International Journal of Advanced Research and Development
ISSN: 2455-4030, Impact Factor: RJIF 5.24
www.advancedjournal.com
Volume 2; Issue 4; July 2017; Page No. 359-366

Disposal and management of temple waste: Current status and possibility of vermicomposting

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Abstract

Gwalior is a typical Indian city with many temples, being visited by a large number of devotees. A huge amount (approximately 100kg) of temple waste, chiefly of garlands of flowers, is generated daily and on special days this amount increases several times as the number of visitors also increases. Devotees and temple administration believe that this waste (Nirmalay) is sacred and holy and it should not be treated like other garbage. Hence authorities of some temples make special arrangement packing and transportation to dispose it off in holy water Rivers, ponds and other water bodies in and around the city. Such a method of waste disposal is not satisfactory as it causes pollution, foul smells, unhygienic atmosphere and spread of infectious diseases. In the present study a successful attempt was made to convert flower waste into vermicompost. The flower waste was mixed with cattle dung to make it suitable for culture of selected earthworm, Eudrilus eugeniae and detailed experiments were conducted in plastic containers. In order to enhance degradation of cellulosic material of flower waste, experiments were conducted to demonstrate the effect of mixing of Trichoderma harzianum powder. Results of the study are highly encouraging it was concluded that the flower waste can be managed, through vermicomposting in an eco-friendly manner by mixing equal ratio of cattle dung and small amount of T. harzianum powder. It was also demonstrated that fresh earthworms and T. harzianum are not required every time because they multiply continuously in the vermi-chamber.

Keywords: earthworms, *eudrilus eugeniae*, temple waste, vermicomposting, nirmalay waste

1. Introduction

Deterioration of environmental quality, climate change, disposal and management of waste and sustainable development are the major issues to human society. One of the major causes of environmental pollution is mis-management of organic waste including temple waste. Gwalior is a typical Indian city with many temples, being visited by a large number of devotees. These visitors come and offer floral garlands, fruits, coconut, sweets and other edibles to the God. The edibles are usually removed to be distributed among the devotees as Prasad and for consumption by priests, temple administrators and other staff. Non-consumable materials (floral garlands) are discarded as waste. Usually temple waste is disposed off like other wastes and contributes a major part in municipal solid waste. But at several places such waste is considered to be sacred and is disposed off in rivers of nearby water bodies.

The famous Sai Baba Temple, located at Tansen Nagar, Gwalior, is visited by good numbers of devotees. The number of visitors is very high on Thursday and special (worshiping) days than on other days. A significant amount (approximately 100 kg) of temple waste, consisting chiefly of flowers, is generated daily and on special days this amount goes up to 1000 kg. According to devotees and temple administration, this waste is sacred and holy and it must not be disposed off like other garbage. Hence it packed in bags and transported and disposed off in nearby rivers, ponds and other water bodies. From environmental safety point of view such a method of waste management is not satisfactory. It causes pollution, foul smell, unhygienic atmosphere and spread of infectious diseases. Shouche *et al.* (2011) [15] have studied the changes in physical parameters during vermicomposting of floral wastes. Have conducting vermicomposting experiments on floral waste. The floral waste was first treated with *Trichoderma harzianum* powder for decomposition of cellulosic waste followed by mixing with cattle dung and vermicomposting. But they have studied only the changes in physical parameters during vermicomposting. The earthworm parameters have not been worked out. They indicated that satisfactory rate of composting depends on the nature of composting mixture especially amount of cellulose and optimum moisture content (60-70%), temperature (25-30^{0}C) and pH (6-8) for proper activities of microorganisms and earthworm. Sailaja *et al.* (2013) [4] concluded that to prevent the environmental pollution from excess application of fertilizers, the effective microorganisms should be recommended to farmers to insure the public health and a sustainable agriculture. The technology is cheap, easy to handle and suggested that using vermicomposting with cattle dung have resulted in the greatest plant yield. It can be concluded that use of vermicomposting considerably improved yields of plant.

Present investigation is an attempt to utilize temple waste for vermicomposting by using earthworm species *Eudrilus eugeniae.* Vankar *et al.* (2009) [13] observed that in *Tagetus erecta* flower a temple waste has been shown to have good dyeing prospects. The ethanolic extraction followed by removal of ethanol and finally using the extract in aqueous medium has provided brighter shades as compared to direct aqueous extract. They have shown repeatability of the process and the consistency in the color content and therefore recommend for industrial application. Metal mordent in conjunction with *Tagetus erecta* flower extract was found to enhance the dye ability and fastness properties effect in case all three types of material and thus the net enhancement of dye uptake due to metal mordanting has been found to ranging from 45-52 % in the case of cotton 38-46 % in silk and 37-51 % in wool with respect to the controlled sample. The higher percentage of color strength in the case of silk and wool makes *Tagetus erecta* best suited for proteinaseous material although cotton dyed samples have acceptable brightness and fastness properties. The dyeing process developed by us is for the ease of industrial application. Gurav *et al.*, (2011) [10] observed that the temple waste based biogas digester slurry admixed with cattle dung and temple waste solids, after partial decomposition works as an excellent raw material for vermicomposting using *Eudrilus eugeniae* earthworm which can produce vermicompost with good fertilizer value and which can be used for plantation in the temple. This ecofriendly method of temple waste management should be extended for the entire temple. Aprana *et al.*, (2011) learned that several developing countries established large-scale composting plants that eventually failed for various reasons. The main flaw that led to the unsuccessful establishment of the plants was the lack of application of simple scientific methods to select the material to be composted. Landfills have also been widely unsuccessful in Indian environment because the landfill sites have a very limited time frame of usage. The population of the developing countries like India is another factor that detrimentally impacts the function of landfill sites. As the population keeps increasing, the garbage quantity also increases, which, in turn, exhausts the landfill sites. Landfills are also becoming increasingly expensive because of the rising costs of construction and operation.

