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REGULAR ARTICLE

PRODUCTION AND UTILIZATION OF VERMICOMPOST IN AGRO INDUSTRY

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SUMMARY

Vermicompost was prepared by using the earthworms, *Eudrilus eugeniae* collected from the Sathyamangalam, Erode district and it is maintained under normal laboratory conditions. The compost was prepared in large amount and the rate of compost was noted for eight months from the months of October 2005 to May 2006. After production of the compost, required amount of compost was taken for the growth of vegetables like *Solanum melongena* (Brinjal), *Capsicum minimum* (Chilli), *Alysicarpus spinosus* (Mullakeerai) and *Amaranthus viridis* (Pachathandukeerai) were observed using 2kgs of garden soil along with 1kgs of vermicompost (in the ratio 2:1). The results showed higher percentage of biomass production in the vermicompost medium (Experiment) when compared to the garden soil (Control). Due to their short life span some plants in the experimental medium showed high growth rate in short period.

Key words: *Eudrilus eugeniae*, Vermicompost, *Solanum melongena*, *Capsicum minimum*, *Alysicarpus spinosus*, *Amaranthus viridis*

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1. Introduction

An innovative discipline of vermiculture biotechnology the breeding and propagation of earthworms and the use of its castings has become an important tool of waste recycling the world over. Essentially, the vermiculture provides for the use of earthworms as natural bioreactors for cost effective and environmentally solid waste management. Earthworm is known to be a nature's best biological element for recovery of vermifertilizer and vermiprotein from the organic waste to be used in agro ecosystem, aquaculture and poultry respectively. Dominiguez *et al.*, (1997) reported that vermicompost is a peat like material with excellent structure, porosity, aeration, drainage and moisture holding capacity. Earthworms constitute more than 80% of soil invertebrate biomass. Reynolds (1998) reported that there are approximately 4000 species of earthworms in the world. In India there are about 509 species of earthworms present and this shows the diversity of these invertebrates in India. Research has revealed that vermicompost contains many micro nutrients like *Mn, Fe, Mo, B, Cu, Zn,* etc in addition to some of the growth regulators. Ceccanti (1999) studied that the composition of micro nutrients was higher in vermicompost has compared with normal compost. Kale (1998) studied that *Eudrilus eugeniae* an exotic, epigeic earthworm has been effectively used in India for vermicomposting of organic wastes and production of vermicompost. In realizing the situation that the agricultural waste biomass can be converted in useful organic bio-manure. The present study has been carried out by the production of vermicompost and seeing the rate of germination and bio mass production of economically important plants.

2. Materials and Methods

The uses of worms speed up the process of decomposition to produce a richer product, and also allow the process to occur indoors, making it an ideal system for apartment dwellers. Vasanthi and Ramadoss (2005)

reported that addition of vermicompost in soil increased the availability of micronutrients to plant.

Collection and maintenance of worms

Earthworms were collected from the Sathyamangalam, Erode District,Tamil Nadu, India. The worms were maintained under normal weather conditions.

Collection of seeds

Seeds were collected from the seed shop at Thudiyalur and were used in the present study. The seeds used for the present study were

1. *Solanum melongena* (Brinjal)
2. *Capsicum minimum* (Chilli)
3. *Alysicarpus spinosus* (Mullakeerai)
4. *Amaranthus viridis* (Pachathandukeerai)

Preparation of vermicompost:

Preparation of vermicompost from cowdung an alternative technology followed as denoted by Koushik, Priya and Garg (2003).

5 Kgs of cow dung was dried and made into powder. This powder was taken in five plastic containers. The cow dung was moistened by sprinkling water. A loose bed was maintained to enable easy movement of earthworms. In each container 200 worms were introduced. In order to protect the earthworm from pests like ants and termites, the containers are covered with nylon net and also kept in shade. A small hole was put at the sides of containers for aeration, water was sprinkled every day in the vermi bed to maintain optimum temperature for the earthworms to grow and multiply. Compost were taken in an alternative days and again 3 Kg of cow dung was introduced. For every removal 1 to 3 Kgs of compost can be collected. This setup was maintained for 8 months to get vermicompost manure.

