RESEARCH PLAN PROPOSAL

UTILIZATION AND MANAGEMENT OF FLORAL WASTE GENERATED IN POPULAR TEMPLES OF JAIPUR CITY

A Synopsis

submitted

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INTRODUCTION

Environmental degradation is a major threat confronting the world. The primary causes of environmental degradation in a country could be attributed to rapid growth of population, over utilization of environmental resources, establishment of different multinational companies and local industries which adversely affect the natural resources and environment. Air pollution, water pollution, deforestation, thinning of the ozone layer, global warming, sanitation and outbreaks of diseases are the problems that are endangering human lives. Besides these, the problem of waste disposal can not be ruled out. Waste gets generated from almost each and every activity which we do and it eventually degrades the quality of human health and accelerates the deterioration of the environment in alarming proportion.

The rapid increase in the volume of waste is one of the major phenomena leading to environmental crisis. Waste can be solid or liquid. Solid waste is defined as the organic and inorganic waste materials produced by different sources and have lost value in the eye of their owner. Solid waste generally comes from the residential and commercial areas such as houses, vegetable markets, hotels, marriage palaces, hospitals, institutions, religious places etc. It is estimated that in cities and rural areas of India nearly 700 million tonnes organic wastes is generated annually which is either burned or land filled (Bhiday 1994).

Management of solid waste is one of the biggest problems that we are facing today.With sound planning, future environmental degradation due to improper management of waste can be prevented (Ghosh 2004). Solid Waste Management (SWM) is one of the essential services provided by municipal authorities in different states of our country. The proper disposal of SW derived from any source depends on management practices.

The main technological options available for processing/treatment or disposal of solid waste are composting, vermicomposting, anaerobic digestion/ biomethanation, incineration, gasification, plasma pyrolysis, production of refuse derived fuel and landfilling.Besides dumping or sanitary land filling the final disposal of solid waste can also be carried out by other methods like incineration and composting (Asnani 2004).

