

Preparation of Compost with Plant Waste, Cow Dung and Food Waste by Using Mass Culture as *Eisenia Fetida* in ARMIET Campus, Shahapur, Thane.

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Abstract- *The Vermicompost preparation at ARMIET Campus, Shahapur, Thane is done at site by using Plant waste, Cattle dung, food waste along with Eisenia Fetida. As the production of decomposable Organic Matter will take a span of 60-75 days. The vermicomposting process was started in the month of March, it will be completed by May. In this study, we will analyse the compost of 0th day and after 30 days for the parameters like pH, Total Nitrogen (TN), Phosphorus (Ph), Potassium (P), and Carbon: Nitrogen ratio (C:N). For many years, earthworms like Eisenia Fetida have been used for organic waste degradation. The Degradation process enhances when cattle dung is added to biodegradable waste like food waste and plant waste in the presence of good amounts of Moisture content and under aerobic conditions. We are expecting an excellent quality of compost and also a good amount of quantity of the same. This compost will be used for the Bamboo Plantation Process in the campus. The preliminary experimental study shows a good amount of nutrients quality as determined. The nutritional values of the compost after 30 days were pH = 7.5, TN=0.5, Ph=1.3, P=0.3 and C:N=27 respectively. The values will be monitored for subsequent change till 60-75 days of degradation. The population of Earthworms is also observed during the experimental study.*

Indexed Terms- *Biodegradation; Compost; Decomposers; Eisenia Fetida; Organic wastes; Vermicomposting*

I. INTRODUCTION

Vermicomposting is a process that includes decomposing organic waste with earthworms to generate high-quality compost that serves as an

effective plant growth promoter since it contains plant-available nutrients, a diverse microbial community, and humic substances. There has been a lot of studies on the use of vermicompost as an organic fertilizer all over the world.[1]

The Earthworms are burrowing animals and have a tendency to form tunnels by eating their way into the soil depending on factors like soil moisture, availability of organic matter. This population of earthworms is attracted to organic materials such as humus, cow dung, and kitchen waste.[7].

Eisenia fetida is used in the production of vermicompost. Earthworms, also known as the "Intestine of Earth," are the most common soil fauna on the planet, accounting for 80 percent of the soil invertebrate population in many ecosystems. [8].

An earthworm serves as an aerator, grinder, crusher, chemical degrader, and biological stimulator by encouraging the growth of "beneficial decomposer bacteria" in waste biomass. When the favourable conditions of moisture content, temperature and good amount of cow dung is introduced, the earthworms eat the organic matter and then passed on to intestine for enzymatic actions. Proteases, lipases, amylases, and cellulases are enzymes secreted by the worm's intestine, which aid in the biochemical conversion of cellulosic and proteinaceous materials in organic wastes.[6].The remainder is excreted as fine mucus-coated granular aggregates known as "worm castings," which are high in nitrates, phosphates, and potassium.Natural biodegradation and decomposition of waste is sped up by 60 to 80 percent when these fauna are present, reducing composting time by several weeks.

II. METHODOLOGY

The ARMIET Campus is located in Shahapur, Thane, where the River Bhatsa flows through the lush green trees and rich vegetation, creating a serene natural beauty around. A 10 no.s of vermicomposting units is set up at ARMIET Campus. Cattle Dung used in the vermicomposting units came from the Campus Cattle Shed, while the food waste was procured from canteen.

A. Experimental Setup

10 no.os of Mipatex Vermi Compost Beds of 12 ft x 4 ft x 2ft are placed on site which is specially designed for making vermicompost for a period from March to May.

The cattle dung (15-20 days old) was obtained from the ARMIET Campus's cattle shed. Plant waste from the garden and food waste from the college canteen. Earthworms (*Eisenia fetida*) and vermi bags were included in the Bag of Cattle Dung. For this study, a separate vermi-bed was considered. Throughout the period, the beds were continuously checked and water was sprayed on them at regular intervals.

