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FEASIBILITY OF ONSITE COMPOSTING FOR INSTITUTIONAL WASTE

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ABSTRACT

The present study describes the generation and handling of waste and the feasibility of onsite composting as a waste management practice. The heaps of non-segregated waste in tones along with foul smelling organic materials make even the paper and plastic a fetid. The waste generated are usually heaped in a place or dumped in the landfill thus causing unhygienic environmental conditioning and improper usage of land. Hence waste management is practiced effectively to manage the waste. Waste management is the collection, transport, recycling, monitoring and disposal of waste. In this paper we discussed about the amount of waste generated in our institution, method and process of managing the organic waste, various sensors used for the process and the process for efficiently managing the organic waste generated from institution.

Key words: *Institutional waste, onsite ccomposting, temperature sensor, management of waste, handling of waste, processing of waste, Organic waste*

INTRODUCTION

Management for non-hazardous waste residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator. Composting is the method for recycling of the organic waste generated to natural compost. Compos-ting is a natural biological process, carried out under con-trolled aerobic conditions (requires oxygen). In this process, various microorganisms, including bacteria and fungi, break down organic matter into simpler substances. The effectiveness of the composting process depends on the environmental conditions pre-sent within the composting system such as oxygen, temperature, moisture, organic matter, material distribution, activity of microbial population. Composting also results in biogenic CO2 emissions associated with decomposition, both during the composting process and after the compost is added to the soil. The C: N ratio should be maintained throughout the process. Waste used for composting and for the rapid compos-ting process to work most effectively, material to be composted should have a C:N ratio of 30:1. In some methods of composting, composter is used for the process of recycling. Various types of composter are available for the recycling of organic waste. In addition to that various sensors are also used for maintaining optimum conditions in the composting process (Baccini et al., 1989, Murugavelh and Vinoth kumar 2010, Sari Kauppi et al., 2007).

Composting is the process of converting organic matter in to useful product by the action of various micro organisms. It is also one of the most energy efficient and green ways of improving the quality of the soil on a perma-culture plot. Onsite composting is the process of composting i.e., collection, maintaining and processing the waste where the waste is getting generated (within the campus).

MATERIALS ANS METHODS

Data Collection: The data on total quantity of non-hazardous generated per day inside the campus is collected through a questionnaire. The collected data were analyzed manually.

Methods of Composting: The organic proportion around 47-50% was allowed for experimental compo-sting using the pit method, bin method and the pile method. In all the methods the C: N ratio is maintained as 30:1, by adding equal amount of dry waste (brown waste) and wet waste (green waste)

Composting pit: Compost pit has the dimension of 1m x 1m x 1m and composting was carried out in large scale and in aerobic condition. The shredded waste i.e. dried leaves twigs and fresh vegetables of equal ratios are accommodated in the pits. The organic matter in pit is regularly overturned and optimum conditions for compo-sting are maintained.

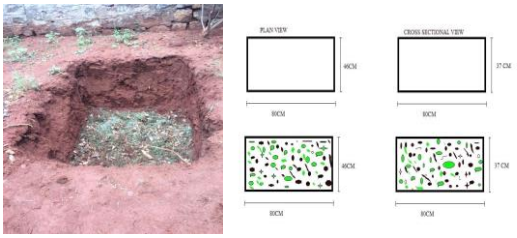

Fig 1: Composting pits

Compost bin: It has the dimension of 0.8m x 0.46m x 0.37 m and composting has been carried out in small scale and in aerobic condition. In natural environment maintaining optimum conditions for com-posting is a difficult process and it is uncontrolled. So, by using compost bin, we are following the controlled composting method by maintaining the optimum conditions as per the requirements. The compost bin contains two compartments, one for collection of the segregated waste and other for composting purposes. ***Mud fabrication*** is done in one layer using top soil with using 2mm sieve size. For detecting temperature of the contents of the compost bin sensors are used.

Fig 2: Composting bin

Composting pile: In composting pile, the composting process is carried in partially aerobic condition. It is the method of heaping and processing of organic waste. In this process tarpaulin sheet is used for the covering the heap. So, the heat generated in the heap is maintained within the sheet.

Fig 3 Composting pile covered with tarpaulin

Sensors: For detecting temperature, PH, moisture content in the composting process periodically these sensors are embedded in the board along with the digital monitor by placing the sensors in contact with the organic materials, the values can be noted from the digital monitor.

Fig 4 Sensors for monitoring temperature

RESULTS

The results showed that around 50% of waste genera-ted from institutions organic green waste which makes feasibility on onsite composting in institutions a possible one. By practising onsite organic composting, we can produce considerable amount of compost and reduce the burden on lands through land filling.

