

Organic residual management and soil physical properties

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Urban population growth promoted a significant increase in the production of organic wastes. The treatment of these residues generates an organic matter rich material (sludge), its adequate final disposal being a fundamental issue in respect to the preservation of natural hydrological resources. One of the disposal alternatives is its use as fertilizer and soil conditioner. This disposal on agricultural land can, however, promote changes on soil physical properties, as it is the case of bulk density, surface sealing, and resistance to penetration and water transport. The objective of this research was to study soil physical alterations due to the application of increasing rates of urban and industrial sludge.

The experiment is being carried out at Jaguariúna, SP., Brazil, being 2001 the 3rd of the eight-planned years. The chosen crop was corn (*Zea mays* L.). For this part of the project, 288 undisturbed samples were collected with the aid of aluminum cylinders, on plots which received inorganic fertilizer (based on soil analysis), with and without sludge at rates equivalent to 10 t, 20 t, 40 t and 80 t. With soil samples the following hydric and physical properties were measured: bulk density via volumetric ring, gamma-ray transmission, and gamma-ray computed tomography, and saturated hydraulic conductivity. Under field conditions, 36 water infiltration tests were also carried out.

The gamma-attenuation method opened the possibility to observe that the differences in soil bulk density due to superficial sealing were significantly higher in relation to values measured at greater depths. At greater depths methods did not differ significantly. The tomographic analysis also confirmed surface sealing, showing higher values at the surface, in relation to greater depths. Results show, in general, that the application of sewage sludge promotes surface sealing affecting water infiltration into the soil.

Keywords: computed tomography, gamma-ray, soil bulk density, sealing, sewage sludge