



## **On-site dry food waste management to reduce the waste load to municipal dump site**

### ***HBT Medical College and Dr RN Cooper Municipal General Hospital***

#### **GGHH Agenda Goals**

- Waste

#### **Hospital Goal**

- Improve management and treatment of dry food waste from the hospital
- Reduce the quantity of dry food waste sent to the Municipal Landfill and Dump site in Mumbai
- Implement food waste vermicomposting and use compost for the plantation drive across the campus

#### **Progress Achieved**

- Reduction of 60MT of waste sent to the municipal dump site.
- Two hundred kilograms of compost generated from vermicomposting used for 2700 trees planted across 13 acres of the hospital campus. This saves the cost of purchasing compost from the market and encourages tree plantation.

#### **The Issue**

As populations grow and food consumption increases around the world, there is a correlated increase in the amount of food waste generated by consumers. This waste ultimately goes to the municipal waste collection centres and then to landfills and dump sites.

Food waste that ends up being thrown into landfill sites produces a large amount of methane – a more powerful greenhouse gas than even CO<sub>2</sub>. Excess amounts of greenhouse gases such as methane, CO<sub>2</sub> and chlorofluorocarbons can absorb infrared radiation and heat up the earth's atmosphere, causing global warming and climate change.<sup>i</sup> The food waste thrown into the landfill or dump sites also contributes to the overall waste load at the dump site of a city. Out of the 9,400 tonnes of waste that is sent daily to Mumbai city's dumping grounds, 73% is food, vegetable

and fruit waste, says the Brihanmumbai Municipal Corporation (BMC)'s latest Environment Status Report.<sup>ii</sup>

Lately there has been significant focus on the biggest waste producers, such as public institutes including medical colleges, government institutes and hospitals. According to the recent amendments to Solid Waste Management Rules 2016 enforced by the Central Government, it is mandatory for all such these institutions India to manage and treat their solid waste at the site of its generation. Due to the discrepancies in implementation of this law at the district level, BMC sent notices in 2017 to 5000 bulk waste generating institutions across Mumbai. The objective was to educate and inform the institutes to segregate and appropriately treat their waste on campus considering the over load at waste dumping sites of Mumbai. Several municipal general hospitals, being among the key bulk waste generators, received these notices.

In response to this call for action, HBT Medical college and Dr. RN Cooper Hospital, a municipal general hospital, undertook vermi-composting to treat its dry food waste. Dry food waste is one of the components of the total solid waste generated at the hospital which also includes wet food waste and biomedical waste and other components. Biomedical waste is segregated as per the law within the hospital campus and is sent to a non-profit for further treatment and disposal. Wet food waste is also sent to another non-profit for the treatment and disposal.

Vermi-composting is the degradation of organic waste (from plant and/or animal origin) by earthworms. Vermi-compost generated as the end product of the process is used to improve growth and yield of different field crops including vegetables, flowers and fruit crops. Apart from providing nutrient to plants, vermi-compost also improves the soil structure leading to the enhanced water and nutrient holding capacity of soil. Another advantage of vermi-compost is that it can be applied to crops at any stage. 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 action. It is a collection of excretory products and mucus secretion of earthworms along with micronutrients from the organic matter, popularly used as foliar spray.<sup>iii</sup>

### **Sustainability Strategy Implemented**

The initiative of managing dry food waste collected from kitchens and canteens of HBT Medical College and Dr RN Cooper Municipal General Hospital was possible only due to the efforts of Mr Subhash Dalvi, Officer on Special Duty, Swachh Bharat Abhiyan Division, BMC, Mumbai in collaboration with the Hospital Management. The municipal general hospital located in the heart of the city took the initiative of managing its dry food waste from both its canteens and all the staff quarters and hostels in 2017.

The institution took the following steps to implement proper and efficient handling of dry food waste at their sites:

- BMC officials and the management team at HBT Medical College and Dr RN Cooper hospital collaborated with each other in early 2017, immediately after receiving the BMC notice.
- The institutions built one smart vermi-compost unit and four brick lined compost pits of 6 ft. length, 4ft. width and 2.5 ft. height in March 2017 for treatment of dry food waste.
- BMC brought in a local non-profit, Shree Aastha Mahila Bachat Gat, to manage this vermi-composting unit.
- The non-profit hired three staff members under the supervision of BMC, to perform waste collection and processing duties.
- Staff collected and applied vermi-compost and vermi-wash, generated from the vermi-compost system, to the campus plantation along with the organic garden (total 2700 trees) maintained at the hospital.

