

# Management of Flower Waste by Vermicomposting

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## ABSTRACT

The temple wastes consist of vegetable material (mainly flowers, leaves, fruits, sugar, jaggery etc.), milk and milk products, grains and water most of which are biodegradable and contain elements required for growth of microorganisms. They are but released in the water bodies or dumped at the available places of land which creates severe environmental pollution and health hazards, hence the present work has proposed to use temple waste for ecofriendly treatment methods like vermicomposting. In this study cow dung was admixed with temple waste solids and after partial the decomposition for 45 days at 30°C. This was subjected for optimization of parameters like, pH of material, Electrical conductivity, C/N ratio and

temperature of vermicomposting using *Eudrilus eugeniae* earth worm species. It was found that 25°C temperature, pH 8.0, Electric conductivity 200 us/cm were optimum parameters of vermicomposting. It was further found that vermicompost obtained by above method was rich in C : N ratio 12.3 after 45 day of vermicomposting. Thus, vermicomposting of temple waste is an excellent and ecofriendly method. The quantity of flower waste generated by few major temples of Indore city is assessed. The cost production of vermicomposting of flower waste is worked out and its viability for the Indore city has been justified.

**KEYWORDS:** C/N ratio, Electric conductivity, pH, temple waste, vermicomposting

## I. INTRODUCTION:

Vermicomposting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better end product (Gandhi et al. 1997). It is a mesophilic process, utilizing microorganisms and earthworms that are active at 10–32°C (not ambient temperature but temperature within the pile of moist organic material). The process is faster than composting; as the resulting earthworm castings (worm manure) are rich in microbial activity and plant growth regulators, fortified with pest repellence attributes and are capable of transforming garbage into 'gold' (Adhikary, S. (2012), Tara Crescent 2003). The vegetable market waste is the leftover and discarded rotten vegetables, fruits, and flowers in the market. This urban waste can be converted to a potential plant nutrient enriched resource — compost & vermicompost that can be utilized for sustainable land restoration practices (S. Suthar and S. Singh, 2008).

Compost and vermicompost are the end products of aerobic composting process, the later with using earthworms. Vermicompost possessed higher and more soluble level of major nutrients — nitrogen, phosphorus, potassium, calcium and magnesium Bansal, and Kapoor, K.K. 2000, A. Singh and S. Sharma, 2002, M. V. Reddy and Okhura, 2004

compared to the substrate or underlying soil, and normal compost. During the process, the nutrients locked up in the organic waste are changed to simple and more readily available and absorbable forms such as nitrate or ammonium nitrogen, exchangeable phosphorus and soluble potassium, calcium, magnesium in worm's gut (K. E. Lee, 1985, R. M. Atiyeh et al, 2002). Vermicompost is often considered a supplement to fertilizers and it releases the major and minor nutrients slowly with significant reduction in C/N ratio, synchronizing with the requirement of plants ( P. Kaushik and V. K. Garg, 2003)

Nutrient element	Vermicompost (%)	Garden compost (%)
Organic carbon	9.8–13.4	12.2
Nitrogen	0.51–1.61	0.8
Phosphorus	0.19–1.02	0.35
Potassium	0.15–0.73	0.48
Calcium	1.18–7.61	2.27
Magnesium	0.093–0.568	0.57

Sodium	0.058–0.158	<0.01
Zinc	0.0042–0.110	0.0012
Copper	0.0026–0.0048	0.0017
Iron	0.2050–1.3313	1.1690
Manganese	0.0105–0.2038	0.0414

**Table1: Nutrient composition of vermicompost and garden compost.**

### Reduction in soil C:N ratio

Vermicomposting converts household waste into compost within 30 days, reduces the C:N ratio and retains more N than the traditional methods of preparing composts (Gandhi et al. 1997). The C:N ratio of the unprocessed olive cake, vermicomposted olive cake and manure were 42, 29 and 11, respectively. Both the unprocessed olive cake and vermicomposted olive cake immobilized soil N throughout the study duration of 91 days. Cattle manure mineralized an appreciable amount of N during the study. The prolonged immobilization of soil N by the vermicomposted olive cake was attributed to the C: N ratio of 29 and to the recalcitrant nature of its C and N composition. The results suggest that for use of vermicomposted dry olive cake as an organic soil amendment, the management of vermicomposting process should be so adjusted as to ensure more favorable N mineralization immobilization (Thompson and Nogales 1999).

