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Flower Waste Management and Utilization by Vermicomposting

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Abstract - *Flower waste is a major problem in religious country like India because everyday huge quantities of flowers are offered as a part of religious rituals. During special occasion this quantity multiplies many times. Temple, hotel, marriage gardens and flower markets are major source of waste flower. At the end however, flowers becomes waste, and in case of non-management creates pollution, health risks and nuances. Such problems can be avoided or lowered by managing waste flower at its initial stage. Vermicomposting is an eco-friendly flower wastes management techniques because it required less resource and also has zero waste during process. In vermicomposting process waste is converted into compost by using earthworm and this compost has highly rich nutrient content which may be use as a fertilizer for soil. . Generally Eisenia fetida species of earthworms are used as they have good tolerance against varying temperature and moisture.*

Key Words: - Flower Waste, Vermicomposting, Temple Waste, Eisenia Fetida, Waste Management

1. INTRODUCTION

Offerings are usually made as a part of spiritual practices in temples. It is estimated that some 800 million tons of flowers, including roses and yellow marigolds, are offered across the temples, mosques and gurudwaras in the country. Along with flowers come vermilion packets, plastic incense packets and bangles made of synthetic material. However, when these generous offerings turn into colossal waste, they become detrimental for our environment (Goswami, 2018).

Places of devotion apart from flower waste generate lot of single-use plastic waste in terms of plastic bottles and plastic begs which is often simply discarded on the roads or the drains without proper disposal (Bhatia, August (Nandita Mehta, 2013), 2018). 90% of solid wastes along with flower waste are deposited off on land in an indiscriminate manner due to lack of financial resources (Mujeebunisa M., 2013).

It's wrong assumption that flower waste is biodegradable in nature so it can be discarding anywhere for decomposition and this leads to makeshift dumping areas for waste, which is a breeding ground for diseases (Puranik, Sep 12, 2019). If proper techniques use to resolve such types of environmental problem which is generated due to flower waste, not only resolve environmental problem but also generate additional revenue (Isha Yadav, 2015).

Composting is the rotting and conversion of organic waste into manure. This process is brought up by bacteria. The process of composting brought about with the help of earthworms is called vermicomposting. Vermicomposting and composting are more or less similar but distinct technique to exploit bio organic waste as a fertilizer for betterment and increase soil fertility (Ritu Nagar, July 2018).

Compost worms are big eaters and can quickly eat their weight in food in just one day. Composting worms will eat almost everything organic, but they definitely prefer some foods to others such as vegetable scraps, leaves, and grasses, fruit scraps and peels, mouldy bread and grains, moist papers and manures, etc (Vermicomposting with Worms, 2020).

It was found that 25°C temperature, pH 8.0, electric conductivity 200 us/cm were optimum parameters for vermicomposting. Vermicompost obtained was rich in C: N ratio12.3 after 45 day of vermicomposting (Mr Ravinder Kohli, 2016). pH start dropping in initial stage and reaches less than 4.2 within 7-8 days and then it start increasing, if the pH drops below 6.0, the microorganisms begin to die of and the decomposition process slows. If the pH reaches 9, nitrogen is converted to ammonia and becomes unavailable to organisms (upadhyay, 2015).

Rate of decomposition during vermicomposting of flower waste can be increased by addition of cow dung because of its high minerals and nutrient content (Gayatri Barad, 2016). 100-200 worms are required for processing 1-2 kg of the bedding and feeding materials. The population of worms doubles in about a month's time (Dr. D. Sailaja, 2013).

Plant hormones like Auxin and gibberellins and enzymes which believed to stimulate plant growth and discourage plant pathogens are present in vermicompost (Abbasi, October 2004).

Vermicompost has many applications in crop improvement such as pathogen destruction, water holding capacity of soil, improved crop growth and yield; also improve soil physical, chemical and biological properties (Nandita Mehta, 2013).

