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An Analysis of Pattern of Floral Waste Generated and Disposal in Hyderabad City of Telangana State

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Flowers are an integral part of Indian culture and tons of flowers often gets accumulated at religious sites like temples, mosques, churches and gurudwaras due to a number of religious practices and it is also generated in places like wedding ceremonies, flower markets, residential areas, *etc.* But sadly, most of these flowers often thrown in water bodies and garbage, creating an environmental hazard. Hence, the present study was taken to analyse the floral waste generation pattern and their disposal in the city. A total sample of 62 floral waste generators consisting of 30 temples, 12 function halls and 20 flower shops was selected for the study. Data was analysed and tabulated. The study analysed that the bigger temples contribute to higher floral waste generation, and the festival seasons around the year also generates more floral waste. The function halls don't generate a constant quantity of floral waste and the usage of flowers highly depends on the budget and theme of the ceremony. The flower markets generate more floral waste if the sales are less in the market. The flowers such as Chrysanthemum, Marigold Jasmine and Rose are generated as major category of floral waste.

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Keywords: Floral waste; temples; function halls; flower markets; disposal.

1. INTRODUCTION

The rich cultural heritage and diverse religious beliefs of Indian culture calls for usage of flowers in each and every occasion of our culture. Flowers are most significant in Indian culture as a part of religious practices, in wedding ceremonies, different celebration and also as a gift. Tons of flowers wastes often get accumulated at religious sites like temples, mosques, churches and gurudwaras due to a number of religious practices and it is also generated in places like wedding ceremonies, flower markets, residential areas, community centres, hotels, various civilized and sacred ceremonies etc. [1]. These flowers which are generated as floral waste contributes a major challenge to the existing waste management disposal and the increasing population of the mega cities are also increasing the waste generation capacity per person, which challenges the existing waste management system [2] thus creating a need for better waste management system.

The floral waste comes under easily degradable organic waste category of Municipal Solid Waste (MSW) and their major disposal process is through Land filling and open dumping in Jawahar nagar of Hyderabad [3]. Mostly the floral waste is disposed in open dump in the state of Telangana, as it comes under MSW under which 593 MTD is open dumped during the year of 2017-2018 [4]. The government doesn't have any policies regarding the floral waste disposal in any of the states of the country. Most of the flowers used in different institutions are either left behind or thrown away in water bodies such as rivers, oceans etc., due to number of religious beliefs water bodies they will be rotting in the rivers and choking fish and other aquatic organisms [1]. The roadside dumped flowers, will attract vectors and can be a reason for spreading diseases along with air quality deterioration as their decomposition emits greenhouse gases such as CO_2 and CH_4 [5]. Their disposal in garbage also leads to various environmental issues. In order to prevent this environmental hazard from the flowers of thousands of temples, function halls, flower markets and various other institutions, there is need to utilize these flowers for preparation of various eco-friendly products [6].

Scientists are constantly developing a safe, nature friendly and hazard free waste management model and one such innovation is converting floral waste into a valuable product. Flower waste can be managed by converting it into nature friendly products such as incense cones, incense sticks, soaps, perfumes, natural colours for cotton and silk products, coloured powders, composts, low-cost decorative items, *etc.* [7]. The flower waste can also be utilized to produce vermicompost which is a environmentally safe management, cost effective and pollution free system [8]. Beside these, floral waste can also be utilized for generation of bio gas [9].

Flower production in India is of two categories. 1. Cut flowers and 2. Loose flowers. The major produced cut flowers in India are Anthurium, Carnation, Dutch rose, Gerbera, Gladiolus, Orchids and Tuberose Double whereas Jasmine, Marigold, Rose Loose and Tuberose Single are the major loose flowers produced from India [10]. Huge amounts of flowers such as marigold, chrysanthemum, rose and jasmine are used in temples and function halls in Hyderabad. Beside these places, the floral waste is also generated from the flower markets, especially when there is a low sale in the market. As the city is located at the bank of River Musi, mostly flower wastes from the major regional festival of Bathukkamma are dumped in into the river as a part of the tradition. The flowers dumped into the river causes adverse effect on the river ecology, making a foul smell along with a breeding center for variety microbe-related diseases. However, this is not the problem of this city only, but throughout the Indian subcontinent [11]. Thus, the present study was taken to understand the floral waste generation pattern in temples, function halls and flower markets of the Hyderabad city. It has also dealt with the present disposal method used by them.

2. METHODOLOGY

The Hyderabad city of Telangana state has 6 Greater Hyderabad Municipal Corporation (GHMC) zones and the study was carried out in all the GHMC zones, namely L.B. Nagar (East-Zone), Charminar (South-Zone), Khairatabad (Central-Zone), Secunderabad (Northeast-Zone), Serilingampally (West-Zone), Kukatpally (North-Zone) during the year of 2021.

