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Analysis of Compost Quality with Time after Mixing with Different Weight Percentages of Dried Sludge from Wastewater Treatment Plants

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Abstract

Composting is the aerobic biological decomposition of organic waste which turns unusable biodegradable solid waste into a valuable soil amendment. This study was carried out at Karadiyana compost yard managed by the Waste Management Authority, Western Province. The Water Board, Ratmalana also dump dried sludge from the wastewater treatment plant to the same dump site since mixing is easy at Karadiyana. The objective of this study was to analyze the performance and durability of compost after mixing with dried sludge in different weight percentages (10%, 25%, 50%, 75% and 90% from pile 1-5). In addition, piles of 100% compost and 100% sludge were also analyzed for the parameters.

The standard characteristics of compost (SLS 1246:2003) were measured momentarily after mixing and continued monthly to determine the sturdiness. The colour, pH, and texture were determined as physical parameters. Moisture content was measured through Dry & Wet analysis, total organic carbon (TOC) using Walkley-Black method, nitrogen content from micro-kjeldhal method, potassium, calcium, magnesium, heavy metals through AAS and phosphorus content from UV Spectrometer.

When considering the results, the colour was darkened with the weight percentage of sludge. Samples had a finer texture than regular compost. The pH values have decreased with sludge but were within the accepted range with the exception of the lot using 100% sludge in every month. None of the subjected mixtures reached the standard levels of moisture content in the first 3 months and after controlling moisture, the 1st, 2nd and total compost piles reached the standards by December. The TOC percentages were positive in all samples other than the first three months' 100% sludge and first month's 5th pile. The Nitrogen amount was increased in the first sample set with sludge but decreased with time. Only the pile with 100% compost and 5th pile remained in the range for four months. Phosphorus wasn't favorable in any of the samples but values increased with the amount of sludge and with time. Potassium amounts had a higher variation. Total calcium increased with sludge in the 1st month but then showed an uneven performance. None of the samples reached the required magnesium amount where highest was recorded in the 100% compost. The C/N ratio was good in each sample. All the samples were within the heavy metal standard minimum levels. From the results, the pile containing 75% dried sludge and 25% compost showed best results just after mixing. In the 2nd month, best results were shown in the pile which contained 50% dried sludge and 50% compost. Mixtures of 90% compost and 10% sludge and also 90% dried sludge and 10% compost were good to use after 4 months from preparation.

Keywords: Dried sludge, Compost, Compost quality