Assessment of a potential agricultural application of Bangkok-digested sewage sludge and finished compost products

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Abstract

A study was conducted to investigate the levels of plant nutrients, heavy metals, parasites and fecal coliform bacteria in Bangkok-produced sewage sludge and finished compost products for potential agricultural application, as well as to compare the quality of compost under different composting conditions. The results indicated that digested sewage sludge had high fertilizing values for organic matter (19.01 ± 0.09%), total nitrogen (2.17 ± 0.07%), total phosphorus (2.06 ± 0.06%) and total potassium (1.16 ± 0.22%), but it was contaminated with human pathogens, including fecal coliform bacteria, viable helminthes egg and active forms of parasite cysts. Thus, fresh sewage sludge should not be disposed on land unless it has undergone pathogen reduction. It is proven that the quality of the sludge mixed with grass clippings at a ratio of 6:1 volume/volume after having passed a windrow composting process for 8 weeks can be classified as class A biosolids as the levels of remaining fecal coliforms were < 3 most probable number g⁻¹ dry solid and all human parasites were destroyed. Concentrations of organic matter, total nitrogen, total phosphorus and total potassium in the finished compost were 16.53 ± 1.25%, 1.39 ± 0.06%, 0.42 ± 0.10% and 1.53 ± 0.05% respectively. The total copper concentration was rather high (2291.31 ± 121.77 mg kg⁻¹), but all heavy metal concentrations were also well below the United States Environmental Protection Agency pollutant limits for land application. The finished compost products can be considered as a soil conditioner as they have relatively low essential plant nutrient concentrations. It is recommended to be initially used for gardening and landscaping to ensure safety utilization.