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Comparative study of characteristics of biocompost produced by millipedes and earthworms

Prabhas C. Thakur[1], Prem Apurva[2] and Shailendra. K. Sinha[3]

[1]Department of Botany, Chas College Chas, Bokaro, Jharkhand, India
[2]P. G. Department of Zoology, V. B. University, Hazaribag, Jharkhand, India
[3]Department of Zoology, R. S. More College, Govindpur, Dhanbad, Jharkhand, India

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ABSTRACT

Plant wastes can be degraded by millipedes (Arthropods of class Diplopoda) to produce compost called Milli-compost similar to Vermi-compost. A comparative study of composts produced with the help of millipedes (Harpaphe haydeniana) / earthworm (Eudrilus eugeniae) / without millipede and earthworm was undertaken. Physico-chemical parameters of composts were evaluated. It was found that contents of available nitrogen, phosphorus, potassium, calcium and magnesium were more in Milli-compost and Vermi-compost as compared to ordinary compost. Contents of nutrients in Milli-compost were more than Vermi-compost. Increase in water holding capacity and pore space between particles of Milli-compost and Veri-compost and decrease in bulk density were also observed. Milli-compost production technology may prove to be beneficial for agriculture in near future.

Keywords: milli-compost, vermi-compost, plant nutrients.

Abbreviations: *BD-Bulk Density, EC-Electric Conductivity, Kg/ha-Kilogram per hectare, OC-Organic Carbon, PD-Particle Density, PS-Pore Space, WHC-Water Holding Capacity*

INTRODUCTION

Wastes of plant origin can be degraded to compost by the activity of soil macro – invertebrates like millipedes which are major saprophagous fauna that decompose the plant and leaf litter. Millipedes are arthropods belonging to class Diplopoda .They have around ten thousand species. They are detritivores and eat dead and decaying leaves and other parts of the plants. They excrete

decomposed organic matter as feacal pellets. These feacal pellets are called compost [1]. This compost is beneficial to plant in the similar way as vermi-compost.

The outcome of the proposed research activity will result into development of technology that will be used in production of compost of high economic value from wastes of plants with the help of millipedes. The studies taken up in this regard to compare the quality of millipede compost (Milli-compost) with Vermi-compost so that the Millipede compost can be further improved and used in farmers field.

MATERIALS AND METHODS

(a) Three experiments were conducted. One with Millipede (*Harpaphe haydeniana*), another with Earthworm (*Eudrilus eugeniae*) and third experiment was carried out without Millipede or Earthworm (control).
(b) Millipedes were cultured in wooden boxes of 3'x 4'x 3.5' dimension with 3 inches of soil at the bottom of the box.
(c) Soil, cow dung, vegetable wastes, leaves, grass and paddy straw were kept in all the three boxes. Kitchen waste including vegetable peels, grasses and leaves (4kg), paddy straw (1kg) were added periodically in all the three boxes as feeding material.
(d) About 100 Millipedes (*Harpaphe haydeniana*) were put in first box, 100 Earthworms (*Eudrilus eugeniae*) were put in the second box.
(e) Third box was cultured as control, without millipede or earthworm.

All the boxes were covered with moist jute sac and kept under thatched roof for two months.

Periodically Collected Samples were Classified and Designated as under: -

Millipede compost (S_1), Ordinary soil (S_2), Vermi-compost (S_3), Ordinary Compost (S_4)

S_1 = Soil + Cow dung + Vegetable wastes + Paddy straw + Millipedes
S_2 = Soil of the given locality
S_3 = Soil + Cow dung + Vegetable wastes + Paddy Straw + Earthworms
S_4 = Soil + Cow dung + Vegetable wastes

Laboratory analysis:
(A) Physico-chemical Parameters
(a) pH: pH of the soil and organic samples were measured using standard pH meter in 1:2 (soil : water) ratio**.**
(b) EC: Electric conductivity of the given samples were measured by conductivity meter (EC machine) in 1:2 (soil: water) ratio.
(c) Organic Carbon: O.C. was determined by the titration method [2].

(B) Chemical Parameters

(a) Nitrogen (N)

Available Nitrogen of the samples was determined by Potassium permanganate (KMnO4) Method [3].

(b) Phosphorus (P)

Phosphorus was determined with the help of 0.5 M Sodium Bicarbonate as extranatent and Ammonium Molybdate for determination with the help of Spectrophotometer[4].

(c) Potassium (K)

Determination of Potassium of the organic samples were done with 1 N Ammonium Acetate solution using Flame Photometer [5].

(d) Calcium and Magnesium:

Determination of Cacium and Magnesium were done collectively using Complexometric Titration Method using ethylene diamine tetra – acetic acid (EDTA), first introduced by Schwartzenbach et al. [6].

(C) **Physical parameters:**

Soil constants of Apparent Sp. Gravity (Bulk Density), Absolute Specific Gravity, Percentage Pore Space, Water Holding Capacity (WHC) and Percentage Volume Expansion was determined using Keen Rackzowski Box.

