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A SPETIAL INVESTIGATETION IN THE DEGRADATION OF MU ICIPAL SOLID WASTE USING MICROORGANISM

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Abstract

The objective of this research was to recycle household biodegradable waste usingcomposting as a technique. Mixtures of organic materials which are components of biodegradable wastes were recycled by decomposing them under a controlled environmental condition. The initial moisture content of each of the materials make up the compost mixture was computed and classified as wet and dry materials, and the average moisture content for both wet and dry materials was computed. The dry materials were weighed as they were collected and were found to be around 8kg with an average moisture content of 39.2% and a chosen moisture goal of 50%. The compost mixture was scaled down to half its quantity for easy turning. With an optimal environmental condition of moisture content, adequate proportion of both the dry and wet material to meet the required Carbon/Nitrogen (C/N) ratio, and an appropriate volume of air in the pore spaces of the compost pile and microbial decomposition was initiated. At the end of the decomposition, a stabilized organic matter which can be used as fertilizer supplement by horticulturists, landscapers, orchardists, Farmers etc, was obtained.

Introduction

The rapid increase of world population in the last years accompanied by the intensification of human activities brought serious environmental problems such as the pollution of soil, water, and air, forest destruction, etc. In the future these negative impacts may cause global climatic changes (greenhouse effect) and might be a menace for the existence of the human race. Immediate measures to avoid the negative influence of human activities are necessary. Many industrial processes result in a large amount of wastes. Food and agriculture industry are among the oldest of human practices, but as a source of wastes it does not make any exception from other industrial activities. In the near future the management of food and agricultural wastes will play an important role in the conservation of the natural

resources in many countries, including India.

With the increase in population the generation of solid waste has also increase in India. Though India is an agriculture based country the there is a huge requirement of organic as well as chemical fertilizer. Composting had been the integral part of Indian waste management. It not only helped in waste management but in the field of agriculture as well. Before the invention of plastics it was easier to compost.With the invention of plastics and urbanization the concept of composting started fading and there came this word "Landfill Site" which is the favorable way to municipalities and for the citizens as well, but as easy as is this option it has sever effect on the natural basic resources for the life and the health of the environment. As people are getting aware of the bigger picture of the landfill consequences research are being conducted to minimize the adverse effect of it. Almost all research on solid waste management suggest the segregation of the solid waste at least in three categories i.e. wet, dry And rest. Then the specific management process for the specific garbage so that management of one type garbage should not impact the other types of garbage. The prime aim of the present study is to compare the effect of already existing products for inoculums on composting and to find out the natural source of Microbes for Composting for enhanced degradation.

Materials & Methods

Material: -The prime material that is required in the present study is the organic waste. Organic waste are that waste which include organic substance such as vegetables peels, green or dry leaves, animal waste, paddy, domestic waste, industrial waste and municipal waste. These substance are highly rich in nutrients as well as carbon and nitrogen which plays a very crucial role in composting.

Methods:-the methodology that was adopted in the study was the standard method of composting but the methods was divided into three stages and they are sampling and preparation of sample, Inoculum preparation and the mixing in the prepared sample and Analysis of the prepared compost.

After the sampling of solid waste they are directly bought to the laboratory for sample preparation. Total of 5 sample were prepared in tray which include the green and dry leaves, vegetable peel etc. C:N ratio has been maintained over here by mixing dry leaves which are rich in Carbon content and green leaves which are rich in Nitrogen content. Maintaining this

ratio is very important for the microorganism. When the sample got prepared then Inoculum was preparedby mixing rice, water, milk and Black strap molasses. Beside inoculum industrial microbe, microbes from compost and microbes from biogas are used for composting. All four tray of organic compost are mixed with above mention microbes and one tray is kept for natural composting then all the five tray are kept for composting for 8 weeks and they are covered which jute sack and water is spray over it on interval of 2 weeks. After 8 weeks the matured compost was taken out for the analysis. The parameter that was analyzed are pH, Electrical conductivity and Moisture Content these parameter were also analysed before composting which will ultimately help in comparing of results. After the composting Nitrogen, Phosphorus and Potassium were also analysed.

Results:-

. The standard methods were followed to calculate the pH, E.C., Moisture Content, Nitrogen, Phosphorus and potassium.

The final results calculated are as follows:

S.No	Inoculum Name	Treatment Notation	Temp(in °C)	pH	E.C(ms)
1	Industrial Microbes	T1	25	6.79	1.335
2	Microbes for Composting	T2	25	7.87	1.566
3	Natural Composting	T3	25	8.30	1.324
4	Molasses	T4	25	7.75	1.400
5	Bio-Gas	T5	25	6.45	1.816

Table - 1- Temperature, pH, E.C. of the samples prior composting

S.No	Treatmen Name	Wt.(in gm)	Temp(in °C)	Duration	M.C (%)
1	T1	2	105	5 min	37.986
2	T2	2	105	5 min	39.958
3	T3	2	105	5 min	37.073
4	T4	2	105	5 min	39.212

5	T5	2	105	5 min	41.875

Table - 2- Moisture Content of samples prior composting

S.No	Sample Name	Temperature(in °C)	pH	E.C(ms)
1	Industrial Microbes	25	7.82	1.461
2	Microbes for Composting	25	8.21	1.664
3	Natural Composting	25	9.54	1.415
4	Molasses	25	8.93	1.502
5	Bio-Gas	25	7 .31	1.913

Table - 3 – Temperature, pH, E.C. of samples after composting

S.No	Inoculum Type	Wt.(in gm)	Temp(in °C)	Duration (in min)	M.C (%)
1	Industrial Microbes	2	105	5	55.8
2	Microbes for Composting	2	105	5	45.3
3	Bio-Gas	2	105	5	39.5
4	Molasses	2	105	5	44.3
5	Natural	2	105	5	45.6

Table -4 – Moisture content after composting

S.No	Treatment Name	Organic Matter	Nitrogen	Phosphorous	Potassium
1	T1	20.4	1.306	0.41	0.90
2	T2	22.7	1.203	0.42	0.95
3	T3	23.8	1.013	0.41	0.88
4	T4	15.7	1.408	0.44	0.92
5	T5	23.2	1.102	0.43	0.99

Table 5 – N, P, and K of compost.

Conclusion

On comparing all the values at last, the trayT4 added with Microbes for Composting was more efficient among all the samples because the parameters like organic carbon value was less compared to remaining samples and also plants would grow better when we provided ambient nutrients to them. Nutrients were rich in Sample T4, incorporated with Microbes for Composting while compared to other four samples. So that we can conclude that the compost which was done by Microbes for Composting was better with compared to Industrial microbes, bio-microbes, molasses, and natural.

It was expected that the work would result in better and low cost option for the composting of solid waste and it would help the players in the field of waste management and plant growth promotion. The self-prepared Em can be used at larger scale. The self-prepared Em has potential for large production.

The tray without any inoculum showed satisfactory result in terms of rate of composting but other trays with inoculum added had advantage of achieving thermophilic phase early.

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