The main aim of the present investigation was to know the extent to which flower waste is vermicomposted in order to maximize the potentials of the processes. Earlier, Graziano and Casalicchio have proposed a combination of aerobic composting and vermicomposting to enhance the value of the final products. Frederickson and Knight have showed that vermiculture and anaerobic systems can be combined to enhance organic matter stabilisation. The benefits of a combined system to process urban green waste could include effective sanitization and pathogen control due to an initial brief period of thermophilic composting, enhanced rates of stabilization, plus the production of earthworms and vermicompost J. Frederickson, 1997.

Vermicomposting appears to be a technological option for treatment and disposal of organic solid component of MSW. Decentralization of solid waste collection might lead to economically viable and probably profitable vermicomposting of MSW. Efforts in this direction appear to have been already

introduced in towns like Sangmaner and Shrirampur, which have chosen this option through private participation.

### Methods and Materials:

Vermicomposting is one of the eco friendly technologies for flower waste management, since it outstrip the problem of organic waste disposal and also alleviates the odor problem. Vermicomposting cleans the environment and also provides remunerative organic manure. Hence awareness should be created among flower growers, sellers, consumers and waste handling persons to adopt vermicomposting in a large scale to have clean environment.

**Portable HDPE Vermi Beds** are unique and latest technology concept for Earthworm Farming as seen in fig Some of its features are as follows :

- \* It very Portable.
- \* Light Weight.
- \* Low Cost benefit.
- \* High Mobility.
- \* Easy Instalation.
- \* Durable, long lasting, waterproof
- \* Available in size 3600 x 1200 x 600mm (LxWxH)
- \* U.V. Stabilized.
- \* Flexible and economical.
- \* Easy to handle and install.

### Selection of Area:

- Area selected must have dimensions 6ft \* 15ft, the area must be made even and elevated with a slope of 4” to 6” towards the drain so as to allow the liquid produced by earthworm to accumulate in pit. Sharp stones should also be removed to prevent the bed from being damaged. In the present study→
- FOR FLOWER waste vermi-composting, flower waste and cow dung are mixed in equal quantity(5kg each).
- Alternate two layers of 6” each of farm waste, floral waste, cow dung are placed over one another.
- About 200 of earthworms will be introduced into partially digested material kept in a vermibed and moisture level is maintained at 60 per cent.

- Watering is done till the contents heat is satisfactorily removed that is around 2 days.
- After the 45th day, when the composting process is over the worms weight increased by 85 %. The amount of finished vermicompost obtained is 2.57 kg.
- Vermiwash produced is collected in the container.
- Vermiwash diluted with water is sprayed on plants as anti fungous nutritious effective.



Figure-1: Portable HDPE Vermi Bed Side View

### Result and Discussion

The processes of vermicomposting were carried out for a period of 45 days. The temperature and moisture content were maintained by sprinkling adequate quantity of water at frequent intervals. The harvesting of vermicompost was done and pH, total C: N ratio and Electric conductivity were calculated after 45 days, at the end of the experiment. The pH and EC of samples were recorded by a digital pH meter and conductivity meter, respectively.

#### pH:

The changes in pH were noted by digital pH meter. The sample was mixed in distill water and alkalinity was measured, it was found that pH from the initial alkaline (8.90) to a more neutral condition was observed for all the beds as shown in table 2. pH reduced during the vermicomposting period. . On analyzing the results it was found that the pH value varied on 0 day 15th, 25 th 35th and 45 th days of vermicomposting period.

No. of Days	pH Value
0 Day	8.9
15 <sup>th</sup>	8.53
25 <sup>th</sup>	8.06
35 <sup>th</sup>	7.9
45 <sup>th</sup>	7.53

Table 2: pH value of Soil

The decrease in pH from 8.9 to 7.53 i.e. from alkaline to nearly neutral, during 45 days. It might have caused by the volatilization of ammonical nitrogen and H<sup>+</sup> released due to microbial

nitrification process by nitrifying bacteria, Eklind Y. and Kirchmann H, (2000). The great reduction in pH level for monoculture suggests the greater mineralization rate in it.

