

AN INNOVATIVE METHOD ON WASTE MANAGEMENT

^[1]Ms.Kezia Jacob A S, ^[2]Mr.Sunil J, ^[3]Mr.Divyaprasad S P

^[1]PG Student, Sarabhai Institute of Science & Technology, Vellanadu, Trivandrum,Kerala

^[2]Associate professor ,HOD of Civil Engineering

Sarabhai Institute of Science & Technology, Vellandu, Trivandrum,Kerala

^[3]PG Student Sarabhai Institute of Science & Technology, Vellanadu, Trivandrum,Kerala.

Abstract: *Waste management, especially biodegradable waste management is a key environmental issue that the world is facing today. The conventional methods so far adopted are time consuming and less efficient. This project aims at introducing a new mechanized unit especially for conventional flat which will manage the waste at source itself. The study is divided into three phases. Phase 1 which includes large scale waste management systems introduced by Government of Kerala. Phase 2 which include study of small scale units implemented by Government of Kerala. Phase 3, modeling of new mechanized unit called Kitchen Waste Mixer Grinder which uses the principle of grinding, mixing and heating is made.*

Keywords: *Waste management, kitchen mixer grinder.*

I. INTRODUCTION

Waste management is a process of collection, transportation, processing, recycling or disposal and monitoring of waste material. This process is done to prevent health, ecological, aesthetic issues and also to recover resources from it. The accepted best practice in solid waste management is the collection solid waste in bins which will be collected by collection trucks. Types of solid waste include recyclable waste (e.g. Paper plastic, wood etc.), toxic waste (e.g. e-waste)

Waste is littered all over leading to unsanitary living conditions. Municipal laws does not have adequate provision to deal effectively with ever rising problem of solid waste management. With rapid urbanization and population growth, the situation is becoming critical. Waste management is one of the mandatory functions of Urban Local Bodies. Though there are lot of developments in the sector due to lack of potential will, financial scarcity, etc. the methods so far developed does not prove to be effective. More concerted efforts and researches are required in this field to ensure a better urban environment.

II. CASE STUDY OF VILAPILSALA PLANT

This is one of the large scale waste management system introduced by Government of Kerala at Vilapilsala in Vilapil panchayat under Thiruvananthapuram City Corporation in the year 2000. The plant which is situated in 48 acres of land is now under the supervision of Center for Environmental and Development. According to the 2001 report out of 300 MT/day of solid waste generated in the city 260 tonnes were collected and processed at Vilapilsala site. The methods adopted include Windrow composting in which aerobic microbes breakdown organic matter into simpler substances in a windrow composter with width varying from around 2 to 4m and landfill.

A three staged process is carried out at the composed plant in which waste collected from city is arranged in heaps or windrows. The treatment shed covers an area of 2.5 acres divided into 8 units in which one unit consist of plant machinery and equipments and rest of the 7 used to store solid waste of each day before feeding into the machinery.

The first stage is defouling stage in which a microbial inoculum is sprayed above the unsegregated municipal waste to control mosquitoes, flies etc. and to reduce the production of noxious gases. The inoculums is available either as a dry powder or colloidal emulsion

The second stage is the bio conversion of waste into compost in which heaps are turned over for accretion periodically and during each turning inoculum is sprayed. This process continues for about 30 to 45 days.

In the third stage, the decomposed waste is passed through rotary and vibratory skills of 36 mm diameter to segregate non compostable materials which are rejected to landfills. The waste is then passed through 40mm sieve. The reject from the sieve is heaped for 3 to 4 days and again sieved. The final sieving is done by passing it through 4mm sieve. The final product is

then analyzed in the chemical laboratory to access the nutritional values and standards of composting quality. During the rainy season, rain water flows through improperly capped landfills which again increase the quantity of leachate generated by it.

The drawbacks of this treatment include the plant could treat only 90 tonnes of waste per day instead of treating 300 tonnes /day. Heaped garbage, contaminated streams and drinking water source. It also caused respiratory and skin diseases and the place became a breeding ground for mosquitoes.

III. SMALL SCALE WASTE MANAGEMENT UNITS

3.1. PIT COMPOSTING

Pit composting also known as trench composting is a compact and tidy way to decompose organic waste and there by enriching the soil. Sources of waste include agricultural, domestic, industrial etc.

Two pits of size 1m x 6m x 1m is usually made for the purpose. It is filled with cow dung, loose earth etc. And covered with tarpaulin or PVC sheet. Once the pit is filled up fully close it by spreading a layer of 15cm of earth. In the meantime use the second pit for dumping waste. The waste in first pit becomes composed after a period of 4 to 6 months.

