TITLE: SOIL QUALITY INDICATORS IN PREPARATION SYSTEMS AND LEVELS OF RESIDUAL STRAW IN SUGAR CANE

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ABSTRACT: Loss of soil quality due to excessive mechanized preparations in sugarcane crops, may result in large losses of the soil quality. The maintenance of soil straw can be a solution to alleviate such disturbances. Thus, the soil microbial biomass can be used as an indicator of soil quality by presenting short-term changes. The aim of this study was to evaluate the effect of conventional soil preparation or no-tillage of sugarcane associated with residual straw levels in the soil microbial biomass attributes. The work was carried out in a Distroferric Red Latossol in Dourados, MS. The experimental design was in randomized blocks, with four replications, in a split-plot scheme. The plots composed by no-tillage systems (NT) and conventional preparation (CP), applied in sugarcane planting in 2013, the subplots by residual straw levels: without withdrawal (100%), partial withdrawal (50%) and total withdrawal (0%), applied annually after harvesting. Samples were collected in the depth of 0-10cm, in two seasons (September and April). The carbon of microbial biomass (CMB) was evaluated by the fumigation-extraction method, and basal respiration (BR) obtained by the method of fumigation incubation, the metabolic quotient (qCO_2) by the ratio of CMB/ BR and the microbial quotient (qMIC) by the ratio of CMB/ C-Total organic. Organic matter (OM) was determined by the dry combustion method. The averages were compared by the Tukey test at 5% probability. There was no interaction between the preparation systems and straw levels. The CMB and RB were higher in the CP in the first evaluation, however for RB in the second evaluation, the NT was higher (23.61 μg C-CO_2 g^{-1} soil day^{-1}). For CMB the maintenance of 100% of the straw showed an average of 227.56 μg C g^{-1}, than treatment 0% with 131.76 μg C g^{-1}. The qCO_2, which indicates possible disturbances in the system, was not influenced by the handling. The maintenance of the straw promoted an increase in soil OM, with 100% (33.80 g kg^{-1}) was higher than 0% (30.78 g kg^{-1}). The same occurred for qMIC, the lowest value was observed in 0% (0.74%). The highest OM contents were in the CP in both evaluations. CP and maintenance of 100% of the straw benefited the accumulation of OM and the attributes of microbial biomass. The CP and the annual gathering of 50% of the residual straw did not negatively affect soil quality indicators after five harvests.

Keywords: microbial activity, carbon, no-tillage, organic matter