Assessment of the Microbial Activity During Composting of Municipal Solid Waste in combination with Locally Available Resources

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Composting is controlled by biological process in which microorganisms convert organic materials into a stable, humus soil like substance called ompost. It is an economically viable and environmentally sound option for solid waste management. Microbial enrichment is one of the possible ways of increasing the decomposition rate of the compost. The objective of present study was to assess the suitability of "panchagavya" (locally made solution using five products from cow namely cow dung, cow urine, ghee, curd, and milk) as a substrate for microorganisms to enhance microbial activity, while enriching the municipal waste with other locally available resources such as cow dung (CD), giliricidia (G) and palmyrah leaf (PL). Locally available resources and municipal solid waste (MSW) nutrient contents such as C and N were analyzed for making a compost mix recipe. Total organic carbon content values ranged from 90.99 % to 38.14 % and total nitrogen values ranged from 0.79 % to 3.27 %. Treatments were prepared according to the C, N content of raw materials which were adjusted to initial C/N ratio of about 40:1 (dry weight basis). Experiment was conducted in completely randomized design with eight different treatments and three replicates. The treatments and there ratio were, T_1- MSW + G + CD(1:0.167:0.75), T_2-MSW + G + CD + 5 % panchagavya solution (PC)(1:0.167:0.75+ 50 ml), T_3- PL + CD (1:2), T_4- PL + CD + 5 % PC (1:2+50 ml) , T_5- MSW+ PL + CD(0.5:0.5:2), T_6- MSW + PL + CD + 5 % PC (0.5:0.5:2+50 ml), T_7- ready to municipal compost mixture (MCM) from commercial composting processes from Kakaithivu, which contain MSW, grasses and CD in improper ratio, T_8- MCM + 50 ml of 5 % PC . T_7 was taken as control. From each treatment 0.15 g of mix was taken and incubated for one week. After one week, microbial activity of the treatments was assessed by measuring CO_2 emission. The highest microbial activity was observed in treatment T_6 (0.98 mg CO_2/ g soil) followed by treatments T_2 (0.90 mg CO_2/ g soil), T_4 (0.78 mg CO_2/ g soil), T_5 (0.70 mg CO_2/ g soil), T_8 (0.69 mg CO_2/ g soil), T_1 (0.68 mg CO_2/ g soil), and T_3 (0.68 mg CO_2/ g soil). Treatment T_7 had the lowest microbial activity of 0.32 mg CO_2/ g soil which was significantly lower than other treatments. However, treatments T_1, T_3, T_5, and T_8 were not significantly different among them. According to the result, the use of panchagavya enhanced the microbial activity in comparison to without panchagavya application.

Key words: Compost, Decomposition, Microbes, Local-resources, Panchagavya