



Bio medical waste management through vermitechnology

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Abstract

The earthworm is very beneficial for the soil fertility and for maintaining the earthworm in the soil, soil moisture and organic matter should be at optimum temperature level. From such a point of view the analysis of nutrient contents in biomedical waste treated with earthworm for the plant growth is very important. In present work the the total organic carbon, nitrogen, available phosphorous (as p₂o₅) and potassium (as k₂o) at beginning and after different vermicomposting period were analyzed. During this study the moisture content (70-80%) pH (7.5 to 8) and organic matter (40-60%) was observed in biomedical waste consisting of cottons and bandage treated through vermicompost while in plant material moisture content (70-90%) pH (7.5-8.0) and organic matter (50-60%) was observed through vermicompost treatment.

Keywords: earthworm, vermicompost, soil fertility

Introduction

Hospital is one of the most complex institutions which are frequently visited by people from every walk of life in the society. This is over and above the normal inhabitants of hospital i.e. patients and staff. All of them produce waste which is increasing in its amount and type due to advances in scientific knowledge and is creating its impact. The hospital waste poses a threat to public health and environment. It is being increasingly realized that composting is an environment friendly process to convert a wide variety of biomedical waste into valuable agricultural inputs. Vermiculture biotechnology is an aspect of biotechnology involving the use of earthworms as versatile natural biomedical waste wooden box for processing of various solid, liquid and gaseous wastes into valuable resources (Bhanagar and Palta, 1996). It is useful for cleaning up the environment with cost-effective bio-medical waste management technology (Kale and Sunita, 1993). Vermi technology is a method of converting all biodegradable wastes into useful product i.e. vermicompost through the action of earthworms. There are three types of earthworms i.e. anecic, endogeic and epigeic. Vermi-technology is useful tool in converting bio degradable waste into useful

biofertilizers that has been commissioned from several bio medical wastes like cotton, bandage etc. In the present study an attempt has been made to use vermitechnology techniques in biomedical waste management.

Material and methods

Vermicomposting study can be undertaken after considering the suitability of bio-medical waste in terms of its organic content and absence of any heavy metal or hazardous substance. Methodology used for the composting and characteristics of bio medical waste is based on the dry weight of waste. An experiment with different wooden box i.e the wooden boxes of 2½ feet lengths, 2½ feet depths having varying amount of biomedical mixtures were taken but with definite number of earthworms. In the present study wooden boxes were used because of their better absorbent and natural insulator property. Holes in bottom of each box were made for drainage and aeration. The boxes were covered with thin polythene net cover to conserve moisture and provide darkness to the worms.

Boxes were kept in a shaded place at normal room temp. i.e. 28°C to 32°C to provide damp condition for worms to live in and to bury food waste in suitable bedding materials such as shredded newspapers, cardboard, shredded fall leaves, chopped up straw, other dead plants, seaweed,

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sawdust, peat moss, compost and aged manure.

The wooden boxes were made with three quarters full of moistened bedding. Two sets of wooden boxes with bio-medical waste and fix number of earthworms were set up for the experiment. Bio-medical waste (bandage + Cotton + Cow dung) mixture was spread evenly in the box and boxes were covered with thin polythene sheet. Water was sprinkled over it.

A control set with cow dung except biomedical waste was also run simultaneously. A comparison was made between vermicomposting of biomedical waste temple solid waste including flowers (mainly *compositae*) and *Aegle marmelos* leaves (*Belpatra*).

Results and discussion

The earthworms are very beneficial for soil fertility. Soil moisture and organic matter shall be kept at optimum levels for maintaining earthworms in the soil. Earthworms feeding on litter gradually lower its carbon-nitrogen ratio as they breakdown the material during their metabolism. This is achieved mainly by combustion of carbon during the respiration. So analysis of nutrient contents in bio-medical waste treated with earthworm for plant growth is very important. As per the objectives of work, bio-medical waste was analyzed for total organic carbon, nitrogen, available phosphorus (as P_2O_5) and potassium (as K_2O), at the start and after different vermicomposting periods.

Table1: Comparative observation table of bio-medical waste and plant material waste vermicomposting (Cotton + Bandage etc) and (Flower + Belpatra Leaves)

S.No.	Parameter	(Cotton+ Bandage) Vermicompost (Bio-medical waste)	(Flower Vermicompost Belpatra) (Plant material)
1	Optimum Temp.	15-20°C	16-20°C
2	Moisture	70-80%	70-90%
3	Aeration	All through the experiment	O ₂ essential
4	pH	Worm compost survive in a pH 7.5 to 8.0 optimum	Same
5	Salt Content	0.5%	0.3%
6	Conductivity	10μ mhos for plant growth	Same
7	Water holding capacity	17%	18%
8	Organic matter	40-60%	50-60%
9	Contents	Organic carbon, total nitrogen, available phosphorus (P_2O_5) and available potassium as K_2O .	Nitrogen, carbon, phosphorus, sodium potassium, magnesium and all other essential minerals required for the growth of Plant.



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