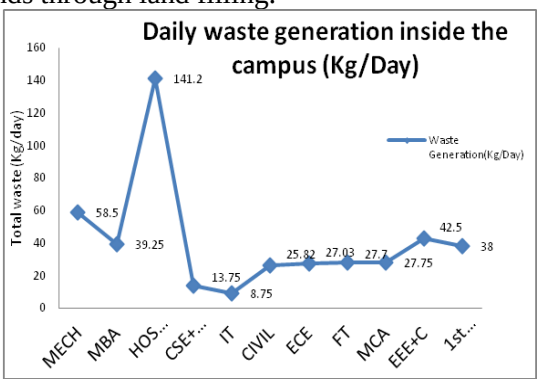

Fig 5 Daily waste generations inside the campus (kg/day)

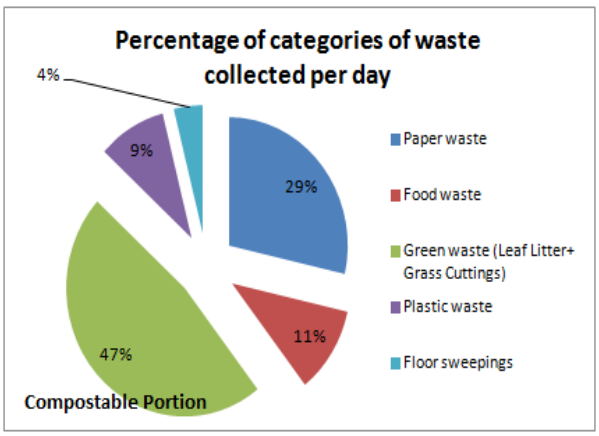

Fig 6: Percentage of categories of waste collected per day

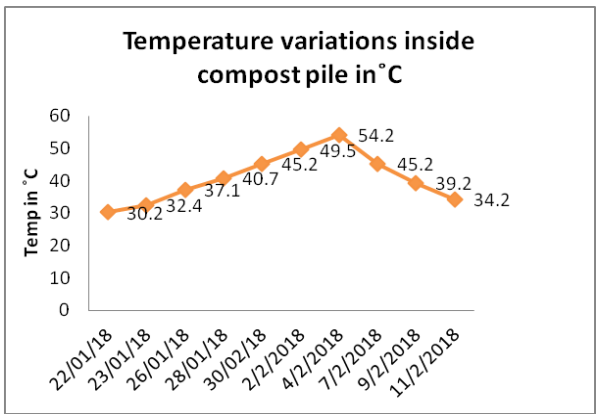

Fig 7: Temperature variations inside compost pile in ˚C

Table 1: Different types of composting methods adopted for institutional waste management

Composting method	Total waste added (kg)	Compost obtained	Time of maturation in days
Composting Pit	98	80	40
Composting Bin	5	2	45
Composting Pile	99	78	32

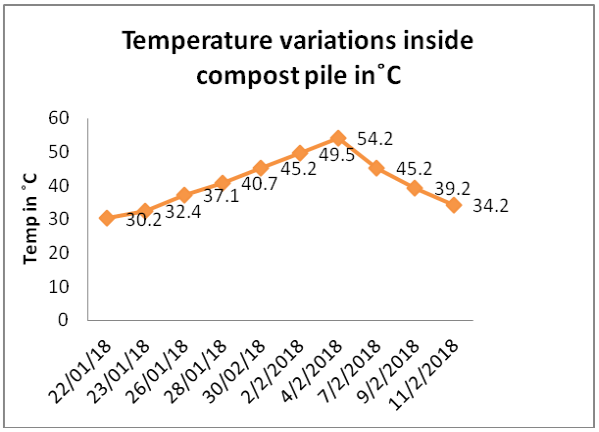

Fig 7: Temperature variations inside compost pile in ˚C

CONCLUSIONS

The present study illustrated that the institutional waste management through onsite composting is possible. Based on the above experimental study the following conclusions have been obtained.

- The more the amount of green waste and grass waste generated through lawns maintained in institutions can be made to composting feasibly.
- In case of Compost pits the hopes are used for better composting in a natural way in which the waste loading can be in better manner. But the pit takes long time for maturation of compost also during rainy days it was very difficult to maintain pit by preventing the infiltration of rain water.
- In the case of Compost Piles, the initial heating starts up quickly and safeguarding the pile from rain water infiltration is easy because of tarpaulin sheet covering. The cycling scarcity for green waste makes the composting process delay.

REFERENCES

Baccini, P. Springer Verlag Berlin Arneth, J.D., Midle, G., Kerndoff, H. and Schleger, R., *Waste in deposits influence on ground water quality as a tool for waste type and site selection for fnal storage quality*, Pp.399 (1989)

Murugavelh. S. and Vinoth Kumar, *Removal of heavy metal from waste water using different biosor-bents*. Current world environment 5(2): 299-304 (2010)

Sari Kauppi C., Dan Yu C., Martin Romantschuk, *Characterization of Source-Separated House-hold Waste Intended for Composting* (2007)