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Comparative Study of Vermicompost Before and After Composting by Eisenia Fetida from Karjat Tehasil, Ahilyanagar District, Maharashtra India

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Abstract

Recently India became a most populous Country in the world. Due to the increasing population the amount of waste generating also increased. Currently the world population is facing a burning issue of waste management. The increase in population of our country also increases the waste generation from their day today activities. Such daily waste causes the pollution of environment. The present study involves the organic solid waste and vegetable market and agriculture waste treatment by the earthworm *Eisenia fetida*. In this experiment we used agriculture and domestic kitchen waste as a substrate for vermicompost preparation. Nowadays "Vermicomposting technology" is considered as ecofriendly, natural, cost effective, pollution free and fast growing. In this experiment the role played by an earthworm species *Eisenia fetida* is very vital, which is responsible for decomposition of organic waste? Earthworms are well-known as friends of farmers which help in making compost rich in NPK. The earthworm *Eisenia fetida* played very vital role in organic waste decomposition and helped to make compost rich in NPK. Vermicompost can be served as a good alternative to the synthetic fertilizers. It can help to minimize the pollution causing due to the excess use of chemical fertilizers.

Keywords: *Eisenia fetida*, Vermicomposting technology, ecofriendly, pollution NPK

Introduction

The increase in population of our country also increases the waste generation from their day today activities. Such daily waste causes the pollution of environment. Solid waste is increasing due to the population explosion from last decade. One of the main issues we are currently facing is the management of solid waste. One factor is the quick rise in waste volume (Singh *et al.*, 2013). Aristotle described Earthworms as intestines of the earth approximately 2,350 years ago. The opinion of him got proved in the 20th century. Darwin stated that "No other creature has contributed to building of earth as earthworm." Vermicomposting is a method in which earthworms plays an important role to produce vermicompost or organic fertilizer from the bio-degradable organic solid wastes. Using earthworms for the composting is an ecofriendly way which can help in reducing the pollution of soil as well as provides high quality compost material which is rich in minerals and essential nutrients (Danilo *et al.*, 2010). Soil is a good source of various minerals, macro and micro nutrients which are essential for floral and faunal elements to complete their life cycle (Kamble *et al.*, 2014; Raut *et al.*, 2020).

Vermicompost does not produce any harmful or toxic components which have not causing any negative effects on soil, flora and ecological cycle (Dickerson, 2006). It improves various aspects of soil such as texture, nutrients and aeration also helps to reduce compaction of soil (Kamble *et al.*, 2015). It increases water holding capacity of soil because of the ample amount of organic matter present in it. It also supports improved root development and nutrient concentration and increases nutrient eminence of soil (Chatwal *et al.*, 1990; Punjab State Council for Science and Technology, 2010; Danilo *et al.*, 2010). Present work on organic solid waste management was carried out in the Karjat Tehasil, District Ahmednagar, Maharashtra, where municipality workers daily collect domestic organic solid waste from schools, colleges, homes, hotels, canteens, and garden. For the proper management of solid waste all such conditions were taken into consideration. In this present investigation municipal solid waste management was studied.

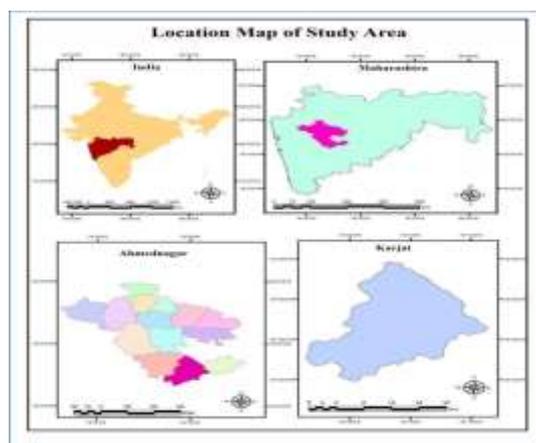


Fig.1 Map of Study area (Patil and Toradmal, 2020)

Materials And Method

Collection: For the current investigation we collected organic solid waste from Karjat city area as well as different locations of weekly vegetable market and agriculture waste. Polythene bags were used to collect the sample. The collected sample was brought to laboratory for further experiment work. Also composted samples were collected from vermi-composting unit located at Panchayat Samiti Office Karjat.

