On-site food waste management to reduce the waste load on municipal dump site

Lokmanya Tilak Municipal General Hospital

GGHH Agenda Goals

- Waste

Hospital Goal

- Implement on- site treatment of food waste through aerobic bacterial composting
- Reduce the solid waste load on municipal landfill and dump sites in Mumbai
- Utilize the generated compost for the campus grounds

Progress Achieved

- About 168 MT of total food waste generated annually can be treated at the hospital campus, reducing the waste load at the municipal dump site.
- Compost generated from on-site treatment is used for 128 trees planted across the hospital campus. This saves the cost of purchasing compost and encourages planting more trees.
- Due to the success of on-site waste treatment and generation of significant amounts of compost, the hospital plans to develop their own organic kitchen garden.

The Issue

Reduction of food waste is environmentally important as it keeps food out of landfills, which can contribute to methane emissions. Methane is considered to be a more powerful greenhouse gas than carbon dioxide. Excess amounts of greenhouse gas emissions such as those of methane are responsible for the global warming and climate change. Food waste reduction also makes economic sense as its reduction or treatment at the source can reduce the transportation cost required to transfer it to the waste dump or landfill sites. This in turn can also reduce the maintenance cost of the dump sites as well as waste load on it.[i] Out of the 9,400 tonnes of waste that is sent daily to Mumbai's dumping grounds, 73% is food, vegetable and fruit waste, says the Brihanmumbai Municipal Corporation (BMC)'s latest Environment Status Report.[ii]

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 of 2016, enforced by the Central Government, it is mandatory for all such institutes across India to manage and treat their solid waste at the point of its generation. Due to the discrepancies in implementation of this law at the district level, BMC, the local municipal body in Mumbai had sent notices in 2017 to 5000 bulk waste generating institutions across the district. 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 the new waste management rules and the notice from BMC, Lokmanya Tilak Municipal General Hospital (LMTMG), commonly known as 'Sion Hospital', adopted on-site treatment of their food waste through aerobic bacterial composting. With this system the hospital is able to treat both its dry and wet food waste, thereby reducing a significant chunk of solid waste load on the municipal waste dump site. Food waste is one of the major components of the solid waste that is usually sent to the municipal dump sites. Biomedical waste, being among the other solid waste generated at the hospitals, is segregated and disposed of as per the Biomedical Waste Management Rules at LMTMG hospital.

Sustainability Strategy Implemented

The initiative of managing dry and wet food waste, collected from all the kitchen sources on campus, began in November 2017 after the BMC notified Mumbai hospitals in early 2017. Sion Hospital, a municipal general hospital located in the heart of the city, generates about 460 kg of food waste (dry and wet) per day from 3 of its bulk kitchen locations that include two on-campus canteens, 2 residential complexes and 1 urban health care centre.

In order to move towards proper and efficient handling of both dry and wet food waste Sion Hospital took the following steps:

- BMC officials and the management team at LMTMG Hospital jointly began working together in mid-2017 to address the food waste issue, after receiving the BMC notice.
- The hospital constructed thirteen brick lined compost pits measuring 9 ft. in length, 4.5 ft. in width and 3.5 ft. in height for the treatment of both wet and dry food waste on their campus.
- A local non-profit, ECO ROX, signed up to manage and maintain the compost units.
- The hospital hired three new employees to manage the food waste and compost program. ECO ROX trained them on how to collect waste and run it through the composting system. They work under the supervision of BMC.

- The hospital collects the compost generated after the treatment and applies it to the campus grounds maintained at the hospital.

Implementation Process

The 1,462 beded LMTMG hospital campus generates around 460 Kg of food waste per day. In absolute numbers the total wet and dry food waste generated by the hospital, which can undergo bacterial composting, in a year is 168 MT. Five per cent of the total weight of food waste put into the pits converts into compost. As per the dimensions of the compost pits, the total volume of each of these pits is 141 ft^3 which can accommodate a total of 4 MT of waste in 8 days.

- The hospital collects food waste, which includes raw vegetables, fruits, peels, meat pieces (cooked and uncooked), cooked food waste and leftover at the point of origin using large bins.
- The hospital then transfers collected food waste to the compost pits containing bacterial inoculums for decomposition and places it in alternate layers of 35-40 cm in width with the inoculum.
- Staff fills the compost pits one by one, with each pit taking about 7-8 days to fill completely. Once the first pit is full, staff places fresh waste in the second pit on the eighth day and subsequently fills up the other pits. On 41st day, staff empties the first pit to begin the process again for the next 8 days.
- Staff rotates the food waste once daily to ensure optimum levels of aeration necessary for the aerobic bacterial decomposition.
- Staff keeps the pits covered with an asbestos shed to prevent extreme heat and temperature conditions. Compost pits maintained at 40-50% moisture content for ideal waste decomposition conditions.
- After 40 days the rich dark brown coloured manure is ready in the first pit which staff transfers to another location for maturing. Maturing takes about 15-20 days. Mature compost is stable complex organic material in which biological activity has slowed and all of the easily degraded molecules have broken down. The compost is sundried before being used in landscaping.