2. Materials and methods

2.1 Collection and processing of temple waste

The temple waste was collected from the “Sai baba Temple” situated at Kherapati colony, Tansen Road, Gwalior. Cattle dung was collected from Charak Udhyan, Jiwaji University Gwalior. *Tricoderma harzianum* powder was procured from R.L. Balaji lab. Some of the edible stuffs are collected to be used as Prasad and rest of the stuff is discarded as waste. Varieties of religious rituals (puja, archana, abhishek etc.) are performed and variety of items including flowers, garlands, leaves, edible and non-edible fruits, sweets, etc, are offered to Sai Baba. From the collected temple waste, non-recyclable and other materials such as plastic, polythene, metal, diya (earthen lamps), hard and intricate plant components etc that cannot be composted easily were segregated. The segregated waste was chopped into smaller pieces with the help of heavy sharp knife. A study has been carried out for bio-conversion of temple waste by vermitechnology using epigeic earthworm’s *E. eugeniae*.

2.2 Experimental design for temple waste and dung ratio in set-I, II and III

Experiments were conducted in plastic containers using different combinations of temple (flower) waste and cattle dung. In first (Set-I) of experiments eighteen containers were used in triplicate and the ratio of dung was kept constant and ratio of TW varied from 0-4. Similarly in second (Set-II) of experiment eighteen containers were also used in triplicate and the ratio of TW was constant and ratio of dung varied from 0-4. Dung alone was also used as positive control and temple waste alone also used as negative control. Besides that (Set-III) were also used for influence of *Tricoderma harzianum* with different ratio of TW and dung. After a pre-decomposting (maturing) period of 15 days, 20 clitellate EWs were released.

3. Results & discussion

Experiments were conducted in plastic containers using different combinations of temple (flower) waste and cattle dung. In first Set-I of experiments eighteen containers were used in triplicate and the ratio of dung were kept constant and ratio of TW varied from 0-4. Dung alone was also used as positive control. After a pre-decomposting (maturing) period of 15 days, 20 clitellate EWs were released. During this period ammonia and other toxic effluents are removed, heat generated in the waste biomass is sub-sided and survival of earthworms becomes possible.

TW alone was not found suitable and EWs did not survive. The stuff became muddy with long lasting foul smell and lots of fly maggots and unwanted insects. On the other hand earthworms could survive and multiply in other media. It was observed that the total bio number (Adults+ cocoon+ juvenile) and biomass of adult worms were higher in TW+DU 1:1 (554.95% and 134.13%) and in DU (508.3% and 130.15%) and TW+DU 2:1 (316.6% and 83.78%). Both of these values showed a gradual decline with increasing proportion of TW. However, in waste mixtures TW+DU 3:1(113.25% and 14.15%) and TW+DU 4:1(4.95% and -31.48%) in which both the values of number and weight of adults were less than initial, some cocoons and juvenile earthworms were found. This indicated that though, the media were not suitable for growth of EWs, cocoon laying by surviving worms was not blocked. The performance of EWs in 1:1 mixture was somewhat higher than in dung alone.

Table 1: Set-I showing number of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No	Ratio of organic waste	Initial No. of worms (Mean ± S.E.)	Final No. of worms (Mean ± S.E.)	No. of cocoons (Mean ± S.E.)	No. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone(1:0)	20	00	00	00
2	DU alone (0:1)	20	32.82±0.75	47.33±1.75	48±1.15
3	TW:DU (1:1)	20	34.90 ±1.01	51.33±2.40	52±1.45
4	TW:DU (2:1)	20	25.1±1.27	32.66±1.76	28±2
5	TW:DU (3:1)	20	13.73±1.37	15.66±0.33	14.33±0.88
6	TW+DU(4:1)	20	10.87±0.91	6.66±0.88	6±1

Table 2: Set-I showing weight (gm) of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No.	Ratio of organic waste	Initial wt. of adult worms (Mean ± S.E.)	Final wt. of adult worms (Mean ± S.E.)	Wt. of cocoons (Mean ± S.E.)	Wt. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone (1:0)	16.8±0.70	00	00	00
2	DU alone (0:1)	16.48±1.13	32.82±0.75	0.49±0.20	4.62±0.15
3	TW:DU (1:1)	17.37±0.32	34.90±1.01	0.52±0.02	5.25±0.06
4	TW:DU (2:1)	15.48±1.31	25.1±1.27	0.35±0.01	3.00±0.35
5	TW:DU (3:1)	14.27±1.23	13.73±1.37	0.16±0.05	2.40±0.12
6	TW+DU(4:1)	17.82±0.98	10.87±0.91	0.07±0.01	1.27±0.10

