



Impact of charcoal waste application on the soil organic matter content and composition of an Haplic Cambisol from South Brazil

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In some regions in Brazil, charcoal is usually applied to the soil with the purpose to improve its fertility and its organic carbon (SOC) content. In Brazil, the use of charcoal waste from steel industry with agronomic purposes represents also an alternative and sustainable fate for this material. In this context, the objective of this work was to evaluate the impact of Eucalyptus charcoal waste application on the SOC content and on the soil organic matter (SOM) composition. Increasing doses of charcoal (0, 10, 20 and 40 Mg ha⁻¹) were applied to an Haplic Cambisol, in Irati, South-Brazil. Charcoal was initially applied on the soil surface, and then it was incorporated at 10 cm with a harrow. Soil undisturbed and disturbed samples (four replicates) were collected in September 2011 (1 y and 9 months) after charcoal incorporation. Four soil depths were evaluated (0-5, 5-10, 10-20 and 20-30 cm) and each replicate was composed by three subsamples collected within each plot. The soil samples were air dried, passed through a 9.51 mm sieve and thereafter through a 2.00 mm sieve. The SOC content and total N were quantified by dry combustion. The SOM was concentrated with fluoridric acid 10% and then the SOM composition was evaluated by thermogravimetric analysis along the soil profile. The main impact of charcoal application occurred at the 0-5 cm layer of the area treated with the highest dose: SOC content increased in 15.5 g kg⁻¹ in comparison to the soil without charcoal application. The intermediary doses also increased the SOC content, but the differences were not significant. No differences for N content were found in this soil depth. Further results were observed in the 10-20 cm soil depth, where the highest dose increased the SOC content and N content. Furthermore, this treatment increased the recalcitrance of the SOM, mainly at the 0-5 cm and 10-20 cm soil layers. No differences between doses of charcoal application were found in the 20-30 cm soil depth, suggesting that the charcoal has not migrated so deep in soil even after almost two years of its incorporation.