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Effects of municipal solid waste compost and sewage sludge on soil organic matter mineralization

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Organic residues applied to soils are expected be undergo biodegradation, depending, among other factors, on the amendments stabilization degree. The mineral substances that are released through the biodegradation processes allow the estimation of the amount of organic matter that the amendments promoted in the soil.

This work aims at studying the carbon mineralization (C-CO_2) on a *Haplic Podzol* (PZha) and on a *Calcic Vertisol* (VRcc), amended with 30 and 60 Mg ha^{-1} of sewage sludge and municipal solid waste (MSW) compost, using a laboratorial instrumental device.

For the experimental incubation, three replicates of each soil-organic amendments mixture were placed in an erlenmeyer and ultra pure water was added until 75 % of its water-holding capacity was reached. The erlenmeyers were closed and put into a water-bath during 28 days, at 28 ºC. Unamended soils were used as controls. The CO_2released from the microorganisms breath was measured everyday, during the first 10 day period, and then every 3 days until the 28^{th} day.

The complementary carbon mineralization (CCM) and the kinetic carbon mineralization parameters (mineralizable carbon quantity and kinetic coefficient) were determinate.

To evaluate the effect of the experimental treatments on the CCM and on the kinetic carbon mineralization parameters, the results were submitted to an analysis of variance and to the Duncan test (p = 0.05).

The PZha and VRcc total carbon content were 6.8 and 1.1 g kg^{-1} in the respective

soils, and the sewage sludge and the MSW compost organic matter content were 544 and 545 g kg^{-1}, respectively.

The different soil type studied influenced the carbon mineralization ($p \leq 0.01$), being higher in the PZha one. The experimental treatments were significantly different among themselves ($p \leq 0.001$) and the highest carbon mineralization occurred with 60 Mg ha^{-1} of sewage sludge in the PZha soil. Sewage sludge showed a tendency to induce a higher carbon mineralization than the MSW compost, although without statistical differences. It seems that the carbon mineralization occurred in two distinct phases, being faster during the first week of incubation, comparing to the following ones.