B.D.PUNDE, R.A.GANORKAR / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com
Vol. 2, Issue 3, May-Jun 2012, pp.2342-2347

"VERMICOMPOSTING-RECYCLING WASTE INTO VALUABLE ORGANIC FERTILIZER"

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ABSTRACT
Management of solid waste has become one of the biggest problems we are facing today. The rapid increase in the volume of waste is one of the aspects of the environmental crisis, accompanying recent global development. Disposal of solid wastes can be done by methods like land filling, incineration, recycling, conversion into biogas, and composting. Most common practices of waste processing are uncontrolled dumping which causes mainly water and soil pollution. Vermicomposting is one of the recycling technologies which will improve the quality of the products.

The present study was carried out for recycling of different type of organic waste. Eight different phases is to be prepare by using different type of partially decomposable organic waste. Eudrilus Eugenie is introduced in each of these eight partially decomposable phases. Moisture content in bed is maintained by spreading water over it and to cover with moist gunny bag. The temperature was monitored at every week. The parameter such as pH, electrical conductivity, C/N Ratio, N, P and K are measure during the specifics interval of time in which result show that the nutrient content at the end of 45 day is increases. Vermicompost is the process which will convert organic waste into valuable fertilizer.

Keywords: ***Cow-dung, Earthworm, NPK, organic waste, Vermicomposting.***

1. INTRODUCTION
In the present day, major environments like air, water, soil are getting polluted due to the various natural and anthropogenic activities like dumping of municipal solid waste without proper treatment, discharging waste water into the water bodies (1)The goal of conventional composting is to create a rich soil amendment using a specific combination of organic matter. Vermicomposting uses earthworms to achieve the same goal. Like regular compost, vermicompost also benefits the environment because it may reduce the need for chemical fertilizers and decrease the amount of waste entering landfills. The chemical secretions in the earthworm's digestive tract help break down soil and organic matter, so the castings contain more nutrients that are immediately available to plants. Vermicompost is similar to conventional compost and can be applied in the same way to gardens, lawns, and potted plants. Vermicomposting is a promising technique that has shown its potential in certain challenging areas like waste recycling and management of solid wastes. A large volume of organic matter generated from agriculture activities, industrial establishments, animal shelters and household activities are dumped to putrefy without proper utilization. Vermicomposting is considered superior to other types of compost because of its quality. (8). V. kartikeyan ET and all collected vegetable waste from market and with different combination they obtain a result for vermicomposting. Alok bharatwaj use kitchen waste for vermicomposting. G.sibi and manpreet kaur together take effort on management of vegetable waste by vermin-composting technology.
The present study is to carried out for use of different type of organic waste for vermicomposting.

2. MATERIAL AND METHOD
2.1Pre-composting
The shredded organics waste are spared in layer and expose to sunlight for 5 to 10 days to remove pathogenic microorganisms and noxious gases. The pre composting process takes 5 to 10 days for their completion except cotton waste which require 20 to 25 days for their decomposition.

2.2Experimental-design or Vermicomposting
The Vermicomposting was done in wooden trays (60 x 60 x 30 cm) under shed condition. In to 8 set of experiment were conducted for Vermicomposting. In each set of experiment eight different type of waste is used. In this experiment, eight pots T1to T8 were arranged. The important parameter i.e. moisture and temperature were controlled by means of spraying water over the bed thereby, the temperature maintain not to exceeding 35°C by adorning wet

gunny bags over bed and moisture were maintained between 50-60% at least 20 adult eudrulis eugaine was introduced in each tray. And the pre compost was finally covered with mat to protect earthworm from bird. The appearance of black granular powder on top of vermin beds indicate harvest stage of compost. Watering was stopped for at least 5 days at this stage and vermicompost was collected from the top without disturbing the lower layer.

2.3Chemical analysis

Sample were drawn periodically at 20 days and 45 days from each of the bed and analyzed for pH, electrical conductivity organic carbon ,total nitrogen and total phosphorous and total potassium. Water extract of Vermicompost were obtain by mechanically shaking the sample with distilled water for 1 h. the suspension glass wool filtrate were used for the determination of pH and electrical conductivity .Total organics carbon was estimated by using the method of Nelson and sommers. Total nitrogen was measured by kjeldahl method. Colorimetric estimation of total phosphorous and flame photometer determination of total potassium.

