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Evaluation of Phytotoxicity and Wheat Response to Composts Prepared from Mixture of Mixed Organic Wastes

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Abstract

Huge quantities of organic waste materials in the form of farm, animal, domestic, agro-industrial and municipal solid wastes are produced in India, but the potential of these organic resources is not fully realized. Therefore, composting of these wastes would be the best technology to reduce these amounts resulting in nutrient rich soil amendment. In this study, a greenhouse experiment was conducted in sandy soil to compare the effects of mixture of mixed organic waste composts on yield and nutrient uptake by wheat. The surface bulk soil was collected from Ludash village located nearby CCS Haryana Agricultural University, Hisar, India. Five composts were prepared using a mixture of different organic wastes with or without enrichment of N, Mussoori rock phosphate (MRP) and microorganism (MO) inoculation. The un-fertilised soil and chemical fertilisers were used as control. The yields were significantly higher with the mixture of mixed organic waste composts compared with unfertilised soil except for compost that received only Mussoori rock phosphate. Compost-fertilised grain yields were increased by 153% with microbial inoculants compost and by 180% with chemical fertilisers compared with unfertilised control. However, among the mixture of mixed organic waste composts, microbial inoculants compost obtained a wheat grain yield comparable with that produced with NPK (recommended dose) fertilisers, indicating a net saving of 100% of P fertiliser. Application of a mixture of mixed organic waste composts significantly increased NPK uptake by wheat and improved the post-harvest NPK status of soil compared with addition of separate Mussoori rock phosphate. Severe inhibition of tomato seed germination was observed up to 60 days of composting due to release of toxic substances, which improved thereafter in all the composts. The results in this study suggest that the germination index >70 % may be accepted as an indicator for absence of phytotoxic substances.

Keywords: Compost, mixed organic wastes, municipal solid waste, phytotoxicity, seed germination, uptake, wheat yield

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