IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

VERMICOMPOSITNG BY FLOWER AND CATTLE DUNG WITH LUMBRICUS RUBELLUS

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ABSTRACT

In this study of vermicomposting by *Lumbricus rubellus* could be used as an excellent soil source for agricultural fields and nursery bed. The ability of *Lumbricus rubellus* species of earthworm is to consume and breakdown wide range of organic residues such as flower and organic residues. Vermicomposting is a method of producing vermicompost which contains most of the nutrients that are available to the plants in various forms such as nitrates, phosphates and exchangeable calcium and soluble potassium and phosphorus. One of the unique features of vermicomposting is that the conversion of various organic waste by earthworms into soluble form. In the Present study organic waste such as flowers and cow dung is degrade by *Lumbricus rubellus* for a time period 90 days under laboratory conditions. Compost obtained was reach in the entire essential nutrient. Present study shows increased scope of organic waste used for biofertilizer.

Keywords: Vermicomposting, Lumbricus rubellus, Earthworm, Biofertilizer

INTRODUCTION

Vermicomposting is an organic process that transforms energy rich and complex organic substances. It improves soil texture, aeration, and increasing water holding capacity. Earthworm as a biological apparatus should be much better understand to make organic forming and feasiable development with the use of selected species of earthworm such as *Lumbricus rubellus*(6). Earthworms were specialized to live decaying matter and can degrade it into fine particulate materials where high in available nutrients with considerable potential and soil activities (5),(13). In vermicomposting method mixture of flowers, cow dung used as a feeding material for earthworm. In their reproduction shows different responses regarding their multiplication and reproduction of *Lumbricus rubellus*(3).Vermicomposting was proved to be an

adequate technology for providing better nutrients from organic waste (10). Vermicompost rich in humus C, N, P or K .The reduction of organic carbon is due to the inhaling activity of earthworms and microbes (4).The nitrogen available was more during vermicomposting. It possesses some potential values like making composting and manures (2). Vermicomposting are products of a non thermophilic biodegradable of organic materials through interactions between earthworms and microorganisms (1). Some of these earthworms include *Lumbricus rubellus* etc (7). These earthworms improve the soils physical, chemical, and biological conditions for plant growth. Organic matters can be ingested by earthworms and excrete as a peat like material known as vermicompost. Vermicomposting has also been reported to contain biologically active stuff such as plant growth regulators .In recent years the use of earthworms to disintegration organic waste, including sewage, animal manure, crop residues and industrial waste to produce vermicompost has increased excessively.

MATERIALS METHODS

1. Collection of organic waste was collected such as flowers marigold and discarded garden dry leaves and dry cow dung was collected from nearby cattle shed.

2. Collection of earthworms Lumbricus rubellus were brought from vermicomposting center Pingleshwar, Ujjain M.P

3. Experimental design:

The waste were chopped and dried for 24 hours. 1kg of cowdung were added individually for each set .In 1 set take 2 cans in first cane add cowdung 1kg ,flower 1kg ,and Lumbricus rubellus 20 earthworms and in second cane add cowdung 1kg, leaf 1kg and 20 earthworms, and one control was prepared. The water was sprinkled in each tanks and moisture was maintained throughout the experimentation. The total 4 cans were used and kept in 2 sets, one control was prepared, regularly control and test samples mixed well. After one month increase number of earthworms and also increase their weight and length. The volume of waste bed is down in 2 months. After 3 months finished compost was collected. Study the physiochemical analysis of compost during this period (2).

RESULTS

In the present study different substrate such as cowdung, flowers, leaf were converted into vermicompost and the efficiency of earthworm species *Lumbricus rubellus*. The physical factors of these obtained vermicompost were determined. The growth rate of earthworm species is investigating during the study period. The time taken for the degradation process to form compost was 90 days. The complete observation was seen in 90 days which was identified by decreases in ¾ volumes of bed, complete decolourization, complete absence of water content and the complete decomposition of organic waste converts into fine granules. The temperature of the compost was increasing in the first week and remains maximum on 20 days and starts decreasing. The pH the compost lowers at final stage of compost formation may due to production of co_2.

