

Floral Waste Utilization- A Review

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ABSTRACT

Flowers are a symbol of devotion and reverence. Every year tons of waste flowers are dumped in the rivers choking them to death - killing fishes and creating havoc in the fragile ecosphere of the water body and cause enormous pollution. 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 holi colours 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. There is need to utilize these flowers for preparation of various eco friendly products.

Key words: Flowers, Bio-gas, Pollution, Fertilizers

INTRODUCTION

The number of temples and mosques in India is a puzzle. Government data shows that we have a readily available list of 108,000 temples and mosques. But actual estimate is that we have at least 600,000. Imagine the amount of flower being used at these temples and then being sent to water bodies for disposal. Showering flowers is a religious ritual in India. Flowers are a symbol of devotion and reverence. According to many religious beliefs, flowers that are offered during prayers are sacrosanct and cannot be dumped into the garbage once they've wilted. This is one of the reasons why people prefer to discard them in rivers, lakes and other water bodies. But not many of us think about the fertilizers and pesticides that might have been

used to grow these flowers, which then mix with the water and pollute it. Those small flower offering don't remain small anymore, they become a part of a big problem. Every year approximately 80, 00,000 tons of waste flowers are dumped in the rivers choking them to death. Sadly, these sacred flowers rot in rivers - killing fishes and creating havoc in the fragile ecosphere of the water body and cause enormous pollution. The pesticides and chemical fertilizers used to grow flowers mixes with the river water making it highly toxic. Various drains and waterways connected to the water bodies also get clogged, creating civic problems of a great magnitude. We always tend to blame the industrial waste but never give a think to flower pollution.

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The flowers end up in the local water body and start rotting. Flowers from thousands of temple end in rotting in the rivers. The arsenic that gets into the river doesn't flow down. Iron and oxygen in the water form ferrous ferric oxide, which in turn bonds with arsenic. Hence, there is need to utilize these flowers for preparation of various eco friendly products.

Waste flower management:

Vermicomposting

Vermicomposting is a biotechnological process of composting in which certain species of earth worms are used to enhance the process of waste conversion and enhances germination, plant growth and thus overall crop yield.

Gurav and Pathade¹ studied vermicomposting, the effluent from biogas digester run on Ganesh temple waste (Sangli, Maharashtra) was admixed with temple waste solids and cattle dung and after partial the decomposition for 30 days at 30^oc, it was used to fill up 2 kg capacity plastic tubs and subjected for optimization of parameters using *Eudrilus eugeniae* earth worm species. It was found that 25^oC temperature, pH 8.0, 1-2mm particle size and 80% moisture content were optimum parameters of vermicomposting. It was further found that vermicompost obtained by above method was rich in percent carbon, nitrogen, phosphorus and potassium content.

Jadhav *et al.*² have reportedly developed a microbial consortium for the effective degradation of flower waste generated from temples. They collected soil samples from the areas near and around the temples and isolated bacterial cultures from them. Flower waste collected was dried and mixed with agar medium and streaking was performed with selected soil samples for isolation. It was observed that microbial consortium enhanced the digestion of the waste and the bio-manure consortium was found to have good quality without posing any harm to the environment.

Makhania and Upadhyay⁶ studied on the degradation aspects of flower waste. The study was conducted up to 50 days of flower waste composting to monitor changes in the

physico-chemical parameters. Maximum temperature was recorded on the fourth day of heap composting as flowers have high moisture content and easily biodegradable content.

In this study⁴ cow dung was admixed with temple waste solids and after partial decomposition for 45 days at 30^oc. It was found that 25^oc, pH 8.0, EC 200 μ s/cm were optimum parameters of vermicomposting. The vermicompost obtained from above method was rich in C: N ratio 12.3 after 45 days of vermicomposting.

In the pot culture studies conducted by Jain on Tomato (*Solanum lycopersicum* L.) plants (using prepared floral waste vermicompost as fertilizer) various growth parameters showed good enhancement of growth. The results indicate that integrated effect of all the nutrients present in flower waste vermicompost results in the increased growth and yield of tomato plants and also played a crucial role in improving soil properties, as compared to control. Thus, vermicomposting of temple flower waste is an excellent and ecofriendly method to get valuable products which will lead to a healthier and waste free environment.

Natural dye and pigment extraction

Vankar *et al.*¹⁵ 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.

