

Feasibility study of pilot scale vegetable waste composting project for Kundasang community's waste management program

ABSTRACT

Purpose: Vegetable waste (VW) composting was assessed using a passive aerated pilot-scale composter at Kundasang, Sabah. The passive aerated composting system proposed at Kundasang Community Composting Site (KCCS) was analyzed for its techno-economic impact. Method: The composting performance (temperature, organic matter loss, moisture content, pH value, electrical conductivity, and nutrient value) of 500 ± 2 kg of VW, 250 ± 2 kg of RH, and 19 ± 1 kg of CM feedstock mixture was analyzed. The benefit-to-cost ratio was used to assess the impact of the technoeconomic analysis on the designed and piloted KCCS. Results: In the pilot scale composting condition, temperature reached its highest at 59 ± 7 °C (day 5) and for five consecutive days (day 2 until day 6) in the thermophilic phase. Results of the final compost (on a dry matter basis) showed that the moisture content is $62 \pm 0.2\%$ WM, the pH level is 7.6 ± 0.1 , the electrical conductivity is 1.8 ± 0.4 mS/cm, and the N, P, and K values are $0.58 \pm 0.10\%$ DM, $0.04 \pm 0.02\%$ DM, and $0.17 \pm 0.04\%$ DM, respectively. The techno-economic analysis shows that with the capital cost normalized on a 20-year basis, the KCCS composter system can generate approximately MYR 25, 000 (USD 5, 600) per year in revenue. Conclusion: The results show that these composting methods are suitable for VW and Kundasang community conditions, and this study will benefit the community in dealing with VW waste and generating a circular economy while establishing a self-sustaining community.