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FLORAL WASTE MANAGEMENT

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Abstract: Floral waste management involves the sustainable disposal and recycling of organic waste generated from floral arrangements, events, and floral businesses. This process aims to minimize environmental impact by reducing landfill waste and promoting the reuse or composting of floral materials. Strategies for effective floral waste management include composting, vermicomposting, generation of biogas, and upcycling into newproducts. By implementing proper waste management practices, we can contribute to a cleaner and more sustainable environment.

In any waste management process, the 3 R's, i.e., Recycling, Reuse and Recover play a very important role. The present work focuses on collection, handling, and usage of waste flowers. A large volume of flower wastegenerated daily in India is improperly disposed of in open places or in dust bins and finally reaches landfill along with the other municipal solid wastes.

Civil engineers/environmental engineers are involved in the planning and development of waste managementsystems that prioritize recycling and minimize the environmental impact of waste disposal. Being Civil Engineers ,they have to design and implement strategies for effective waste segregation, recycling, and composting. Here we have tried to reduce the flower waste quantity and convert them into useful products.

Keywords: Floral Waste, Compost, Vermicompost, Biogas, Incense Cones & Sticks

I. INTRODUCTION

For a country that believes in the **Principles of Active Secularism**, promoting every religion, it is quite normal to have flower waste. India is a land of flowers and they are extensively used in religious ceremonies and weddings. The resulting floral waste accounts for nearly **one-third** of the total solid waste accumulated in thecountry. These flowers are one reason behind the water pollution in our country, which is now a growing concern.

Ganga has always been a symbol of faith, hope, culture and sanity. The extraordinary faith and respect for theRiver Ganga in India are as old as Indian culture itself. Every year **80,00,000 metric tonnes** of waste flowersare dumped into the river Ganga. Floral waste, reportedly, accounts for **16%** of the total river pollutant. Whilerotting flowers affect the water quality, the pesticides used on them leach into the waters and harm marine life.

Since temple offerings are considered sacred, their disposal in landfills is not recommended. Most temples throw waste into local water bodies, such as rivers, ponds and lakes. Presently, in the various regions of India,flowers are discarded into the water bodies in the least eco-friendly manner. About 8 Mt of flower waste are dumped in the Indian rivers each year. T

he amount of pollution caused by the flowers is immense. Due to thefact that most of the flower waste is thrown directly into water bodies, organic matter present in the flowers decomposes and results in algal blooms and eutrophication in lakes, which can further deplete oxygen levels in the water bodies and cause marine life to die. These decayed flowers may also cause pollution problems onland. This type of activities finally results in the alteration of the ecosystem.

There are several temples in the country, particularly those in the Ganga basin, which dump daily waste directly into the river without segregating it into biodegradable and non-biodegradable components. Although industrial runoff in Ganga is not only responsible for the pollution status, floral waste hardly gets all the blame. Floral waste accounts for 16% of total pollution of river. So it is the present need to mange it using appropriate methods.

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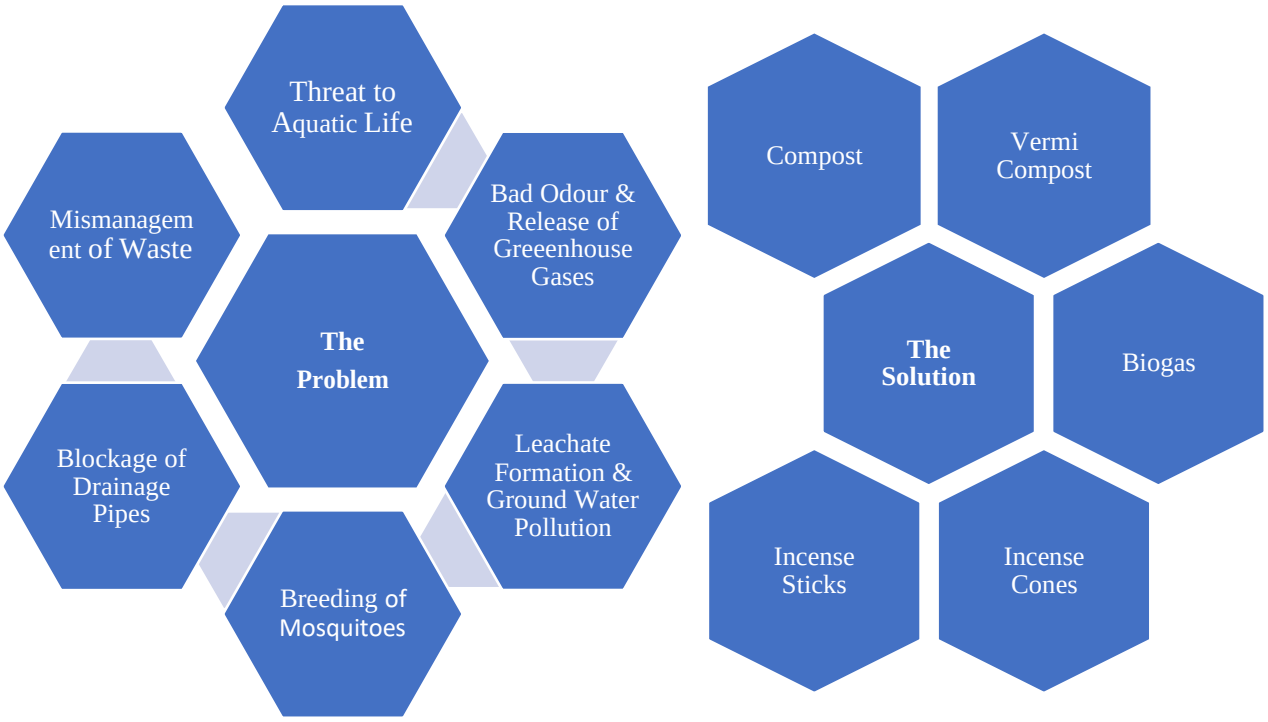

