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Changes in chemical properties during composting of spent pig litter at different moisture contents

S.M. Tiquia [a,b], N.F.Y. Tam [a,*], I.J. Hodgkiss [b]

[a] Department of Biology and Chemistry, City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong, China
[b] Department of Ecology and Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong, China

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Abstract

An ordinary pig pen employing the pig–on–litter system was set-up and 40 pigs were placed inside. After 12 weeks, the pigs were removed from the pen and the spent litter was collected and piled up in an open shed for further composting and maturation. Three piles of the spent litter were set up with moisture content adjusted to 50% (Pile A), 60% (Pile B) and 70% (Pile C). During further composting, the changes in temperature and chemical properties of the piles were monitored. Results of the study revealed that moisture content affected the changes in temperature and chemical properties (i.e., concentrations of NH_4^+-N, $[NO_3^- + NO_2^-]$–N, C:N ratio, cation-exchange capacity [CEC], total and water extractable K and pH value) of the spent litter. Pile C, the pile adjusted to 70% moisture, had a delay in reaching peak temperature values and the temperature never dropped back to the ambient level. Piles A and B, the piles adjusted to 50 and 60% moisture content respectively, had very similar changes in temperature and chemical properties and had faster decomposition rates than pile C suggesting that moisture content between 50 and 60% is the suitable moisture content for an efficient further composting of spent litter. The maturation of spent litter was accompanied by changes, with periods of composting in pH, total C, ash, various forms of N, CEC and C:N ratio. Results of the regression analysis showed a curvilinear relationship between these chemical parameters with period of composting and temperature. Moreover, changes in these chemical parameters were found to be either positively or negatively correlated with temperature. © 1998 Elsevier Science B.V.

Keywords: Composting ; Pig-manure ; Moisture ; Temperature ; Spent litter

1. Introduction

Pig farms are a basic agro-industry in Hong Kong and generate large volumes of pig manure and liquid wastes, containing high concentrations of organic matter, nutrients, trace elements and pathogenic organisms. Pollution from pig wastes accounts for 70% of all stream pollution in the New Territories and 50% of organic matter entering the sea (Hoshmand, 1991). Various studies (Hodgkiss, 1979; Hodgkiss and Griffiths, 1987) have shown the marked decline in Hong Kong's marine water quality resulting from pig wastes entering the sea via streams. The survival of the livestock sector, particularly swine, depends on the effective disposal of the enormous wastes generated from farms. In 1987, the Hong Kong Government implemented a pollution control policy

* Corresponding author. Tel.: 852-2788-7793; fax: 852-2788-7406; e-mail:bhntam@cityu.edu.hk

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