Ideal Solid Waste Management at a glance

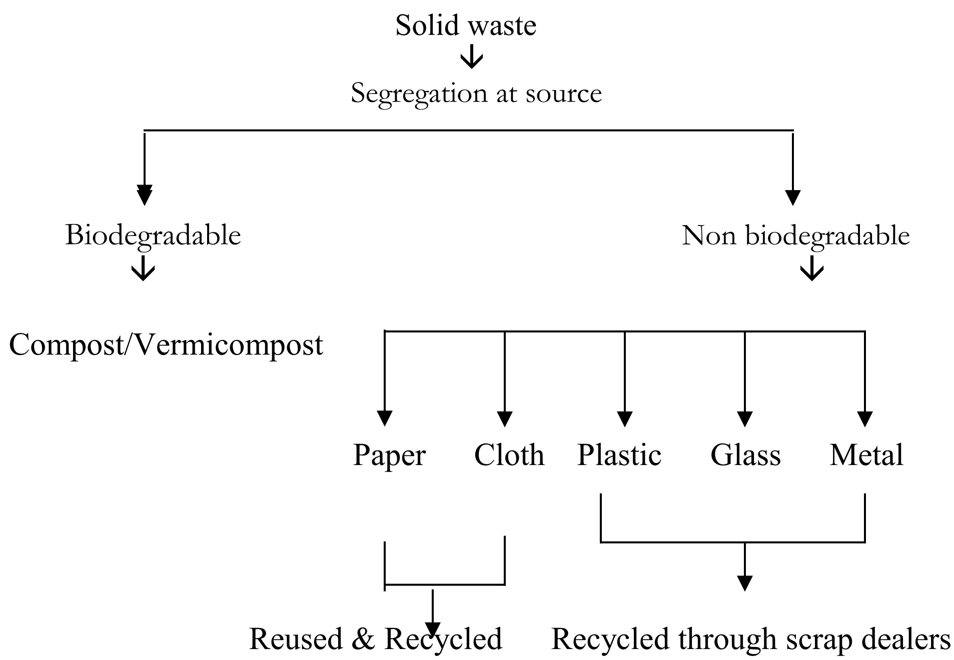


Figure 1 : Solid Waste management System

Recycling of wastes should be given priority in waste management practices and land disposal should be avoided as far as possible (Battacharayya et al., 1996).Recycling and reuse of solid waste helps to reduce the problem of waste disposal. As we intend to maximize the efficiency of resources to meet our growing needs, let us not neglect the fact that waste products have magnificent potential waiting to be harnessed. Nowadays we have a number of methods which are used for waste disposal like biomethanation, sanitary land filling etc; but the most economically viable method is vermicomposting. Organic matter in the waste stream can be used as a resource rather than going to landfills where it creates a range of environmental problems that are costly to ameliorate. All the biodegradable part of the community waste like agro industrial waste, food industry waste, vegetable market waste, kitchen waste etc can be converted into a vermicompost.A portion of this community waste also includes the waste that is coming out of the religious practices from places like Residential areas, Community centres, Temples, Mosques, Gurudwaras, etc which is still being neglected and requires due consideration. There is no segregation of this waste at the source of generation. It is well known that many of us avoid throwing the flowers and other items which are used in prayers in the garbage because of our religious beliefs and instead put it in the plastic bags and throw them directly into the water bodies. Some of it is also thrown near sacred trees with no suitable mode of disposal. Such disposal of waste creates problems like water pollution, foul odour, land pollution moreover it is not good aesthetically. So to solve this problem we can adopt sustainable techniques like vermicomposting as it is good for soil and promotes sustainable agriculture. Nevertheless, the biological process of vermicomposting presents a viable opportunity to decompose and convert the organic fraction of solid wastes into agriculturally useful organic fertilizers using earthworms. Also; the deleterious impact on the environment by chemical fertilizer urges the need for production of organic manure out of waste.

On one hand, these wastes are converted into agriculturally useful organic fertilizers which in turn have the potential to reduce the dependency on nonrenewable chemical fertilizers and pesticides, and, on the other, it controls waste which is a major pollutant and a consequence of increasing population, urbanization and intensive agriculture (Kaushik and Garg 2003). The widespread adoption of this technology can be interpreted as one with a double interest. The floral waste generated can also be used for making natural Holi colours, rose water, essence and various ornamental purposes.

The aim of the present study is to investigate the potential of bioconversion of floral waste of temples to vermicompost through biological process of vermicomposting.Vermicomposting is one of the ecofriendly and ecologically sustainable technologies for waste management, since it overcomes the problem of organic waste disposal and also alleviates the odour problem.

Vermicomposting cleans the environment and also provides remunerative organic manure. Hence awareness should be created among the temple authorities, pilgrims and waste handling persons to adopt vermicomposting in large scale to have better income and clean environment. Vermicomposting represents an alternative approach in waste management, since the material is neither land filled nor burnt but is considered a resource that may be recycled. In this sense, vermicomposting is compatible with sound environmental principles that value conservation of resources and sustainable practices and thus, can be an appropriate alternative for the safe, hygienic and cost effective disposal of the organic fraction of solid wastes.

OBJECTIVES

The objectives of the study are-

- Determination of amount of floral waste generated by popular temples of Jaipur in a month or during festival seasons.
- Characterization of the waste generated.
- Vermicomposting of segregated floral waste and suggestion of ways for recycling or converting the waste in some other useful product(s).
- Physicochemical analysis of the manure obtained by vermicomposting of floral waste.
- Providing the community with an alternative to the disposal of temple flowers through the traditional *Jal Pravah* method that is severely polluting the river banks.
- To propose the concept of “green temples” with Zero waste management in the temples selected.

REVIEW OF LITERATURE

Resource efficiency means to produce a desired outcome by using a minimum amount of material or energy. In other words, we can say that it deals with getting more from using less. One should realize that organic waste that is coming out of our kitchens, gardens, agricultural fields and religious places such as temples may actually posses great potential that can be recycled into valuable resource. Waste is a valuable raw material located at a wrong place, which can be converted into useful products by making use of appropriate processing technology (Sharma, 2005).

India has yet to appreciate the full importance of vermiculture despite the potential for the production of 400 million tonnes of vermicompost annually from waste degradation (Sinha, 1996). . Many comparative studies between vermicomposting and composting systems have shown that earthworms (especially in trials conducted using composting worms) will accelerate the mineralization of organic matter, increase humification, lower the C: N ratio and bioavailability of heavy metals (Elvira et al, 1996a, 1998; Dominguez 1997; Edwards and Bohlen, 1996). Gunathilagraj and Ramesh (1996) and Gunathilagaraj and Ravignanam (1996) reported respectively about management of coir and sericultural wastes by earthworms in India. Kale et al. (1993), Seenappa and Kale (1993), and Seenappa et al. (1995) have each advocated vermicomposting and management on aspects of sugar factory waste, solid wastes from the aromatic oil industries, and distillery wastes in India.

