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ROLE OF PROBIOTICS IN ENHANCING *ACETOBACTER* BACTERIAL POPULATION IN SOME VERMICOMPOSTS

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ABSTRACT
Vermitechnology is a boon for eco-friendly agriculture practice. In the present study the animal wastes (dung) was (Red Sindhi variety cow and Ellichpuri variety buffalo) composted with leaf litter of *Ficus religiosa*. The three concentrations of probiotic were used (10%, 20% and 30%) to enhance the composting process. For each waste, viz., cow and buffalo were inoculated with 1kg earthworms (*Eisenia foetida*) of similar size per 800 g of waste. The total *acetobacter* population was screened at regular intervals (0, 15, 30 and 60 days) under identical laboratory conditions during the composting process. Total *acetobacter* population was found to be high in the vermicompost processed with the wastes of Red Sindhi cow variety at 10% probiotic concentration.
Keywords: Vermicompost, *Eisenia foetida*, Probiotic, *Acetobacter*, Eco-friendly agriculture.

INTRODUCTION

Organic farming system in India is not new and is being followed from ancient times. It is a method of farming system which primarily aims at cultivating the land and raising crops in such a way as to keep the soil alive and in good health by use of organic waste (crop, animal, aquatic and farm wastes etc) and other biological materials. Compost is an organic matter that has been decomposed and recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming. Composting is categorized into various types such as: municipal solid waste composting, domestic waste composting, vermicomposting, etc [1].

Vermicomposting is a biological oxidation process in which organic materials are converted into compost. Vermicompost have large particulate surface areas that provide many micro sites for microbial activity and for strong retention of nutrients [2,3]. Vermicomposts consistently promote biological activity which can help plants to germinate, flower and grow and yield better than in commercial container media, independent of nutrient availability [4,5]. *Eudrilus euginiae* and *Eisenia foetida* have been used in converting organic wastes into Vermicompost [6-8]. As *Acetobacter* bacteria are unable to synthesize its own organic carbon-based compounds from inorganic sources, it utilizes carbon from other organic sources. *Acetobacter* bacteria are involved in biogeochemical cycles during which they release essential elements such as Nitrogen and Carbon. It enhances the fertility of the soil by nitrogen fixation and thereby the nutritive value of the soil. This work was designed to study the microbiological aspect of vermicompost produced using *Eisenia foetida* from *Ficus religiosa* leaf litter amended with Red Sindhi-cow and Ellichpuri-buffalo dungs in the presence of selected concentration of a commercially available probiotics.

MATERIALS AND METHODS

Collection and Processing of Leaf Litter

The leaf litter of *Ficus religiosa* were collected and cut into small pieces and taken for vermicomposting.

Collection of Animal Wastes

Fresh dung of the Cow (Red Sindhi Variety) and Buffalo (Ellichpuri Variety) was collected in polythene bags and brought to the composting site.

Experimental Set Up

400 g of each of the cow dung was taken in plastic trough and 4 kg of processed leaf litter waste was added to it.

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This mixture was mixed well with the required amount of water. In each plastic trough 20 uniform sized *Eisenia foetida* earthworms were introduced and turned well for uniform distribution. Duplicates (replica 1 and 2) were maintained for each experiment. This set up was kept under shadow for 60 days. The physical parameters such as pH, temperature and moisture content were monitored with utmost care.

Studying the Effect of Probiotics in Vermicomposting with Different Wastes

To study the effect of probiotics in vermicomposting – commercially available EM (Effective Microorganisms) solution was used. The EM should be activated prior to use as per manufacturer (Maple Org Tech, India (P) Ltd) guidelines. The effectiveness of EM in the vermicomposting was checked at 10%, 20% and 30% concentrations. EM was added at 10%, 20% and 30% in cow dung and buffalo dung added vermicomposts (Expand all abbreviations at first usage). The four different combination taken for analysis were: CDV-I (combination of leaf litter, cow dung, earth worms and EM); BDV-I (combination of leaf litter, buffalo dung, earth worms and EM); CDV-II (combination of leaf litter, cow dung and earth worms); and BDV-II (combination of leaf litter, buffalo dung and earth worms).

Total Acetobacter Bacterial Population (TABP) Analysis

Acetobacter bacterial population was assessed at different periods. On initial (0), 15th, 30th and 60th days, the samples were collected for bacterial enumeration from replica-1 and replica-2. Sterile nutrient agar plate was used as control. Analysis was carried out based on the work of Cappuccino and Sherman [9]. The bacterial enumeration results are presented in Table.