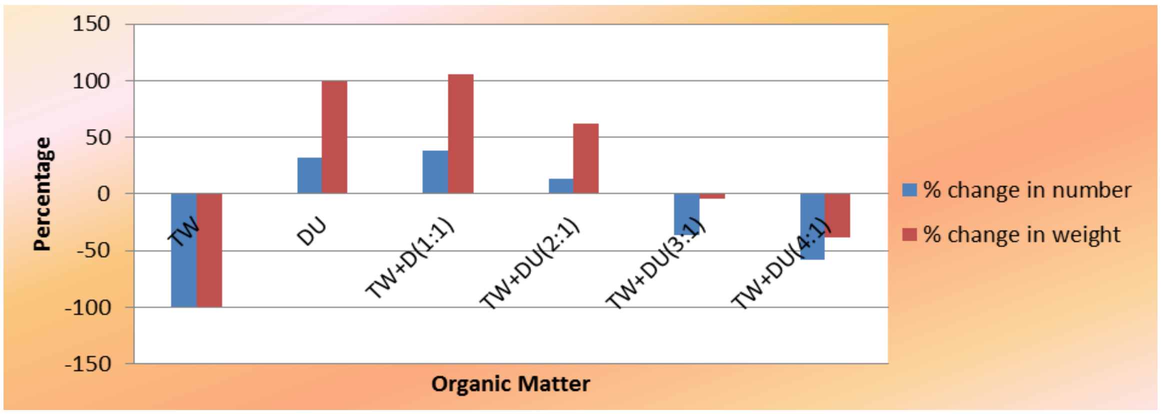

Fig 1: Set-I Showing Percent change in number and weight of adults in different culture media (organic ratio) of TW: DU.

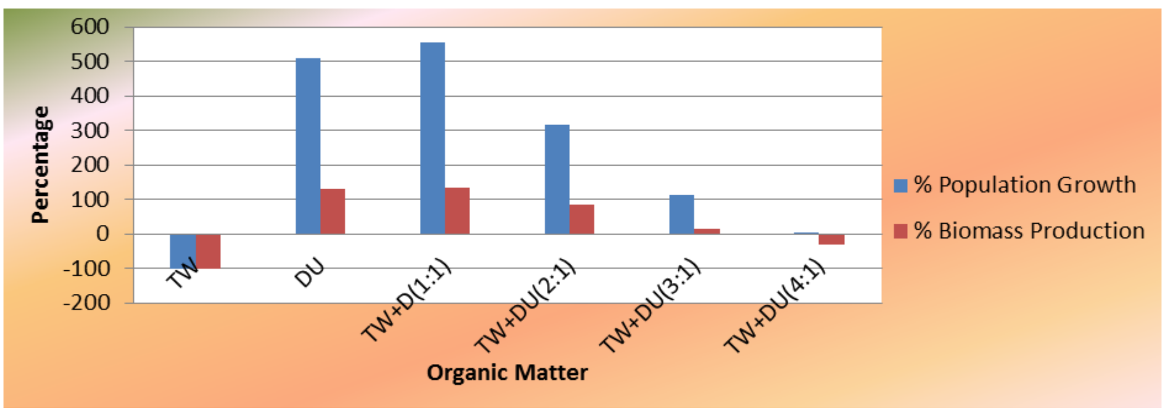

Fig 2: Set-I showing % Population Growth and Biomass production in ratio of TW: DU culture media.

In (Set-I) maximum nitrogen content was noted in TW + DU 1:2 (1:1%) while minimum in TW + DU 3:1 (0.73%). Maximum phosphorus noted was in TW 1:0 (1.3%) while minimum in 2:1 (0.36%). Maximum potassium was seen in DU 0:1 (0.94%) while minimum in TW + DU 4:1 (0.41%). (Fig.4.1.2.3)

