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Research Article

VERMICOMPOSTING OF ORGANIC WASTES BY USING *EUDRILUS EUGENIAE* EARTHWORM

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ABSTRACT

Vermicomposting the conversion of organic waste into vermicompost, is mediated by the combined action of earthworms and microorganisms. This interesting and attractive alternative to composting turns organic waste into a substrate that can be used as a soil amendment and as a growing medium for use in horticulture. Soil not required in vermicomposting as the organic matter acts as both the substrate the food, and therefore only epigeic earthworms can be used in the process. Vermicompost is nutrient-rich casts generated by the earthworms that can be used as biofertilizers.

Keywords: Organic waste, Epigeic earthworm, Vermicompost, Prikshapariyar.

INTRODUCTION

Earthworms vermicompost is proving to be highly nutritive 'organic fertilizer' and more powerful growth promoter over the conventional composts and a protective farm input increasing the physical, chemical and biological properties of soil, restoring and improving its natural fertility against the destructive chemical fertilizers which has destroyed the soil properties and decreased its natural fertility over the years (Am Euras *et al.,* 2009). Vermicompost is rich in NPK, macronutrients, beneficial soil microbes and also certain plant growth. This research aimed at technology development and modifications for the production of quality vermicompost from locally available organic waste materials using compost earthworm (Kaplan, 2016). In the vermicompost of different organic materials, nitrogen content is very high and sample A (onion peel), sample B (orange peel) is very low, than the organic materials following this, potassium and phosphorus is normal sample C (vegetable waste) sample D (control).So the macro nutrients will increase the soil fertility by the continuous using of orange peel as composting material than the other organic materials. Based on the results, macronutrients are before and after vermicomposting of the different organic samples were increased after the inoculation of earthworms. The ph level of onion vermicompost is 9.8 which lower than the study of Gajalakshmi *et al.,* 2003 shows 7.8-5.6 ph in control and onion compost respectively. Phosphorus content was very lesser than the current result compared with the study of Gajalakshmi *et al.,* 2003. Potassium level is less equal to the study of Gajalakshmi *et al.,* 2003. Macronutrients are comparatively more than vegetable waste and similar the onion peels (Shanthi, 1993).

MATERIALS AND METHODS

The organic materials were mixed with 60 days. After 60 days of pre decomposition earthworm were inoculated in the vermin bed for vermicomposting.

Preparation of compost

In this current study, bin method was used for vermicomposting. For this process plastic bins were used in the size 27 cm height, 24 cm and capacity to hold 5.5 kg soil substrate. The bins were named as sample A (Onion peel), sample B (Orange peel), sample C (Vegetable waste) and sample D (Control). Except control, other bins were mixed with 600gm of different organic waste. Then allow them for pre decomposition upto 35to 50 days. During this period water was sprinkled over the vermibeds to boostup the process. After it, earthworm *Eudrilus eugeniae* was added in the various vermibeds. Sprinkling of water was

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continued until the harvest of vermicast. The bins were allowed upto 100 days for vermicomposting process. Have a frequent check to avoid the compost from overheating. Maintain proper moisture and temperature. After the minimum few days, around 400 to 500 new worms are introduced and the entire raw material is turned into vermicompost,

In the vermicompost of different organic materials, Sample A (Onion peel), Sample B (Orange peel), Sample C (Vegetable waste) and D (Control). Nitrogen content is normal. The highest value of available Phosphorus and Potassium was also registered from vermicompost prepared from all materials. Even if values of recorded (Table 1-4) exchangeable Fe, Zn, Mn and Cu and extractable micronutrients were different, the vermicompost obtained from all substrates showed the highest values for all macro and micro plant nutrients. The Ph level of the onion vermicompost 9.8, which is lower than control. The orange peel is higher than the values of the vermicompost , shows 6.0-7.9 pH and control compost respectively. Than the current study Phosphorus content very lesser than the current result compared with the study of (Gajalakshmi *et al*., 2002). Micronutrients are comparatively the orange peel andthe normal to onion peel, Potassium level is lower than the vegetable peel (Lee K. E. 1985). Soil chemical parameters include concentrations of specific chemicals (eg. Phosphorus, nitrogen, carbon major cations (Calcium, Magnesium, Sodium, Potassium), Sulphur trace metals and elements) pH, cation exchange capacity, base saturation, salinity, sodium adsorption ratio and enzymes (Shrikant Kekane 2015).

Calculation for organic Carbon (Walkley-Black method, FAO United Nations, 2019

$$\text{OrganicCarbon\%} = \frac{(V_b - Vs) \times M_{Fe}^{2+} \times 0.49}{W}$$

V_b = Volume of titrant blank in ml

V_s = Volume of titrant sample in ml

M_{Fe}^{2+} = Molarity of FeSO4 solution

0.49 = 3 x 10^{-3} x 100 x 1.3, where 3 is equivalent weight of carbon and 1.4 is correction factor.

Calculation for Nitrogen

Weight of the sample taken = 1g

Volume of 0.1N Sulphuric acid taken in the beaker to absorb ammonia = Xml

Volume of 0.1 Potaassium hydroxide used for back titration = Yml

Actual volume of 0.1N Sulphuric acid consumed to absorb ammonia = X-Y ml

1ml of 0.1N Sulphuric acid = 0.00014g N

Percentage of Nitrogen in the sample = 0.00014 x (X-Y) x 100/1 =_____ %

Process of macronutrients

Vermicompost is rich in NKP (nitrogen 2-3%, potassium 1.85-2.25%, and phosphorus 1.55-2.25%) micronutrients beneficial soil microbes and also contain plant growth hormones and enzymes. The contents were directly fed into atomic absorption spectrometer with different nanometers like 367.4nm.