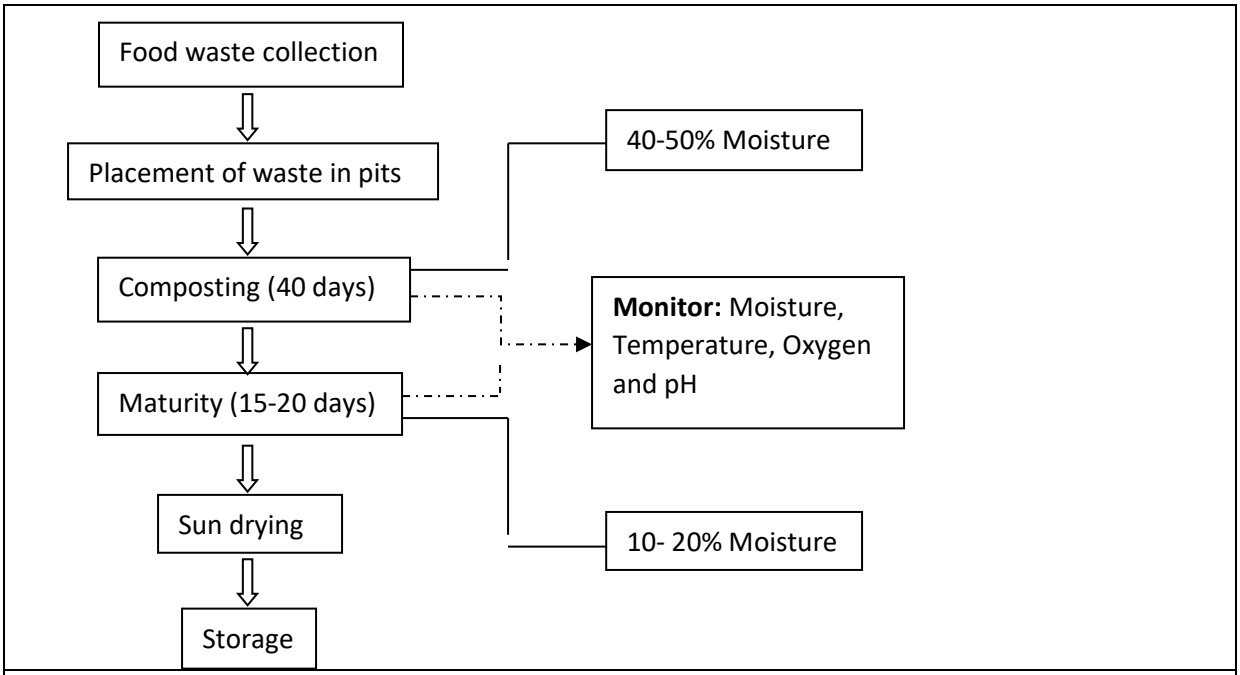

Figure 1: Stepwise process involved in bacterial composting

Tracking Process

ECO ROX and BMC jointly oversee technical monitoring and supervision of the entire bacterial composting unit. BMC is responsible for the employment of labourers tasked with waste collection and running it through the system. Cost of labour, operation and maintenance is part of the budget of BMC's Swachh Bharat Abhiyan Division.

Challenges and lessons learned

The hospital is successfully able to manage their entire food waste within the campus through aerobic bacterial composting. This has contributed to a lot of motivation and encouragement among the hospital community and BMC officials in Mumbai to take up similar initiatives at other facilities.

Next Steps

As a result of the success of this waste management project, hospital management is planning to set up a large scale on-campus plantation block and organic kitchen gardens for meeting the consumption needs of the hospital canteens.

Links

To know more about aerobic bacterial composting:

- http://mohua.gov.in/upload/uploadfiles/files/chap14(1).pdf
- https://www.unescap.org/sites/default/files/Operational%20Manual%20Composting%20and%20IRRC_FINAL.pdf

To learn more about LMTMG Hospital: http://ltmgh.com/FrontView/inner.aspx?Mkey=MTE=&lKey=Mg==

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

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Keywords/topics: Bacterial composting, aerobic decomposition, wet and dry food waste management

Submission date: XXXX 2018

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[ii] a. https://www.hindustantimes.com/mumbai-news/bmc-finds-73-of-mumbai-s-garbage-is-food-waste-two-years-in-a-row/story-7Dls4uyotbmzUXuDULKGHI.html b. https://www.pmc.gov.in/sites/default/files/reports_dpr/ESR%202016-17.pdf