



Chemical Nutrient Analysis of Different Vermicomposts and their Effect on the Growth of *Zea Mays*

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Abstract : *Vermicomposts processed by two earthworm species, i.e. Eisenia fetida and Eudrilus Eugeniae, and pit compost (control) were taken first for nutrient analysis and then the effect of these composts on the growth of the vegetative crop 'Zea mays' was observed. Vermicompost of Eudrilus eugeniae was rich in nutrients like N, P, K, Mg, Mn, OC. The optimal plant growth was found in pots containing vermicompost processed by Eudrilus eugeniae after a period of one month. We found vermicompost of Eudrilus Eugeniae to be more efficacious.*

Key words : *Nutrient content, vermicompost, pit compost (control), Zea mays.*

Introduction:

Earthworm is aptly called “cinderella of organic farming”, due to its vital role in sustainable organic farming (Rao, 2004) . Vermicomposting is an aerobic process, the process of ingestion , digestion and absorption of organic waste, carried out by earthworms followed by excretion of castings through the worm's metabolic system, during which their biological activities enhance the level of plant nutrients of organic waste (Pattnaik, 2009). “Vermicast” are popularly called as “Black gold”. This compost is an odourless , clean , organic material containing adequate quantities of N, P, K, OC, Mg , Mn and several micronutrients essential for plant growth . Vermicompost is useful, as it increases soil porosity, aeration and water holding capacity . It also increases the surface area , provides strong absorbability and retention of nutrients, as well as retaining more nutrients for a longer period of time (Lunt, 1994) . In the long run , vermicompost will prove to be an indispensable natural organic fertilizer .

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Materials and Methods:

For the present study ,the area chosen was 'Eco – farm', Patna Women's College , Patna . A total of three sets of earthen pots, each set comprising three replicates was taken for composting . Now in each pot 3kg precomposted substrate was mixed with 1kg dried cow dung in 3:1 ratio for vermicomposting. Two species of earthworm, each of 50 adults individuals i.e. *Eisenia fetida* and *Eudrilus eugeniae*, were introduced on top of the pre-composted substrate in the first and second sets of pots respectively, keeping aside the third set for composting without earthworms (Pattnaik, 2009). The process of vermicomposting and composting were carried out for a period of 60 days . After two months the compost was ready.The material became moderately loose and crumbly , humus rich and the colour of compost was dark brown. Approximately 500g of each vermicompost and pit compost were kept in clean polythene bags with proper labeling for analysis of different physio- chemical parameters (Khan, 2011). Further treatment was conducted in triplicate consisting 6 pots filled with vermicompost made by *Eisenia fetida* and *Eudrilus eugeniae* in combination with soil in ratio 1:2 separately. Further in 3 pots, filled with pit compost mixed with soil in 1:2 ratio . 5 seeds of *Zea mays* were sown in each pot and the height and number of leaves of plants were observed and measured every week (Sreenivas et al, 2000).

Result and discussion:

The present study was conducted by observing the physical and chemical parameters of vermicompost (*Eisenia fetida*,*Eudrilus eugeniae*) and pitcompost (control) .The results of physical and chemical parameters are as follows :

Table – 1:Showing the physical parameter of two vermicompost(*Eisenia fetida*,*Eudrilus eugeniae*) and pit compost (control).

S. No.	Physical parameters	Control mean \pm SE (n=3)	<i>Eisenia fetida</i> mean \pm SE (n=3)	<i>Eudrilus eugeniae</i> mean \pm SE (n=3)
1.	pH	7.037 \pm 0.017	6.633 \pm 0.026	6.507 \pm 0.017
2.	Conductivity	493.2 \pm 3.900	752.2 \pm 3.622	1610 \pm 2.974
3	Moisture	28.51 \pm 1.213	31.45 \pm 1.573	40.19 \pm 1.643
4.	TDS	430.1 \pm 3.299	708.1 \pm 2.754	1515 \pm 3.178
5	Bulk density	0.913 \pm 0.145	0.923 \pm 0.020	0.800 \pm 0.0472

Level of significance: *P<0.05

Microflora isolation- It has been observed that the growth of microbes was higher in vermicompost of *Eudrilus eugeniae* than that of vermicompost of *Eisenia fetida* and Pitcompost (control)



(Figure showing growth of microbes in nutrient media)

Table -2:Showing the chemical parameters of two vermicompost (*Eisenia fetida*,*Eudrilus eugeniae*) and pit compost (control).

S. No.	Physical parameters	Control mean \pm SE (n=3)	<i>Eisenia fetida</i> mean \pm SE (n=3)	<i>Eudrilus eugeniae</i> mean \pm SE (n=3)
1.	Organic carbon(%)	14.68 \pm 0.290	12.59 \pm 0.410	12.23 \pm 0.183
2.	Nitrogen(%)	0.643 \pm 0.027	0.823 \pm 0.059	0.916 \pm 0.014
3.	C : N	18.07 \pm 0.325	16.01 \pm 0.200	14.35 \pm 0.1819
4.	Magnesium (ppm)	5.203 \pm 0.008	8.320 \pm 0.005	9.147 \pm 0.02
5.	Phosphate (P ₂ O ₅)(%)	0.320 \pm 0.034	0.466 \pm 0.029	0.646 \pm 0.087
6.	Potash (K ₂ O)(%)	0.313 \pm 0.018	0.403 \pm 0.012	0.523 \pm 0.035
7.	Manganese (ppm)	5.583 \pm 0.047	7.817 \pm 0.029	10.34 \pm 0.292

Level of significance: *P<0.05

Table 3 : Showing growth of plant in two vermicompost (*Eisenia fetida*, *Eudrilus eugeniae*) and pit compost (control).

	Plant Character	Pot1 (Control)	Pot2 (<i>Eisenia fetida</i>)	Pot3 (<i>Eudrilus eugeniae</i>)
Week 1	Height of plant (cms)	5.5	7	10
	No. of leaves	3	3	4
Week 2	Height of plant (cms)	10	13.5	15
	No. of leaves	4	4	6
Week 3	Height of plant (cms)	20	26	33
	No. of leaves	5	5	7

The experiment showed that there was significantly higher concentration of the nutrients i.e N,P,K,OC,Mg and Mn in *Eudrilus eugeniae* followed by *Eisenia fetida* and compost (control) as seen in Table1 and 2. Further it was evident that there was higher microbial growth in *Eudrilus eugeniae*, when compared to *Eisenia fetida* and pit compost (control) as in fig.1. This indicates that *Eudrilus eugeniae* is more efficient in recovering nutrients from the wastes compared to *Eisenia fetida* and pit compost (control) through vermicomposting process. P.K Padmavathiamma L.Y.L (2008) also found similar results. It was also observed that vermicomposting of *Eudrilus eugeniae* contains higher nutrients so that it enhanced the growth of *Zea mays* at a faster rate in comparison to vermicompost of *Eisenia fetida* and pit compost (Singh et al, 2004).

In conclusion, the present study has shown that *Eudrilus eugeniae* was more efficient in bioconversion of kitchen waste into nutrients rich vermicompost as compared to *Eisenia fetida* and pit compost (control). The vermicompost processed by *Eudrilus eugeniae* possessed high nutrients i.e.N,P₂O₅,K₂O,Mg,Mn as compared to *Eisenia fetida* and pit compost (control). Therefore, vermicompost has proved to be a better technology for the management and nutrient recovery from the kitchen waste.

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