Sample is collected from all the GHMC zones consisting of 5 temples and 2 function halls from

each zone. The city has 2 major flower market and 10 flower shops from was selected for the study. Total sample size of 62 is taken for the study (Table 1).

The floral waste generating pattern during regular days and festive occasions, the different category of flowers which are generated, the disposal method adopted and the awareness about the floral waste rejuvenated products among the personal were identified in the study.

2.1 Sampling Procedures

Method of Data Collection: Data was collected through survey method. Three types of separate schedules were prepared to collect data from temples, function halls and floral shops.

Method of Sampling: For selecting the temples, convenience sampling method was employed and for selecting the function halls and floral shops, simple random sampling method has been employed.

2.2 Analytical Technique Employed

2.2.1 Tabular analysis

The data collected from the primary sources such as temples, function halls and flower markets were analysed in multiple stages and they were coded, analysed, compiled and tabulated to draw valid inferences from the study. The analysis used simple statistical tools such as averages and simple percentages to compute amount to floral waste generated in each zone of the city.

3. RESULTS AND DISCUSSION

The results obtained have been tabulated and analysed separately for temples, function halls and flower markets.

3.1 Pattern of Floral Waste Generated and Disposal

3.1.1 Floral waste generated in temples

The study has identified Khairatabad zone (50 Kgs) as the major floral waste generator of the city, followed by Kukatpally (37.5 Kgs) and L.B. Nagar zones (37.5 Kgs), followed by Secunderabad (36.5 Kgs) and Charminar zone (33.5 Kgs). Serilingampally zone (20 Kgs) generates the least amount of floral waste. The big temples located in Khairatabad zone and L.B Nagar zone contributes to the higher generation of floral waste, compared to other zones.

Table 1. Zone wise distribution of sample personal

Sl. No	Sample area	Sample size	Total sample
1	6 GHMC zones	5 temples from each	30 temples
2	6 GHMC zones	2 function halls from each	12 function halls
2	2 Flower markets	10 flower shops from each	20 flower shops

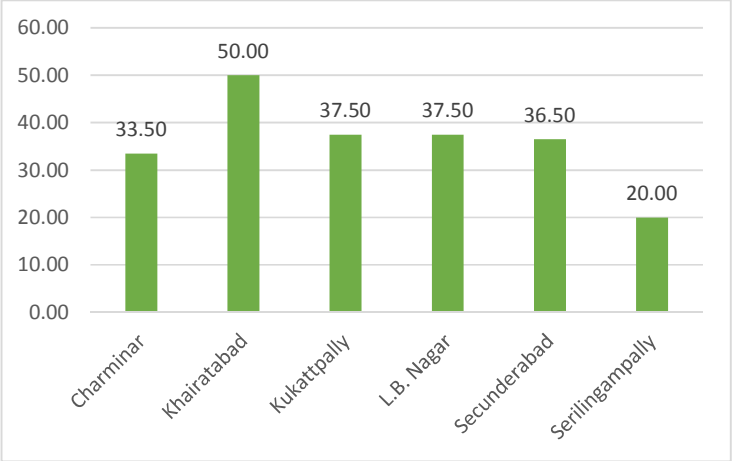

Fig. 1. Floral waste generated in the GHMC zones from the temples (kg /day)

The major festivals during the months of April, July, October, November and December are contributing to more floral waste generation. The festivals such as Bathukamma (57.8 Kgs) and Dussara (45 Kgs) in the month of October, Ugadi (60 Kgs) and Sri Rama Navami (45.7 Kgs) in the month of April and Karthiga Purnima (45.8 Kgs) in the month of November generate high floral waste in a day in a temple.

Major flowers that are generated in temples of Hyderabad are Marigold (3.67 Kgs /day/temple), Chrysanthemum (2.85 Kgs/day/temple), Jasmine (0.48 Kgs/day/temple) and Rose (0.17 Kgs/day/temple). The majority of the temples (84%) are disposing their floral waste through GHMC, around 7 % of temples are disposing their floral waste through burning their flowers, around 7 % of temples are giving floral waste to the devotees itself, and around 3 % of temples are supplying their floral waste to a floral waste manufacturing company.