20 days analysis of vermicomposting sample.

Sr. No	Parameter	T1	T2	T3	T4	T5	T6	T7	T8
1	pH	7.16	6.62	6.45	5.95	8.92	6.95	6.02	6.64
2	EC	3.57	6.48	5.75	7.66	4.82	4.08	5.61	3.86
3	OC	21.3	14.14	9.26	15.72	6.42	7.2	9.27	4.3
4	N	0.89	0.45	0.8	0.42	0.3	0.76	1.14	0.27
5	P	0.24	0.186	0.35	0.248	0.18	0.24	0.37	0.21
6	K	0.15	0.68	0.64	0.88	0.211	0.67	0.28	0.49
7	C:N	23.93	31.42	16.83	37.42	21.33	9.47	16.9	15.92

45 days analysis of vermicomposting sample.

Sr. No	Parameter	T1	T2	T3	T4	T5	T6	T7	T8
1	pH	6.91	6.51	6.24	5.82	7.52	6.82	6	6.6
2	EC	3.42	6.07	4.2	6.88	4.1	4	4.94	3.77
3	OC	15.9	12.17	7.48	13.62	5.93	6.87	8.74	3.9
4	N	1.12	0.66	1.32	0.51	0.39	0.88	1.2	0.31
5	P	0.31	0.214	0.45	0.261	0.22	0.3	0.44	0.3
6	K	0.24	0.76	0.75	0.98	0.249	0.81	0.45	0.63
7	C:N	14.19	18.43	5.66	26.7	15.2	7.8	6.88	12.5

EC—Electrical conductivity; OC—Organic carbon(%); N—Total Nitrogen (%) P—Total Phosphorous(%);K—Total Potassium (%) .

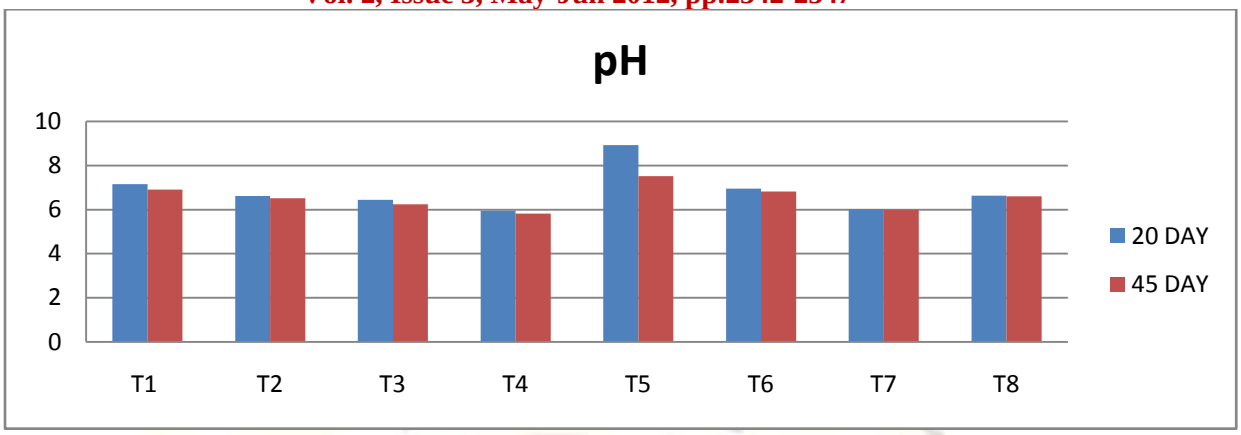
Where,

T1 Soil + cow dung (0.5:1)
T2 Soil +vegetable waste (1:1)
T3 Soil +cow dung+ vegetable waste (1:1(Market waste: Cow-dung))
T4 Soil +cow dung + rice husk (1:1(rice husk: Cow-dung))
T5 Soil +food waste + cow dung (4:1(food waste: Cow-dung))
T6 Soil +cloth waste + cow dung (3:10(cloth waste: Cow-dung))
T7 Soil +sugarcane waste + cow dung (1:1(sugarcane waste: Cow-dung))
T8 Soil + Paper waste + cow dung (1:1(Paper waste: Cow-dung))

