

Evaluation of Windrow Composting Pilots for Domestic Organic Waste Amended by Horse Manure and Biosolids

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Abstract: This study entails planning, operation and assessment of two composting pilots using different mixture ratios of domestic organic waste, municipal sewage sludge, horse manure and saw dust. The first experiment, winter season, comprised five composting piles with different mixtures (ratio 2:1 wet weight) were prepared. The second experiment, summer period, carbon to nitrogen ratios (C: N) were tested for four mixed samples. Using plastic containers, various compost mixtures were processed in a greenhouse at Birzeit University Campus under controlled conditions (moisture, temperature and pH). In both experiments, no major deviations in the moisture content and pH values, but larger deviations were recorded in process temperature. Over the 100 experimental days during winter (first experiment), the temperature ranged from 7 °C to 41 °C compared with summer composting phase (23 °C to 66 °C). Samples from raw and finished compost were tested for physical, chemical and microbial quality parameters. The results revealed that the compost quality for the both experiments complied with U.S. EPA compost regulations. All samples of raw and finished compost were free from the *Salmonella*. During winter, results showed no major differences in the fecal coliforms and *E. coli* content (≤ 1000 CFU/g) in the finished compost from all compost piles. However, compost pile 3, a mixture of domestic organics, sludge and sawdust exceeded the fecal coliforms rule indicating low sludge stabilization degree. For the second experiment, the microbial indicators in the finished compost complied with U.S. EPA standards pertinent to fecal coliforms (≤ 1000 CFU/g) and *Salmonella* free in the finished compost. The reduction in mass weight of raw compost materials reached 58% for pile 2, during summer compared with 56 % for pile 5 during winter. Pile number 4 (two domestic organics and one sludge), processed during winter and pile 2 (one domestic organics, two manure, one sludge), processed during summer, complied with U.S. EPA (40 CFR Part 503) standards than other composting piles in two experimental periods. Composting variable mixtures of domestic organics, horse manure and municipal sludge forms an effective and a sustainable management technology for the reduction of operational expenditures of municipal waste management in Palestinian communities.

Keywords: Biosolids reuse, compost quality, sludge treatment, waste management, windrow composting

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