Fig. 1 Problem & Solution of Floral Waste

Flower Waste as Compost

Composting is the biological decomposition of organic waste such as food or plant material by bacteria, fungi, worms and other organisms under controlled aerobic (occurring in the presence of oxygen) conditions. The end result of composting is an accumulation of partially decayed organic matter called humus.

Procedure:

i. First layer: Deposit a layer of soil in the bottom of about 10 to 15 centimetres.

ii. Second layer: Place the organic waste (floral waste) in layers, start with the green waste (leaves),forming a layer of 3 to 5 inches.

iii. Continue with the next layer of sawdust or dried leaves (brown residues) of 3 to 5 inches.

iv. Repeat the process as you generate waste until the bin is filled and add water to keep it moist (avoid waterlogging). Repeat until the container is filled.

v. Mix the layers constantly to circulate the air and help decomposition. Mix the layers constantly.

vi. Cover the compost with a mesh. Always cover the last layer with soil or brown residues and cover the container with a mesh to avoid unwanted animals.

vii. It will be ready be in about 30 days.

Advantages:

i. Using compost can reduce the need for water, fertilisers and pesticides

ii. Reduces landfill wastes

iii. Help reducing greenhouse gas emissions

iv. Increases water holding capacity of soil

v. Maintains pH of soil

vi. Increases crop yield and contributes to healthy growth

Disadvantages

i. Takes long time to decompose

ii. Can produce unpleasant odours

iii. Limited types of waste accepted

iv. Needs regular turning of windrows

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Results: The comparison between standard values and test values on parameters are obtained as given below-Table I Comparison of Parameters of Compost

Parameter	Unit	Standard Value	Test Value
pH	-	6.5-7.5	7.64
Moisture	%	<50	7.11
Nitrogen	%	>0.40	0.43
Phosphorus	%	>0.10	0.27
Potassium	%	>0.20	0.15
C/N Ratio	-	>10.0	11.39
Copper	ppm	<100	76.83

All the parameters matched the standard values and hence the compost is suitable to use and contributes to protection of environment**.**

a) Initial Setup b) Compost Formation

Fig. 2. Compost from Floral Waste

It is better to use compost instead of chemical fertilizers because:

- Compost is eco-friendly and harmless. While chemical fertilizers destroy the natural composition of soil and have the adverse effect on human health, compost maintains the texture and fertility of the soil without affecting human health.
- Production of compost is easy, cheap and harmless whereas production of chemical fertilizers iscostly and harmful.
- The natural composition of the soil is affected while using fertilizers and some of them are even toxic in nature at higher quantities.
- Composting helps in recycling of matter and also in the disposal of garbage. Leaching of chemical fertilizers causes water pollution and death of aquatic organisms.

Flower Waste as Vermicompost

Vermicomposting is a process in which the earthworms convert organic waste into manure rich in highnutritional content.

Materials Required*:*

1. Water
2. Cow Dung
3. Thatch Roof
4. Soil or sand
5. Gunny Bags
6. Earthworms
7. A large bin (plastic or cemented tank)
8. Dry flowers and leaves

Procedure:

i. To prepare compost, either a plastic or a concrete tank can be used. The size of the tank depends uponthe availability of raw materials.

ii. Collect the flowers and place it under the Sun for about 8-12 days. Now chop it to the required sizeusing the cutter.

iii. Prepare cow dung slurry and sprinkle it on the heap for quick decomposition.

