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ASSESSMENT OF *PSEUDOMONAS* POPULATION IN THE SOME VERMICOMPOSTS

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ABSTRACT
Organic farming is a practice of agriculture with the involvement of natural products and its derivatives which protects the health of environment and it biotic components including human race. *Pseudomonas* sp. Play a vital role in vermicompost degradation and soil enrichment. The present study mainly focused to enumerate the total population in Ficus religiosa, cattle dung (cow and buffalo) and probiotic added vermicompost. The results clearly shows that the probiotic and cow dung added vermicompost contain high amount of *Pseudomonas* bacterial population than buffalo dung added vermicompost.

KEYWORDS: Vermicompost; Eudrilus eugeniae; probiotic; *Pseudomonas* sp.

INTRODUCTION

Bio-degradable solid wastes can be composted and used as manure for the enrichment of nutrients in soil in a safe way. Vermitechnology is a mean of solid waste transformation into wealth. Earthworm farming (vermiculture) is one of the bio-technique for converting the solid organic waste into compost (Ghosh, 1993).Vermicompost have large particulate surface areas that provide many micro sites for microbial activity and for the strong retention of nutrients Nighawan and Kanwar (1952); Lunt and Jacobson (1994). Vermicomposts are rich in microbial populations and diversity, particularly fungi, bacteria and actinomycetes (Edwards, 1998; Tomati et al., 1987).

Vermicomposting process accelerates the mineralization of N content in organic waste resources (Garg and Kaushik, 2005; Suthar, 2006). Prakash et al., (2008) studied the physico-chemical parameters, electrical conductivity, moisture content, total nitrogen, total phosphorus, total potassium, calcium, copper, iron, zinc organic carbon and C/N ratio in the vermicast. Vermicomposts consistently promote biological activity which can cause plants to germinate, flower and grow and yield better than in commercial container media, independent of nutrient availability (Arancon et al., 2005; Atiyeh et al., 2002).

Eisenia foetida and Eudrilus euginiae (Kinberg, 1867) have been used in converting organic wastes (agro waste and domestic refuse) into Vermicompost (Hartenstein et. al., 1989; Kale et. al., 1988).

This work was designed to study the microbiological aspect of vermicompost produced using Eudrillus euginae from Ficus religiosa leaf litter processed with different animal wastes in the presence of selected concentration of a commercially available probiotic Effective Microbes (EM).

MATERIALS AND METHODS

Collection and Processing of Leaf Litter

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

Collection of Animal Wastes

Different animal wastes such as cow and buffalo were collected in a fresh polythene bags and brought to lab. The animal wastes were sundried to make it as dry powder, packed and used for further testing.

Experimental Set Up

400 g of each animal wastes were taken in a plastic troughs and4 kg of processed leaf litter wastes were added into it. This mixture is mixed well with the required amount of water. In every trough 1 kg uniform sized Eudrilus eugeniae (Kinberg) earthworms were added and turned well for uniform distribution. Duplicates were maintained for each experimentation. The troughs were kept protected from ants, rats and other insects. This set up was closed with a mesh and kept under shadow condition. The troughs holding different animal wastes and leaf litter wastes were maintained for a period of 60 days. During the period periodical turning

was done to mix the contents uniformly and water was sprayed based on the requirement.

Studying the Effect of Probiotics in Vermicomposting with Different Waste

To study the effect of probiotics in vermicomposting – Effective Microbes (EM) – A commercial water probiotics was used. The EM -manufactured by Maple Org Tech, India Pvt Ltd. According to the manufacturer, the EM should be activated prior to use. The friendliness of EM in the decomposition of the selected leaf litter waste and its impact on the microbiological quality of the compost produced was checked at two concentrations. These concentrations were 10% and 20%. In all the treatments processed with the selected animal wastes EM was added at 10% and 20%leaflitter processed with animal waste lacking EM Was maintained as control (Table 1).

Total *Pseudomonas* Population Analysis

Pseudomonas in original and activated form of EM was checked following Caapucino (2004).

Pseudomonas in different treatment with selected animal wastes was assessed at different periods initially. On 10^{th}, 20^{th} and 30^{th}days, the samples were collected for bacterial enumeration from replica-1 and replica-2 of every treatment. The analysis was carried out based on Caapucino (2004).

