

## BEST FROM WASTE

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**Abstract:** In our country, India, worshipping is the way of living and people offer various offerings to the deities which mainly consist of flowers, leaves, fruits, coconuts, clothes. out of which floral offerings are found in huge quantity. Thus, temple waste has a unique share of flower waste in the total waste. After fulfilling their purpose, flowers along with other waste, find their way into the garbage or are discarded either into some water bodies or left up on the open places as a waste causing various environmental problems. The majorly offered flowers in temples are rose, jasmine, marigold, chrysanthemum, hyacinth, hibiscus, etc. This floral waste can be utilized in different ways to produce valuable products and can thus help to save environment from pollution caused due to improper disposal of flower waste. Techniques like vermicomposting, composting, dyes extraction, extraction of essential oils, making of holy colors and bio-gas generation can be used. Moreover, this flower waste can also be used for making incense sticks besides using them for some art and craft techniques. Petals of different flowers can also be utilized for handmade papermaking by extracting the pulp or by mottling them into the readymade pulp. In this paper, we have reviewed the ways by which temple waste can be utilized and managed to get valuable products which will lead to a healthier and waste free environment.

### INTRODUCTION

Environment is defined as the sum total of all the conditions and circumstances and the living and non-living things around an organism, which affects its life. Human and environment are closely interwoven with each other, to maintain a balance or equilibrium in nature. With the increase in population and development, there is a tremendous increase in the pollution levels which leads to environmental degradation. The primary causes of environmental degradation are exploitation of natural resources, industrialization, urbanization, etc. Pollution of all sort like air, water, land along with solid waste and its disposal eventually degrade the environment as well as human health.

Waste (also known as rubbish, trash, refuse, garbage, junk, litter and ort) is unwanted or useless material. Waste includes all the items that people have no use any longer and which they either intend to get rid of or have already discarded. Additionally, wastes are such items which people need to discard.

Waste gets generated from each and every activity of humans, which eventually degrades the quality of human health and accelerates the environmental degradation at an alarming rate. Wastes are substances or objects which are disposed or are intended to be disposed or are required to be disposed of by the provisions of national laws.

Apart from leading to various environmental issues, the waste also leads to number of problems in economically developing nations, as they are facing challenges in treating the waste generated. India is a developing country and is facing waste disposal crisis, but solutions are not impending. Since, it is being realized that waste can be used in industrial processes and also for the generation of energy, appropriate waste management is being explored. Today, management of waste is a challenge accompanied by numerous factors adding constraints and complexity to the process (The Expert Committee, Ministry of Urban Development, Government of India, 2000). Therefore it is generally understood that proper waste management helps to protect health, environment and also preserves natural resources.

Flowers come as waste from various sources like hotels, marriages, gardens, temples, churches, Dargah and various other cultural and religious ceremonies. In India, religion is a path of life. It is an intrinsic element of the entire Indian culture. People worship God and are accustomed to go to the temples offering flowers, fruits, coconuts and sweets, etc. The bulk of the flowers, leaves of different plants, coconut shells, milk and curd are piled up and then disposed off exclusively in water bodies (Singh and Singh, 2007).

Everyday, these flowers are offered by devotees in temples and are left unused and therefore become waste. India is a country of festivals and many occasions are celebrated round the year that eventually leads to generation of solid waste. This proportion of waste is generally neglected and requires due consideration. Because of our religious beliefs, many of us avoid throwing flowers and other items that are used for prayers in the garbage, and instead put them in the plastic bags and throw them directly in the water bodies. Apart from this; flowers are also kept under the sacred trees and thus there is no suitable mode of disposal. For instance, Banaras, one of the holiest cities of the country, has no policy for disposal of the tonnes of waste that comes from its many temples. Each day waste material weighing 3.5-4 tonnes is left behind in the city of temples.

Degradation of floral waste is a very slow process as compared to kitchen waste degradation (Jadhav et al., 2013). Therefore, there is a need for proper and ecofriendly process of floral waste treatment. Management and utilization of flower waste has been carried out in some studies. One such

example is the Kashi Vishwanath temple which draws maximum devotees all round the year, especially in the month of Shravan. It has its own system for disposal of hundreds of kilograms of waste resulting from offerings by devotees; the floral waste generated in the temple is converted into manure.

To avoid ill effects caused by disposal of these offerings, they can be used to make some valuables. Like burning of incense sticks produces smoke (fumes) which contains Particulate Matter (PM), gas products and many organic compounds, therefore flower petals obtained from temples can be used to make herbal incense sticks. Flowers like genda are used to make incense sticks, while roses are converted to rose water. Besides incense sticks and rosewater, the flowers can also be incorporated into herbal products such as herbal colours, natural dyes etc.

Another case where floral waste management has yielded good pay offs is that of Ajmer Sharif Dargah of Khwaja Moinuddin Chishti where nearly 15 to 18 Quintals of flowers, offered each day were used to be dumped in a well. Now, the flowers are not only recycled, but also generate employment for local women. With technical assistance from Central Institute of Medicinal and Aromatic Plant (CIMAP), Lucknow, the Dargah Committee has established a rose water distillation plant at the outskirts of Ajmer (Indian Express, May, 2010).

Temple waste mainly consists of organic waste like flowers, leaves, coconut shells, residues of incense sticks, fruits etc. which find their way ultimately into bins or some water bodies and thereby result in the pollution and hygiene problems. Thus, the present paper has reviewed various methods reported for the utilization of temple waste.

