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SOLID WASTE MANAGEMENT FOR PALGHAR CITY

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Abstract – *Managing solid waste is become a major issue nowadays, energy recovery from waste is an essential part of modern waste management. Palghar city faces major problem of solid waste management from past few years due to increase in population and its recognition as a district place. Design of a vermi-compost plant in the located dumping area will help to recover the current situation and will result in a better way of solid waste disposal and will generate a new source of income for Palghar city.*

Key Words: **Vermi-composting, Waste management, Earthworms, Revenue generation, Compost.**

1. INTRODUCTION

Solid waste management can be defined as the process of collecting and treating solid wastes. Solid waste management also gives idea about the waste which can recycle. Waste generation in rural household of India is increasing day by day and it is becoming serious concern. Waste in rural areas is not segregated and it is directly dumped. In order to manage waste proper way, there should be a functional waste management system. The most common method used in Palghar city for municipal solid waste treatment is open dumping. The main purpose behind this initiative is to manage solid waste by appropriate method and to provide better facilities and services for citizens of Palghar.

2. LITERATURE

This paper finds a solution for paper waste which is major concern from past few decades. The vermicompost area was divided into three segments. Each segment was filled with paper waste, organic waste along with 25 numbers of earthworms and they monitored it periodically. Soil samples were collected after 20, 45 and 60 days and the quality of waste was compared. The loss percentage of organic waste and paper waste showed the amount of degradation [1].

Vermi-compost has higher level of carbon- nitrogen, phosphorous, potassium, calcium, magnesium derived from the waste. This paper emphasizes on use three varieties of earthworms named as Eisenia foetida, Eudrilus eugeniae and Perionyx. The compost is made from waste paper, cattle dung and plant debris in the ratio 1:1:1. Physical and biological parameters were analyzed for 60 days [2].

The paper showcases the technique of vermiculture which is a science of raising and breeding of earthworms for waste reduction, production of fertilizer as well as assortment of possible uses for the future. Composting with worms avoids irrational disposal of organic waste and enjoys the benefits of high quality compost. It explains the process of breaking down of organic matter by the earthworms and production of castings that are exceptionally valuable type of fertilizers. This paper verifies and proves the statement "Earthworms are intestine of earth" stated by Aristotle [3].

3. METHODOLOGY

3.1 Collection

The Palghar dumping ground is located near Kharekuran. The municipal solid waste samples are collected from Palghar dumping ground in polymer bags. The bags are handled with care from health and safety point of view. These polymer bags are then brought for further process.

3.2 Segregation

The collected waste samples are later segregated as organic and inorganic waste. The segregated wastes are filled in polymer bags based on their category for further testing.

3.3 Testing

Moisture content, volatile content and ash content are conducted on organic as well as inorganic samples. For

moisture content the samples are kept in oven for 24 hours at 105-110°C. For volatile content samples are kept in muffle furnace for 15 minutes at 400°C. For ash content open burning of the samples are carried out.

3.4 Test Conclusion

For results refer table no.[1]. Due to high moisture content and high volatile content two methods for treating the municipal solid waste of Palghar are suitable, vermi-composting/composting or bio-methanation. Vermi-composting being economical and a source of income for Palghar, we selected vermi-composting over bio-methanation.

3.5 Vermi-composting

Favorable conditions for vermi-composting are:

- Moisture: 50-60% of moisture content of organic waste.
- Temperature: Range Between 18° C to35° C.
- pH :Range Between 6.5 to 7.5.

Earthworm details are:

- Type: Epigeic earthworm e.g. Red-worms.
- Proportion: 1kg of earthworms required for 100kg of organic waste.
- Cost of earthworms: Rs.50 to Rs.150 per kg.

Procedure of vermi-composting:

Area of land selected for vermi-composting is divided into small segments. Pits of dimension 20'X3'X2' are either constructed or excavated in each segments. Depth of pit should not be greater than 2 feet because the earthworms are active only up to depth of 2 feet. The organic waste is filled in the pit up to 1 foot. Later the surface is covered with earthworms, cow dung slurry and soil. Cow dung to water ratio is 1:1. For 100 kg of organic waste 1 kg of earthworms are required. The remaining depth is again filled with organic waste and the pits are covered with earthworm and cow dung slurry along with soil layer as the top most layer. Pits are provided with sheds to avoid direct contact of sunlight.

4. RESULTS

SAMPLE CALCULATION:

Total Weight = 7.70 kg

Weight of Organic Waste =6.8 kg

Weight of Inorganic Waste=0.80 kg

4.1 Moisture Content

Empty wt. of Pan 1= 1.3 kg

Empty wt. of Pan 2=1.6 kg

Empty wt. of Pan 3=0.85 kg

Dry wt. of Inorganic Waste + Pan 1 = 1.75 kg

Dry wt. of Organic Waste + Pan 2 = 2.80 kg

Dry wt. of Organic Waste + Pan 3 = 1.95 kg

Moisture Content of Organic Waste = {(6.8-2.3)/6.8}*100= 66.176 %

Moisture Content of Inorganic Waste= {(0.8-0.45)/0.8}*100 =43.75 %

4.2 Volatile Content

Empty wt. of Crusible 1 = 87.30 gms

Empty wt. of Crusible 2 = 105.81 gms

Wt. of Organic Waste + Crusible 2 = 129.91gms

Wt. of Organic Waste + Crusible 1 = 99.77gms

After heating at 400 °C:-

Wt of Organic Waste + Crusible 2 = 109.54gms

Wt of Inorganic Waste + Crusible 1 = 89.74gms

Volatile Content of Organic Waste = {(129.91-109.54)/129.91}*100 =15.68 %

Volatile Content of Inorganic Waste = {(99.77-89.74)/99.77}*100=10.053 %

4.3 Ash Content

Empty wt. of Pan 1=0.9 kg

Empty wt. of Pan 2=0.85 kg

Wt. of Organic Waste + Pan 2=1.55 kg

Wt. of Inorganic Waste + Pan 1=1.30 kg

After Complete Burning.

Wt. of Organic Waste + Pan 2 = 1.05 kg

Wt. of Inorganic Waste + Pan 1 = 1.00 kg

Ash Content of Organic Waste = {(1.55-1.05)/1.55}*100 = 32.258 %

Ash Content of Inorganic Waste = {(1.3-1.0)/1.3}*100=23.077 %

Table – 1: Results of solid waste sample

Sample		Moisture Content (%)	Volatile Content (%)	Ash Content (%)
1.	Organic	66.176	15.68	32.25
	Inorganic	43.75	10.053	23.077
2.	Organic	56.374	14.179	29.04
	Inorganic	19.00	4.348	9.836
3.	Organic	59.452	13.875	30.875
	Inorganic	25.496	7.845	11.001
4.	Organic	54.785	14.60	26.875
	Inorganic	24.458	6.50	7.560

5. CONCLUSION

Rather than looking municipal solid waste as a waste it should be looked upon as a source of income. If managed properly through prescribed methodology, solid waste can yield high quality compost. Compost can be sold in the open market and which will result in source of income. Waste is no more a waste but a major resource.

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