Co-Composting of Sewage Sludge with Biochar as a Bulking Agent in Aerated Bin Composters

S.V. Chandeepa[1]*, C.S. Kalpage[1], A. Pallegedara[2]

[1]*Department of Chemical and Process Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya, 20400, Sri Lanka*
[2]*Department of Manufacturing and Industrial Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya, 20400, Sri Lanka*
**e16058@eng.pdn.ac.lk*

Biochar is considered an effective bulking agent which enhances the compostability of sewage sludge. Many studies recommended that biochar is a good bulking agent for sewage sludge composting to improve the quality of the final product. The present work proposes forced aerated composting supported by co-digestion for improving the rate of composting. The proposed method introduced a bin composting system with a continuous temperature recording facility which was fabricated for the study. The impact of operating parameters such as aeration rate and the mass ratio of sewage sludge to biochar were studied. Nine composter bins were placed in a 3x3 matrix. Each bin were filled with sewage sludge, mixed with sawdust, and different amounts of wood biochar varying from 0 to 9% were added. The bins were supplied the continuous flow of air at rates of 0, 0.3 and 0.6 l/min/kg. Further, temperature sensing probes were inserted at the middle of every reactor and the temperature variation was intermittently measured for 7 weeks under 24/7 in each minute continuously. The results showed that the aeration rate and the particle size of biochar strongly influenced the temperature increase of the pile. The bin with 5% biochar and 0.3 l/min/kg air flow rate has recorded the highest temperature during the composting period and the appearance of the final product became closer to the commercially available compost products, which realizes the effectiveness of the proposed approach and methodology.

Keywords: Aerated bin composting, Aeration rate, Biochar, Co-Composting, Sewage sludge