

Characterization of Malaysian sewage sludge and nitrogen mineralization in three soils treated with sewage sludge.

ABSTRACT

Studies to determine the chemical composition of sewage sludges produced in Malaysia and potentially mineralisable nitrogen (N_o) and mineralization rate constant (k) of sewage sludge in three Malaysian soils are reported. The sludges collected from ten wastewater treatment plants in Malaysia were acidic in nature and the N, P, K, Ca and Mg contents were variable. The heavy metal (Pb, Cd, Cu, Mn and Ni) concentrations of the sludges, except for Zn, were below the European Union Maximum permitted level in sludges. In an incubation study, three topsoils of Bungor, Jawa and Serdang series were treated with three rates (0, 140 and 420 kg N ha⁻¹) of dewatered sewage sludge and incubated about 60% of the water holding capacity for 12 weeks. Mineralization of N exhibited a slow initial rate, followed by a rapid increase in rate in week 4 to 8. Accumulation of mineral N ranged from 50.5 to 147.6 mg kg⁻¹ soil. Bungor and Jawa series had higher N mineralization than Serdang series. Sludge added at 420 kg N ha⁻¹ resulted in the highest concentration of net mineralised N. Values of potentially mineralisable N, (N_o), and mineralization rate constant, (k), ranged from 23.4 to 137.5 mg N kg⁻¹ soil and 0.036 to 0.082 week⁻¹, respectively. It was concluded that N mineralization of the sewage sludge treated soils was dependent on the application rate of sludge and soil type.

Keyword: Sewage sludge characterization; Nitrogen mineralization; Nitrogen mineralization.