RESULTS AND DISCUSSION

Chemical Properties:

Available Nitrogen (N): Available Nitrogen content varied from 218 to 499 kg/ha. Lowest value was observed in ordinary soil (S_2) due to low organic matter present in the soil which generally contributes to the available forms of Nitrogen content. Higher value of Nitrogen was observed in Millipede compost (499.84 kg/ha) and Vermi compost (450.26 kg/ha).

Available Phosphorus (P): Similarly, as that of available Nitrogen, higher values of available Phosphorus were found in Milli-compost and Vermi-compost (Table1). However, Phosphorus content was more in Milli-compost as compared to Vermi-compost. It showed that digested organic matter through millipedes and earthworms releases more available forms of 'P' as compared to other forms of compost.

Table 1. Physico– chemical characteristics of study samples

Types of samples	pH (1:2)	EC (1:2)	Organic Carbon%	Potassium Kg/ha	Phosphorus Kg/ha	Available Nitrogen Kg/ha	Calcium+ Magnesium Meq/100gm
Millipede Compost (S_1)	7.20	0.24	3.55	784	148	499.84	49.43
Ordinary Soil (S_2)	8.20	0.31	0.16	301	22.5	218.68	18.00
Vermi Compost (S_3)	7.00	1.85	15.4	560	96.63	450.26	47.60
Ordinary Compost (S_4)	7.65	0.32	0.66	326	88	234.30	19.20

Available Potassium (K): It ranged from 301 to 784 Kg/ha. Highest K content was observed in Millipede compost. It may be due to addition of higher amounts of millipede casts to the compost during their activity. Millipede compost observed to be superior to vermi compost with regard to K content (Table1).

Available Calcium (Ca) + Magnesium (Mg): As observed above both of these elements were also high in organic samples compared to Soil and Ordinary compost samples. Highest values were observed in Millipede compost. This is attributed to digestion of vegetable and crop based wastes by worm activity to release more Calcium and Magnesium in the compost.

Similar to our finding, Ashwini and Sridhar [7] also reported increase in concentration of N, P, K, Ca and Mg in compost produced with the help of millipede and earthworm.

Physical Properties:

Bulk Density (BD): Bulk Density varied from 0.63 to 1.29 g/cc among the samples. Lowest B.D. was seen in Vermi compost. As percent organic Carbon increases the Bulk Density decreases (Table 2).

Particle Density (PD): As this parameter depends on inorganic components of the soil, lesser inorganic components contributed to lower values of P.D in Vermi-compost and Millipede compost. It ranged between 1.24 to 2.51 g/ cc in all the four samples.

% Pore Space (PS): Total pore space depends on finer inorganic and organic materials of the samples. The highest % pore space was observed in vermi compost (67.15%) followed by 55.6% in case of Millipede Compost.

Table 2. Physical properties of different study samples

Types of samples	Apparent Specific Gravity (Bulk Density) g/cc	Absolute Specific Gravity (Particle Density) g/ cc	% Pore Space	% WHC	Volume Expansion
Millipede Compost	1.08	1.76	55.60	45.98	28.8
Ordinary soil	1.24	2.44	50.24	24.15	0.88
Vermi Compost	0.63	1.24	67.15	70.25	22.67
Ordinary Soil	1.29	2.51	55.3	28.90	6.007

% Water Holding Capacity (WHC): Similarly, the highest % of WHC (70.25) was observed in Vermi-compost followed by Millipede Compost. This is attributed to higher absorption and adsorption properties of organic components present in them as compared to soil. Lower WHC of Millipede Compost is due to high chitinous content of Millipede casts and mouldings present in the compost (Table 2).

%Volume Expansion: Volume of Expansion depends upon % of clay and organic matter content in the sample. Even though % clay content in Vermi Compost and Millipede compost is low because of high organic material, the values of %Volume Expansion of Vermi-compost and

Milli-compost are high as compared to soil samples. Percentage volume of expansion varied from 0.88 to 28.8 in all the four samples.

CONCLUSION

On the basis of findings of the experiment it can be concluded that millipede compost and Vermi-compost are superior to ordinary compost. Field experiments with millipede compost on growth of plants by Ashwini and Sridhar [8] proved that millipede compost has definite positive effect on plant growth over ordinary compost.

REFERENCES

[1] K. M. Ashwini, K.R Sridhar, *Curr. Sci*. **2002,** 82 (1), 20-22
[2] A. Walkley , I.A. Black, *Soil Sci*. **1934,** 34, 29-38
[3] B.V. Subbiah, G.L. Asija, A rapid procedure for the determination of available Nitrogen in soils. *Curr. Sci*. **1956,** 25, 259 -260
[4] N.P. Datta, M.S Khera, T.R Saini, *J. Indian Soc. Soil Sci.*, **1962,** 10, 67-74
[5] J.J. Hanway, H. Heidel, *Iowa Agric.*, **1952,** 57, 1-31
[6] G. Schwartzenbach, W. Biedermann, F. Bangerter, Komplexone . *Helv. Chim. Acta.*, **1946,** 29, 811-*818*
[7] K.M. Ashwini, K.R Sridhar, *Curr. Sci.,* **2006,** 90 **(7)**, 954-959,
[8] K. M. Ashwini, K.R Sridhar, *Electron. J. Environ. Agris. Food Chem.,* **2006,** 5(2), 1323-1329.