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Vermicompost Production with different Agricultural Wastes

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Abstracts—*The present studied conducted on vermicompost preparation with different agrowaste material. The data of 4 treatments with five replications used in the experiment. The data were analysed with RBD. Significant differences were found among treatments. The ranges of body weight of earthworm 30-43 gm observed among treatments respectively. The highest body weight 43 gm recorded with banana sucker treatment. The concentration ranges of Nitrogen 1.23-1.93%, 0.67-1% Phosphorus, 1.02-1.35% Potassium and 26.4-41% Carbon observed among treatments. The highest nitrogen content 1.93% observed with banana sucker treatment. The highest potassium 1.35% reported with straw treatment. The highest phosphorus content 1% recorded with dry leaves treatment and the highest carbon content 41% observed with straw treatment. The advantageous agrowaste material improves and progresses quality of organic matter and earthworm populations. It stabilizes and maintains the metabolism of earthworm and bacteria populations.*

Keywords*: Agrowaste material, decomposed dung, earthworm, nutrient and body weight*

INTRODUCTION

Vermicompost is bulky organic manure that prepared with agricultural waste without addition of citrus, onion and garlic. The compost is decayed with beneficial bacteria i.e., Nitrogenous bacteria, Phosphatic bacteria, Potash solubilising bacteria, Cellulomonas bacteria and lignomonous bacteria etc. The bacteria available organic molecules and nutrient in the compost. It intakes nutrient from decomposed matter. The vermicompost sales are 24.89% at 2015 in worldwide. The vermicompost production of India is less than 9.5% of the total value of global vermicompost in 2015. My NOKE company is the world leading vermicompost manufacturer with market share 8.79% in 2015 (NBC Right Now, 2018).

The aim of study is to determine physical nature of vermicompost with different agrowaste material. The growth, development and multiplication of earthworm are different with agrowaste material. The habit and growth of earthworm are variable with different agrowaste material. Khucharoenphaisn and Sinma (2018) reported vermicompost production with agricultural waste. They observed the weight of earthworm and nutrient content of vermicompost. Sibbulakshmi and Thiruneelakandam (2011) prepared vermicompost with agriculture waste like vegetable scraps, fruit, peels, tea bags, coffee grounds, coffee filters. They mentioned that mea, fish, cheese, butter, greasy, oily foods, cat litter and cat faces are not used to vermicompost preparation. They analyses the nutrients of vermicompost. Barik *et al*. (2011) reviewed the ranges of nutrient content (%) of vermicompost with agrowaste material. Alla *et al*. (2016) reported vermicompost preparation with plant debris, cattle dung and paper waste by using three varieties of earthworm. They observed the body weight of earthworm and nutrient analysis. Azizi *et al*. (2014) observed vermicompost production with vegetable waste. They observed earthworm growth and multiplication at 70 days. They analysed the NPK nutrient of vermicompost. Karmakar *et al*. (2013) observed the grain yield, no. of panicles and filled grain rice with vermicompost application. Maya *et al*. (2016) prepared vermicompost with paddy straw. They estimated the NPK nutrient with paddy straw. With this background, the following objectives were taken for experiment.

i) Effect of different agriculture waste into Earthworm production.

ii) Nutrient estimation of vermicompost with different agriculture waste.

MATERIAL AND METHODS

Agriculture waste 100kg tea, 100kg dry leaves, 100kg banana sucker, 100kg straw and 100kg cattle dung were used as treatments into vermicompost preparation. The treatments have given 5 replications. The following observations reported in vermicompost preparation NPK estimation and body weight of earthworm. The Nitrogen is estimated with Khejadal method, Phosphorus is estimated with Bray method, Potassium is estimated with Flame photometer and Carbon is estimated with Blakeley and Walkley method. The period of vermicompost production 90-110 days. The observation was taken after 120 days.

Data analysis

The data was analyzed with RBD. It was calculated with square root transformation of correction factor 5%.

Results and Discussion

i) Effect of different agriculture waste into Earthworm production

The physical growth, development and multiplication of earthworm are different with treatments. The habitat of earthworm is different with treatments. This activity observed into present experiment. The data depicted in Table 1 and Fig. 1. Significant differences were reported among treatments. The body weight of earthworm ranges 30-40 gm observed among treatments. The highest body weight 43 gm reported with banana sucker. The banana sucker provides tissue fluid, growth regulators, vitamins, mineral nutrients, carbohydrate, protein and lipid to the earthworm. It offers more water in that earthworm population adapts more in the banana sucker. The tissue of banana suckers assimilates more water that increases the survival ability of earthworm populations. Nayavallemma *et al*. (2004) resulted bodyweight of earthworm. Manaig (2016) resulted body weight of earthworm with rice straw. Suthar and Singh (2008) observed body weight of different earthworm species.

