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Organic carbon dynamics and enzyme activities in agricultural soils amended with biogas slurry, liquid manure and sewage sludge

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ABSTRACT

The application of organic soil amendments is a common practice for increasing soil fertility and soil organic carbon (SOC) content. In recent years, a new product from biogas production, biogas slurry is increasingly applied to agricultural soils, although little is known about its effects on soil properties. In this study, the influence of this new product in comparison with liquid manure and sewage sludge on the organic carbon dynamics and enzyme activities were investigated in two different agricultural soils in short-term incubation studies. As a control, biologically inert sand was also amended with these organic wastes. In sand, biogas slurry degraded to 10.4% within 14 days, while no differences were found between the degradability of liquid manure and sewage sludge with 6.6% and 5.4%, respectively. However, although the degradability of biogas slurry was highest among the organic amendments, liquid manure application resulted in the highest respiration rates in the soil samples. This was likely due to the organic waste borne easily decomposable substrates which were most dominant in liquid manure. Organic waste applications were found to generally increase the activity of numerous enzymes but did not change the soil enzyme patterns. Thus, in general it was shown that the microbial population of the organic wastes will not become prominent when introduced with the manures to soils. Thus, an inoculation with organic waste borne microorganisms could likely be neglected when discussing the extent of organic carbon dynamics after organic waste application to agricultural soils.

KEYWORDS

Biogas Slurry; Organic Wastes; Organic Carbon Dynamics; Enzyme Activity; Priming Effects

Cite this paper

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