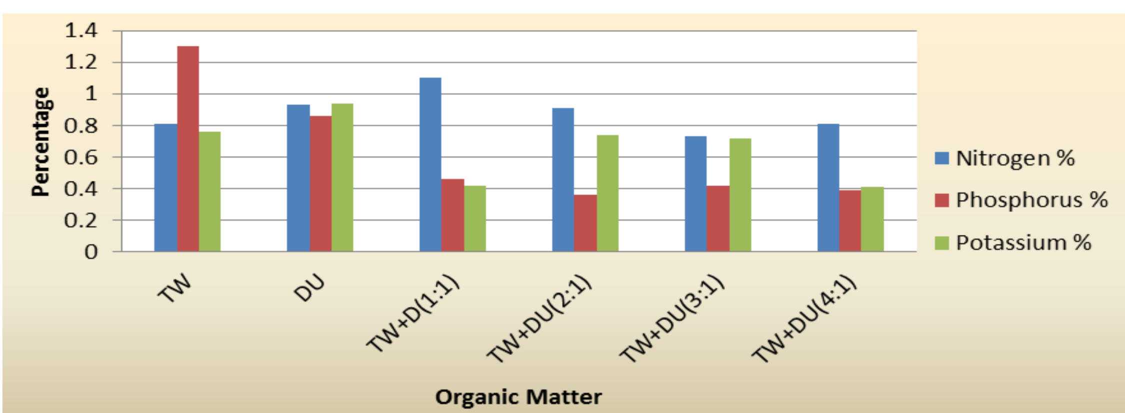

Fig 3: Set-I showing variation of total nitrogen, total Phosphorus and total Potassium in different culture media (organic ratio) of TW: DU.

In next Set-II of experiments amount of TW was fixed and that of dung increased. It was revealed from results that the performance of EWs increased with increasing amount of dung. The interesting point is that the best performance in (Population growth and Biomass) was observed in 1:4 ratios (806.6% and 199.88%) of TW+D followed by TW+DU 1:3 (706.6% and 138%), TW+DU 1:2 (641.6% and 123.40%), 1:1 TW+DU (556.6% and 114.10%) and DU alone (534.95% and 104.30% respectively). It was concluded from these experiments that TW can be easily converted into vermicompost by mixing equal amount of cattle dung and a higher amount of dung can improve the vermicomposting process. But it is not desirable because the target waste is TW and not dung. Addition of TW in dung is better to process than dung alone.

Table 3: Set-II showing number of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No	Ratio of organic waste	Initial No. of worms (Mean ± S.E.)	Final No. of worms (Mean ± S.E.)	No. of cocoons (Mean ± S.E.)	No. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone (1:0)	20	00	00	00
2	TW:DU (1:1)	20	25.66±0.33	55.66±2.33	50.00±1.73
3	TW:DU (1:2)	20	27.66 ±1.20	66.33±2.02	54.33±1.45
4	TW:DU (1:3)	20	31.66±0.88	71.00±1.73	58.66±1.76
5	TW:DU (1:4)	20	37.33±0.66	77.33±1.45	66.66±1.76
6	TW+DU(0:1)	20	25.33±0.88	53.33±3.52	48.33±1.20

Table 4: Set-II showing weight (gm) of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No.	Ratio of organic waste	Initial wt. of adult worms (Mean ± S.E.)	Final wt. of adult worms (Mean ± S.E.)	Wt. of cocoons (Mean ± S.E.)	Wt. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone (1:0)	17.88±0.53	00	00	00
2	TW:DU (1:1)	17.23 ±0.39	31.62±0.34	0.62±0.003	4.65±0.04
3	TW:DU (1:2)	16.92 ±0.60	32.28±0.59	0.72±0.0273	4.80±0.06
4	TW:DU (1:3)	17.17±0.58	35.22±0.53	0.72±0.008	5.09±0.04
5	TW:DU (1:4)	16.97±0.35	44.42±1.16	0.78±0.011	5.69±0.08
6	TW+DU(0:1)	17.65 ±0.56	31.03±0.59	0.54±0.038	4.49±0.10

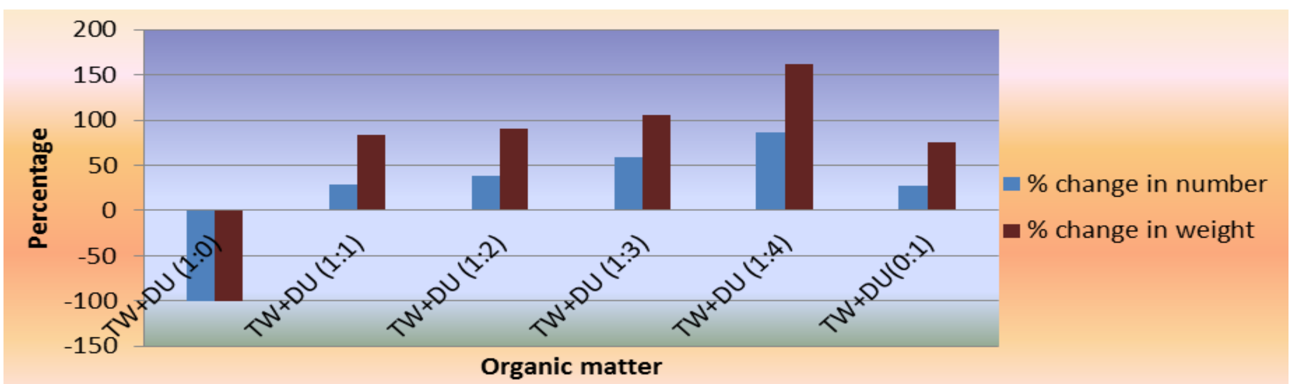

Fig 4: Set-II Showing Percent change in number and weight of adults in different culture media (organic ratio) of TW: DU.