3. RESULT AND DISCUSSION

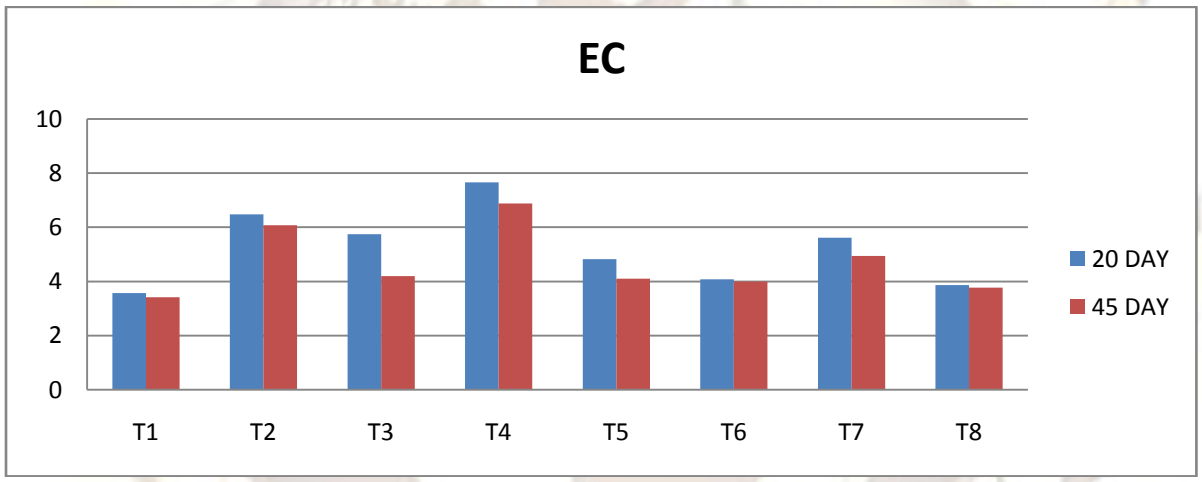
pH

Initially, pH value of all these raw organic waste is observed as high During the Vermicomposting process, pH value of phases was increasing due to mixing of inoculants and this was slightly decreasing as shown in graph. It shows that the alkalinity of the bio-compost is slowly reducing in the process.



