# COMPOSTING OF MUNICIPAL SOLID WASTE

by

T. J. Weerasinghe



DEPARTMENT OF CIVIL ENGINEERING

UNIVERSITY OF MORATUWA

SRI LANKA

1993

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This thesis was submitted to the Department of Civil Engineering of the University of Moratuwa, Sri Lanka, as a partial fulfilment of the requirements of the degree of Master of Engineering in Environmental Engineering.

This thesis has not been previously presented in whole or part to any University or Institute, for a higher degree.

*UOM Verified Signature*

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T. J. Weerasinghe

15 - 09 - 1993

*ACKNOWLEDGEMENT ....*

*The Solid Waste Management Division of the Colombo Municipal Council assisted me in many ways to implement this research project. It provided all the necessary equipment, labour and the site, required for the project. Civil Engineering Department of the University of Moratuwa, too, helped me in this project. It met the cost of all the tests done and the labour engaged to carry out various activities of the research work, with the financial assistance provided by the World Health Organization.*

*I am grateful to the Colombo Municipal Council, University of Moratuwa and the World Health Organization, for the assistance extended to me.*

*Mrs. N Ratnayake, Senior Lecturer of the University of Moratuwa, and the supervisor of this research study, advised and guided me at every stage of the project, to complete it successfully. I sincerely thank her.*

# C O N T E N T S

Appendices

## SUMMARY

The Colombo Municipal Council dispose of the solid waste by dumping on open marshy land. The land suitable for dumping waste, was fast exhausting and as a mean of lengthening the life time of the available dumping areas, the CMC decided to do a pilot study to determine the feasibility of converting solid waste into compost.

Prior to the pilot study, two other studies, (1) a survey on the production of compost in Sri Lanka, on commercial basis (2) a literature survey, were done.

Three organizations that produce compost on commercial basis were surveyed under the first study. They are,

1. Hiat Aggro Ltd.
2. Department of Agrarian Services
3. Water Resources Board

Hiat Aggro Ltd. use coir waste, leaves and poultry droppings to produce compost. Most of the compost produced by this company, are exported and the rest is sold in the local market.

The compost produced by a cultivation officer for the Department of agrarian Services, using garden waste and cowdung, in pits, are sold by the Dept. of Agrarian Services in 1 kg. packets.

The compost produced by the Water Resources Board, using grass cuttings and cowdung is used in it's plant nursery and the excess is sold in 2 kg. packets, at the sales outlet of the Board.

The second study was on the research work that has been carried out, world over, on composting of municipal waste. The literature survey revealed that there are several fundamental factors that are applicable to a composting operation, such as, carbon to nitrogen ratio, temperature, moisture content, shredding, aeration, etc.

The last study was the pilot project, where the behavior of six municipal waste piles were studied under different conditions of carbon to nitrogen ratios and aeration. Urea was used to lower the C-N ratio and aeration was provided by using aeration frames.

The non compostable material could be sufficiently removed by hand picking and sieving.

The carbon to nitrogen ratio of the waste, in the piles, studied under the pilot project, varied from 23 to 88, and within this range, waste decomposed at a fairly satisfactory rate, stabilising within an almost equal time period. The rate of decomposition retards when the moisture content is over 55% and the optimum range is 40% to 50%, which can be maintained by wetting the piles once in 2-3 days.

The solid waste of the Colombo Municipal Council, can be converted into compost in about 40 days, maintaining a temperature above 60 C, within the pile, for over 7 days.

* when the particle size is less than 2 inches ( 5 cm ).
* when piled on an aeration frame and turned once in 3-4 days.
* when moisture content is maintained between 40 and 50%, by wetting once in 2-3 days.

The compost, produced, is more suitable to be used as a soil stabiliser, as it is, and if it is to be used as an organic fertilizer, it should be supplemented with phosphorus. Compost, from municipal waste, can be produced as an odorless, dry powder.