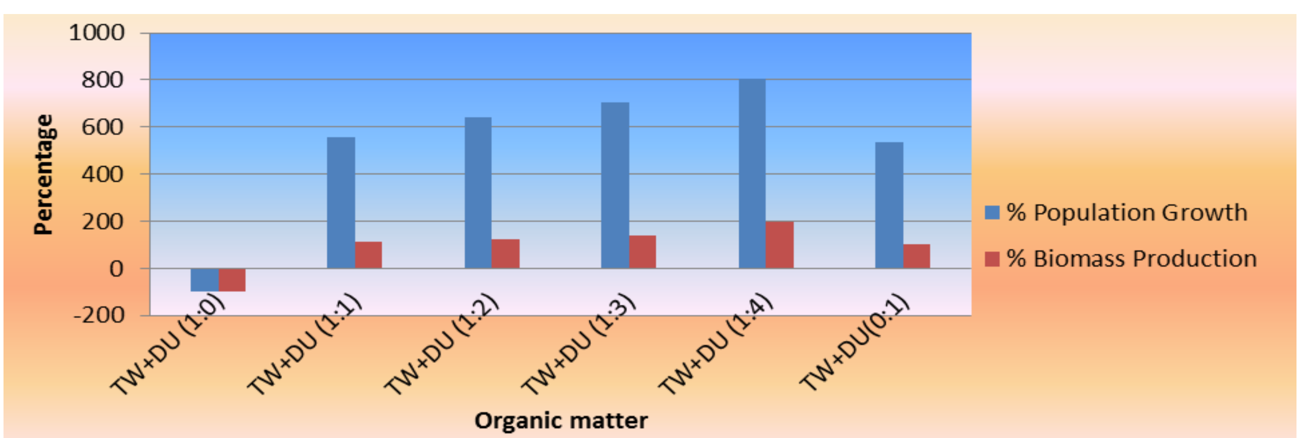

Fig 5: Set-II showing % Population Growth and Biomass production in ratio of TW: DU culture media.

In (Set-II) maximum nitrogen content was noted in TW + DU 1:4 (2:2 %) while minimum in TW + DU 0:1 (0.81%). Maximum phosphorus noted was in TW+DU 1:0 (1.6%) while minimum in 0:1 (0.59%). Maximum potassium was seen in TW+DU 1:0 (0.76%) while minimum in TW + DU 0:1 (0.41%).

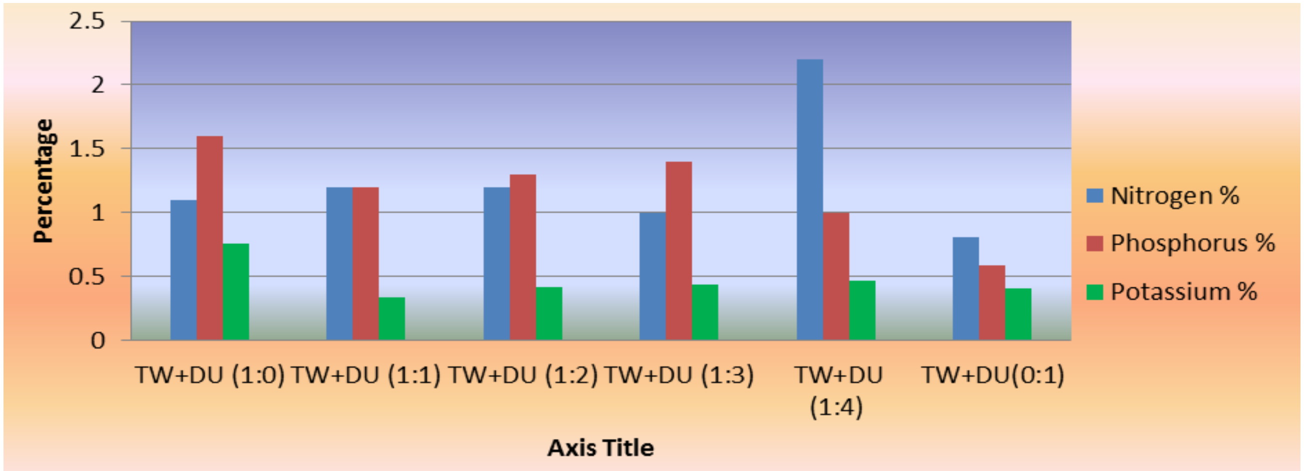

Fig 6: Set-II Showing variation of total nitrogen, total Phosphorus and total Potassium in different culture media (organic ratio) of TW: DU.

4. Influence of *Trichoderma harzianum* in vermicomposting of TW: dung mixture.

Trichoderma h. is fungal culture powder that is widely used in agriculture against other harmful fungi in the soil. It is also supposed to help biodegradation of organic inputs in the soil. Several workers have demonstrated that it acts as vermicomposting booster as it helps in degradation of plant (leaves, flowers) waste. Addition of *T.h.* also enhances the composting process in dung.

Therefore experiments of Set-III were conducted in which different combinations of TW and dung was processed in the presence of 0.125% of *Tricoderma harzianum*. In all the combinations inclusion of *T.h.* showed its significant effect. The values of all the parameters % increase in bio-number and biomass, fecundity and growth rate as well as composting parameters (degree of composting, time of composting, compost quality) were improved in *T.h.* added than in control media. It also enhances the performance of EWs in dung alone. The performance of 1:1 waste mixture which was little lower than dung alone, became better than dung and that of 2:1 mixture became more or less at par with dung alone.

