

Sustainable Food Waste Management in Indian Healthcare Sector

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Aim

- To highlight the role of health sector in reducing solid waste load on the municipal dump site thereby reducing its green house gas emissions
- To highlight the environmental and financial benefits of dry and wet food waste management techniques that potentially can be adopted by healthcare establishments

Introduction

About 40% of the food produced in India is wasted. The estimated cost of food wastage in India is more than \$1200 per annum. Much of this waste ends up into landfill sites which in turn produces large amounts of methane – an even more powerful greenhouse gas (GHG) than carbon dioxide. GHGs like methane, carbon dioxide and chlorofluorocarbons are known to absorb infrared radiation and heat up the earth's atmosphere, contributing to global warming and climate change. Out of the total waste generated from healthcare activities, 70-75% is general non-infectious waste. It primarily comprises of office waste and food waste from a hospital's administrative wing and the kitchen area. Treatment of food waste within healthcare establishments can decrease the waste load on the landfill sites and reduce the hospitals' GHG emissions. Adoption of sustainable waste management solutions across healthcare sector can promote environmental health.

Material and Methods

According to India's Solid Waste Management Rules 2016, bulk waste generators are required to manage most of their general waste onsite. This provides ample opportunity for large establishments to treat generated food waste at its source. Healthcare establishments being among bulk waste generator category, can adopt sustainable solutions such as vermicomposting and aerobic composting to treat food waste generated from their kitchen areas. These can, not only endow environmental but also financial benefits to the healthcare facilities.

Vermi-composting: Vermi-composting is the degradation of organic matter by earthworms. It involves bio-oxidation and stabilization of organic matter when it passes through the earthworm gut to produce nutrient rich compost as an end product. This compost is also known as vermi-compost. The technique involves mixing of dry waste of plant origin such as plant leaves, uncooked vegetables, fruit peels etc. with cowdung and suitable earthworms species in a vermi-compost unit. A typical vermi-compost pit is shown in the below diagram.

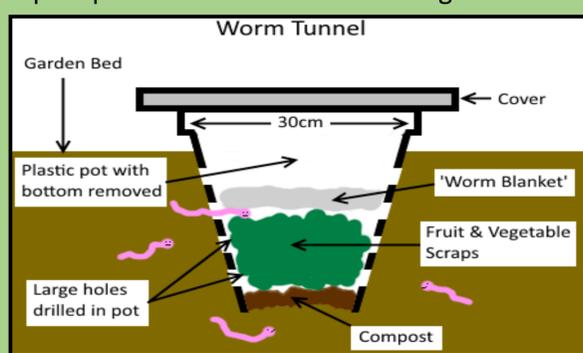


Image Source: Deep Green Permaculture

Most large establishments in India construct vermi-compost units made up of bricks or cement lined pits. There are many Indian hospitals that have taken up this approach to manage their kitchen waste. Image below shows the vermi-compost unit and pit constructed within HBT Medical College and Dr RN Cooper Hospital, Mumbai. The hospital treats 2925 Kg of dry food waste through vermi-composting per month. Generated vermi-compost is used as manure for campus plantation (2700 trees). It is not used for yielding any profits.



Image source: Case Studies on select Indian hospitals published by Health and Environment Leadership Platform.

Apart from vermi-compost, vermi-wash is another by product of the vermi-composting which is a liquid collected after the passage of water through a column of worm excreta. It is a collection of excretory products and mucus secretion of earthworms along with micronutrients and enzymes from the organic matter, popularly used as a foliar spray.

Aerobic composting: Aerobic composting is the oxygen-requiring decomposition of organic matter by microorganisms under controlled conditions. During this process the microorganisms consume oxygen (O₂) while feeding on organic matter generating considerable heat, carbon dioxide (CO₂) and water vapor. This loss of CO₂ and water can amount to half the weight of the actual feed, thus reducing the mass and volume of the final product. The major difference between this process and vermi-composting is that aerobic composting can utilize both cooked kitchen waste and uncooked food items (dry and wet food waste). Just like vermi-compost, end product generated after aerobic composting is also nutrient rich providing nourishment to plants and the soil. Lokmanya Tilak Municipal General Hospital situated in Mumbai is managing their dry and wet food waste through aerobic composting for the past 2 years. Different stages of aerobic composting are described in below diagram.

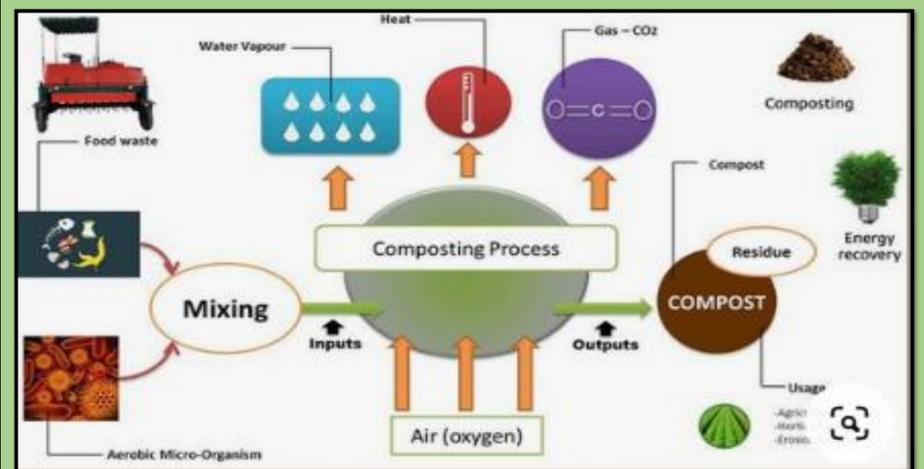


Image Source: Bagoio Waste Management & Recycling Limited.

Conclusion

Benefits of compost generated through vermi-composting and aerobic composting.

Environmental benefits:

- It is high in nutrients and plant growth hormones due to which it improves growth and yield of crops.
- It improves soil structure leading to enhanced water and nutrient holding capacity of soil. Adds nutrients and trace minerals to the soil that stimulates biological activity and encourages plant rooting systems
- Helps in reducing soil erosion and emission of methane
- Maintains neutral pH

Financial benefits:

- Vermi-composting or aerobic composting if carried out on a large scale can produce ample quantities of compost that can be sold in markets to avail financial benefits. Composts are a popular choice among Indian organic farming markets. Profits from this can recover the initial cost of constructing compost pits/ units or any other material that is added to the feed.

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Note: None of the research findings promote or endorse any establishment or institutional activity. This is purely a work of research to highlight recent advancements in the area of food waste management.

- References:
- Food Waste in India, 2019, Chintan Environmental Research and Action Group.
 - Vermi-composting: A Profession of Youth: A Success Story by Krishi Vigyan Kendra, Indian Council for Agriculture Research-Indian Veterinary Research Institute.
 - Pro-poor and sustainable Solid Waste Management For Secondary Cities and Small Towns in Asia and the Pacific, 2012, Operational Manual on Composting for Integrated Resource Recovery Center (IRRC).
 - Case Studies from Health and Environment Leadership Platform.
 - SDG 12: Responsible consumption and production, United Nations Development Programme.
 - Health Care Waste, Key Facts, 2018, World Health Organization.
 - Bagoio Waste Management & Recycling Limited, Food Wastes
 - Deep Green Permaculture



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