TITLE: MICROBIAL ACTIVITY IN THE SOIL AFTER SEWAGE SLUDGE APPLICATION

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ABSTRACT:

Soil is a vital resource for the maintenance of the terrestrial ecosystem, and the role that microorganisms play is fundamental for soil quality and function preservation. Soil quality can be evaluated physically, chemically and biologically. In this way, the microbial activity, specifically the respiration, can be used to evaluate the impact that different residues, such as sewage sludge, may cause when applied in the soil as an alternative to mineral fertilizer. The respirometric method by Bartha and Pramer has been applied in Brazil to determine the microbial activity in the soil, and to infer biodegradability rates, that is, to establish the degree of biodegradation or the persistence of pollutants and residues in the soil. This experiment is based on the determination of CO_2 released by the microorganisms in the soil during the biodegradation process. The present study evaluated the microbial activity in the soil with two different dosages of sewage sludge, 25 and 50%. The sewage sludge used in this study was from a sewage treatment plant located in the Metropolitan Region of Campinas – SP and was collected after the residue undergoes the centrifugal dehydration process. The soil samples used were a tropical natural type of soil, collected at 20cm depth on the University of Sao Paulo (USP) campus, located in the city of Itirapina/Broa - SP. In order to evaluate the microbial activity in the presence of sewage sludge, 50g of soil was used in dry base for the control samples and the proportions of sludge for the 25 and 50% concentration, in triplicate, and then the respirometers were incubated in a controlled temperature of 28 ± 2oC. From the quantification of the CO_2 produced during the studied period, it was observed that the soil sample with 50% of sewage sludge presented greater microbial activity, evaluated by respiration, evidencing that the microorganisms in this sample had a better degradation efficiency when compared to the sample with 25% of sewage sludge and the control. This also indicates that the heterotrophic bacteria and fungi in the soil readily assimilate the organic carbon of the sludge. In this study, it was also used the Ford-Walford mathematical model in order to verify the limit value of stabilization of CO_2 production.

KEYWORDS: Respirometry; Sewage sludge; Microbial degradation

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