#### **UTILIZATION OF FLOWER WASTE**

Apart from coconut shell, the foremost used offering in temples is flower. After fulfilling their purpose, these flowers also become environmental menace just like the other offerings. Such flower waste can be used in different manners to produce valuable products and thereby may also contribute towards saving the environment from pollution caused by inadequate disposal of flowers offered to the deities.. Techniques like vermicomposting, composting, dyes extraction, extraction of essential oils, making of holi colours and bio-gas generation have been reported in the literature.

### Vermicomposting

Vermicomposting of temple waste (Nirmalya) obtained from Ganesh temple, Sangli, Maharashtra was done by Gaurav and Pathade; (2011). They used effluent produced from biogas digester and mixed it with temple waste and cattle dung which was then allowed to decompose for a period of 30 days at 30°C. The prepared vermicompost was also used to for pot culture study as a fertilizer with five flowering plants. Good growth parameters were obtained in terms of height, flowering time as well as number of flowering time and the number of flowers produced as compared to the control sets, which were not treated with vermicompost. Hence, vermicomposting of flower waste is an excellent and eco-friendly method of flower waste management.

Shouche et al; (2011) used various processes like composting followed by vermicomposting to manage floral waste. They used different proportion of mixtures of cattle dung and floral wastes to prepare vermicompost. Various parameters like temperature, pH and moisture content, which showed some periodic changes in the beginning were found stable in the end.

### Bio-gas generation

Shri Mahakaleshwar temple is from one of the 12 Jyotirlingas in India and produces around 3 tonnes of organic waste which mainly consist flowers. Agarwal; (2011) commenced a study to produce energy from the temple waste. He used flower and kitchen waste to produce bio gas and vermicompost from them. At Mahakaleshwar, mahakumbh takes place every 12th year, therefore he tried to develop a system there to generate energy from that waste.

### Extraction of Dyes and Essential Oils

Khan and Rehman (2005) worked on the extraction and analysis of essential oil of Rosa species, they evaluated various parameters like oil yield, colour and other physical and chemical properties of two different species of rose that are Rosa damascena and Rosa centifolia. They concluded from their study that there was quantitative and qualitative difference in chemical composition, aroma constituents of essential oil of two species.

Vankar et al ; (2009) had also reported that enormous amount of flower waste is produced in temples of India which can be utilized in making dyes for dyeing of cotton, wool and silk on industrial scale. They used (marigold) *Tagetes erecta* petals which

mainly consists of carotenoids-lutein and flavonoid-patuletin, these colorants have been identified, isolated and used for dyeing textiles. Pretreatment with 1-2% of metal mordant and 5% of plant extract was found to be satisfactory and showed very good result to dye cotton, wool and silk.

A survey was conducted by Perumal et al (2012) in and around five temples of Chennai, Tamil Nadu to evaluate the amount of flowers offered there. Around 2350 kg of flowers were offered every day and the common flowers were rose, marigold, chrysanthemum and jasmine. Out of all flowers they collected rose petals and shade dried them to extract essential oils from them by using steam distillation process. The chemical components of rose oil were analyzed by GC-MS technique. 54 compounds were recorded out of which phenyl ethyle alcohol (23.19%) was recorded as major component followed by octadecane (10.49%), hexadecane (7.76%), phenyl ethyl decylester (5.77%) and tetra methyl trisilocen decanol (3.45%).

As the awareness among people for using natural dyes is being increased due to some toxic effects and allergic reactions associated with synthetic dyes, Teli et al (2013) had undertaken a study with the aim to isolate natural dyes from the flowers of hibiscus and marigold and applied them on the cotton and cotton/silk blended fabric with the help of different natural mordents like alum, harad and ferrous sulphate. They concluded that the dyes thus extracted show a very good potential to dye cotton and cotton/silk blended fabric.

Ravishankar et al; (2014) have reported that around 1450 tonnes of flowers are being offered to the deities in various temples all over the country.. Rose, jasmine, marigolds, chrysanthemum, hyacinth, hibiscus and tuberose are the major flowers being offered in Indian temples. Disposal of these flowers becomes a problem when dumped without any preventive measures. Therefore, they reported a study on the utilization of flower waste by extraction of dyes and essential oils from them. For the extraction of dyes, flowers were dried and grinded and were dissolved in solvents such as ethanol, methanol and hexane. While for the extraction of essential oils, soxhelt apparatus was used. Mixture of fresh flower and suitable solvent were heated and put in soxhelt apparatus and the distilant obtained gives the desired product. They reported that the dye thus extracted gives satisfactory results and can be used on clothes.

## CONCLUSION

Thus the exhaustive review of various methods of utilizing temple waste for one or the other useful product like vermicompost, biogas, dyes, incense sticks, concrete aggregate replacement etc. suggest that the temple waste can not only be disposed safely in an environmental friendly manner but can also be utilized for making diversified products. This study will propose an alternative approach to waste management since the waste will neither be land filled nor burnt but would be used as a resource that will be recycled. It will throw light on reducing volume of temple waste which would eventually generate additional revenues for temples. Floral waste utilization would eventually be beneficial to the society as people would get to live in a cleaner and a healthier environment. The “green temple concept” can prove to be helpful in Government policy formulation for waste management and in promoting sustainable development approach towards temples.

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