3.1.2 Floral waste generated in function halls

The function halls in Charminar zone (225 Kgs) and Khairatabad zone (170 Kgs) generates more floral waste, followed by Kukatpally zone (150 Kgs) and L.B. Nagar zone (100 Kgs). The least amount is generated from Secunderabad (90 Kgs) and Serilingampally zone (86.5 Kgs).The floral waste generated from function halls is from

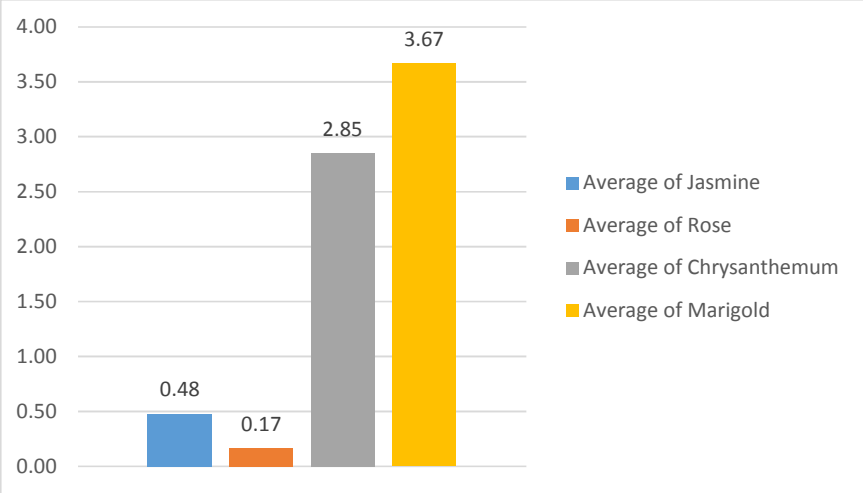

Fig. 2. Major category of floral waste generated in the city (kg /day/temple)

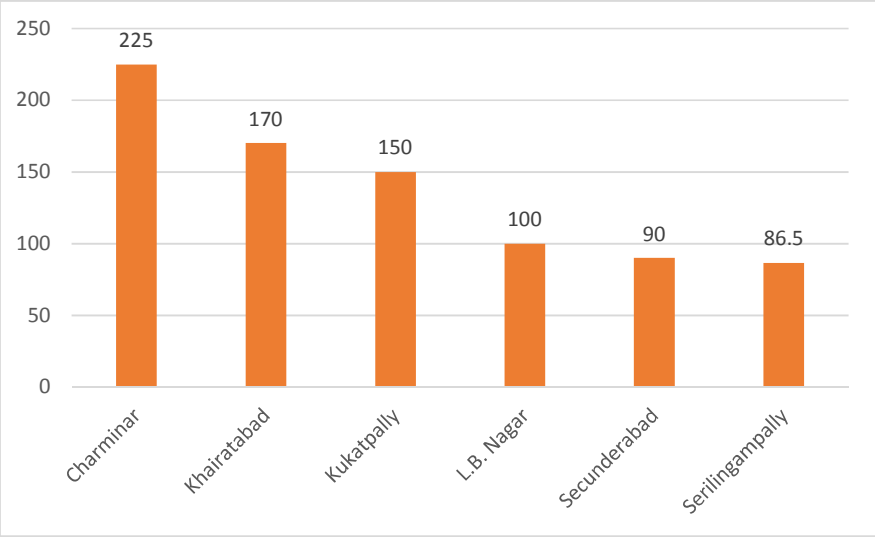

Fig. 3. Floral waste generated in the GHMC zones from the function halls (kg / Ceremony)

two major ceremonies conducted in the premises i.e., wedding and reception. During the wedding season all the wedding halls are booked for auspicious ceremonies and during non-wedding season, mostly birthday parties are conducted, which doesn't generate much floral waste, as balloons become the major decoration materials there.

The major loose flowers that are generated in function halls of Hyderabad are Marigold, Chrysanthemum and Rose, whereas the major cut flowers which are usually used in decoration are Cut Rose and Orchids. An average amount of 40.42 kgs of Marigold, followed by 39.17 Kgs of Chrysanthemum and 22.08 Kgs of Rose is generated during a ceremony. The other category of flowers combinedly contributes an average amount of 35.25 Kgs of flowers per ceremony in a function hall.

Almost 100 per cent of the samples are disposing their floral waste through GHMC. But sometimes, the flowers are taken back by the decorators for their usage and the function hall management has no rights over this area.

3.1.3 Floral waste generated in flower markets

The Gudimalkapur flower market generates more floral waste than Moazzam Ali flower market. An average amount of 526.5 Kgs of flowers are sold by each shop in Gudimalkapur market in a day and generates an average amount of 51.75 Kgs of floral waste, whereas an average amount of 332 Kgs of flowers are sold by each shop in Moazzam Jahi flower market in a day and generates an average amount of 32.25 Kgs of floral waste.