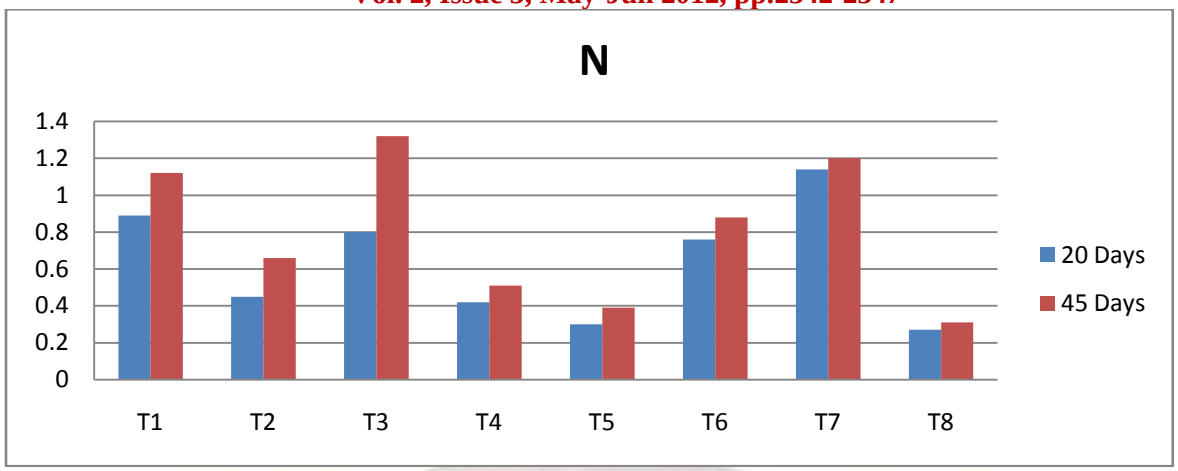
Electrical Conductivity

The electrical conductivity of all the bed was considerably decreasing during the vermicomposting process. The reduction of EC in all beds reveals the reduction of salinity considerably. The lower level of salinity is the essential character of good bio-compost which is better for crop growth.



Total Nitrogen

The total Nitrogen present in the vermicompost is depend upon the nitrogen content of waste used. The total Nitrogen is increasing about 12% to 16% due to the recycling of Nitrogen in the process. The increase of Total Nitrogen shows the good quality of bio-compost.



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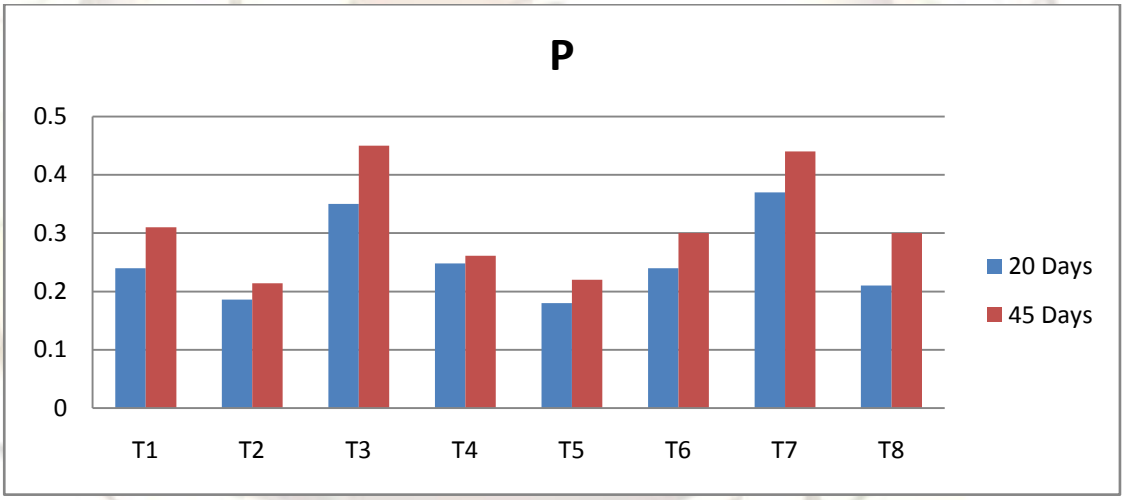
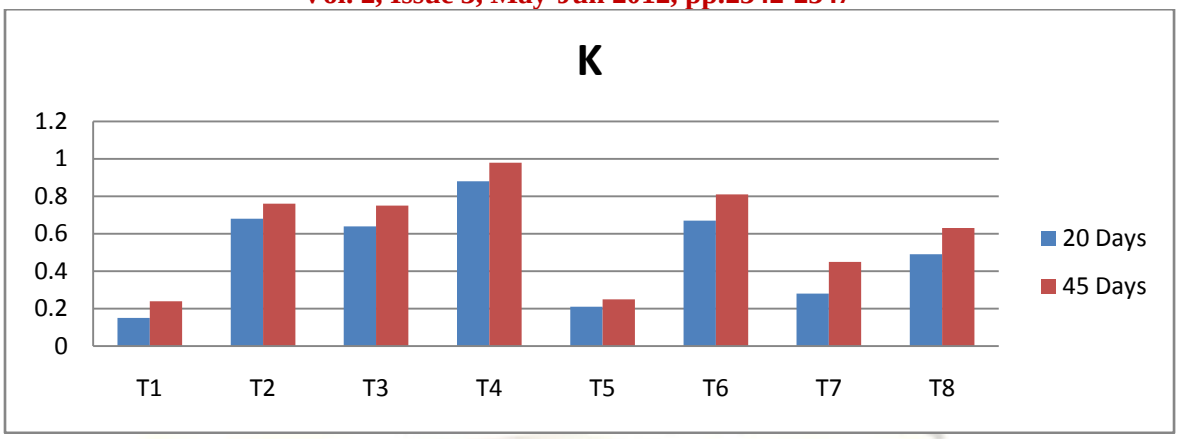
Total Phosphorous