2. MATERIAL AND METHOD

Average 4 tons of flowers are produced daily from Mahakaleshwar, Mangalnath, Harsiddhi, Siddhavat, Kalabhairav, Chintaman Ganesh, the major temples of the

city (Ujjain Agarbatti Sunlight And Bio Fuel Ready From The Flowers Of Mahakal Temple, 2018).

2.1 Collection and Segregation of flower

The flower waste was collected from Shri Chintaman Ganesh temple Ujjain and from flower market near freegunj Ujjain. After collection of flower waste, non-biodegradable part like plastic, coconut shell was removed by hand sorting.

2.2 Air Drying

The segregated flower waste was air dried for 48 hours before use for composting.

2.3 Collection of earthworms

The earthworms (Eisenia fetida) were obtained from palkhi village near nagda dist. Ujjain.

2.4 Site Selection:

Vermicompost production can be done at any place which is having shades, cool and has high humidity.

2.5 Experimental setup

The experiments were conducted in plastic pots with 2kg waste holding capacity, with a hole at the bottom. A layer of dry leaves and news paper was spread at bottom of pots for preparing bed for experiments.

Fig-1: layer of dry leaves and news paper

For flower waste vermicomposting, flower waste and cow dung was mixed in different proportions.

1. 100:0
2. 85:15
3. 70:30
4. 50:50

Fig-2: plastic pots for different ratio of waste and cow dung

For flower waste vermicomposting, flower waste and cow dung were mixed in selected proportions and then 40 Eisenia fetida earthworms were added in mixture. Cow dung used for experiment was 20–25 days old to avoid excess heat generation during the composting process. 60 % moisture content was maintained throughout the period of vermicomposting by sprinkling of water in every second day. Watering was stopped when uniform dark brown to black colored granular structure was appearing. The cast was sieved through 2-3 mm sieve, the earthworms were removed manually. Weight of vermicompost for all the groups was calculated. Physical parameters like Bulk density, moisture content, colour, odour, particle size was measured. Temperature was measured with the help of Mercury thermometer at the depth of 10 cm.

3. RESULT AND DISCUSSION

Flower waste and cow dung in a different ratio (100:00, 85:15, 70:30, and 50:50) was used for experiment. Compost worms need some basic things:-hospitable living environment, food source, adequate moisture, adequate aeration and Protection from temperature extremes. For experiment flower waste was collected from Chintaman Ganesh temple Ujjain and from flower market. Before experiment vermin bed was prepared by paper and dry leaves. Bedding materials high in cellulose are best because they help aerate the bin so the worms can breathe in the deeper layer (Allen, 2016). Eisenia fetida earthworms are used to convert waste material into dark brown nutrient rich humus that is a good source of manure for plants (Kaur, 2020). The container needs a cover to conserve moisture and provide darkness for the worms. Worms need air to live, so be sure to have bin sufficiently ventilated (Dr. S.K. Srivastava). 60 % moisture content was maintained throughout the period of vermicomposting by the sprinkling of water in every second day because less than 40 percent moisture, the earthworm are slowed by the lack of water. At greater than 60 percent moisture, there is not enough air for aerobic decomposition. Earthworms require a temperature range of 0°C–35°C (optimum is 25°) (Chaoui, 2010) so

temperature was maintained by covering the bin with gunny bags. After 4-5 day rotten smell was found which decrease with time. After 2 weeks there was no smell found. Watering was stopped when black granular structures appear on the top surface. Time required for composting was in between 60-75 days. Weight loss of flower waste during the process was nearly 42-60%. Compost in pots was sieved through 2-3 mm sieve, the earthworms were removed manually. Weight of vermicompost for all the groups was calculated which nearly 40-60% by weight of flower wastes.