In the present study Raja *et al.*¹⁰ utilized the petal part of the saffron flower to extract dye for application on the Pashmina shawl. The extracts were then applied on Pashmina wool at two different pH namely pH 4-5 and pH 7-8 with and without the use of mordant. The results showed that saffron flower waste extracts was able to dye the

Pashmina shawl satisfactorily with very good washing and light fastness properties.

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.*¹⁴ 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.

Singh *et al.*¹³ studied the natural dye recovery from various biodegradable temple and household wastes. The extracted natural colours were produced by means of ultrasonication, and were dried in the spray drier. They were used to dye various fabrics such as cotton, silk, and wool. It was found out that the remaining residue, left after dye extraction, was rich in nutrients, hence, it could be further used as the resource material, itself.

Biogas

Prasad *et al.*⁸ conducted a study to determine the biogas yield by using temple flower waste as a raw material. Tests were conducted in control by following parameter such as ph, temp, retention time, moisture Content, C/N. Production of biogas was achieved in the duration of 10 days in a single phase lab scale reactor under ambient condition. The pressure of biogas was found to be 0.44kg/cm² in the reactor.

Kumar and Swapnabhavini⁵ conducted a study to determine the biogas yield and nutrient reduction potential of rose residue by using a laboratory scale completely mixed batch reactor. Laboratory scale digesters of 2.5 L capacity were used and fed with rose residue, which was digested in a batch reactor for a retention period of 30 days at room temperature. The process removed up to 73%, 45%, 82%, 42%, 58% of TS, VS, chlorides, BOD, TKN respectively, along with biogas production.

Singh and Bajpai¹² worked on anaerobic digestion of flower waste for

methane production. Gas chromatographer was the device used to determine the quality of gas produced and the experiment was conducted in cold atmospheric conditions in Lucknow. They reported that the process eliminated the pollution effects caused due to flower disposal and also removed pollutants like BOD and TS along with biogas production.

This type of work was further carried out by Ranjitha *et al.*⁹ where they used vegetable waste and flowers waste to generate bio gas. Study was carried out in a 1L capacity anaerobic digester in a laboratory with cow dung as inoculum. The results obtained showed that flowers had given higher yield of biogas *i.e.* 16.69 g/Kg then vegetable waste *i.e.* 9.089 g/Kg and the digestion period of flowers was also less. They also concluded that flowers which are abundantly available in India are very good feed stock for biogas production and generation of bio gas from these flowers upholds the concept of waste to wealth in enhancing the sustainability.

Extraction of essential oil

Khan and Rehman³ 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.

A survey was conducted by Perumal *et al.*⁷ 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 and 54 compounds were recorded.

Ravishankar *et al.*¹¹ 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.

Here are few technologies available that can solve the problem of waste flower and help augment existing enterprise or start a new one.

| Sl/No | Technologies Available | Product/Process | Technology Provider |
|-------|--|---|---|
| 1 | Technology for utilization of waste | Incense sticks from waste flowers | CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow Website : www.cimap.res.in |
| 2 | Dehydration of flowers & foliage technologies | Artistic greeting cards, wall plates, landscapes, three dimensional interior decorative items, etc. | CSIR-National Botanical Research Institute, Lucknow Website: www.nbri.res.in |
| 3 | Eco-friendly dyeing and antibacterial finishing of soya bean protein fabric using waste flowers from temples | Natural dye | Department of Fibres and Textile Processing Technology, Institute of Chemical Technology, Matunga (E), Mumbai-400019, India mdt9pub@gmail.com ; javed_uict@yahoo.co.in |
| 4 | Production of Vermicompost from Temple Waste | Vermicomposting of temple waste is an excellent and eco-friendly method of temple waste management. | Department of Microbiology, K. W. College, Sangli, Maharashtra and Department of Biotechnology, Fergusson College, Maharashtra |
| 5 | Utilization of temple waste flower for dyeing of Cotton, Wool and Silk on industrial scale | _____ | Indian Institute of Technology, Kanpur |

CONCLUSION

From foregoing discussion, it can be concluded that the challenges to utilization of waste and minimize losses can be fulfilled by utilizing floral waste for one or the other useful products. Floral waste can not only be disposed safely in an environmental friendly manner but can also be utilized for making diversified products. Floral waste utilization would eventually be beneficial to the society as people would get to live in a clean and a healthier environment. 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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