Table 5: Set-III showing number of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No	Ratio of organic waste	Initial No. of worms (Mean ± S.E.)	Final No. of worms (Mean ± S.E.)	No. of cocoons (Mean ± S.E.)	No. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone (1:0)	20	00	00	00
2	DU alone (0:1)	20	30.33±2.02	54±1.15	48±1.15
3	TW:DU (1:1+*Th*)	20	35.33 ±0.33	55.66±1.33	49.66±1.20
4	TW:DU (2:1+*Th*)	20	29.33±0.88	43±1.52	35.33±1.20
5	TW:DU (3:1+*Th*)	20	13.66±1.20	16.33±1.20	16.33±2.18
6	TW+DU(4:1+*Th*)	20	12.66±1.45	9.33±0.66	9.33±0.66

Table 6: Set-III showing weight (gm) of adults, juveniles and cocoons of *E. eugeniae* in TW: DU.

S. No.	Ratio of organic waste	Initial wt. of adult worms (Mean ± S.E.)	Final wt. of adult worms (Mean ± S.E.)	Wt. of cocoons (Mean ± S.E.)	Wt. of baby worms and Juveniles (Mean ± S.E.)
1	TW alone (1:0)	15.8±0.48	00	00	00
2	DU alone (0:1)	17.7±0.642	35.81±0.81	0.55±0.01	5.48±0.19
3	TW:DU (1:1+*Th*)	17.7±0.875	38.02±0.94	0.56±0.17	5.90±0.24
4	TW:DU (2:1+*Th*)	16.82±2.49	34.48±0.57	0.42±0.01	4.49±0.32
5	TW:DU (3:1+*Th*)	14.89±1.29	15.46±0.59	0.17±0.01	3.41±0.02
6	TW+DU(4:1+*Th*)	15.66±0.05	10.10±0.75	0.11±0.01	1.31±0.07

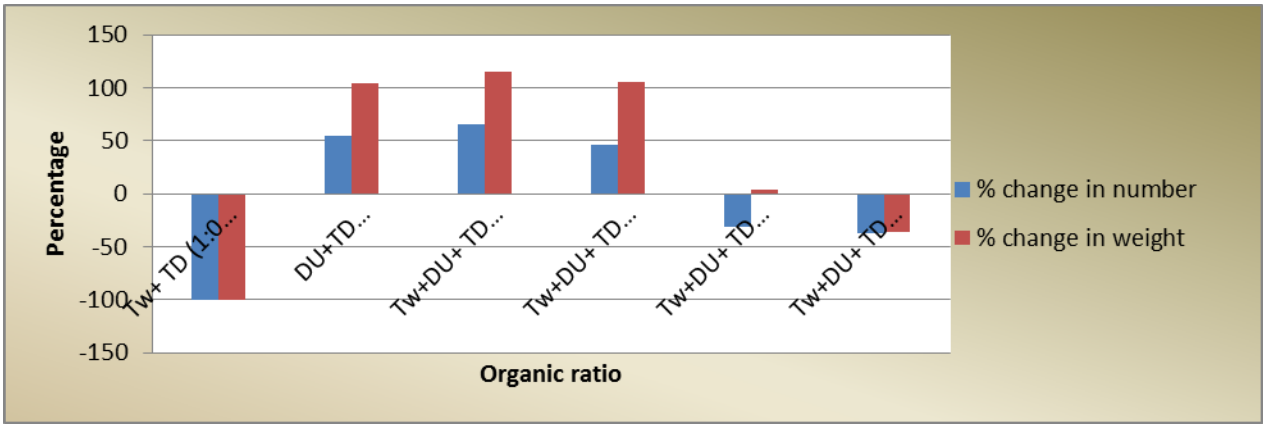

Fig. 7: Set-III Showing Percent change in number and weight of adults in different culture media (organic ratio) of TW: DU.

