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Analysis of sewage sludge and its suitability as land application

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Disposal of sewage sludge on agricultural or forest lands has been shown to be an economical means of sludge disposal which reduces the amount of waste going to landfills and returns nutrients to the soil. The objective of this study was to evaluate selected chemical, biological and plant growth characteristics of sewage sludge generated from the central sewage treatment plant of the Biyagama Export Processing Zone (BEPZ) by comparing with that of composted municipal solid waste, bio compost, and soil also with the standards set by SLSI to determine its suitability as land application.

In this study total N, P, Organic Carbon by, K and Heavy metals (Cd, Cr, Cu, Zn, Ni, Pb), pH, microbial activity, were determined to determine the possibility of using sewage sludge as a land application. To determine the suitability for plant growth, germination of Phaseolus vulgaris variety T.C., and their mean plant height, mean number of leaves emerged; fresh and dry shoot weight and root weight were analysed. The results were statistically analysed using one way ANOVA and Turkey's pair-wise comparison

Based on the results obtained, the pH level of sewage sludge is less than the lower limit of the standard range for organic manure and it shows no significant difference with other land application media which was analysed. Heavy metal content of the tested sewage sludge was within the standard values for organic manure set by the SLSI. According to the one way ANOVA with the exception of content of Ni, the contents of other heavy metals in sewage sludge are significantly higher than that of composted municipal solid waste, bio compost and soil. N content in the sewage sludge is less than the standard level, but compared to other land application media it shows no significant difference with municipal solid waste and soil. The contents of other nutrients such as, K, P and Organic Carbon are higher than that of the minimum required levels of the standards for organic manure. Microbial activity in the sewage sludge shows no significant difference with composted municipal solid waste. Analysis of results obtained for plant growth shows that the growth of plants is poor in sewage sludge compared to other land application media, and growth in sewage sludge was improved when sewage sludge was sterilised which indicates that there is a pathogenic effect in sewage sludge. Therefore, it can be concluded that heavy metals in the sewage sludge analysed in the study are within the standards for organic manures set by the SLSI, and except for K, N and P levels are lower than the Sri Lankan Standards. Therefore large amounts of sludge should be added in order to obtain the same effect as other organic fertilizer. If not, a source of nitrogen and phosphorous should be added. There is a good microbial population which can release nutrients fast enough to maintain rapid plant growth. The growth is poor in sewage sludge due to an undefined reason. This may be due to pathogens or harmful organics used by the industries in the zone.

Further studies should be carried out to investigate the cause of retardation of growth and to investigate further to determine whether there are any harmful micro organisms and harmful organic constituents in the sewage sludge. This would enable to identify a suitable disinfectant for disinfecting sewage sludge and thereby make it suitable for an appropriate land application. Further studies should be carried out to determine the appropriate sludge soil composition for land application. If sewage sludge is applied on land, regular monitoring should be done to ensure that in-house treatment of industrial waste water is properly done so that there is no risk of releasing toxics to sewage treatment plant.

The results are confined to sewage sludge analysed from common sewage treatment plant of BEPZ as composition can vary based on industry and type of activities handled by waste water treatment plant.

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