IJPSR (2018), Volume 9, Issue 12 **(Research Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 09 April, 2018; received in revised form, 08 July, 2018; accepted, 18 July, 2018; published 01 December, 2018

COMPARATIVE STUDY OF POTENTIAL LEVELS OF VERMICOMPOST USING DIFFERENT WASTES FROM ERODE DISTRICT

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Keywords:

Vermicompost, Compost, Fertilizer, Earthworms, Solid waste management and Erode wastes

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ABSTRACT: Waste disposal has become one of the major problems we are facing today. The rapid increase in the generation of huge extent of waste is one feature of the environmental crisis. This is accompanying with recent global development with respect to rapid urbanization and population growth which has resulted into development of large quantity of organic solid waste. Vermi composting has become progressively more popular across the word in recent decades; Vermicompost is the process which will convert waste into valuable fertilizer. The function of earthworms on soil ecosystem differs considerably with different earthworm species that are linked to their approach. In the present study was conducted to manage the different wastes obtained from erode district. The solid waste like Agriculture waste, Market waste, Industrial waste, Hospital waste and Household waste were collected and converted into vermicompost. The characteristics and nutrients elements of different vermicomposts are evaluated. Among all vermicomposts the agricultural waste, market waste and house hold waste gave potential vermicompost.

INTRODUCTION: Solid waste management is one among the basic essential services provided by Municipal in order to keep the country clean. The public sectors in many areas are unable to have services effectively; illegal dumping of domestic and industrial waste is common practice rapid growth industrialization and population explosion in country lead to migration of people from village to cities which leads to tons of waste increase daily [1]. Soil is one of the most important natural resource on earth. Most life on earth depends on soil as a direct or indirect source of food, but deterioration of the environment through depletion of resources is a major threat confronting the world.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.9(12).5449-54

Article can be accessed online on: www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.9(12).5449-54

The widespread use of chemical fertilizers has contributed to environmental degradation especially on soil fertility reducing the natural nutrients on the soil surface. Though intensive use of chemical fertilizers in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and environmental health. Concerns regarding soil degradation and agricultural sustainable have kindled interest in assessment of soil quality [2].

Vermicompost is a organic fertilizer obtained from the earthworms by passing out the organic wastes through the digestive systems. The process of preparation of this organic fertilizer may be called as Vermicomposting. Earthworm improves and restores soil fertility and boost up crop productivity by the use of their excretory products known as vermicast. Vemicast is popularly known as Black gold because of rich in nutrients, Growth promoting substances beneficial soil micro flora, having properties of inhibiting pathogenic microbes

and synergistic relationship in plant rizhospheres. Being stable, multifunctional organic manure which enriches the soil quality by improving physic-chemical and biological properties it must be promoted [3]. Earthworms have been indicated as a candidate bio-monitoring organism for soil pollutants. To establish a bio-monitoring system using earthworms, the effects of various chemical pollutants on earthworms have been studied. The accumulation of both natural and depleted uranium in earthworms was analyzed to evaluate the corresponding biological effects [4]. Earthworms also accelerate the mineralization as well as the turnover of soil organic matter. Earthworms are known as "Farmer's Friend", "Nature's Best Friend". Past experience teaches us to replace the use of chemical fertilizer with the organic manure using earthworms. One of the most important earthworm families is Lumricidae, and one of its members, Eiseniafetida, can be used to stabilize organic waste the process called "Vermicomposting" or composting with worms [5]. Applications of vermicompost increases in soil health, soil minerals, water holding capacity, soil microorganism and nutritional values of yielding crop as well as decreases plant pests population [6]. In accordance with our results it was found that vermicompost increases seed germination, shoot length, root length, pH, macro nutrients, micro nutrients [7].

The main aim of the present investigation is to study about the "Comparative study of potential levels of vermicompost using different wastes from erode district". The objectives was framed for the present study is to identify and collection of wastes generating from erode district and to convert the raw wastes into compost then to recycle the different waste into vermicompost using simple vermicompost technology. The evaluation of micro and macro nutrients levels in different vermicompost and to compare the effectiveness of different vermicompost based growth substrates in protecting seeds and promoting seedling in green house.

MATERIALS AND METHODS:

Sample Collection: The different wastes are collected from erode district.