Table- 1 Growth parameters of earthworm species

Species	Incubation period	Initial weight/earthworm/gm	Net weight	Length of earthworm	No. of cocoons in/month
		Cowdung/Leaf, Cowdung/Flower	Cowdung/Leaf, Cowdung/Flower		
Lumbricus rubellus	90 Days	02-0.8 gm	1-2.5 gm	2.5-10.5 cm	40-50 cocoons

Table- 2 Physical Parameters of compost

Days	Temperature (degree centigrade)		pH		Moisture Content	
	C/L	C/F	C/L	C/F	C/L	C/F
0	22	22	4	4	2.9	3.94
10	24	24	5	5	2.11	4.01
20	26.5	27	6.1	6.2	3.11	4.15
30	30.2	31.1	6.8	6.5	3.94	4.22
40	40.3	40.1	6.9	6.9	3	4.18
50	42.5	43.1	7.1	7	3.11	4.12
60	45.1	45.3	6.5	6.3	4.12	4.28
70	32.3	31.2	5.5	5.6	4.18	4.16
80	28	27	4.5	4.5	4.18	4.31
90	26	27	4	4.1	4.15	4.26

DISCUSSIONS

The results shows a high in nitrogen, potassium and a high decrease in organic carbon in the experiment set up using *Lumbricus rubellus.* The growth rate of earthworm *Lumbricus rubellus*is investigating during the study period in Table- 1. The initial biomass of earthworm is 0.2-0.8gm and the net biomass of earthworm is 1-2.5 gm. The length of earthworm was increased in one month and number of cocoons also produced in one month. The physical parameters of compost observed that the moisture content of the waste varied between 20%-70%.The pH values of the waste was found in the range from acidic (minimum 5) to slightly basic up to 8.5. The pH variations are based on the percentage of cowdung/flower and cowdung/leaf. The temperature of the compost was increasing in the first 30–35 days and remains maximum on 40–60 days and starts decreasing after 60 days and loss in earthworm biomass. Nauhauser *et al* reported that rate of biomass gain by *Lumbricus rubellus* was dependent on population density and food type. Edwards's *et al* reported that the growth rate (gm weight gained/day/earthworm) has been considered a good comparative index to compare the growth of earthworms in different wastes. Hait and

Tare reported that temperature influences the biological system of the earthworm by modifying metabolic activity.

REFERENCES

- Abdelhamid A.M. and Gaber A.A. 1991. Evalution of water hyacinth as feed for ruminants. Arch. *Animal Nutri*. 41(7/8): 745-756.
- Bansal S, Kapoor K.K. 2000. Vermicomposting of crop residues and cattle dung with *Eisenia fetida. Biores. Technol*. 67: 95-98.
- Bhattacharya S .S. Chattopadhyay G.N. 2004. Transformation of nitrogen during vermicomposting of fly ash. *Waste manage. Res.* 22(6): 488-491.
- Bohlen P. J. 2002. Earthworms Encyclopedia of soil science. Marcel Dekker. Inc.USA.
- Curry J.P, Byrne D, Boyle K.E. 1995.The earthworm population of a winter cereal field and its effect on soil and nitrogen turnover. *Biol. Fertility of soil* .19(2): 166-172.
- Chitrapriya K, Asokan S, Nagarajan R. 2013.prospects of Eudrilus eugeniae in saw-dust waste management. *Internationl Journal of Zoology and Research.* 3(4): 43-46.
- Edwards C.A. 1995. Historical overview of vermicomposting. *Biocycle.* 56-58.
- Edwards C.A, Bohlen P.J. 1996. Biology and Ecology of Earthworms. Third ed. Champan and Hall, London. England.
- Edwards C.A, Dominguez J, Neuhauser E.F. 1998. Growth and reproduction of Perionyx excavates (per.) (Megascolecidae) as factors in organic waste management. *Biol. Fertile. Soils* 27: 155-161.
- Gajalaxmi S, Ramasamy E.V, Abbasi S.A. 2001.The potential of two epigeic and two anecic earthworm's species in vermicomposting of water hyacinth. *Biores Technol.* 76(3): 177-181.
- Ghosh M.Chattopadhyay, G.N. Baral, K.1999.Transformation of phosphorous during vermicomposting. *Biores.Technol*. 69(2): 149-154.
- Hait S, Tare V. (2011). Optimizing vermistabilzation of waste activated sludge using vermicompost as bulking material. *Waste Manag.* 31(3): 502-511.
- Jeshika M, Lekeshmanaswamy M. (2013). Effect of P.ongamia Leaf Medium on Growth of Earthworms (Eudrilus eugeniae). *Int j Sci Res Publ*. 3(1): 2250-3153.
- Kibatu T, Tilahun B, Alemayehu A. 2015. Banana and Manure Waste on Growth, Reproduction and Vermicompost of *Eisenia foetida*. *Journal of Environmental and Applied Bioresearch*. 3(1): 15-19.
- Manaf L A, Armi M, Samah A, Ilyana N, Zukki M. 2009. Municipal solid waste management in Malaysia: Practices and challenges, Waste Management. 29(11): 2902-2906.
- Nagavallemma, K.P., Wani, S.P., Stephane, L. (2006) Vermicomposting: RecyclingWastes into Valuable Organic Fertilizer. J. SAT Agri. Res. 2 (1), 1–17.
- Neuhauser E.F, Hartenstein R, Kaplan D.L.1980. Growth of the earthworm *Lumbricus rubellus*in relation to population density and food rationing. *OIKOS*. 35(1): 93-98.