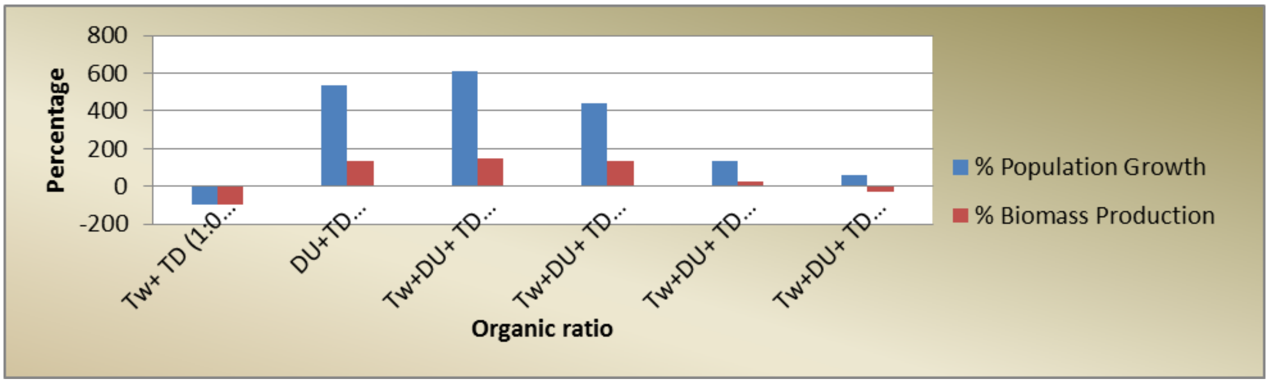

Fig. 8: Set-III showing % Population Growth and Biomass production in ratio of TW: DU culture media (organic ratio) of TW: DU.

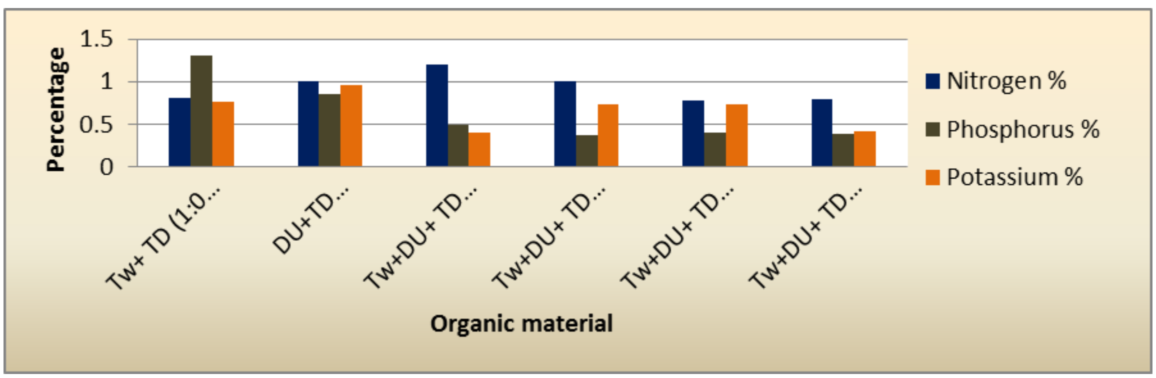

Fig 9: Set-III Showing variations of total nitrogen total Phosphorus and total Potassium in different culture media (organic ratio) of TW: DU.

5. Comparative analysis of SET-I and SET-II waste and dung with or without *Tricoderma harzianum*:

Table 7: Comparative difference of Temple waste and dung with or without *Tricoderma harzianum*.

S.NO	SET-I	SET-III
	TW+DU	**TW+DU+*Th***
1.TW+DU	1:0 No survival	1:0 No survival
2.TW+DU	0:1 Good results	0:1 Good results
3.TW+DU	1:1 Best results	1:1 Best results
4. TW+DU	2:1	2:1
5. TW+DU	3:1	3:1
6. TW+DU	4:1	4:1

Comparative analysis revealed that the number of adult worms, total bio-number (Adults + baby worms+ juveniles + cocoons) and respective biomass decreased with increasing amount of temple waste from 1 to 4 parts of the mixture. Thus the best results were obtained in (Set-I) TW + DU (1:1), in which there was 554.95% increase in worm population and 134.13% increase in biomass. The observations further revealed that number and weight of earthworms (including adult, baby worms and juveniles) increased in three sample Dung and 2:1) waste combinations containing low in temple waste alone and

(3:1 and 4:1). Higher values of both parameters (number and weight of worms) in the form of percent change in number and weight of worms were reported, *viz.* 38.3% and 105.58% TW + DU (1:1), 31.65% and 99.15% (DU), 13.3% and 62.14% TW + DU (2:1), -36.7% and -3.78 % TW + DU (3:1), -58.35% and -39.00% TW + DU (4:1), 0 % and 0 % in temple waste alone. Number and weight of cocoons increased in all waste combinations containing low temple waste. The results of population growth and biomass production of earthworms show variations in different culture media was 508.3% and 130.15% (Dung), 554.95% and 134.13% (1:1), 316.6% and 83.78% (2:1), 113.25% and 14.15% (3:1), 4.95% and -31.48% (4:1) & 0% and 0% in temple waste alone. Similarly, the best results were obtained in (Set-III) a ratio of temple waste and cattle dung mixture with *Tricoderma harzianum* (1:1 + 0.125%), in which there was 611.6% increase in worm population and 151.18% increase in biomass. The observations further revealed that number and weight of earthworms (including adult, baby worms and juveniles) increased in three sample (1:1, 2:1 and dung) while less number earthworm were observed in temple waste alone and (3:1 and 4:1). Higher values of both parameters in the form of percent change in number and weight of worms were reported, *viz.* 65% and 114.8 % (1:1), 55% and 104.18% (Dung), 46.65 % and 104.99 % (2:1), -31.7% and 3.82 % (3:1), -36.7 % and -35.5 % (4:1), 0 % and 0 % in temple waste alone. Number and weight of cocoons increased in all waste combinations containing low temple waste. The results of population growth and biomass production of earthworms showed variations in different culture media was 611.6 % and 151.18 % (1:1), 533.3% and 136.38% (Dung), 438.3 % and 134.28 % (2:1), 131.8% and 27.87 % (3:1), 56.6 % and -26.43 (4:1), & 0% and 0% in temple waste alone. Thus it seems that temple waste, cattle dung and *Tricoderma* powder mixture is a suitable medium for vermicomposting.

