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Vermicompost Preparation from Plant Debris, by Using *Eisenia foetida* (Red Earthworm) in PSIT campus, Kanpur (U.P.), India

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Abstract: ***Vermicomposting is a method of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. Earthworms consume biomass and excrete it in digested form called worm casts. Worm casts are popularly called as Black gold. The casts are rich in nutrients, growth promoting substances, beneficial soil micro flora and having properties of inhibiting pathogenic microbes. Red earthworm was used because of its high multiplication rate and thereby converts the organic matter into vermicompost within 45-50 days. During the experiments of composting process the material was analysed for different physico-chemical attributes such as total Nitrogen, available Phosphorus, exchangeable Potassium and pH, by using conventional methods. . From the present study, it can be concluded that Earthworms are potentially important creatures that are capable of transforming garbage into gold. It promotes environmental sustainability by converting a waste to a value-added product that improves our environment.***

Keywords: Eisenia foetida , plant nutrient, physic-chemical properties, vermicompost

1. Introduction

About 2,350 years ago Aristotle has said, “Earthworms are intestines of the earth.” Only in the twentieth century has the truth in this statement been verified and found correct. He was ahead of our times by two and half of millennia. Darwin was another one to state: “No other creature has contributed to building of earth as earthworm.” Vermiculture is basically the science of breeding and raising earthworms. It defines the thrilling potential for waste reduction, fertilizer production, as well as an assortment of possible uses for the future [1]. Chemical fertilizers which ushered the ‘green revolution’ in the 1950-60’s came as a ‘mixed blessing’ for mankind. It boosted food productivity, but at the cost of environment & society. It dramatically increased the ‘quantity’ of the food produced but decreased its ‘nutritional quality’ and also the ‘soil fertility’ over the years. It killed the beneficial soil organisms which help in renewing natural fertility [2]. Vermicomposting is the process of producing organic fertilizer or the vermicompost from bio-degradable materials with earthworms. Composting with worms avoids the needless disposal of vegetative food wastes and enjoys the benefits of high quality compost. The earthworm is one of nature’s pinnacle “soil scientists [3]. Earthworms are liberated and cost effective farm relief. The worms are accountable for a variety of elements including turning common soil into superior quality. They break down organic matter and when they eat, they leave behind castings that are an exceptionally valuable type of fertilizer [4]. Vermicompost is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties. It is highly useful in raising seedlings and for crop production [5].

2. Material and Methods

2.1 Vermicompost Materials

Red earthworm was used because of its high multiplication rate and thereby converts the organic matter into vermicompost within 45-50 days. Since it is a surface feeder it converts organic materials into vermicompost from top. Important characteristics of red earthworm (Eisenia foetida): Body length 3-10cm Body weight 0.4-0.6g Maturity 50-55days Conversion rate 2.0 q/1500worms/2 months Cocoon production 1 in every 3 days Incubation of cocoon 20-23days. The cattle dung (15 days old) was procured from Bhauti village. The moisture content of the medium was maintained at about 50%.-80%, Plant waste was taken from PSIT Campus.

2.2 Methods of Vermicomposting

For the present study, pit was made using 15 days old cattle dung, plant for mass culture of *Eisenia foetida*,. Composting is done in the cemented pits of size 10x10x4 feet. Cow dung and chopped dried leafy materials are mixed in the proportion of 3: 1. Red earthworm (1500-2000) was released on the upper layer of bed. The culture was constantly monitored throughout the period of study with time by time spraying of water. Also this waste was turned up and down for proper aeration and decomposition.
During the experiments of composting process the material was analyzed for different physico-chemical attributes such as total Nitrogen, available Phosphorus, exchangeable Potassium and pH, by using conventional methods. During this research experiment, the samples were examined at periodic intervals after 30 and 60 days of vermicomposting.

2.3 Harvesting

Raw material was completely decomposed and appears like black and granular (Figure 1). Worms was separated from compost. Watering was stopped as compost gets ready.

3. Results and Discussion

Total nitrogen, phosphorus and potassium were found in very trace amounts in compost and excellent result was obtained for nutrient ratio carbon and nitrogen. The process of vermicomposting activity showed significantly changes in the physical and chemical properties compost that can be an important tool for organic compost farming. It is indicated in Table.1 that during vermicomposting the pH declines (from 7.8 to 7.2) with the advancement of vermicomposting period (from 0 to 30 to 60 days).

The result found that (Table 1) that the ratio of carbon and nitrogen and values phosphorus and potassium increased over 60 days of vermicomposting. Excellent values of total nitrogen (0.68%), phosphorus (2.10%) and potassium (1.56%) were compared with control (0day). Initially the C: N ratio was 42:12 but after 30 and 60 days it was 27:35, 8:87 respectively.

3.1 Figures and Tables

Figure 1: Different stages of Vermicompost

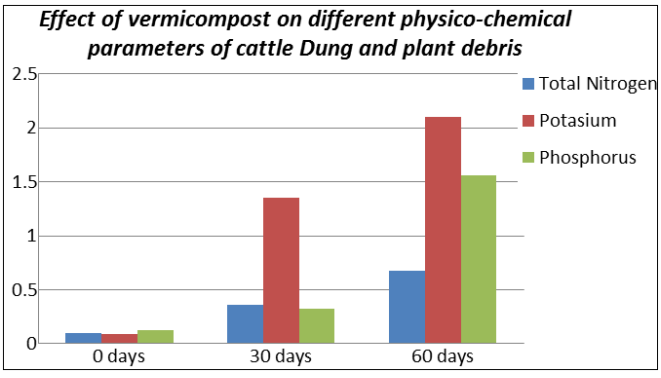

Table 1: Effect of vermicompost on different physico-chemical parameters of cattle Dung and plant debris

Parameters	Duration of vermicompost and % of organic carbon			*Comments*
	0 days	30 days	60 days	
pH	7.8	7.6	7.2	Excellent
Total Nitrogen	0.10	0.36	0.68	Excellent
Phosphorus	0.09	1.35	2.10	Good
Potassium	0.126	0.320	1.56	Excellent
C:N Ratio	42:12	27:35	8:87	Moderate

4. Conclusion

Earthworms Vermicompost is a powerful Crop Nutrient over the Conventional Compost & Protective Soil Conditioner against the Destructive Chemical Fertilizers for Food Safety and Security [6]. Vermiculture is ecofriendly since earthworms feed on anything that is biodegradable, vermicomposting then partially aids in the garbage disposal problems [7]. This is cost effective methods. It is an ideal method for the management of solid waste. The castings which are rich in microorganism enhance the plant growth hormones. In present work, *Eisenia foetida* is the most commonly species of earthworms are placed in the pits and the study shows that the good quality of bio-compost was obtained. The study area is totally based on natural process; it is quite economical in construction and maintenance. From the present study, it can be concluded that Earthworms are potentially important creatures that are capable of transforming garbage into gold. It promotes environmental sustainability by converting a waste to a value-added product that improves our environment.

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