregation, soil water retention