1. Agriculture Waste: Weed waste is collected from agricultural lands located in west side of Erode district. The weed waste contains Parthenium plant and dried leaves.

FIG. 1: WEED WASTE FROM AGRICULTURAL LAND

2. Market Wastes: Market wastes are collected from Erode vegetable market and erode fish market located in east side of Erode.

FIG. 2: VEGETABLE WASTE

FIG. 3: FISH WASTE

3. Household Waste: Household waste is collected from houses in and around erodes. The household waste containing daily waste from houses.

FIG. 4: HOUSEHOLD WASTE

4. Industrial Waste: Industrial waste are collected from SIPCOT (State Industries Promotion Corporation of Tamil Nadu) south side of erode. *i.e.,* Dye waste and Carbon waste, Molasses.

FIG. 5: DYE WASTE

FIG. 6: CARBON WASTE

5. Medical Waste:

FIG. 7: COTTON WASTE

FIG. 8: NAPKIN WASTE

Preparation of Compost: Composting is the biological decomposition and stabilization of organic substrates under conditions that allow thermophilic temperatures as a result of biologically produced heat to produce a final product` It is an aerobic method of composting. The finished product is obtained through that process of composting within 90-120 days [8].

Preparation of Vermicompost: Conversion of compost into vermicompost by vermicompost technology by pit method. The earth worm chosen for the study is`

FIG. 9: VERMICOMPOSTING UNIT

Phase 1: Processing involving the collection of wastes, shred, mechanical separation of the metal, glass and ceramics and storage of organic wastes.

Phase 2: Pre digestion of organic waste for twenty days by heaping the material along with cattle dung slurry. This process partially digests the material and fit for earthworm consumption. Cattle dung and biogas slurry may be used after drying. Wet dung should not be used for vermicompost production.

Phase 3: Preparation of earthworm bed. A concrete base is required to put the waste for vermicompost preparation. Loose soil will allow the worms to go into soil and also while watering, all the dissolvable nutrients go into the soil along with water.

Phase 4: Collection earthworm after vermicompost collection. Sieving the composted material to separate fully composted material. The partially composted material will be again put into vermicompost bed.

Phase 5: Storing the vermicompost in proper place to maintain moisture and allow the beneficial microorganisms to grow.

Soil Characteristics and Nutrients Elements of Different Vermicompost: The soil characters such as pH, nutrients contents such as nitrogen, potassium, phosphorous, organic content, humus content are found for 90th day.

RESULTS: Use of vermicompost promotes soil aggregation and stabilizes soil structure. This improves the air-water relationship of soil, thus increasing the water retention capacity and encourages extensive development of root system of plants. The mineralization of nutrient is observed to be exchange and more exchangeable calcium, potassium, magnesium in soil which those worms lives.

1. Soil Characteristics and Nutrients Elements of Different Vermicompost:

A. Impact of pH on Different Vermicompost: The pH level is near to neutral pH in the Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also near to neutral pH compared to the other wastes.

TABLE 1: SHOWS THE IMPACT OF pH ON DIFFERENT VERMICOMPOST

S. no.	Types of waste	Name of the sample	pH level
1	Agricultural waste	Weed waste	7.27
2	Market waste	vegetable waste	7.02
3		Fish waste	7.27
4	Hospital waste	Napkin waste	8.87
5		Cotton waste	8.44
6	Industrial waste	Molsses waste	7.85
7		Dye waste	9.76
8		Carbon waste	9.02
9	House hold waste	Household waste	7.05

B. Nitrogen Content in Different Vermicompost: The Nitrogen content is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher nitrogen content, compared to the other vermicompost.

TABLE 2: SHOWS THE NITROGEN CONTENT IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Nitrogen level %
1	Agriculture waste	Weed waste	**7.2**
2	Market waste	Vegetable waste	**3.8**
3		Fish waste	**2.5**
4	Industrial waste	Dye waste	**0.9**
5		Carbon waste	**1.15**
6		Molasses waste	**0.75**
7	Hospital waste	Napkin waste	**1.15**
8		Catton waste	**0.8**
9	Household waste	Household waste	**7.2**

C. Phosphorous Content on Different Vermicompost: The Phosphorous content is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher phosphorous content, compared to the other vermicompost.