The disadvantage is that it requires more space and more time for degradation of materials and also an unpleasant color will be generated especially during the rainy season

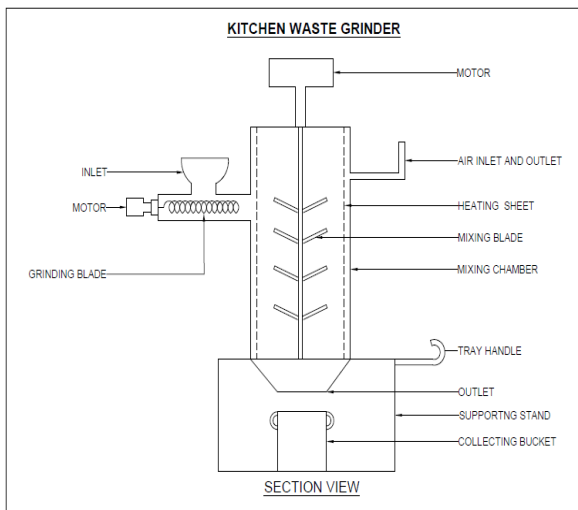
3.2. POT COMPOSITNG

Pot composting is one of the easiest and safest method as it does not create unbearable smell due to sufficient aeration for the purpose two country burned mud pots of about 50cm height and 35cm diameter at center with lid covers and hole in bottom are used. It is placed on a wooden or steel tripod stand of 50 cm height. Plastic vessel of half litre capacity and 10cm height is used for collection of leachate

Put some salt powder into the plastic vessel to avoid the entry of flies. Once the first pot is filled use second pot and by the time the second pot is filled the waste material in the first pot will convert to compost. During rainy season spread plastic sheets over the top with brick pieces placed on top to protect from rain. If too much flies seen over the pot, make a solution of camphor in coconut oil (dissolves two tablespoon in 25ml of oil and apply it on bottom and top cover of the pot by means of a brush. The disadvantage is that the process is time consuming and very difficult to maintain and there are chances of generation of unpleasant odor from leachate water.

IV. PROPOSAL-KITCHEN WASTE MIXER GRINDER

From all the above study we understand that there are lot of disadvantages for the current waste management units adopted by the public. The main disadvantages of the current waste management units are that all these units require more time and the maintenance is so difficult. So by understanding the above problems now we are putting forward a new small unit for waste management which can be adopted in a single flat. Our unit is completely electrical it takes only few minutes for its complete operation.



Cad Drawing Of The Model

4.1. WORKING PRINCIPLES

The working principle includes 3 steps:

1. Grinding
2. Mixing
3. Heating

4.1.1.Grinding

It involves grinding of kitchen waste into small pieces. Blades inside the grinder grinds the waste and converts it into slurry.



Grinder

4.1.2.Mixing

In this the slurry obtained from the above process is mixed thoroughly by blade provided inside the cylindrical portion of the unit.



Mixer

4.1.3. Heating

Heating coil is provided inside the machine. Heating coil provided inside will heat the mixture and remove the moisture content. Mixing and heating is done simultaneously. After the above three process the wastes turns into a powdered form which is collected in a tray or a bucket placed below the unit.



Heating Coil

4.2. PECULIARITY OF THE UNIT

There are many peculiarities for our machine. The main specialty or peculiarity is that it requires less to manage the kitchen waste and the waste is managed at its source itself. The machine can handle waste of up to 2 kg at a time. Time for each operation can be set if needed. The main advantage of using such a machine is that the leachate water is removed completely during heating process and as a result the foul smell or odor produced from the waste and also the harmful effect such as diseases due to leachate water from the waste can be avoided. Also the unit can be using solar instead of electricity.

Advantages

- Requires less time.
- Requires less space
- Waste can be managed at the source itself.
- Transportation of the waste can be avoided.
- No labor is required.
- Leachate water is completely removed.
- No foul smell or odor is produced.

Disadvantage

- Initial cost is high.

V. FUTURE SCOPE

THE MACHINE

Future modification can be possible by the following ways

- Time can be set for each operations.
- Fully automatic system is possible.
- Capacity of the machine can be changed.

THE RESIDUAL POWDER

- It can be converted into manure by further methods.
- It can be used as an additive for manufacturing bricks for the construction of temporary structures having less strength.
- It can be used as an additive for manufacturing garden tiles, pet houses and for making crafts

VI. CONCLUSION

Large and small scale waste management units introduced in Thiruvananthapuram city had respective failures such as

- requirement of processing time
- working labour
- installation space
- leachate problem

Improper working of these kind of units leads to accumulation of waste. From all the above studies and surveys it can be understood that there are a lot of problem with the current waste management system. To reduce such problems to a certain limit we proposed a small unit-Kitchen Waste Mixer Grinder. The working principle of Kitchen Waste Mixer Grinder is grinding, mixing and heating. It will reduce the amount of waste generation from kitchen and manage at the source itself.

“Those who generate the waste will have the responsibility to manage it at the source itself”

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