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Research Paper

Environment cleanup through vermi-technology using Nirmalaya (Floral Waste)

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Abstract: Waste materials generated from different resource ultimately enter into natural environment e.g., water and soil without any change. Ujjain is a holy city with various temples for pilgrims. Routinely flowers are used in the temple for the *Pooja-Archana* and after use dumped in the soil as such which ultimately increase the chance of contamination/pollution in and around the area. Vermi-technology is an economic, ecofriendly and employing, technique in which worms are used to produce compost. Floral waste collected, chopped, mixed with worms in a proportion and kept for some period of time for the compost preparation. Using this technology we can transform the harmful waste into useful compost. The compost is called vermicompost can be effectively applied into the field, garden, for improvement of plant health without harming the soil fertility.
Keyword: Worm, Compost, Nirmalaya.

INTRODUCTION

Composting is a process in which microorganisms rapidly consume organic Composting is the transformations of raw organic materials into biologically stable, humic substances suitable for a variety of soils and plant uses. Essentially, composting is controlled decomposition, the natural breakdown process that occurs when organic residue comes in contact with soil.

Basics of Vermicomposting:

Vermicomposting is the process of using worms ("vermi" is Latin for "worm") to matter, using it as an energy source and converting it into carbon dioxide, water, *microbial biomass*, heat and *compost*. process organic food waste into nutrient-rich soil. Worms eat decaying food waste and produce vermicompost, a very effective soil amendment. One of the unique features of vermicompost is that during the process of conversion of various organic wastes by earthworms, many of the nutrients are changed to their available forms in order to make them easily utilizable by plants. Earthworms have been associated with

human civilization as "Friends of farmers", forming an important group of soil animals that are known to improve soil productivity by enhancing the physical, chemical and biological characteristics of soil (Lee, 1985). Earthworms belonging to Phylum Annelida, Class Chaetopoda, and Order Oligochaeta occupy a unique position in animal kingdom (Kaviraj and Sharma 2003). Animal manure is a valuable resource as a soil fertilizer because it provides large amounts of macro- and micronutrients for crop growth and is a low-cost, environmentally-friendly alternative to mineral fertilizers. However, the use of manure in agriculture is being abandoned because of increasing transportation costs and environmental problems associated with the indiscriminate and inappropriately-timed application to agricultural fields (Hutchison *et al.*, 2005). Main aim of the present study was to observe the effect of flower extract for conversion by verms at P.G. Department of Microbiology, Govt. Science College, Ujjain.

MATERIAL AND METHODS

This study was conducted during the period from October 2012 to January 2013. For this experiment *Eisenia foetida* (The Red Wiggler) was used and floral waste collected from different temples were used as a substrate. All flowers firstly taken from the sources and brought to the laboratory for further study.

Collection of substrate: The sample e.g., cattle dung was collected from local animal husbandry (cattle houses) in and around, Ujjain (M.P.). The floral wastes material used in this experiment was collected from different temples such as Shri Mahakaleshwar and ISKON temples, due to huge amount of flowers (Nirmalya) are discharged after worship. Plastic and other waste and non degradable materials were separated through hand sorting from collected floral waste.

Preparation of material for composting: First step of the preparation of composting materials was to chopping of flowers into degradable form **(Suthar and Singh, 2008).** For the determination of composting quality of the worm used different combination of cow dunk and chopped flowers were mixed in the different ratio.

Analysis of compost: After preparation of vermicompost, different parameters were analyzed using various methods for the determination of compost quality.

Odor: This detection was done simply by smelling (Rodale, 1960).

Heating: *It was detected by inserted the hand into the vermicompost at ½ feet depth.*

Granule size: *During vermicomposting particle size of vermicompost measured with the help of scale in millimeter (mm).*

pH variation: pH of each sample was determined with the help of pH meter according to the method of Rebollido *et.al.,* (2008).

Color: *The color of vermicompost was detected by simply looking them.*

Seed germination: For this experiments three plant varieties e.g., wheat, gram, and soybean were selected. Surface sterilized ten seeds of all three varieties were sown in the earthen pots in the 30:70 ratio of vermicompost: soil. Percent seed germination was calculated after seeds germination.