Cultivating the plants using vermicompost

Different plants seeds were collected and sown in pot, containing compost along with garden soil in which germination of plant seeds were recorded.

Two growing media were compared

- Experimental medium was maintained by mixing 2 kg of Garden soil and 1 kg of Vermicompost (2:1).
- Garden soil were taken and kept as control.

Each experiment was repeated twice at least and 10 seeds per replication were randomly chosen to evaluate the development of seedlings. The pots were kept in the Garden and in each pot 250ml of water was sprinkled daily. Data's were collected once in three days during the first week after seedling and once during the second week. Observations were ended when the plant was well developed. Growth of plants was noticed for 6 to 9 days and the turnover of growth in terms of biomass.Results was statistically treated.

3. Results and Discussion

In the present study Biology of earthworm *(Eudrilus eugeniae)* and its vermicomposting efficiency was noted. Vermicompost was produced in large amount and it is applied to some of the economically important plants and their periods of germination and Biomass production was noted.

The characteristic of vermicompost

The colour of the vermicompost is brown in colour. The pH of the vermicompost is about 7.2. There is no odour in the compost. The shape of the casting is small and cylindrical grains. The vermicompost is prepared by adding only dried cowdung powder to the earthworms. The compost production was about 1 tonne/10 *Kgs* of worms. The compost has been harvested once in two days. (Table 1)

Table 1: The characteristics of vermicompost *(Eudrilus eugeniae)*

Colour	PH	Odour	Shape	Food	Ratio of compost production	Harvesting
Brown colour	7.2	Nil	Cylindrical grains	Decomposed Cowdung	1 tonne/10kg of worms	Once in two days

Production of Vermicompost using Earthworm (*Eudrilus eugeniae*)

In the present study the vermicompost was produced for the period of eight months from October to May. The largest amount of vermicompost was produced from October to January (60kgs, 57kgs, 56kgs, and 54kgs). When compared to the other months such as February to May (44kgs, 42kgs, 40kgs, 38kgs). (Fig. 1 ⏩ Plate 1). From our experiment it was noted that the production of vermicompost was more in the months of October to January. This may be due to the favorable environmental conditions to the earthworms. In the other months such as February to May low production of vermicompost was seen. This may be due to some discomfort ness like extreme temperature and unfavourable climatic conditions.

Fig.1: The rate of production of the vermicompost (*Eudrilus eugeniae*) for a period of eight months from october – 2005 to may- 2006

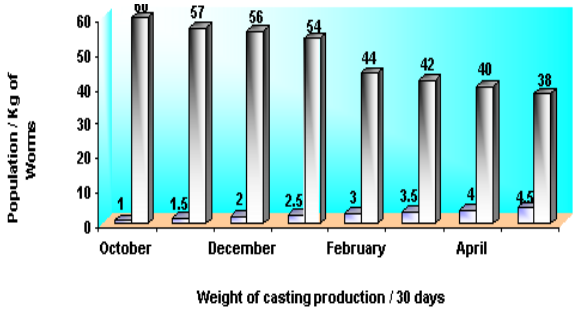

Plate 1: Shows the Vermicompost produced by the *Eudrilus eugeniae*

Biomass production in different economically important plants

Biomass production was observed in the following plants *Solanum melongena* (Brinjal), *Capsicum minimum* (Chilli), *Alysicarpus spinosus* (Mullakeerai) and *Amaranthus viridis* (Pachathandukeerai) were in garden soil and garden soil amended with vermicompost ratio 2:1 (Experiment).Growth of plants was noticed using garden soil amended with vermicompost in the ratio 2:1 for 7 to 8 days and the turnover of growth in terms of biomass was calculated.