TABLE 1: TIME REQUIRED FOR VERMICOMPOSTING

Proportion	Time after which granular structures appear
100:00	68-75 day
85:15	68-72 day
70:30	60-65 day
50:50	60-65 day

TABLE 2: PHYSICAL PARAMETER OF VERMICOMPOST

Physical parameter	Colour	odour
100:00	Black	Odourless
85:15	Black	Odourless
70:30	Black	Odourless
50:50	Dark brown to black	Odourless

TABLE 3: WEIGHT LOSS DURING VERMICOMPOSTING

Proportion	Initial weight	Final weight	Loss % during vermicompostin g
100:00	2kg	.8±.1 kg	60
85:15	2kg	.905±.1 kg	54.75
70:30	2kg	1.01±.1 kg	49.5
50:50	2kg	1.15±.1 kg	42.5

4. CONCLUSION

The results obtained from this study indicate that properly designed vermicompost system will process flower waste into compost in 60-75 days by using Eisenia fetida earthworms. 50:50 and 70:30 ratio of flower waste and cow dung take less time as compare to 85:15 and 100:00 ratio. It helps to reduce weight of flower waste and also generate additional revenue. This technique is cheap, easy and pollution free. Compost is being applied to agriculture land to increase fertility of land. Thus vermicompost technology can be successfully applied for management and utilization of flower waste which is collected from various sources.

5. REFERENCES

1. Abbasi, S. G. (October 2004). Earthworms and vermicomposting. Indian Journal of Biotechnology , 486-494.
2. Allen, J. (2016). Vermicomposting. NMSU and the U.S. Department of Agriculture cooperating.
3. Bhatia, A. (August, 2018). How These Five Places Of Worship In India Are Taking The 'Go Green' Concept Ahead. New Delhi: NDTV.
4. Chaoui, H. (2010). Vermicasting (or Vermicomposting): Processing Organic Wastes Through Earthworms. Factsheet .
5. Dr. D. Sailaja, P. S. (2013). Preparation of vermicompost from temple waste flower. International Journal of Science Innovations and Discoveries , 367-375.
6. Dr. S.K. Srivastava, D. H. (n.d.). manual on vermiculture biotechnology for eco-friendly agriculture. Bhubaneswa: National Research Centre for Women in Agriculture.
7. Gayatri Barad, A. U. (2016). Degradation of Flower Wastes: A Review. International Journal for Scientific Research & Development , 83-84.
8. Goswami, S. (2018). In these temples, offerings do not go waste. Down To Earth.
9. Isha Yadav, S. K. (2015). Temple Waste Utilization and Management: A Review. International Journal of Engineering Technology Science and Research , 14-19.
10. Kaur, T. (2020). Vermicomposting: An effective Option for Recycling Organic Wastes.
11. Mr Ravinder Kohli, D. M. (2016). Management of Flower Waste by Vermicomposting. International Conference on Global Trends in Engineering, Technology and Management , 34-38.
12. Mujeebunisa M., D. V. (2013). Effect of leaf litter, vegetable waste, coffee waste, flower waste and may flower waste added vermicompost on weight gain in Eudrilus eugeniae. Asian Journal of Plant Science and Research , 1-4.
13. Nandita Mehta, A. K. (2013). Solid waste management with the help of vermicomposting and its applications in crop improvement. Journal of Biology and Earth Sciences , B8-B16.

14. Puranik, A. (Sep 12, 2019). Moving to compost: Floral waste turns fertile ground for innovation in Bengaluru. Bengaluru: The ecomomic times.

15. Ritu Nagar, A. T. (July 2018). Study of Changes in Physical Parameters of compost and Vermicompost of Eucalyptus Leaf Litters. Advanced Journal of Graduate Research , 34-40.

16. (2018). Ujjain Agarbatti Sunlight And Bio Fuel Ready From The Flowers Of Mahakal Temple. ujjain: denik bhaskar.

17. upadhyay, M. M. (2015). Study of Flower Waste Composting to Generate Organic Nutrients. International Journal of Innovative and Emerging Research in Engineering .

18. (2020). Vermicomposting with Worms. Alternative Energy Tutorials.

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