Effects of Organic and Inorganic Amendments on Salinity Levels of Municipal Solid Waste Composts in Sri Lanka

T.D.P. Liyanage[1*], T. Jayasinghe[2], E.M.L. Prasad[2], S.K.P Manujaya[2] and D.A.L. Leelamanie[1]

[1]Department of Soil Science, Faculty of Agriculture, University of Ruhuna
[2]Faculty of Agriculture, University of Ruhuna

Abstract

Composting is considered as an appropriate and affordable strategy to mitigate the problems related to Municipal Solid Waste (MSW) management in developing countries. One important concern related with MSW compost is extreme salinity levels revealed by high Electrical Conductivity (EC). As a remediation measure, it was suggested to amend organic and inorganic substances together with MSW compost. We hypothesize that using organic and inorganic compounds at the production stage may reduce the salinity of MSW composts. Accordingly, the objective of this study was to examine the effects of two selected amendments (Gliricidia leaves as organic and gypsum as inorganic amendments) addition at the production stage to reduce the extreme salinity levels of MSW composts in Sri Lanka. Slightly decomposed (one month) MSW were collected from Weligama (S1) and Malimbada (S2) compost production units in Southern Sri Lanka. They were amended with Gliricidia and gypsum at the rates of 5, 10, 20, 30, and 40% (dry basis) separately. Samples were allowed to decompose under aerobic conditions, while frequent mixing and moistening. At the complete decomposition (8 weeks after amendments), pH and EC of the samples were tested in triplicates using 1:2.5 and 1:5 solid: water ratio (EuTech PC 700 electrode), respectively. The data were statistically analyzed using ANOVA. Results revealed that, pH of all the treatments of S2 MSW compost became significantly low compared with the control except for those with 5% Gliricidia. This might be due to acidifying effects of organic acids produced during the decomposition. However, the pH values of all the treated samples from both sites were in the standard pH range (5.5-8.0) which is favorable for composting. The control samples were from strongly to very strongly saline with EC values of 19.24±0.16 mS/cm (S1) and 10.41±0.61 mS/cm (S2). With the application of amendments, EC values of both sites were reduced. The 5% Gliricidia amended samples showed slightly-moderately saline levels. This might be due to salts leaching and excess Na^+ removal from exchange complex sites of compost. The EC values increased from 5% up to 30% Gliricidia rate which might be due to increasing organic matter content. Amending of Gliricidia at the lowest used rate (5%) with highly saline MSW compost is more effective in reducing salinity and in the terms of cost effectiveness. Further experiments are required to explore the effects on soil productivity and quality under field conditions.

Keywords: Compost, Electrical conductivity, Municipal solid waste, pH, Salinity

[*]***Corresponding Author:*** liyanage@soil.ruh.ac.lk / liyanagethanu@gmail.com

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