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Amelioration Potential of Sulphur and Phosphogypsum Enriched Municipal Solid Waste Compost in Saline-Sodic Soils

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Abstract

Salinity and sodicity severely influence soil physico-chemical properties and impose stress on plants, consequently decrease the crops yield in arid and semiarid regions. Sustainable management of Municipal Solid Waste (MSW) and other industrial by-products is another emerging challenge. MSW compost and some industrial byproducts can be utilized as amendments for reclamation of salt-affected soils. In this context, a controlled condition study was carried out on composting of MSW alone and its enrichment with gypsum, phosphogypsum, spent wash, elemental sulphur, and press-mud followed by assessment of the efficacy of MSW compost and products of its enrichment for amelioration of saline-sodic soil [pHs, electrical conductivity (ECe) and exchangeable sodium per cent of 9.55, 4.72 dS m^{-1} and 58.3, respectively]. A sequential leaching column experiment was also conducted, on homogenized mixture of saline-sodic soil with MSWC/enriched MSWC, to assess the salts release and removal efficiency of different byproducts enriched MSWC. Use of MSWC and its enrichment with organic and inorganic amendments reduced soil pH and EC with significant improvement in soil health. Elemental sulphur and phosphogypsum enriched MSWC application @ 20 Mg ha^{-1} significantly reduced soil pH and soluble salts and thus, proved more effective than gypsum, pressmud and spent wash enriched MSWC. In the view of decreasing availability and purity of mined gypsum, due to competing demand of gypsum in other sectors, elemental sulphur and phosphogypsum enriched MSWC can prove a low-cost alternative to costly amendments for reclamation of saline- sodic soils.

Key words: Elemental sulphur, Municipal solid waste compost, Phosphogypsum, Saline-sodic soil, Total cation mass