

## ***Treatment of Kitchen Waste Using Microbial Culture***

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### ***Abstract***

*In this paper, management and utilization of kitchen waste for productive uses is showcased. By using compression and decomposition methods of microbial culture, it is possible to turn commonly available wastes into productive manure. By analyzing treatment of kitchen waste using microbial culture from an economic angle, it can be easy for decision makers to implement this on a large scale. This paper discusses the methods involved in treatment of kitchen waste as well as the cost involved so that feasibility of this idea can be highlighted.*

***Keywords:*** Kitchen Waste, Microbial Culture, Green Waste, Compost

### **INTRODUCTION**

At the end of the 19th century the industrial revolution saw the rise of the world of consumers. Not only did the air get more and more polluted but the earth also became more polluted with the generation of non-biodegradable solid waste. The increase in population and urbanization was also largely responsible for the increase in solid waste.

Each household generates garbage or waste day in and day out. Items that are no

longer needed or do not have any further use fall in the category of waste and we tend to throw them away. There are different types of solid waste depending on their source. In today's polluted world, learning the correct methods of handling the generated waste has become essential. Segregation is an important method of handling municipal solid waste.

Segregation at source can be understood clearly by a schematic representation. One

of the important methods of managing and treating wastes is composting.

As the cities are growing in size, so are their problems, such as the generation of plastic waste. Various municipal waste treatment and disposal methods are now being used to try and resolve these problems. One common sight in all cities is the rag picker who plays an important role in the segregation of this waste. In this paper, we discuss the garbage that, with proper segregation generated in households, can be recycled and reused to prevent creation of waste at source and reduce the amount of waste thrown into the community dustbins.

## LITERATURE SURVEY

The process of crushing the MSW with the help of mechanical instruments, adding mega-bacillus culture and keeping the crushed waste for curing in the pits or in the containers is known as Mechanical Biological Treatment. The compost obtained by this method is known as MBT-compost.

### *Culture Details*

- i. Mega Bacillus (B. subtilis 2 strains):- Produces useful enzymes like amylase, protease, cellulose, and lipase.

- ii. Phototropic bacteria: - Produces bacteria cell ATP, absorbs CO<sub>2</sub>, and breaks down H<sub>2</sub>S.
- iii. Ingredients: - Essential minerals and amino acid.
- iv. Dosage: - 1 packet of Mega Bacillus can be applied for up to 15MT of organic matter.
- v. **Characteristics:-**
  - Appearance: - Light brown colour fine powder.
  - pH: - 8.0 – 8.6
  - Effective pH range: - 5.0 – 8.5
  - Effective temperature: - 10 – 45°C
  - Storage: - 2 years.

## NATURE AND SCOPE OF PROJECT

This project is eco-friendly and offers a combined solution for most of the burning problems the world is facing, such as pollution, unemployment, uplifting rural poor, poor soil fertility, wasteland development, poor health, declining yield, more need of irrigation of water, need for more power and increase in use of chemical fertilizers and pesticides.

- By culture technology, we can solve all the problems, as total available biodegradable waste can be converted into the best quality organic manure, it can provide

employment to unemployed youth and rural poor by establishing projects like MBT and OS1dms, improve soil structure, porosity and overall fertility of the soil, and develop wasteland by utilization of humus bio-fertilizers produced when conducting such projects.

## MATERIAL AND METHODOLOGY

### i. Mechanical biological treatment (MBT)

This method works on aerobic decomposition of organic matter. In this method, the generated MSW is segregated and then crushed in the shredding machine. Simultaneously, the culture and saw dust is added in the waste and mixed properly, then kept for decomposition. The final product is sieved and marketed.



*Fig 1: Shredding Machine*



*Fig 2: Spraying of OS 1 culture on MSW*

### ii. Operating System 1 (OS1)

This method also works on aerobic decomposition of organic matter. The MSW generated in the society is dumped in open land without segregation and culture is applied on it. After decomposition the final product is segregated and used for land filling, or as manure.

### ***Comparison of Microbial Methods***

There are many disadvantages in using conventional methods of solid waste management; and the microbial methods overcome some disadvantages of the conventional method.

### **The comparison of MBT & OS1 method is as follows:-**

#### **Mechanical biological treatment (MBT)**

- i.** It rejects only non-degradable materials.
- ii.** Less requirement of space, no need of skilled labour.
- iii.** Suitable to a wide variety of wastes.
- iv.** Requires hardly 1 month for supply & commissioning.
- v.** Temperature controlled in system, water content reduced in the process, pH & C/N maintained.
- vi.** In all seasons, the process is stable throughout the year.

