

Utilization of *Eisenia Foetida* In Vermicompost Production At Rural Level Using Organic Waste of Plant Origin

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Abstract

The earthworm species *Eisenia foetida* is a widely used earthworm of economic importance and is a useful friend of farmers. It is beneficial for improving the agricultural production of crops when used judiciously for vermicompost production. The earthworm eats away the waste of organic origin and produce a quality manure of commercial importance in the form of vermicasts in a short span of time under proper care and controlled conditions.

In this context the terrestrial nuisance weeds thriving in N.S.Science and Arts College, Botanical garden at Bhadrawati town in Chandrapur district of Maharashtra state were successfully converted into commercially important manure through the utilization of vermitechnology.

For converting the organic waste of plant origin the earthworm species *Eisenia foetida* was successfully utilized.

KEYWORDS: *Vermicompost, Earthworm, Organic Waste, Eisenia foetida*

INTRODUCTION

Earthworms are the common soil organisms in most terrestrial environments and play an important role in structure and fertility of soil ecosystems (Bartlet *et. al*, 2010). Earthworms are of enormous ecological importance to man in his agricultural endeavour. The earthworms make significant contribution in the recycling of organic waste and production of organic manure which are helpful in maintenance of soil structure, aeration and fertility.

India's National Agricultural Policy of 2000 states that agriculture sector has to be sustainable technologically, economically as well as environmentally. In this context promotion of organic farming and utilization of organic waste has been one of the thrust areas of the 10th five year plan (Bhattacharya, 2004).

The use of *Perionyx excavatus* was the beginning in India to employ earthworms for the degradation of solid wastes and later on *Eudrilus eugeniae* was brought to India from Nigeria for testing the possibility of its establishment in this subcontinent (Gupta, 2012).

The University of Agricultural Sciences, Bangalore, India initiated vermiculture in India and they are propagating it for use of Indian farmers. In Maharashtra state there are about 40 biofertilizer production units which produce about 8-10 tonnes of vermicompost annually (Bhattachryya, 2004).

The recycling of available bio wastes of different sources is helpful and reduces the environmental pollution. Vermicomposting is an important part of organic farming which does not involve much financial involvement and can convert rural and urban unutilized organic wastes into useful nutrient rich manure of commercial importance(Sajnanath and Sushama, 2004).

Vermicomposting is a journey that leads us to live in harmony with nature without degrading it. It minimizes the environmental pollution and the use of non renewable natural resources, and it conserves soil fertility (Gupta, 2012). Through application of vermitechnolgy with minimum cost the useful and unique vermicompost of farmers utility is produced.

REVIEW OF LITEATURE

The vermicomposting of animal waste using an African earthworm *eudrilus eugeniae* is studied by S.Vijayalakshmi and G.S.Vijayalakshmi in 2012. The studies on vermicompost production of palm oil mill effluent sludge using *eudrilus eugeniae* were conducted by biddatul Syirat et al (2013) in Malaysia. Elvira et al (2013) studied the vermin composting of sludges from paper mill and dairy industries with *Eisenia andrei*. Grately et al (1996) studied the dairy processing plant sludge for vermicomposting. Garg and Kaushik (2004) studied the dynamics of biological and chemical parameter during vermin composting of solid textile mill sludge mixed with cow dung and agricultural residue.

The utilization of plants for vermicompost preparation studies are very meager, so keeping this aspect in view present studies are conducted with a objective to conserve the nature from harmful pollution effect as well to produce commercially important product without harming the mother nature.

MATERIALS AND METHODS

The garden waste in the form of nuisance terrestrial weeds thriving in N.S.Science and Arts College, Bhadrawati botanical garden serve as a useful source of raw material for converting the organic waste of plant origin into useful vermicompost.

The weeds were carefully uprooted, chopped into uniform size using choppers and then used for filling the vermicompost unit. Prior to filling the unit they were decomposed for about 10-20 days (partially) and then used.

A vermicompost unit of 12 x 7x 5 feet size was prepared using bricks, cement, sand and boulders and is provided with a outlet at the bottom to drain off the excess collected water in the unit. The unit is regularly sprinkled with water for avoiding the dessication of earthworms. A roof is prepared to protect it from direct sunlight and green cloth is fixed in the roof to minimize light penetrating in the unit.

The earthworm *Eisenia foetida* were procured from Maharogi Seva Samiti, Anandwan Vermiculture unit of Warora in Chandrapur district.

The vermiculture unit was carefully filled in alternate layer with chopped waste weeds and soil. Cow dung is applied in alternate layer over the weeds in the form of paste and a layer of chopped weeds are again spread over it.

Jute bags are then covered over it and the whole set up is moistened by sprinkling water over it. Then cover made of wire meshed iron net is fitted over it so as to resist unwanted objects from damaging the earthworm unit during the production.

The vermiculture unit was daily moistened by sprinkling water over it and their contents were slowly turned up and down using a wooden prick. Every morning and evening the water was sprinkled in the unit over the jute bags and the contents are turned up and down in the afternoon so as to facilitate aeration in the unit. This process was repeated for about 60 days.

RESULT AND DISCUSSION

After about 45-50 days span the vermicompost is ready for harvest. A brown-black colour casting layer is visible on the top of the filled unit after removing the jute bags.

For harvesting the compost upper layer is slightly pricked to move away the earthworms. Alternately in order to avoid injury to worms a cowdung heap is placed on one corner inside the unit itself so as to move the earthworm to that side and vermicompost is easily picked out without having earthworms.

At a atmospheric temperature of about 28-32^oC the worms survive well when the moisture content is maintained about 75% daily and the bed is well covered with jute bags.

The castings are then removed and kept in sunlight for drying after removing the earthworms from it and filled in bags for further operation. About 120 kgs. of vermicompost is obtained from the garden waste in about 2 months (Table 1) which is sufficient for garden plants as a manure.

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Table 1**Experimental Protocol and Details of Vermicompost Production**

Sr. No.	Description	Value
1	Size of Vermiculture Unit	12 x 7 x 5 (Feet)
2	Species Used for Vermicompost production	<i>Eisenia Foetida</i>
3	Type/Nature of Worm	Epigeic Type
4	Substrate Used	Organic of Plant Origin (Terrestrial Weeds of botanical garden)
5	No. of Days the unit was operated to produce vermicompost in the year 2012	60 days (2 months)
6	Quantity of vermicompost recovered (output of the unit)	120 kgs.
7	No. of worms inserted in the unit (initial) in Kgs.	7 kgs.
8	No. of worms obtained from the unit (after vermicompost harvest) in Kgs.	9 kgs.
9	Ambient (Atmospheric) Temperature	26 - 30 ^o C
10	Utility of Vermicompost	The produced vermicompost is used for improving the health of garden plants itself.
11	Watering Shedule for the unit	Morning – 7.00 A.M. Evening - 5.00 P.M.