Vermicompost: A better option for waste management

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Abstract

St. Aloysius College, Jabalpur had started ‘Vermitechnology’ an innovative and scientific process by using the earthworm species Eisenia fetida, for the betterment of human beings, sustainable development and establishment of a healthy society. The present study was undertaken to convert vegetable waste into value added vermicompost. The canteen waste, kitchen scraps, non-toxic solids and household garbage’s of surrounding was dumped in compost pit, wooden craters then it was left for 30 days for decomposition after that slurry of cow dung was also added into the organic biowastes afterward earthworms were inoculated to decompose it into manure. Then the vermibed was covered by gunny bags to protect earthworms from birds and insects. After this the vermibed was moistened daily up to 50 to 60 days for maintaining of moisture. Following 50 to 60 days granular tea like vermicompost appeared on the upper surface of beds. A heap of vermicompost was made in sunlight on a plastic sheet and was kept for 1-2 hrs to settle down the earthworms. Then fine granular vermicast was sieved. The harvest vermicompost was air dried at 30% moisture. This process helped in recycling waste which also reduced the pressure on the surrounding dumping site. It develop additional source of income especially among the youth, additional income can also be derived from sales of excess earthworms produced.

Keywords: Vermitechnology, Earthworm, Eisenia fetida, Sustainable, garbage

Introduction

The domestic waste or garbage of the city is a major unavoidable source of waste products released by human beings very abruptly without proper treatment. The production of domestic wastes has been increased day by day due to increase in human population and their requirements. Now a day, agricultural system has become extremely expensive due to requiring heavy inputs and becoming out of reach for farmers because they are economically very poor. Moreover, the organic waste by-product in the urban and rural areas, chief source of pollutant can be used as a source of organic matter or manure for soil rejuvenation and also a chief source of nutrients. The effluents of organic matter from rural and urban areas can be used as a vermicompost (manure), which is composed of organic matter, without toxicants. As Madhya Pradesh is mostly covered with forest and the chief occupation of the people is agriculture and cattle breeding, raw materials like solid waste, cattle dung are available in abundance and also burning of agricultural residues is depriving the agricultural lands the most needed humus and forcing the farmers to go for chemical fertilizer application to maintain the nutrient requirement of the crops spending huge amounts of money and in the end reducing the soil
fertility. This abundance of raw materials is causing major problems in the disposal of the waste.

In the present day condition, it becomes very essential to protect environment from further degradation. Natural degradation of organic waste is a time consuming process, in today’s scenario Vermitechology is a promising technique used in recycling various organic waste and to harness energy to minimize environmental stress. Vermicomposting is essentially an environment friendly efficient technology generating wealth from waste is safe, proper and appropriate way for the safe hygienic. Thus composting and vermicomposting are ideal technologies, these are economical and non-time consuming as well. With the increasing need to conserve natural resources and energy, recycling of organic wastes assumes major importance. In vermicomposting, organic wastes are degraded with the help of earthworm and various microbes present in the soil. Earthworms play a key role in vermicomposting. Earthworms have been long recognized by farmers as beneficial to soil (Singh and Pillai, 1973; Edward and Lofty, 1977) and, as one of the major soil macro fauna, constitute an important group of secondary decomposers. Earthworms are key biological agents in the degradation of organic wastes (Syres et al., 1979; Albanell et al., 1988; Jambakar, 1992). Vermicomposting technology using earthworms as versatile natural bioreactors for effective recycling of organic wastes to the soil is an environmentally acceptable means of converting waste into nutritious composts for crop production (Graff, 1981; Edward et al., 1985). This inexpensive technology not only help to keep environment clean and safe but can also provide an opportunity for the rural community specially women to become independent by establishing a cottage industry or they can take up this low-cost vermicomposting as a basis of income for their livelihood and at the same time there is decline in the use of outdoor input (agro-chemicals), with more use of locally produced biofertilizers (vermicompost) the costs of food produced by farmers practicing sustainable agriculture will be reduced significantly. There will be more useful trees, more farm wildlife, increased groundwater in wells and ponds, cleaner non-polluted water bodies, more soft and nutritive soils with biological organisms in and around the farmlands in the farm ecosystem where sustainable agriculture is practiced by vermiculture. These will help boost the ‘economic prosperity’ of farmers. Vermicomposting was started in Ontario (Canada) in 1970 and is now processing about 75 tones of refuse per week. American Earthworm Company (AEC) began a farm in 1978-79 with about 500 tones capacity per month. Aoka Sangyo Co. Ltd., Japan has three 1000 tones per month plants processing wastes from pulp and food industries. Besides these, there are about 3000 other vermicomposting plants in Japan with 5-50 tones capacity per month. It has also started in Italy and in the Philippines. It is now time for India to think about vermitechology commercially (Palaniappan et al., 2005).