- vii.** Relatively expensive method.

#### **Operating system 1 (OS1)**

- i.** More requirements of space & skilled labour.
- ii.** Suitable to a wide variety of wastes.
- iii.** Requires more than a month for supply & commissioning.
- iv.** Suits only in winter & summer season.
- v.** Less expensive method.

#### **Objectives**

- i.** To compare decomposition of kitchen waste by mechanical biological treatment and OS 1.
- ii.** To study the economical method for decomposition of kitchen waste.
- iii.** To study the efficient and effective decomposition of kitchen waste.
- iv.** Comparison of manure obtained by M.B.T. and OS 1.

### **RESULT AND DISCUSSION**

In this project, the wastes used are green waste (generated from vegetable and kitchen). These wastes were collected from the market, canteen as well as college mess. The vegetable and kitchen waste were collected and composted. In our study, the cultures used are mega-bacillus and mother culture (lacto bacillus).

These cultures have been considered as key agents for organic waste management thorough the process of culturing. The main aim of this investigation was to

know the compression of decomposition of vegetable and kitchen waste as a culturing method to enhance the value of the final products.

**Table 1: Amount of Manure Obtained and Time Consumption**

| Sl No. | Method                                | Time Consumed in days | Amount of Manure Obtained in Kg |
|--------|---------------------------------------|-----------------------|---------------------------------|
| 1      | Mechanical Biological Treatment (MBT) | 16                    | 4.074                           |
| 2      | Operating System 1 (OS 1 dms)         | 29                    | 1.67                            |

**Table 2: NPK and Other Nutrients Obtained in Manure**

| Sl No. | Nutrients                           | MBT     | OS 1dms |
|--------|-------------------------------------|---------|---------|
| 1      | pH                                  | 7.96    | 5.85    |
| 2      | EC                                  | 260     | 1079    |
| 3      | Total N                             | 2.15%   | 2.92%   |
| 4      | Total P <sub>2</sub> O <sub>5</sub> | 0.82%   | 1.16%   |
| 5      | K <sub>2</sub> O                    | 2.11%   | 2.32%   |
| 6      | OC                                  | 53.92%  | 51.04%  |
| 7      | C:N                                 | 25.07:1 | 17.47:1 |
| 8      | Zn                                  | 60 ppm  | 180 PPM |
| 9      | Cu                                  | 0 ppm   | 20 ppm  |
| 10     | Fe                                  | 300 ppm | 300 ppm |
| 11     | Mg                                  | 0.18%   | 0.32%   |
| 12     | Ca                                  | 0.80%   | 1.20%   |
| 13     | B                                   | 0 ppm   | 620 ppm |
| 14     | S                                   | 0.14%   | 0.62%   |

**Table 3: Description of sample: Solid Waste**

| Sl No. | Parameter                              | Results   |
|--------|----------------------------------------|-----------|
| 1      | p <sup>H</sup> of 10% solution         | 7.96      |
| 2      | Electrical Conductivity of 1% solution | 260 ms/cm |
| 3      | Total Nitrogen                         | 2.15%     |
| 4      | Total Phosphate                        | 0.82%     |
| 5      | Potash                                 | 2.11%     |
| 6      | Organic Carbon                         | 53.92%    |
| 7      | C N ratio                              | 25.07 : 1 |
| 8      | Zinc                                   | 60 PPM    |
| 9      | Copper                                 | 0.001 PPM |
| 10     | Iron                                   | 300 PPM   |
| 11     | Magnesium                              | 0.13%     |
| 12     | Calcium                                | 0.80%     |
| 13     | Boron                                  | 0.001%    |
| 14     | sulphur                                | 0.14%     |

## CONCLUSION

- i. The MBT and OS 1dms methods can successfully decompose the vegetable & kitchen waste and converted into useful eco-friendly manure.
- ii. The compost strength is mainly decided by three parameters, viz. pH, N & C: N ratio. In this study the manure obtained by the MBT method has the desirable parameters, hence it is richer.
- iii. As MBT method leads to early decomposition, the quantity of

manure obtained in the method is more than OS 1 dms.

- iv. For MBT method, initial investment is high but it proves more economical in future compared to OS 1 dms method.

## FUTURE SCOPE OF STUDY

- i. MBT and OS 1dms is a very simple process wherein waste can be collected and converted into useful and rich manure. We can use solid waste and many other

types of wastes to convert them into manure.

- ii. Every institute, municipal council and industry can adopt these methods and convert their kitchen waste into useful rich manure. The wastes collected in these places need to be checked for different trails of composting by MBT and OS 1dms in order to get rich manure.

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