Shredding and composting: The organic content of solid waste was shredded in small pieces up to 20-30 mm diameter. This shredding was necessary to give the material a sufficiently large surface area for microbes attack. The earthworm species *Eisenia fetida* obtained from Krushi Vidnyan Kendra, Yashwantrao Chavan Maharashtra Open University Nashik was introduced in the shredded solid waste material and kept undisturbed for 120 days allowed to decompose by earthworm *Eisenia fetida*. After the treatment of *Eisenia fetida* the composted material was analysed by using standard methods given by Trivedi and Goel, (1987).



Fig. 2: Showing the KVK Vermicomposting Unit at YCMOU Nashik and Collection of earthworm *Eisenia fetida*

Analysis of samples before and after Composting by using earthworm *Eisenia fetida*:

The large shredded organic content of solid waste sample was analyzed for its physical and chemical characteristics like pH, EC, nitrogen, phosphorus, potassium, organic carbon and moisture content, with the help of standard methods (Trivedi and Goel, 1987; APHA, 1971; Bewick, 1980; Deshmukh A.M., 1998; Trivedi and Kumar, 1998; Nathanson, 2003; Sharma, 2005; Raut *et al.*, 2022).

Results And Discussion

As per the illustrated in table 1 and fig. 3. The pH of vermi-composted sample increases from 6.5 to 8.4. The electrical conductivity EC observed was 1.32 ($\mu\text{mhos/cm}$) before vermicomposting and 3.21 ($\mu\text{mhos/cm}$) after the composting. Nitrogen content after composting recorded in vermicomposting sample is 1.49 %. The Phosphorous content before composting was 0.51 mg/kg while after composting it was increased to 5.3 mg/kg. The Potassium content recorded before composting was 0.83 mg/kg while after composting it was increased to 1.43 mg/kg. The Organic Carbon content was 9.12 % before and it was also increased after composting to 17.95 %. Moisture content of organic waste before composting was 31.4 % and after vermicomposting sample moisture content was 42.01%. All the physical and chemical parameters under observation showed increase in parameters quantity in a positive direction. The results obtained by Kamble *et al.*, (2015) supports the current findings.

Sr. No.	Parameters	Before compost	After compost
1	pH	6.5	8.4
2	EC ($\mu\text{mhos/cm}$)	1.32	3.21
3	Nitrogen (%)	0.58	1.49
4	Phosphorous (mg/kg)	0.51	5.3
5	Potassium (mg/kg)	0.83	1.43
6	Organic carbon (%)	9.12	17.95
7	Moisture content (%)	31.4	42.01

Table 1: Showing characteristics of organic material before and after composting

The results obtained illustrated in the above table 1 and following fig. 3 showing the vital role played by the earthworm *Eisenia fetida* which is responsible for organic waste decomposition and help in making compost rich in soil nutrients.

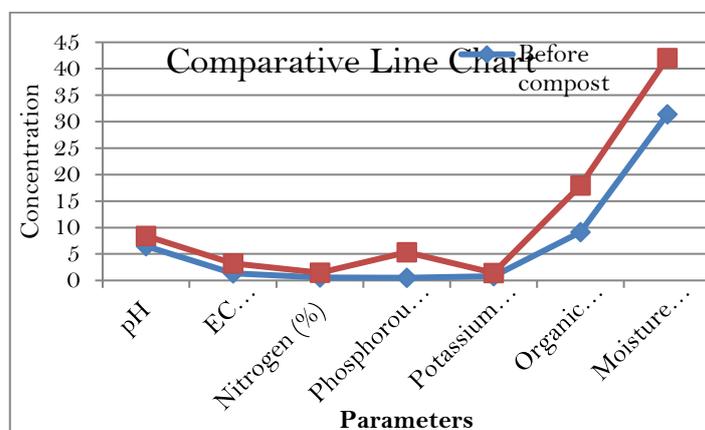


Fig 3: Graphical representation of organic material before and after composting by using *Eudrillus eugine*

There are many evidences of Bioremediation Technology, in which by using living organisms one can reduce the pollution and its toxic effects. Raut *et al.*, (2022) investigated the termite mound soil and surrounding soil physicochemical properties, they found that termites played vital role significant increase of physicochemical properties. In a similar way we used Earthworm species *Eisenia fetida* for this experiment and we got results like them.

Conclusion

It was concluded that analysis after decomposing of organic solid waste by using earthworm *Eisenia fetida* gave good results. Earthworms plays very vital role in organic solid waste management practices. The compost produced by using earthworms is more neutral in which worm live and this may due to the fact that the earthworm neutralizes the organic matter. High quality vermicompost can be produced by using earthworms. Which can be proved as an better option to other commercial synthetic fertilizers in the market.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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