RESULTS AND DISCUSSION

Deterioration of environment is a major problem facing by the world, the extensive use of chemical fertilizers/pesticides plays a key role in degradation of environmental resources, loss of soil fertility, and less agricultural yield and soil degradation are few of them (Inbar *et al.*, 1993). Vermicomposting is one of the best ways to

dispose the wastes, not only due to its capacity of reducing the wastes, but also for its ability to remediate and amend the soil (Aleagha *et al.,* 2009).

Earthworms represent the major animal biomass in most terrestrial temperate ecosystems (Edwards & Bohlen, 1996). Physical parameters after preparation of vermicompost were analyzed by using various methods and results are depicted in the Table-1. The vermicomposting process includes two different phases regarding earthworm activity: (i) an active phase during which earthworms process the organic substrate, thereby modifying its physical state and microbial composition (Lores *et al.,* 2006), and (ii) a maturation phase marked by the displacement of the earthworms towards fresher layers of undigested substrate, during which the microorganisms take over the decomposition of the earthworm-processed substrate (Aira *et al.,* 2007; Gomez-Brandon *et al.,* 2011b). In addition, the nutrient content of the egested materials differs from that in the ingested material (Aira *et al.,* 2008), which may enable better exploitation of resources, because of the presence of a pool of readily assimilable compounds in the earthworm casts. Therefore, the decaying organic matter in vermicomposting systems is a spatially and temporally heterogeneous matrix of organic resources with contrasting qualities that result from the different rates of degradation that occur during decomposition (Moore *et al.,* 2004).

CONCLUSION

Vermicompost production has many environmental impacts, some of which can be highlighted such as pollution reduction from manufacturing, collection and transportation of organic waste, pollution minimization from discharging of leachate contamination on the surface streets, pollution decreasing thanks to unpleasant odor, diminution of insects and vermin, loss of problems from waste accumulation in streets and generation centers, general environmental protection, and pollution reduction of agricultural lands used as landfill.

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Figure: 1, 2, and 3: Floral waste and cow dunk for the preparation of vermicompost

The concept of vermiculture bio-technology gives hopes for healthy ecology and acts as a versatile natural bio-reactor. Earthworms which form one of the major soil macrofauna are of very important group of secondary decomposers. Previous reports suggested that the earthworm population size and their activities in the soil are closely related to the extent of organic matter input to the soil (Edwards and Lofty, 1977). In present study it was noticed that flower extracts prepared for the vermicompost was found to very effective when mix with a proper ratio with the soil as indicated in th

Table-2. Apart for this it was also reported in the present study that it is best for germination of wheat and Gram (**Table-2**) compared to control where only soil was used in a pot to study seed germination. As a result, vermicompost has a potential for improving plant growth and dry matter yield when added to the soil (Atiyeh, 2000; Zaller, 2007).

Table: 1 Physical parameters and results

S.No	Parameters	Results
1.	Odor	Odorness (Dung type)
2.	pH variation	Varied
3.	Color	Yellowish brown
4.	Health of earthworms	Average
5.	Temperature variation	More variated
6.	Weight of biomass	10% reduced from initial biomass
7.	Moisture percentage (%)	70-80%

Table: 2 Effect of vermicompost on Percent (%) Seed germination of three plant varieties (n=10)

S. No	Experiment	Wheat seed	Gram seed	Soybean seed
1	*E1 (20:80) (V:S)*	*70±2.5*	*85±3.6*	*73±6.2*
2	*E2 (40:60) (V:S)*	*75±4.1*	*78±2.7*	*81±4.21*
3	*E3 (60:40) (S:V)*	*63±2.4*	*61±3.87*	*59±2.8*
4	*C1 (with soil)*	*70±1.8*	*90±4.2*	*87±3.5*
5	*C2* (with vermicompost only)	*51±2.0*	*48±3.3*	*56±4.2*

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