RESULTS AND DISCUSSION

In the vermicompost of different organic materials, Sample A (Onion peel), Sample B (Orange peel), Sample C (Vegetable waste) and D (Control). Nitrogen content is normal. The highest value of available Phosphorus and Potassium was also registered from vermicompost prepared from all materials. Even if values of recorded(Table 1-4) exchangeable Fe, Zn, Mn and Cu and extractable micronutrients were different, the vermicompost obtained from all substrates showed the highest values for all macro and micro plant nutrients. The pH level of the onion vermicompost 9.8, which is lower than control. The orange peel is higher than the values of the vermicompost, shows 6.0-7.9 Ph and control compost respectively. Than the current study Phosphorus content very lesser than the current result compared with the study of (Gajalakshmi *et al*., 2002).Micronutrients are comparatively the orange peel and the normal to onion peel, Potassium level is lower than the vegetable peel (Lee K. E. 1985).

Figure 1. Shows vermicompost setup.

Onion peel

Orange peel

Vegetable Waste

Figure 2. Shows raw material of organic waste (a- onion peel, b-orange peel, c-vegetable waste).

Table 1. Control Sample.

Nutrients /No of Days	0-30 Days (%)	30-60 Days (%)	60-90 Days (%)
Nitrogen	60	60	60
Phosphorus	5	5	5
Pottassium	198	198	198

Table 2. Onion peel vermicompost.

Nutrients /No of days	0-30 Days (%)	30-60 Days (%)	60-90 Days (%)
Nitrogen	72	90	150
Phosphorus	8	30	40
Pottassium	380	480	500

Table 3. Orange peel vermicompost.

Nutrients /No of days	0-30 Days (%)	30-60 Days (%)	60-90 Days (%)
Nitrogen	70	75	150
Phosphorus	7	30	30
Pottassium	490	520	520

Table 4. Vegetable waste vermicompost.

Nutrients /No of days	0-30 Days (%)	30-60 Days (%)	60-90 Days (%)
Nitrogen	80	95	130
Phosphorus	7	30	35
Pottassium	250	450	550

CONCLUSION

In our study we had made compost from various organic waste things such as Onion peel, Orange peel and Vegetable waste. Vermicompost is a magic thing for the essential macro and micro nutrients for the soil. The decompose through agricultural waste might be a alternative method. The utilization of vermicompost to plants to increase to plants increase the growth and productivity Vermicompost is an unconventional biofertilizer than any other thing. It has the capacity to change the poor soil into best fertile soil. Vermicompost is the only remedy for polluted soil UNEP has acknowledged the importance of vermicomposting as our study recommend that it acts as biofertilizers, restores soil nutrients, stabilizers soil and enhances soil fertility at a long term period. Vermicompost stimulates to influence microbial activity of soil, increases the availability of oxygen, maintains normal soil temperature, increases soil properties, and infiltration of water improves nutrients content increases the growth, yield and quality of the plant.

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REFERENCES

Shrikant Kekane I.C.S College Khed (2015). Impact of Industrial Waste on Soil and Water Quality, *International Journal of Chemical Studies*, 3(4), 29-32**.**

Bo, Kishor Kumar Maharajan, Prakrit Noppradit (2021).Sustainability of Vermicomposting for different varieties of Organic Waste: A Systematic Literature Review, *Organic Agriculture*. 12 (07) 1-22.

Fudzagbo, J., & Abdulraheem, M. I. (2020). Vermicompost technology: impact on the environment and food security. *Agricultural Environment*, 1(1), 87-93.

Atiyeh, R. M., Edwards, C. A., Subler, S., & Metzger, J. D. (2001). Pig manure vermicompost as a component of a horticultural bedding plant medium: effects on physicochemical properties and plant growth. *Bioresource Technology*, *78*(1), 11-20.

Anjana Thakur, Adhesh Kumar, Vinay Chava. (2022). Lovely Professional University, School of Agriculture. *Plant Cell Biology and Molecular Biology*.22 (11and 12), 156-164.

Zambere V.P., Padul M.V., Yadav A. Aand Shete T.B. (2008). Vermiwash Biochemical and Microbiological Approach as Ecofriendly Soil Conditioner, *Journal of Agricultural and Biological Science*, 4(8), 2348-6848.

Ali., (2015). Nida Sajid, Nida Sajid, Azeem Khalid, Are view on Vermicomposting of Organic Wastes. *Environmental Progress and Sustainable Energy*, 34(4).1050-1062.

Gajalakshmi and Abbasi, (2003). High rate Vermicomposting Systems for Recycling Paper Waste, *Indian Journal Biotechnology*, 2, 613-615.

N.R.Shanthi, R.V.Bhoyar, A.D.Bhide (1993). Vermicomposting of Vegetable Waste, *Compost and Utilization* 1(4), 27-30.

Am. Euras, Sunil Herat, Rajiv Kumar Sinha, (1993). Environmental Economical of Crop Productivity Vermiculture: Economically Viable and environmentally sustainable over Agriculture. *Journal of Agricultural Environmental Science*, 5 (S), 01-55.

Lee.K.E.(1985). Gopinath K.A, SRKumar,Vermicompost: A Viable Resource in Organic Forming.500-059.

Kaplar.A M and Haenlein M. (2016). Open Journal of Social Sciences, MOOC Research Hotspot Based on the Visual Co-word Network Map, 6 (9).