***Solanum melongena* (Brinjal)**

The growth of Brinjal in the medium consisting of vermicompost showed 37.13*gms* wet weight of the plant when

compared to 16*gms* of wet weight in the control containing garden soil alone. The results showed higher yield in vermicompost when compared to the garden soil. (Table 2, 3).

Table 2: Growth of different economically important plants in Garden Soil (Control)

No of Sets.	Total wt of the Plants (gm).			
	Solanum melongena	*Capsicum minimum*	*Alysicarpus spinosus linn*	*Amaranthus viridis linn*
Set I	12	7.2	50.4	15
Set II	15	6.9	42	10
Set III	21	4.8	40	12.5
Mean	16	6.3	44.13	12.5
SD	4.58	1.30	5.518	2.5

Table 3: Growth of different economically important plants in the medium amended with vermicompost (2:1) (Experiment)

No of Sets.	Total wt of the Plants (gm).			
	Solanum melongena	*Capsicum minimum*	*Alysicarpus spinosus linn*	*Amaranthus viridis linn*
Set I	40.7	26.6	108	77
Set II	40.5	15.2	96	74
Set III	30.2	28.6	103	86
Mean	37.13	23.46	102.33	79
SD	6.005	7.22	6.027	6.244

***Capsicum minimum* (Chilli):**

The growth of Brinjal in the medium consisting of vermicompost showed 23.46gms wet weight of the plant when compared to 6.3gms of wet weight in the control containing garden soil alone. The results showed higher yield in experimental medium when compared to the control. (Table 2, 3)

***Alysicarpus spinosus* (Mullakeerai):**

The growth of Mullakeerai in the medium consisting of vermicompost showed 103gms wet weight of the plant when compared to 44.13gms of wet weight in the control containing garden soil alone. The results showed that higher yield in the vermicompost medium when compared to the garden soil. (Table 2, 3)

***Amaranthus viridis* (Pachathandukeerai):**

The growth of Pachathandukeerai in the medium consisting of vermicompost showed 79*gms* wet weight of the plant when compared to 12.5*gms* of wet weight in the control containing garden soil alone. The results showed that higher yield in experimental medium when compared to the control (Table 2, 3).

The results showed higher biomass yield in the plants grown vermicompost medium (experiment) than in the garden soil (control). Green plants like *Alysicarpus spinosus* (Mullakeerai) and *Amaranthus viridis* (Pachathandukeeerai), shows higher yield when compared to other plants like *Solanum melongena* (Brinjal) and *Capsicum minimum* (Chilli) because the Amaranthus plants have short life period so the rate of growth is higher but in other plants the life period is long so the rate of growth is slower. Vermicompost is the dropping of earthworms after the intestinal digestion of organic matter. Russel (1909) reported that earthworms decompose the organic matter quickly and increased the nitrification, which are responsible for increasing yield. The compost was

produced and it is applied to different economical plants such as *Solanum melongena*, *Capsicum minimum*, *Alysicarpus spinosus* and *Amaranthus viridis* were cultivated in same percentage of vermicompost. These plants showed different percentage of biomass production. The reason for getting different biomass production is that vermicompost consist of beneficial micro-organisms natural plant hormones, enzyme, balanced micro and macro nutrients. Because of these the plants revealed the high percentage of growth of plants. Lavelle *et al.* (1998) stated that plant growth is modified mainly indirectly by changing the soil physical structure mineralization process, hormone like effects disposable of plant growth stimulating micro-organisms and disposable of micro-organisms are antagonistic to root pathogens. Nainawat (1997) observed that the addition of vermicast in different ratio to the soil increased the crop production. It is important to here that the cost of vermicompost is not included in the present study, as raw materials such as cowdung and agricultural wastes are available in plenty with the farmers at no cost. The farmers also have a plenty of free time to devote for vermicomposting. Only what is needed now is popularising of vermicomposting among the farmers.

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