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iv. Add a layer (2-3 inch) of soil or sand at the bottom of tank.

v. Now prepare fine bedding by adding partially decomposed cow dung, flowers, dried leaves,biodegradable wastes collected from fields and temples. Distribute them evenly on the sand layer.

vi. Continue adding both the chopped bio-waste and partially decomposed cow dung layer wise into thetank up to a depth of 05-10 ft.

vii. After adding the flowers release the earthworm species over the mixture and cover the compostmixture with gunny bags.

viii. Sprinkle water on a regular basis to maintain the moisture content of the compost.

ix. Cover the tank with a thatched roof to prevent the entry of ants, lizards, mouse, snakes, etc. and protectthe compost from rainwater and direct sunshine.

x. Have a frequent check to avoid the compost from overheating. Maintain proper moisture andtemperature. It will be ready in about 24 days.

***Advantages*:** Vermicomposting helps to-

a. Develop roots of plants
b. Improves the physical structure of the soil
c. Increases the fertility and water resistance of soil
d. Helps in germination, plant growth and crop yield
e. Nurtures soil with plant growth hormones like auxin and gibberellins.

Disadvantages:

a. It is a time-consuming process
b. It releases very foul odour
c. Requires high maintenance i.e. periodically feeding of worms
d. Moisture level should be monitored regularly

Results:

Table II Comparison of parameters of Vermicompost

Parameter	Unit	Standard Value	Test Value
pH	-	7 to 8	7.47
Moisture	%	15.0-25.0	37.97
Nitrogen	%	0.51-1.61	0.58
Phosphorus	%	0.19-1.02	0.32
Potassium	%	0.15-0.73	0.23
Calcium	%	1.18-7.61	1.16

The Vermi Compost Project successfully demonstrated the effectiveness and numerous benefits of vermicomposting for organic waste management. It showcased the potential for sustainable agriculture and environmentally friendly practices

a) Initial Setup

b) Vermi-Compost Formation

Fig. 3 Vermicompost from Floral Waste

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Biogas Production

Biogas a renewable fuel that's produced when organic matter, such as food waste, agricultural waste, floral waste or animal waste, is broken down by microorganisms in the absence of oxygen. This process is called anaerobic digestion. For this to take place, the waste material needs to be enclosed in an environment where there is no oxygen.

Raw materials:

i. Biogas plant model
ii. Cow dung
iii. Floral waste
iv. Water

Procedure:

i. Prepared biogas model having inlet pipe, digester, outlet pipe and overflow pipe.
ii. Preparation of slurry by using proper proportion i.e. 50% biomass (Cow dung +Flower Waste) and50% water and mixing it properly.
iii. When the digester is moderately filled with the slurry, the introduction of slurry is stopped and theplant is left unused for about 2 months.
iv. During this 2 months, anaerobic bacterium present in slurry decomposes or ferments the biomass andbiogas is formed which is then collected in the gas collecting tube.
v. As increasingly biogas starts collecting the pressure exerted by the biogas forces the spent slurry intothe outlet chamber.
vi. The spent slurry is manually removed from the overflow tank and is used as manure for plants.
vii. The gas valve connected to a structure of pipeline is opened when a supply of biogas is required.
viii. To get a continuous supply of biogas, a functioning plant can be fed continuously with the preparedslurry.

Advantages

i. It is ecofriendly fuel
ii. The required raw materials for biogas production are available abundantly in villages.
iii. Availability of biogas would reduce the use of firewood and hence trees could be saved, thussubstitutes fossil fuels.
iv. It not only produces biogas, but also gives us nutrient rich slurry that can be used for crop productionand hence reduces landfills.
v. It is used for domestic and street lighting and cooking.

Disadvantages

i. Odour trouble
ii. Initial investment is high
iii. Cold weather can slow down the decomposition process affecting the biogas production.
iv. Not efficient on large scale

a) Initial Model Setup b) Biogas Generation

Fig. 4 Biogas Working Model

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With the increasing demand of energy biogas demand has also increased. Many biogas plants have been set up in the rural and urban area by the municipality. Biogas will soon replace fossil fuels as a source of energy.With this global warming and greenhouse effect will also reduce in the coming years. As we head into the 21stcentury, awareness and education will most assuredly continue to be the most important ways to spread use of biogas. The developed countries are coming up with new technologies to make better biogas plant to meet theincreasing demand. This project will help the people to contribute towards the biogas plant and understand itas a better source of energy. In short, with the coming technology the energy scenario will be changed in the coming years.