After pre decomposition period (15 days), pH value of (Set-I) all these raw organic waste were noted initial pH maximum in (7.6) while minimum noted in (6.2) during the vermicomposting. pH value of (Set-III) all these raw organic waste were noted initial pH maximum in (8.1) while minimum noted in (6.4) during the vermicomposting process. Vermicompost is rich in NPK (nitrogen 0.78-1.2%, phosphorus 0.37-1.3%, and potassium 0.40-0.96%), micronutrients, beneficial soil microbes, plant growth hormones and enzymes.

In (Set-I) maximum nitrogen content was noted in TW + DU 1:2 (1:1%) while minimum in TW + DU 3:1 (0.73%). Maximum phosphorus noted was in TW 1:0 (1.3%) while minimum in 2:1 (0.36%). Maximum potassium was seen in DU 0:1 (0.94%) while minimum in TW + DU 4:1 (0.41%). In (Set-III) maximum nitrogen content was noted in TW + DU 1:1 (1.2%) while minimum in TW + DU 3:1 (0.78%). Maximum phosphorus was noted in TW alone (1.3%) while minimum in TW + DU 3:1 (0.37%). Maximum potassium noted in DU 0:1 (0.96%) while minimum in TW + DU 4:1 (0.42%).

According to Shweta *et al*., (2006) [17] flower waste in combination with dung gave faster multiplication but mixed dung was best found substrate to increase the biomass production. Chakole and Jasutkar (2014) [12] concluded that nirmalya waste vermicomposting using artificial aeration by perforated pipe along with natural as well as artificial aeration gives the good result at sort time period as compared to natural aeration. They also observed the better physiochemical properties of compost obtained by the artificial aeration. Hence, nirmalaya waste vermicomposting using artificial aeration is a good method for the minimization of solid waste management at sort interval. Jadav *et al*. (2013) studied the higher value of N, P and K in degraded material, so it can be used as an excellent nitrogen potash biofertilizer. They also observed in rapidly degradation of flower by prepared microbial consortium, thus to avoid generation of heaps of flower and other temple waste. Separated microorganisms are very efficient to cause floral waste degradation and convert it into nitrogen potash fertilizer. Similarly in our studied used the *Tricoderma harzianum* (species of fungi) for easily pre-decomposition of floral waste and helps us to easily degraded, modified in vermicompost. Senthil *et al.,* (2013) [5] temple waste used different microbial media (*Azospirillum*, *Phosphobacteria*, *Blue green algae* and *Rhizobium*) for easily culture of earthworm, growth and reproductive performance. The moisture level was maintained around 60-80% same as stated by Senthil *et al.,* (2013) [5]. Singh *et al.* (2004) [11] revealed that the rate of decomposition and mineralization becomes faster with the optimum moisture content. Mitchell *et al*. (1977) [8] studied the feeding activity of earthworm species depends on the moisture content of the substrate. Reinecke *et al.*, (1985) reported the sexual maturity maintain between 65 to 80% moisture level *E. fetida* species. Edward and Bater (1992) [3] studied the optimum moisture content for growth of earthworm's *E. fetida*, E. *eugeniae* and P. *excavates* was 85% in organic waste management.

The moisture content of Temple waste alone was found maximum than other combinations, which directly or indirectly can influence the growth and reproduction of earthworms. Hartenstein *et al*. (1979) [14] and Kaplan *et al*. (1980) [6] showed that the greatest biomass and maximum weight gain of earthworms in domestic dung or activated sludge to be achieved at temperature of 20°C-29°C and at moisture levels of 70%- 85%.

6. Conclusions

On the basis of various experiments, it can be concluded that in Set-I, one part of temple waste and one part of dung (1:1) are highly suitable combination for *Eudrilus eugeniae*, In Set-II four part of dung and one part of temple waste (4:1) are highly suitable combination for *E. eugeniae* and Set-III one part of temple waste and one part of dung (1:1) with (0.125%) of *Tricoderma harzianum* are highly suitable combination for *Eudrilus eugeniae*. If the amount of temple waste increases in any combination and in temple waste alone, *Eudrilus eugeniae* cannot be survived significantly. It can be concluded that the combination of temple waste, cattle dung (1:1) and *Tricoderma* powder (0.125 %) were found to be highly suitable and effective for survival, biomass production and reproductive performance for *Eudrilus eugeniae* and yielding of vermicompost.

7. Acknowledgements

1. The authors are highly thankful to Shri Sai Baba Prabandhan Samati, Gwalior (India) for providing flower waste for Charak Udyan Jiwaji University Gwalior.
2. Author is also thankful to M.P. Higher Education for providing Financial Support.

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