Table 1: Bodyweight of earthworm with treatments

Treatments	Average Bodyweight of earthworm (gm)	Treatment means
Tea	40	6.3
Dry Leaves	36	5.9
Banana sucker	43	6.5
Straw	30	5.4

Anova Table

Source of variation	Degrees of freedom	Mean sum of squares	F cal	F prob
Replications	4	0.566	2.609	0.089
Treatments	3	1.130	5.211	0.016
Error	12	0.217	-	-
Total	19			

Significant level at 5%

CV = 7.67

CD (5%) = 0.642

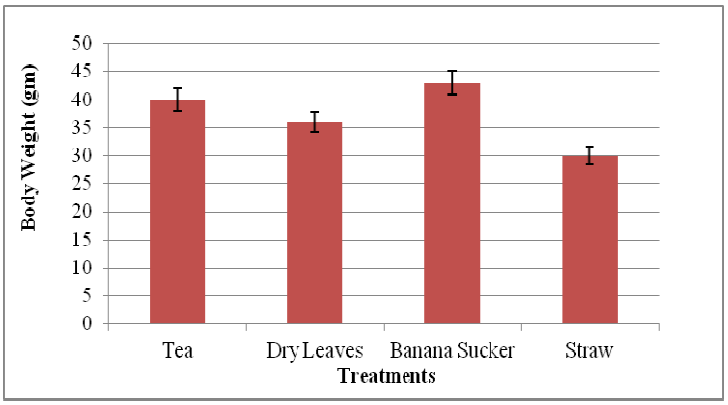

Fig. 1: Bodyweight of earthworm observed with agrowaste material

ii) Nutrient estimation of vermicompost with different agriculture waste

The effect of treatments is alter the nutrient concentrations of vermicompost. This treatment provided essential nutrients to earthworm populations and organic matter. This action has obtained in the present investigation. The data was showed in Table 2 and Fig. 2. Significant differences were observed among treatments. The concentration range of 1.23-1.94% Nitrogen, 0.67-1%

Phosphorus, 1.02-1.35% Potassium and 26.4-41% Carbon recorded among treatments. The highest nitrogen content 1.93% observed with banana sucker treatment. The highest phosphorus content 1% recorded with dry leaves treatment. The highest potassium content 1.35% reported with straw treatment and the highest carbon content 41% observed with straw treatment. The banana sucker, straw and tea provides biomolecules, enzymes, growth regulators, alkaloids, Terpenoids and secondary metabolites to the organic matter and earthworm. Atiyeh *et al*. (2000) stated that earthworm populations affect the nitrogen concentrations of vermicompost. It enhances the nitrogen content through mineralization. It facilitates the growth, development and multiplication of earthworms and improves the texture of bulky manure. The earthworm and phosphorus bacteria receives energy and nutrients from treatments. It releases available phosphorus into the organic matter (Lee, 1992; Garg *et al*., 2006). Potassium enhances potassium exchange rate and mineralization of organic matter. It improves the defense system of earthworm. It available more in all combination except cow dung and parthenium (Shutar, 2007). The loss of carbon as CO_2 through microbial respiration. The carbon might be responsible for nitrogen addition in the form of mucus nitrogenous excretory substances, growth stimulatory hormones and enzymes from the gut of earthworms (Tripathi and Bhardwaj, 2004; Viel *et al*., 1987). Mistry *et al*. (2015) resulted NPK and carbon estimation from vermicompost. Sajedeh *et al*. (2015) reported NPK and carbon estimation of vermicompost. Prabha *et al*. (2015) observed nutrient content in vermicompost.

Table 2: Nutrient contents observed with different agrowaste treatments

Treatments / Nutrient contents	Tea	Dry Leaves	Banana Sucker	Straw	Treatment means
Nitrogen (N)	1.64	1.47	1.93	1.23	1.2
Phosphorus (P)	0.76	1	0.95	0.67	1.0
Potassium (K)	1.25	1.02	1.1	1.35	1.2
Carbon (C)	30.2	26.4	29.1	41	4.6

Anova Table

Source of variation	Degrees of freedom	Mean sum of squares	F cal	F prob
Replications	4	2.296	2.259	0.123
Treatments	3	15.223	14.976	0.000
Error	12	1.016	-	-
Total	19	-	-	-

Significant level at 5%

CV = 49.2

CD (5%) = 1.4

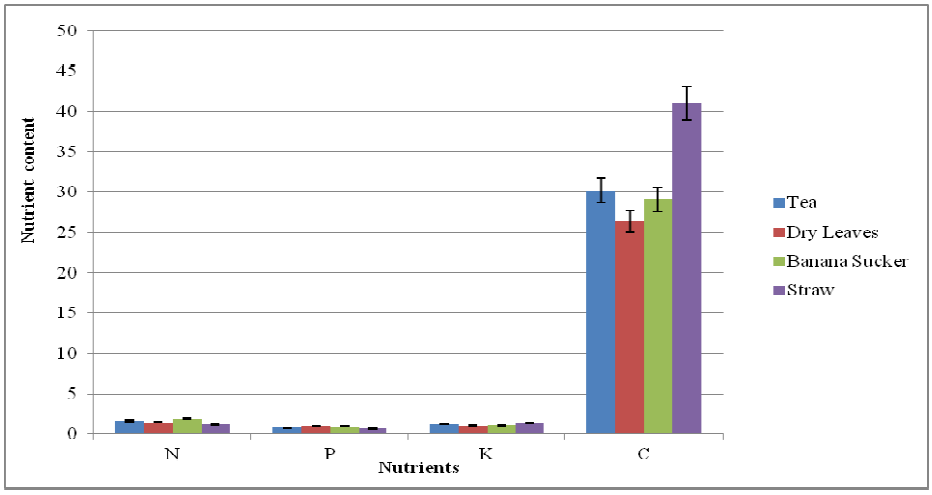

Fig. 2: Nutrient content obtained with various agricultural wastes

CONCLUSION

Vermicompost can prepare with different agrowaste material. Tea and Banana sucker are more appropriate for vermicompost preparation. It progresses the availability of biomolecules, enzymes, mineral nutrient and growth regulators that improves adaptation of earthworm and organic matter. The agrowaste material provides moisture to organic matter that prepares friable texture and good colour organic matter.

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