Different treatments of vermicomposting with the selected animal wastes treated at different concentrations (10% and 20%) of the selected probiotics were sampled and taken for *Pseudomonas* population analysis as per Caapucino (2004). Before sampling the contents were properly mixed using a cleaned separate glass rod.

RESULTS AND DISCUSSION

Total *Pseudomonas* population was checked in effective microbes (EM) in its original and in activated form. *Pseudomonas* population of inactivated EM was found to be 71.5 x 10^3, whereas the bacterial population checked after seven days of activation of EM was 66.5 x 10^3.

Pseudomonas in the vermicompost processed with different animal waste such as cow and buffalo was checked at 10, 20, 30 days interval during the composting process in general the *Pseudomonas* was found to be increasing with the duration irrespective of the waste selected for the current study. In all the checked periods' highest value for THPB was recorded in the leaf litter processed with cow waste. Except the 20^{th} day other checked periods, *Pseudomonas* was found to be higher in the leaf litter processed with cow waste (Tables 2 and 3).

As in the control the highest value of *Pseudomonas* was recorded in the leaf litter waste containing both hybrid cow waste and probiotics (10%and 20%concentrations). The *Pseudomonas* load was found to be declining irrespective of concentration compared to control in all treatments processed with the different types. Among the treatments highest value was recorded in the treatment processed with wild cow at 10% and 20% in all the three duration of the study. *Pseudomonas* in Effective microbes was found to be 71.5 $X10^3$CFU/ml. Bacterial load before activation in EM was reported as 1.78$X10^4$CFU/ml previously as by Viswanathan (2008). Less *Pseudomonas* population in active form of EM was due to more dilution. Even though it was diluted as per the direction of the manufacturer, the load was found to be lesser compared to its original form. Non availability of desired nutrients in materials may the reason for the poor replication and lesser load of organism like Lactobacillus sp found in EM or the reduction in the bacterial population may due to the secretion of antibacterial substances produced by microbes like actinomycetes.

From the observed result, it was understood that bacterial load was found to be rich in the vermicompost processed with cow than buffalo. Further research on standardization of probiotic concentration will increase the vigor of the vermi biotechnology. Vijaya et al., (2008) have used EM to pre-compost the wastes of a medicinal plant Andrographis paniculata (Burm.f.) and then composted with earth worm and found a positive effect of using earthworm.

Discoveries like this will increase the commercial value of vermin-technology and make it very friendly. Switching over to sustainable agriculture by vermiculture can truly bring in 'economic prosperity' for the farmers and the nations with 'environmental security' for the earth.

TABLE -1: Total *Pseudomonas* population in vermicomposting with different animal wastes at different period (CONTROL)

DAYS	DILUTIONS CFU/g	COW		BUFFALO	
		WCD1	WCD2	BD1	BD2
10	10^{-3}	180	199	137.5	142
	10^{-4}	46.5	32.5	62	60
20	10^{-4}	92.5	104	80	80
30	10^{-3}	TNTC	TNTC	TNTC	TNTC
	10^{-4}	TNTC	TNTC	100	101

TABLE -2: Total *Pseudomonas* population in vermicomposting with different animal wastes and treated with EM (10%)

DAYS	DILUTIONS CFU/g	COW		BUFFALO	
		WCD1	WCD2	BD1	BD2
10	10^{-3}	TNTC	TNTC	TNTC	TNTC
	10^{-4}	80	74	80	85
20	10^{-4}	115	101	82	91
30	10^{-3}	TNTC	TNTC	TNTC	TNTC
	10^{-4}	121	89	99	103
	10^{-5}	32	32	35	TLTC

TABLE -3: Total *Pseudomonas* population in vermicomposting with different animal wastes and treated with EM (20%)

DAYS	DILUTIONS CFU/g	COW		BUFFALO	
		WCD1	WCD2	BD1	BD2
10	10^{-3}	TNTC	TNTC	TNTC	TNTC
	10^{-4}	116	156	99	85
20	10^{-4}	131	184	124	103
30	10^{-3}	TNTC	TNTC	TNTC	TNTC
	10^{-4}	160	264	167	106
	10^{-5}	34	80.5	TLTC	TLTC

TNTC – To Numerous To Count; TLTC - To Low To Count

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