RESULTS AND DISCUSSION

The total *Acetobacter* population in the vermicompost processed with cow and buffalo dung was checked at 0, 15, 30 and 60 days interval during the composting process. Total *Acetobacter* count was highest in CDV-II compost than BDV-II compost. The CDV-I and BDV-I composts showed higher TAB populations than CDV-II compost; at the same time CDV-I showed higher TAP populations when compared to BDV-I. The TABP load was found to be declining at 30th and 60th days in CDV-I and BDV-I composts with 20% and 30% concentration of EM, respectively. Interestingly CDV-I and BDV-I composts with 30% EM at 60th day did not show any colonies. The reduction in the bacterial population may be due to the secretion of antibacterial substances produced by microbes like actinomycetes present in the probiotic (EM) solution [10,11].

Among the treatments, highest *Acetobacter* population was recorded in the CDV-I vermicompost processed with cow dung waste and 10% EM solution, so this probiotic concentration may be considered as the best one as it will enhance the maximum growth of *Acetobacter* in vermicompost.

CONCLUSION

The result suggests that the bacterial load is rich in the vermicompost processed with dung from Red Sindhi-cow than Ellichpuri-buffalo in the presence of 10% probiotic solution. The findings thus pave way for increasing the commercial value of vermitechnology and improving organic agriculture and thereby sustainable agriculture.

Table 1. Total Acetobacter bacterial population in vermicomposting at different periods.

Days	EM Concentration (%)	Total Acetobacter Bacterial Count (CFU/ml)				
		CDV-I	BDV-I	CDV-II	BDV-II	Control
0	10	8×10^{-3}	7×10^{-3}	7×10^{-3}	5×10^{-3}	-
	20	10×10^{-3}	9×10^{-3}			
	30	12×10^{-3}	12×10^{-3}			
15	10	15×10^{-3}	11×10^{-3}	9×10^{-3}	7×10^{-3}	-
	20	13×10^{-3}	12×10^{-3}			
	30	10×10^{-3}	6×10^{-3}			
30	10	17×10^{-3}	12×10^{-3}	12×10^{-3}	10×10^{-3}	-
	20	10×10^{-3}	8×10^{-3}			
	30	6×10^{-3}	4×10^{-3}			
60	10	20×10^{-3}	14×10^{-3}	14×10^{-3}	10×10^{-3}	-
	20	8×10^{-3}	6×10^{-3}			
	30	-	-			

Each value presented in this table is Mean of 12 samples.

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REFERENCES

1. Ghosh AH. Earthworm Resources and Vermiculture. Zoological Survey of India. Calcutta, 1993.
2. Nighawan SD and Kanwar JS. Physico-chemical properties of earthworm castings. Indian J. of Agricultural Sciences, 22, 1952, 357-375.
3. Lunt HA and Jacobson HG. The chemical composition of earthworm casts. *Soil Science*, 58, 1994, 367-75.
4. Arancon NQ, Edwards CA, Bierman P, Metzger JD and Lucht C. Effects of vermicomposts produced from cattle manure, food waste and paper waste on the growth and yield of peppers in the field. *Pedobiologia*, 49 (4), 2005, 297-306.
5. Atiyeh RM, Lee S, Edwards CA, Arancon NQ and Metzger JD. The influence of humic acids derived from organic wastes on plant growth. *Bio-resource Technology*, 84, 2002, 7-14.
6. Hartenstein R and Bisesi MS. Use of Earthworm Biotechnology for the Management of Effluents from Intensively Housed Livestock. Outlook on Agriculture, USA, 18, 1989, 72-76.
7. Kale RD, Bano K and Krishnamoorthy RV. Potential of *Perionyx excavates* for utilization of organic wastes. *Pedobiologia*, 23, 1982, 419–425.
8. Prakash M, Jayakumar M and Karmegam N. Physico-chemical characteristics and fungal flora in the casts of the earthworm, *Perionyx ceylanesis* Mich, reared in *Polyalthia longifolia* leaf litter. *Journal of Applied Sciences Research*, 4(1), 2008, 53-57.
9. Cappuccino JC and Sherman N. In: Microbiology: A Laboratory Manual, New York, 1992, 125–179.
10. Viswanathan S. Use and effects of probiotics on selected freshwater fish *Channa* species. Ph.D, Thesis, Manonmaniam Sundaranar University, Tirunelveli, 2008.
11. Vijaya D, Padmadevi SN, Vasandha S, Meerabhai RS and Challapandi P. Effect of vermicomposted coir pith on the growth of *Andrographis paniculata*, J. of Organic System, 3(2), 2008, 53.