TABLE 3: SHOWS THE NITROGEN CONTENT IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Phosphorous level %
1	Agriculture waste	Weed waste	2
2	Market waste	Vegetable waste	1.86
3		Fish waste	1.95
4	Industrial waste	Dye waste	0.65
5		Carbon waste	0.98
6		Molasses waste	1.5
7	Hospital waste	Napkin waste	0.56
8		Catton waste	0.12
9	Household waste	Household waste	1.8

D. Potassium Content on Different Vermicompost: The Potassium level is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher potassium content, compared to the other vermicompost.

TABLE 4: SHOWS THE NITROGEN CONTENT IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Potassium level %
1	Agriculture waste	Weed waste	6.53
2	Market waste	Vegetable waste	4.45
3		Fish waste	4.23
4	Industrial waste	Dye waste	0.83
5		Carbon waste	2.25
6		Molasses waste	5.85
7	Hospital waste	Napkin waste	0.55
8		Catton waste	0.6
9	Household waste	Household waste	1.57

E. Humus Content in Different Vermicompost: The humus level is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher humus content, compared to the other vermicompost.

TABLE 5 SHOWS THE HUMUS CONTENT IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Humus content %
1	Agriculture waste	Weed waste	15
2	Market waste	Vegetable waste	10.5
3		Fish waste	12.5
4	Industrial waste	Dye waste	7.35
5		Carbon waste	9.85
6		Molasses waste	14.3
7	Hospital waste	Napkin waste	6.75
8		Catton waste	11.67
9	Household waste	Household waste	12.5

F. Organic Content on Different Vermicompost: The organic content is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher organic content, compared to the other vermicompost.

TABLE 6: SHOWS THE HUMUS CONTENT IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Organic content %
1	Agriculture waste	Weed waste	25.8
2	Market waste	Vegetable waste	17.5
3		Fish waste	17.25
4	Industrial waste	Dye waste	10.5
5		Carbon waste	14.6
6		Molasses waste	20.3
7	Hospital waste	Napkin waste	9.87
8		Catton waste	13.67
9	Household waste	Household waste	19.3

G. Electro Conductivity on Different Vermicompost: The electroconducivity level is higher in Agricultural waste (weed waste, vegetable waste and fish waste) and Household waste. The molasses waste (Industrial waste) also shows higher electro conductivity, compared to the other vermicompost.

TABLE 7: SHOWS THE ELECTRO CONDUCTIVITY IN DIFFERENT VERMICOMPOST

S. no.	Type of waste	Name of the sample	Electro conductivity %
1	Agriculture waste	Weed waste	1.59
2	Market waste	Vegetable waste	1.66
3		Fish waste	1.89
4	Industrial waste	Dye waste	0.98
5		Carbon waste	0.97
6		Molasses waste	1.60
7	Hospital waste	Napkin waste	0.87
8		Catton waste	0.65
9	Household waste	Household waste	1.76

DISCUSSION: The current study was to observe the solid waste management and to find the potential level of different vermicompost using *Eisenia fetida*. The result will be shown on the all macro and micro nutrients will high in the Agricultural waste (weed waste vermicompost), Industrial waste (molasses waste vermicompost), Market waste (vegetable waste vermicompost, fish waste vermicompost). These vermicompost enhanced the soil fertility, crop yield and soil quality. This study may be valuable to evaluate avoid the different type of waste storage. Vermicompost accelerates the production of quality fertilizer by promote decomposition of wastes and inorganic matter used in agriculture and lowers the hazards of sustained cropping in open and green house environment.

CONCLUSION: Agricultural waste, Industrial waste and market waste vermicompost accelerates the production of quality fertilizer by promoting decomposition of wastes and inorganic matter used in agriculture and lowers the hazards of continued cropping in open and green house environment. To prevent the environmental pollution from extensive application of prevent the different wastes. These different waste vermicompost recommended sustainable agriculture. Therefore, it is used for nitrogen fertilizer like NPK fertilizer should be within ecologically safe limits.

ACKNOWLEDGEMENT: Authors are thankful to Bharathidasan College of Arts and Science, Erode and Department of Biochemistry to carry our this project.

CONFLICT OF INTEREST: Nil

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How to cite this article:
Hamsa D and Karthika: Comparative study of potential levels of vermicompost using different wastes from Erode district. Int J Pharm Sci & Res 2018; 9(12): 5449-54. doi: 10.13040/IJPSR.0975-8232.9(12).5449-54.