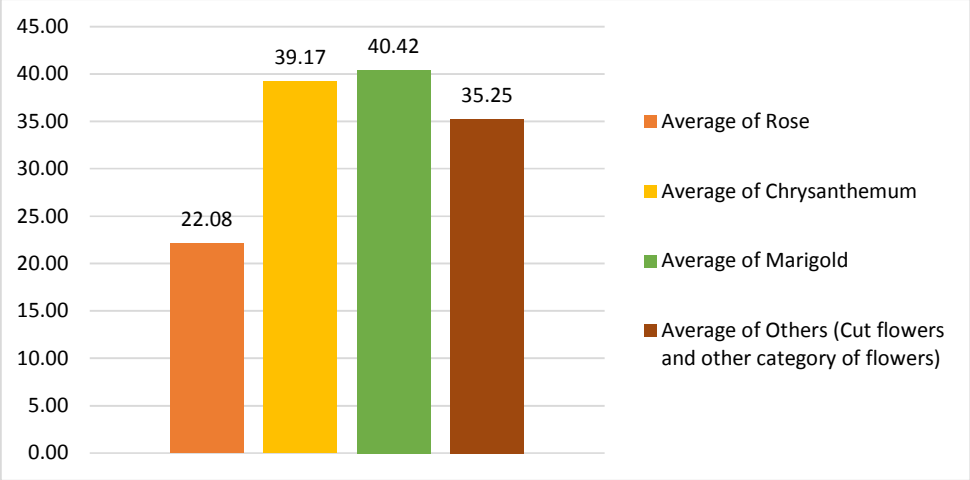

Fig. 4. Major category of flowers generated in the city from function halls (kg/ Ceremony)

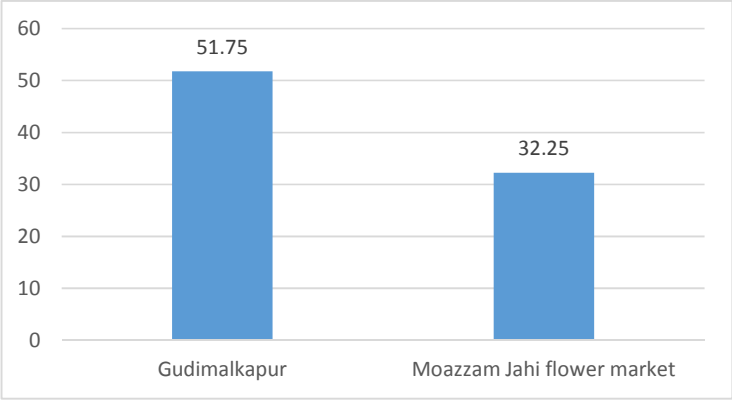

Fig. 5. Average floral waste generated in a flower shop of the major flower markets (kg/day/shop)

The months of January, April, May, June, August, November and December are having more sales with an average of 1315 Kgs per day per shop in Gudimalkapur market and an average of 985 Kgs per day per shop in Moazzam Jahi flower market, as these months are considered as auspicious months.

An average amount of 735 Kgs of flowers are sold during weddings and 580 Kgs of flowers are sold during festivals by a flower shop in a day in Gudimalakapur market. Whereas an average amount of 550 Kgs of flowers are sold during weddings and 435 Kgs of flowers are sold during festivals by a flower shop in a day in Moazzam Jahi market.

Major loose flowers that are sold in flower markets of Hyderabad are Marigold, Chrysanthemum and Rose. Major cut flowers that are sold in flower markets of Hyderabad are Gerbera, Carnation, Dutch Rose, Anthurium and Orchids. An average amount of 300 Kgs of cut flowers, 170 Kgs of marigold, 35 Kgs of Chrysanthemum, 17.5 Kgs of Rose, 2.5 Kgs of Jasmine and 1.5 Kgs of other categories of flowers are sold in a day in Gudimalakapur market. On an average per day 111.5 Kgs of marigold, 90 Kgs of Chrysanthemum, 50 Kgs of cut flowers, 32.5 Kgs of Rose, 24 Kgs of Jasmine and 24 Kgs of other categories of flowers are sold in Moazzam Jahi market.

The major method of disposal is throwing away in garbage which is kept inside the market in Gudimalkapur and outside the market in Moazzam Jahi market. Almost 100 per cent of the samples are disposing their floral waste through this method.

4. CONCLUSION

The bigger temples contribute to the higher generation of floral waste in the city, and the festival seasons around the year also generates more floral waste. But the function halls don't generate a constant quantity of floral waste and the usage of floral waste is also depends on the budget and theme of the ceremony. The flower markets generate more floral waste at a single point than the other two sources. The institution who are working in the role of converting the floral waste into value added products can collect flowers from temples and flower markets, as they are generating floral waste regularly. The flowers such as Chrysanthemum, Marigold, Jasmine and Rose are generated as major category of floral waste and products such as essential oil based on these flowers can be manufactured. The temples and function halls are making use of GHMC for disposing their floral waste, whereas the flower markets are throwing the floral waste in garbage in the market. So, a proper awareness about the floral waste management and their disposal should be provided to the people involved in the process.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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