Composting of goat dung with various additives for improved fertilizer capacity

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Composting of goat dung mixed with lime, soil, Napier grass or urea was followed by monitoring the C:N (w/w) ratio of the substrate, temperature, pH, moisture content, water-holding capacity, weight loss and mineral content. Equilibration to 24°C took between 90 and 120 days, the dung with Napier grass or urea composting fastest. Napier grass addition was also beneficial in decreasing loss of C and PO₄³⁻ and increasing N content. The most active region of the compost was 10 to 30 cm from the base of the heap. Depletion of C, PO₄³⁻ and K⁺ occurred during all compostings but varied among the treatments. The moisture content in the substrate remained between 34% and 73% (w/w) for all treatments, while the water-holding capacity averaged 100% to 150%. The average weight loss of substrate was between 55 to 84%. The compost could be used as manure for Napier grass production, although effluent from a palm oil mill was found to be superior.

Key words: Composting, fertilizer, goat manure, Napier grass.

The livestock industry in Peninsular Malaysia is expected to expand, both in terms of farm size and stocking density, owing to intensification of the farming systems. It is estimated that animal waste from goats, sheep and cattle will reach 1.7 million tonnes per year by the year 2000 (Vimala et al. 1992). The goat population in Peninsular Malaysia for 1990 was 288,000, producing an estimated 134 million tonnes of animal waste (Anon. 1988). Currently, this waste is allowed to compost naturally and is not popular as an organic fertilizer. Unlike chickens, ducks, which are more readily available. In the present study the composting of goat dung mixed with various additives was investigated and the performance of the compost as fertilizer for Napier grass (Pennisetum purpureum) was compared with those of inorganic fertilizers and oil mill effluent.

Materials and Methods

Goat Manure and Treatment

Goat manure from intensive goat feedlots was collected daily and used to fill 30 plywood boxes [1.2 m (length) × 0.6 m (breadth) × 0.6 m (height)]. Holes were drilled on one side of each box at 5-cm spacings, the lowest 10 cm from the base, to facilitate temperature measurements. The manure was mixed manually each week and the moisture content maintained between 40% and 60% (w/w) throughout the process. Weekly samples were analysed for moisture content, pH, total N (TN), total organic C, K⁺, PO₄³⁻, and water-holding capacity. Two boxes each contained (on a fresh wt basis): (1) 100 kg dung; (2) 200 kg dung and 20 kg lime; (3) 200 kg dung and 20 kg soil; (4) 90 kg dung and 90 kg Napier grass cut into 2.5-cm pieces; and (5) 200 kg dung and 5 kg urea.

The effect of two rates of the final (12-week) compost mixture on the growth of Napier grass was compared with that of conventional fertilizers such as NPK (12% N) and urea (46% N). fresh goat dung, compost, and water-soluble ammonium N (46% N), with an nitrogen equivalents of 13.00 kg/ha per application, using four replicate plots.

Results and Discussion

Temperature

The final composts were all dark brown to black with no malodour or smell of ammonia. The nutrient content and other parameters were normal in most instances (see below).

Each compost heap was 24 to 49°C 20 cm above the base; the highest recorded temperature being in dung with lime (Figure 1). The equilibrium (final) temperature for all treatments was 24°C. Dung with added Napier grass or urea required only 90 days to reach this, whereas pure dung took about 135 days, dung with soil 105 days and dung with lime 120 days (see Figure 1).

Temperature measurements at different levels in the compost showed that the most active region was 10 to
ABSTRACT

In this study, the effects of using a commercial catalyst on composting oil palm empty
fruit bunches, chicken manure, garden waste alone and garden waste with sewage slud.
were monitored over a period of 90 days. Waste piles mixed with the catalyst at a ratio
1:1 (v/v) were compared against piles without the catalyst. Common physical and
chemical parameters for evaluation of compost maturity were monitored at select
intervals throughout the entire period. The parameters that were studied included pile
temperature, bulk density, conductivity, volatile solids content and the C:N ratio. The
temperatures of piles mixed with catalyst showed a rapid rise to a level between 50 at
65°C within 2 days of composting when compared to the control piles. The bulk densi-
of waste piles plus catalyst at the second week showed an increase of 7-11 kgm⁻³ more
than the control pile in the same period. The C/N ratios for the piles mixed with catal-
also showed greater decreases than the control piles over the same period.

ABSTRAK

Dalam kajian ini, kesan penggunaan suatu mangkin komersial atas pengomposan tangkai
buah kosong kelapa sawit, baja ayam, sisa kebun dan sisa kebun campur dengan
kumbahan telah dikesan selama 90 hari. Longgok sisa dicampur dengan mangkin dengan
nisbah 1:1 (v/v) telah dibandingkan dengan longgok tanpa mangkin. Ciri-ciri fizikal dan
kimia yang biasa digunakan untuk penilaian matangan kompos dikesan pada param-
terpilih. Parameter yang telah dikaji termasuk pH, suhu, ketumpatan, konduktiv-
kandungan pepejal volatil dan nisbah C:N. Suhu longgok dengan mangkin menunjukkan
kenaikan pesat kepada tahap antara 50 dan 60°C dalam dua hari berbanding dengan