#### Electrical conductivity (EC):

Increment in EC was observed 15th day of the composting. With the increase in time EC was observed to be reduced on 35th and 45th day of composting as shown in table 2. The increase in EC might have been due to release of different mineral salts in available forms. As the composting process further progressed the available salts were converted into insoluble salts which may be the reason for the reduction of EC at the latter stage. But as composting progressed, significant variation was observed on 30th and 45th days of sampling .

No. Of Days	Electrical conductivity (EC) (5 % soln. ) us / cm
0	71
15 <sup>th</sup>	91
25 <sup>th</sup>	535
35 <sup>th</sup>	430
45 <sup>th</sup>	200

Table 3: Electric Conductivity (EC)

#### Total C: N Ratio:

In this study C: N ratio decreased significantly from their respective initial level The level of reduction and the corresponding C/N value is presented in Table. Suthar reported 62.7% reduction of C/N ratio in vermicomposting domestic waste ratio is also an indicative of

acceptable maturity of compost. The C/N ratio of the substrate material reflects the organic waste mineralization and stabilization during the process of composting or vermicomposting. Higher C/N ratio indicates slow degradation of substrate, and the lower the C/N ratio, the higher is the efficiency level of mineralization by the species. Lower C/N ratio in vermicompost produced by *E. eugeniae* implied that this species enhanced the organic matter mineralization more efficiently. F. M. C. Morais and C. A. C. Queda. The C/N ratio of the substrate material reflects the organic waste mineralization and stabilization during the process of composting or vermicomposting. Higher C/N ratio indicates slow degradation of substrate, R. T. Haug and the lower the C/N ratio, the higher is the efficiency level of mineralization by the species. Lower C/N ratio in vermicompost produced by *E. eugeniae* implied that this species enhanced the organic matter mineralization more efficiently. The loss of carbon through microbial respiration and mineralization and simultaneous addition of nitrogen by worms in the form of mucus and nitrogenous excretory material lowered the C/N ratio of the substrate, M. C. Dash and B. K. Senapati; S. C. Talashilkar et al; 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. But the C/N ratio is depends upon the quality of raw organic waste used B.D.PUNDE, R.A.GANORKAR,2012. Present study shows the decrease in C: N ratio as seen in table below.

No. of Days	C: N Ratio
0	20.5
15 <sup>th</sup>	19.75
25 <sup>th</sup>	17.1
35 <sup>th</sup>	16.32
45 <sup>th</sup>	12.3

**Table 4: C: N Ratio.**

**Cost estimation:**

HDPE vermibed Rs 1000 requires 24sq. ft only a unit of 4 beds require 100 sq. ft only with space margins in between of 1.5 ft each. Floral waste from temples can be collected cost free in the rags. Cow dung waste and waste leaves are available at very nominal rates i.e 200 – 300 / quintal. 4 tons Vermicompost can be prepared within 45 - 50 days with production cost of Rs. 25000 – Rs. 30,000 only. A tractor trolley can carry 5 tons at a time which is quite cost effective.

**Conclusion:**

The results obtained prove the potential of vermiculture for degradation of flower waste amended with cattle manure. The earthworms have enriched the end product with high carbon nitrogen profile as confirmed by many fold increases in C/N. *Eudrilus eugeniae* is suitable vermiculture for vermicomposting of organic solid waste. *Eudrilus eugeniae* doesn't require soil for habitation, provision of a sustainable environment in the soil by amending with good quality organic soil additives enhances the water holding capacity and nutrient supplying capacity of soil. Tetra vermin bed is estimated that around 6 metric ton, 100 kg of vermiculture is generated in one year. Provision of vermiwash which is highly nutritious and 80 – 100 lts of it is produced per year. First yield from vermiculture after 45 days of installation and around 1 ton of it is produced which is useful in generating the profits. Thus looking to the production, rate, and income it is noted that HDPE Vermibed is easy to use rate is quite lower than the other bed, and moreover income is sufficiently suffice for the farmers to conduct and purchase the vermicompost.

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