Figure 1: Vermi-compost unit at HBT Medical College and Dr. RN Cooper Hospital (NGO worker with the vermi-compost pit on the left and dry waste collection pit on the right)



### Implementation Process

- Food waste segregation implemented at the point of origin using separate bins.
- Staff transports dry food waste, such as uncooked vegetables and meat pieces, fruits, peels etc. to the compost facility and places waste in the compost pits containing different species of earthworms.

- The four pits are interconnected with each other to enable free movement of earthworms between the chambers.
- Staff rotate dry food waste once daily to ensure optimum oxygen availability for the earthworms.
- Staff covers composting pits with an asbestos shed to prevent earth worms from extreme heat and temperature (<math><35^{\circ}\text{C}</math>). Moisture of 50% is maintained within the compost pits for waste degradation.
- After a period of 45 days staff collects vermi-compost which is used in form of manure for the campus plantation. On an average, pits can process 30 MT of waste annually. On average 100 kg of waste generates 10 kg vermi-compost.

The total dry food waste generated from the 940 bedded facility at HBT Medical College and Dr. RN Cooper hospital campus is around 100 Kg per day. In absolute numbers the total dry food waste generated from the hospital, (30% of the total solid waste) which undergoes vermi-composting, is 2925 Kg per month, accounting to 35100 Kg of waste generated per annum. This waste now goes for treatment through four vermi-compost pits and one smart vermi-compost unit, a movable unit, installed in one corner of the organic garden, established in March 2017 on the hospital campus.

Figure 2: Smart vermi-compost unit and the organic garden at HBT Medical College and Dr. RN Cooper Hospital (from left towards right)



The total cost of operating, maintaining and consumables for the vermi-composting systems is roughly 17,931.22 USD. Consumables include waste generated, biological inoculum required for composting, odour control agent, herbal repellent, saw dust and electricity charges.

Table 1: Total cost of vermi-composting system installed at HBT Medical College and Dr RN Cooper Hospital

<b>Description</b>	<b>Rate</b>
Cost of Organic Waste Converter "OWC60" model (total equipment+ taxes+ transport)	862784
Total operating and maintenance cost	260084
Consumable Cost for 5 year	119298
<b>Total Cost</b>	<b>1242166.05</b>

### Tracking Process

BMC manages monitoring and supervision of the entire vermi-composting unit. They are also responsible for the employment of labourers for providing assistance in waste collection and treatment process. Cost of labour, operation and maintenance is part of the budget of BMC's Swachh Bharat Abhiyan Division. The initiative is aimed at reducing the load at waste at dumping sites in Mumbai.

### Challenges and lessons learned

The hospital is successfully able to manage all of the dry food waste generated within the campus however there have been no steps taken towards management of wet food waste that includes cooked food waste. Currently this waste goes off campus for treatment. Wide media coverage on the hospital's initiative to manage dry food waste has contributed to a lot of motivation and encouragement among the hospital community and BMC officials in Mumbai. As a result, several other municipal general hospitals in Mumbai have also taken up steps towards on-campus dry food waste management.

### Next Steps

- The hospital management is considering to also set up composting facilities to treat the wet waste on campus.
- In future, depending upon the quantity of compost generated from vermicomposting, hospital may consider to sell it out in the market for financial benefits.

### Links

To know more about vermi-composting:

- [http://agritech.tnau.ac.in/org\\_farm/orgfarm\\_vermicompost.html](http://agritech.tnau.ac.in/org_farm/orgfarm_vermicompost.html)
- <http://www.fao.org/docrep/007/y5104e/y5104e08.htm>

To learn more about HBT Medical College and Dr. RN Cooper Hospital: <http://hbttmc.edu.in/>

Media reports:

- <https://indianexpress.com/article/cities/mumbai/cooper-hospital-expands-eco-friendly-projects-4677090/>
- <https://swachhindia.ndtv.com/from-garbage-to-greenery-mumbais-cooper-hospital-leads-the-way-in-effective-waste-management-19474/>

Health and Environment Leadership Platform's work and other case studies: <https://www.ceh.org.in/activities/help/about/>

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## References

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<sup>i</sup> <https://www.moveforhunger.org/the-environmental-impact-of-food-waste/>

<sup>ii</sup> <https://www.hindustantimes.com/mumbai-news/bmc-finds-73-of-mumbai-s-garbage-is-food-waste-two-years-in-a-row/story-7DIs4uyotbmzUXuDULKGHI.html> and

[https://www.pmc.gov.in/sites/default/files/reports\\_dpr/ESR%202016-17.pdf](https://www.pmc.gov.in/sites/default/files/reports_dpr/ESR%202016-17.pdf)

<sup>iii</sup> <https://www.vknardep.org/sustainable-agriculture/technology/vermi-wash.html>