

EVALUATION OF SEWAGE SLUDGE COMPOST AND OTHER BIOWASTES STABILITY AND MATURITY

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ABSTRACT

Compost stability and maturity are important factors affecting the successful application of composts for agricultural purposes. Application of unstable or immature compost may cause slow plant growth and damage crops by competing for oxygen or causing phytotoxicity to plants due to insufficient biodegradation of organic matter. The objective of this research was to identify physico-chemical and biological characteristics of composted sewage sludge and other biowastes that can be used to predict the potential for plant growth in agriculture, and to compare them with those established as indicators of stability/maturity in the literature. Sewage sludge composts used in the study were collected from Tartu and Kuressaare wastewater treatment plants. Also other biowastes (animal manure and lagoon sludge) were investigated for the same parameters. For physico-chemical analysis total solids (TS), organic matter content as volatile solids (VS), pH, electrical conductivity (EC), water soluble nitrogen ($\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, $\text{NO}_2\text{-N}$) and carbon (TC, TIC, TOC) compounds and BOD and COD in the water extracts were determined. Also phytotoxicity test based on compost extract test was used to evaluate composts maturity. Seed germination, root length and germination index (GI) were determined. For stability investigations oxygen consumption of an aqueous compost suspension (SOUR test) and of a solid matrix (OxiTop[®]) were used. A correlation matrix of the data was also calculated for determining the relationship between different chemical and biological parameters. Organic matter content, VS/TS ratio, EC, TOC, BOD/COD ratio, GI and microbial respiration were quite good indicators to detect differences between stabilised/mature and unstabilised/immature composts. Nitrogen compounds were not suitable compost maturity indicators because $\text{NH}_4\text{-N}$ content was high even in the cured compost, which indicates to anaerobic conditions within the compost pile. Our findings suggest that compost stability and maturity are both needed for compost quality control. The suitability of investigated parameters depended on materials investigated.