There is considerable increase of Total Phosphorous in T3 is from 0.35% to 0.45% and in T7 it is 0.37% to 0.44% and in T1 it is 0.24% to 0.31%. The increase in Total Phosphorus content reveals that the vermicomposting process is in order.



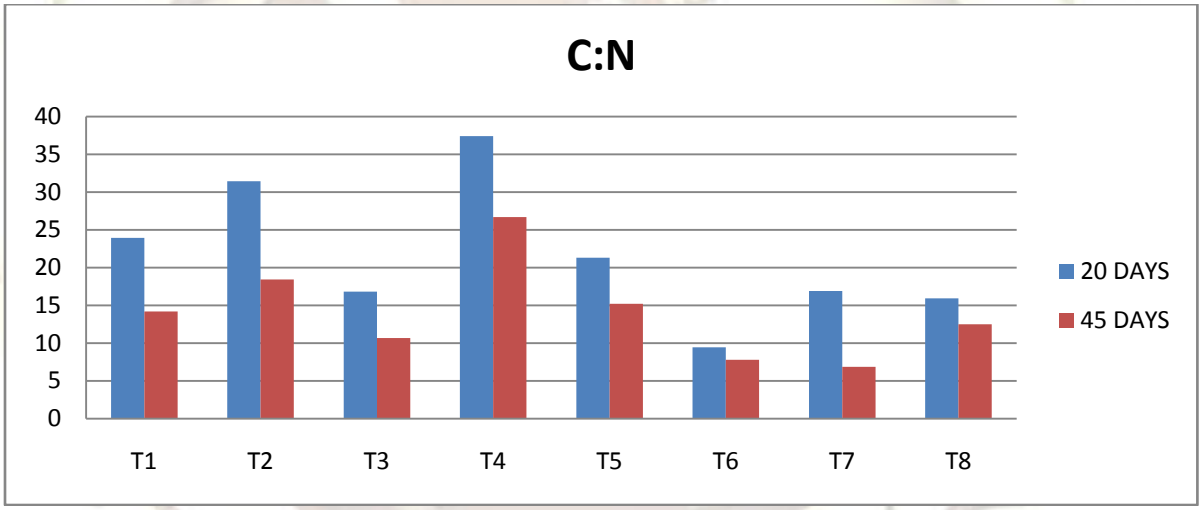
Total Potassium

The concentration of Total Potassium in the vermicomposting manure is as shown in graph. The amount of potassium is increases gradually which is also depend on the amount of raw organic waste used.



Carbon/Nitrogen Ratio

The carbon content present in the organics was utilized as source of energy for earthworms. And simultaneously, the Nitrogen is being recycled in the compost. During this process, the casting of earthworms in turn enriches the macronutrients such as N, P, K and hence bio compost will becomes as an organic fertilizer. The C/N ration is about 15 to 20:1 for good compost. But the C/N ratio is depends upon the quality of raw organic waste used.



4. CONCLUSION

The study reveals that the good quality of bio-compost was obtained from T3 phase from T6 and from T7 in 45 days. The important characteristics such as pH, N, P, K, C/N ratio meets the standards given in the manual on Municipal solid waste Management 2000. This process will reduce the environmental damage. Also vermicompost is a valuable input for sustainable agriculture and wasteland development.

Composting is an effective way to manage organic wastes. It promotes environmental sustainability by converting a waste to a value-added product that improves our environment. Vermicomposting is recommended for treating and converting the huge amount of MSW generated in the city. This process will reduce the environmental damage. Municipal Corporations will adopt the vermicompost technology to fetch revenue.

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