**Vermicomposting in college**

At St. Aloysius College, Jabalpur, Department of Zoology and Biotechnology along with the undergraduate students had started a project on vermitechology. The project management of organic solid waste of college canteen, kitchen waste brought by the Department members and students and then converted into useful resource through Vermicomposting. The main objective of this project is...
to develop awareness among youth by using the solid waste as useful resource. Under this project we have conducted awareness programmes in adjoining areas of the college regarding garbage free society. As we all know that vermicomposting is the biological degradation and stabilization of organic waste by earthworms and microorganisms to digest organic waste such as kitchen scraps to form vermicompost (Edwards and Neuhau, 1988). It requires less space, low or no-energy, creates little odor and zero-waste, technology, easy to construct, operate and maintain. This has become a vital part in organic farming today because it is prepared effortlessly, is faster than traditional composting methods, can also be easily self-promoted, self-regulated, self-improved and self-enhanced, has exceptional properties, and is harmless to plants, so the management of solid waste/organic waste to produce rich compost through vermicomposting, can help urban people to keep their surroundings clean and green, besides developing a sense of responsibility among common mass. Common man in general and students in particular was our main targets.

**Material and Methods**

Composting was done by using vegetable wastes dried leaves, waste paper and cow dung in plastic containers (50 cm in diameters depth 16 cm), wooden crater (50 cm in diameters depth 16 cm) and two Vermipits (2 m length *3 m breadth *3 depth) in the college campus/home. Composting site was preferably selected under shade, in upland or an elevated level, to prevent water stagnation in pits. Vermicomposting pit was set up by first placing pebbles (3-4 cm) in basal layer of vermbed followed by a layer of kitchen scraps excluding peelings of tomatoes, onion, garlic and citrus fruit because it will increase pH and left to decomposed by a natural process when the organic solid waste was 3/4 decomposed then at least 5 kg of lumps of cow dung (dry) mixed with water are then scattered over organic waste and water sprayed till the entire set up was moist but not wet, pH of soil was tested into the compost 100 earthworms (*Eisenia foetida*) were inoculated according to weight of compost. Loaded waste was finally covered with jute mat to protect earthworms from birds/insects.

Fig. 1. (a) Picture shows the pits covered with vegetables and dried leaves
Water was sprinkled on the vermin bed according to requirement and season to keep them moist. The waste was turned upside down fortnightly without disturbing the basal layer (vermin bed). The appearance of black granular crumbly powder on top of vermin beds indicate harvest stage of the compost. Watering was stopped for at least 5 days at this stage. The earthworms go down and the compost was collected from the top without disturbing the lower layers (vermin bed). After the collection, the different combinations of organic wastes will be sprayed in a layer of 1-2 feet and exposed to sunlight for 5 to 10 days to remove the various harmful organisms and noxious gases. Then fine granular vermicast was then sieved. The harvested vermicompost was air dried at 30% moisture. The whole vermicomposting process took 90 days from preparation of pit to harvesting of compost.

Results and Discussion

The results of the study clearly indicated that vermicomposting have better options for converting organic solid wastes into nutrients having rich organic bio fertilizer for improving productivity of crops. The study also revealed that the earthworm's species ie; Eisenia foetida is a good organic useful source which feed on any types of organic waste and then convert it into organic compost. The vermicompost being easily and cheaply produced can be used as a source of additional income.

Acknowledgement

I am thankful to the Principal Dr. Fr. Valan Arasu for providing necessary facilities. We are grateful to the Head Dr. Asha Khanna, Department of Zoology and Biotechnology and other staff members for their valuable guidance.
References