Incense Cones and Sticks

When compared to kitchen waste degradation, floral waste degradation is a very slow process. As a result, a proper and environmentally friendly floral waste treatment process is needed. To prevent the negative consequences of discarding the flower offerings, they can be used to create useful products. Incense sticks arean integral part of prayer in any Indian household; without them, the puja (ritual) is incomplete. Incense burning, on the other hand, creates air pollution, which can be harmful to one's health, particularly if the room isn't well ventilated; the smoke produced creates toxic gas and particulate matter, which can be a major sourceof indoor pollutants. In fact, the smoke from incense sticks may be as harmful as cigarette smoke.

The chemicals found in the incense being burned determine the form of contaminants emitted into the air. However, according to research, the concentrations of carbon monoxide (CO), nitric oxide (NO), and sulphur dioxide (SO_2) gases contained in incense smoke could be high enough to damage human health. It is importantto reduce the amount of air pollution emitted in the smoke by selecting incense made from natural, plant-basedingredients without the addition of harmful chemicals.

Procedure:

i. Flower wastes are collected from various dustbins, vendors, temples, etc. Flowers are segregated, thepetals are separated from the collected flowers and set out to dry and the remaining green parts of theflowers can be used for composting.
ii. The dried flower petals are powdered and mixed with binding powder.
iii. We used honey, rose water as a binding material and essential oil for fragrance.
iv. Camphor powder is added in the mixture in order to make it ignitable.
v. Added distilled water to the mixture and kneaded the dough slowly.
vi. Finally, the dough is rolled over bamboo sticks and similarly shaped into cones to form the finalproducts.
vii. Dry the prepared products until the moisture content vanishes and the products are ready to use.

Results:

The ecofriendly marigold incense sticks prepared were acceptable and had satisfactory results with good aromatic character and had a belief that they are safe to use.

a) Making of Cones

b) Fragrance of Burning

c) Incense SticksIncense Cones

Fig. 5 Incense Cones and Sticks

II. CONCLUSION

From the presented review paper, it can be concluded that floral waste can be recycled and reused in various ways. Review article focusing on various methods of utilizing temple waste for one or the other practical product like vermicompost, biogas, compost, incense sticks, etc. put forward that the temple waste can not only be disposed safely in an environmentally friendly manner but can also be utilized for making diversifiedproducts. This study will offer a substitute approach to waste management since the waste will neither be landbut would be used as a resource that will be recycled.

The value-added products obtained from floral wastes viz; compost & vermicompost can be used for plant growth; biogas used as fuel. Vermicomposting is a great way to convert floral and green waste into nutrient- rich soil. It helps to maintain soil health due to the presence of microorganisms. Vermicomposting is an environmentally friendly process that recycles organic waste into compost and generates valuable nutrients. Compost helps to reduce soil erosion and decreases the reliance on chemical fertilisers. Thus, this is a close loop approach towards Environmental sustainability and waste management. In future there is large scope for this because every year the production of flowers will increase and rising number of temples, increasing tourism, rising number of pujas and rituals. If Campaigning Programmed on Waste Recycling are increased then awareness will increase so that we can save rivers & reduce pollution.

REFERENCES

[1] https://medium.com/@devangtri007/creating-a-better-future-using-flower-waste-5e95e7e90e5a

[2] https://www.researchgate.net/publication/341966736_Temple_waste_management_and_utilization-a_review

[3] https://www.aesacademy.org/books/edcrs-vol-1/011.pdf

[4] https://www.academia.edu/27489226/Waste_Management_of_Temple_Floral_offerings_by_Vermicomposting_and_its_effect_on_Soil_and_Plant_Growth

[5] https://scholar.google.co.in/scholar?q=flower+waste+management+research+paper&hl=en&as_sdt=0&as_vis=1&oi=scholart#d=gs_qabs&t=1708859065788&u=%23p%3DpzMclwvO-SMJ

[6] https://scholar.google.co.in/scholar?q=flower+waste+management+research+paper&hl=en&as_sdt=0&as_vis=1&oi=scholart#d=gs_qabs&t=1708859150058&u=%23p%3D6zP-9zX2ha8J

[7] https://justagriculture.in/files/newsletter/2021/june/113.%20Floral%20Waste%20Management%20&%20Opportunities.pdf

[8] https://swachhindia.ndtv.com/heres-can-treat-flower-waste-turn-everyday-use-items-9773/

[9] https://mad4india.com/mad-for-nature/startup-companies-recycling-floral-waste/

[10] https://www.instructables.com/Biogas-at-home-Cheap-and-Easy/?amp_page=true

[11] https://www.primrosecreations.com/flower-waste-management-can-the-floral-industry-make-a-change/

[12] https://oorvi.org/holy-waste/