B. Preparation of Vermibed

The Vermi Bags are placed on site along with wooden sticks for the support wherever provided. The first layer of bed consisted of Sundried Neem Leaves to give medicinal Value to the compost that will be prepared. Later sprinkling water on the layer of neem leaves.



Fig. 1 Preparation of Vermibed by adding Neem Leaves

Then adding aged cow dung into the bed, Cow dung is food for earthworms. You can sprinkle some water on cow dung if it is dry. Again sprinkling some amount of water to maintain the moisture in the bed. Then adding Chopped leaves and rice husk on the layer of cow dung. It helps to hold moisture & Aeration for Earthworms. Sprinkle some water on Dry straw to maintain moisturize. Again sprinkling water on this layer, adding cow dung. Continue the process until the Vermi Bed completely fills up. Make sure the moisture level shall not exceed 40-50%. Sprinkle water on top of Bed, maintain moisture for Earth Worms. Now introduce Earth Worms into the Vermi Bed, Just leave them on the Vermi Bed.



Fig. 2 Eisenia Fiteda in Cowdung culture

Then the topmost layer is covered by Jute Bags for limiting the amount of light entering the units. Also to maintain the moisture in bed. The jute bags are exposed to spraying of water, so that good amount of moisture content is maintained. This Compost takes 60-75 days for preparation.



Fig. 3 Vermicomposting bed at Site; ARMIET Campus

II. EXPERIMENTAL STUDY

The experiment was conducted on samples collected from vermicompost bed located in ARMIET Campus, Shahapur, Dist. Thane . As the temperature is more in this area and also due to presence of humidity (due to river flowing along side), the beds were covered and were monitored on a regular basis to ensure that the different requirements needed were met.

For the study of the nutritional value of the compost that was collected, these two experiments were held for a period of 0 day and 30 days. Using conventional methods, the sample was analysed for pH, total Nitrogen (TN), and Phosphorus (TP) for the composting phase as well as for earthworm number & Body weight of Eisen Fetida.

III. RESULTS AND DISCUSSIONS

According to the findings, the physical and chemical properties of plant debris, cattle dung, and paper waste material changed significantly during the vermicomposting process. These improvements would be beneficial to compost farming. The pH decreases (from 8 to 7.5) as the vermicomposting cycle progresses, as shown in Table.1 (from 0 to 30 days). Also it is seen that the Nitrogen level, C:N level has increased subsequently over a span of 30 days as compared to the 0th day.

Table I IMPACT OF VERMICOMPOST ON VARIOUS PARAMETERS

Sr.No	Parameters	Nutritional Value	
		0day	30 days
1	pH	8	7.5
2	Total Nitrogen	0.12	0.5
3	Phosphorus	0.11	1.3
4	Potassium	0.14	0.3
5	C:N	42	27

TABLE II INFLUENCE ON POPULATION ON EISENIA FETIDA DURING COMPOST PERIOD

Type of Material	Earthworm Number		Bodyweight of Earthworm (g)	
	0 day	30 days	0day	30 days
Cow Dung+Plant Debris + Food Waste	50	6	11	2
	5		0	

According to Table 2, there was no worm mortality in the pre-decomposed. There was an increase in Earthworm population as well as a modest increase in body weight.

CONCLUSION

Vermicomposting is a green and environmentally friendly composting technique. Vermiculture is a simple, odourless process with low operating costs. Residents should be taught to vermicompost all of their kitchen and garden waste, which would relieve the strain on local governments. As a result, there are economic as well as environmental ramifications.

Food waste, such as plant waste, cattle dung, and paper waste, can be converted into the best form with the best nutrient release, according to the study's findings. Hot, humid, and dark conditions are ideal for worms to decompose organic matter. If there is no bait material available, such as cattle dung, the Eisenia Fetida will accept food wastes directly.

ACKNOWLEDGMENT

We Express our special gratitude to our Civil Department Team who always guide and motivate each other.

Last but not the least, we would like to Thank ARMIET Management to support us.

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