- Reinecke A, Viljoen S.A, Saayman R.J. 1992. The suitability of Eudrilus eugeniae, perrionyx excavates and *Lumbricus rubellus*(Oligocheeta) for vermicomposting in southern Africa in terms of their temperature requirements. *Soil Biol Biochem*. 24(12): 1295-1307.
- Neuhauser, E.F., Loehr, R.C., Malecki, M.R. (1988) The Potential of Earthwormsfor Managing Sewage Sludge. In: Earthworms in Waste and EnvironmentalManagement (Edited by Edwards, C.A. and Neuhauser, E.F.), pp. 9–20, SPBAcademic Publishing, The Hague.
- Orozco, F.H., Cegarra, J., Trvjillo, L.M., Roig, A. (1996) Vermicomposting ofCoffee Pulp using the Earthworm Eisenia foetida: Effects on C and NContents and the Availability of Nutrients. Biol. Fert. Soil. 22, 162-166.
- Paavilainen, L. (1993a): Importance of Cross-Dimensional Fibre Properties andCoarseness for the Characterisation of Softwood Sulphate Pulp. Pap puu-Pap. tim. 75 (5), 343-351.
- Paavilainen, L. (1993b): Conformability-Flexibility and Collapsibility of SulphatePulp Fibres. Pap puu-Pap. tim. 75 (9-10), 689-702.
- Padmavathiamma, P.K., Li, L.Y., Kumari, U.R. (2008) An Experimental Study ofVermi-Biowaste Composting for Agricultural Soil Improvement. Bioresour.Technol. 99 (6), 1672-1681.
- Pajon, S. (2007) The Worms Turn-Argentina; Intermediate Technology DevelopmentGroup, Case Study Series 4. Munroe. Retrieved from http://www.tve.org.
- Palanichamy, V. Mitra, B., Reddy, N., Katiyar, M., Rajkumari, R. B., Ramalingam, C. and Aranganthan. (2011)". Utilizing Food Waste by Vermicomposting, Extracting Vermiwash, Castings and Increasing Relative Growth of Plants". International Journal of Chemical and Analytical Science, pp. 1241-1246.
- Parekh, S. A. and Mehta, M. J. (2015). Vermicomposting as sustainable option for organic waste management. International Journal of Innovative and Emerging Research in Engineering, Volume 2 (1), pp 13-20.
- Parle, J.N. (1963) A Microbiological Study of Earthworm Casts. J. Gen. Microbiol.31, 13-23.