Earthworm farming (vermiculture) is a bio-technique for converting the solid organic waste into compost. Vermiculture (derived from the Latin *vermis* meaning worm) involves the mass production of earthworms for waste degradation, and composting with 'vermicast' production (Kale, 1991).Role of earthworms in the breakdown of organic debris on soil surface and soil turn over process was first highlighted by Darwin (1881).Since then it has taken almost a century to appreciate their important contribution in curbing organic pollution and providing topsoil to impoverished lands. Earthworms in general are highly resistant to many pesticides and have been reported to concentrate the pesticides and heavy metals in their tissues. They also inhibit the soil borne pathogens and work as detoxifying agents for polluted soil (Davis 1971, Ireland 1983). Earthworms serve as "nature's plowman" to facilitate these functions. They form nature's gift to produce good humus, which is the most precious material to fulfill the nutritional needs of crops. In short, earthworms, through a type of biological alchemy, are capable of transforming garbage into 'gold' (Vermi Co 2001, Tara Crescent 2003).

Just any earthworm from the garden would not suffice.Vermicomposting requires a specific species of worms that is adapted to living in decomposing organic materials rather than the soil.Two such species are *Eisenia foetida,*more commonly known as the red worm,manure worm or red wiggler and *Lumbricus rubellus*(Thakur,2006). The magnitude of the transformation of phosphorus forms is considerably higher in the case of earthworm-inoculated organic wastes, showing that vermicomposting may prove to be an efficient technology for providing better phosphorus nutrition from different organic wastes (Reinecke et al., 1992; Ghosh et al., 1999). The castings of earthworms may contain two to three times more available potassium than the surrounding soil (Basker et al., 1993). Earthworm castings have a higher ammonium concentration and water-holding capacity than bulk soil samples, and they constitute sites of high denitrification potential (Elliot et al., 1990).

In 1998, the Government of India announced exemption from tax liability to all those institutions, organizations and individuals in India practicing vermiculture on a commercial scale (Annual Budget 1998**).** Vermicomposting technology is known throughout the world. Normally, vermi-composting is preferred to microbial composting in small towns as it requires less mechanization and it is easy to operate. A few vermi composting plants generally of small size have been set up in some cities and towns in India, the largest plant being in Bangalore of about 100 MT/day capacities (Sinha, 1996). Chennai, Mumbai, Indore, Jaipur and several other Indian cities are also setting up vermiculture farms.

The Bhawalkar Earthworm Research Institute (BERI) at Pune in India is one of the largest non-governmental organizations involved in vermiculture practice and is operating a vermiculture plant on a commercial scale for the management of municipal wastes (Bhawalkar and Bhawalkar 1994).

Vermicomposting facilities have already entered domestic and industrial marketing in countries like Canada, USA, Italy and Japan. Vermicomposting was started in Ontario (Canada) in 1970 and is now processing about 75 tonnes of refuse per week (Asnani, 2004). As a process for handling organic residuals, it represents an alternative approach in waste management, in which the material is neither land filled nor burned but is considered a resource that maybe recycled. In this sense, vermicomposting is compatible with sound environmental principles that value conservation of resources and sustainable practices.

Some of the important characteristics of vermicompost are as follows:

- Vermicompost is a finely-divided mature peat-like material with high porosity, aeration, drainage, water-holding capacity and microbial activity which are stabilized by interactions between earthworms and microorganisms in a non-thermophilic process (Edwards and Burrows 1988).

- It is natural organic manure produced from the excreta of earthworms fed on scientifically semi-decomposed organic waste. Use of organic amendment, such as traditional thermophilic composts, has long been recognized as an effective means of improving soil structure, enhancing soil fertility (Follet et al., 1981).

- It increases microbial diversity and populations (Barakan et al., 1995).

- Vermicompost contains most of the nutrients such as nitrates, phosphates and exchangeable calcium and soluble potassium in plant available form (Edwards 1998; Orozco et al., 1996).

- It has large particulate surface areas that provide many micro sites for microbial activity and for strong retention of nutrients (Shi-wei and Fu-Zhen 1991).

- It is rich in microbial populations and diversity, particularly fungi, bacteria and actinomycetes (Edwards 1998; Tomati et al., 1987)

Vermicompost consistently promotes biological activity which can cause plants to germinate, flower, grow and yield better than in commercial container media, independent of nutrient availability (Arancon et al., 2004; Atiyeh et al., 2000 a, b).

Vermicompost is a nutrient-rich, natural fertilizer and soil conditioner. The process of producing vermicompost is called vermicomposting. Vermicomposting is essentially an environment friendly technology generating wealth from waste. Vermicompost is known to be the world's best organic fertilizer. Vermicomposting is a panacea for solid waste management. It is a simple kindred process of composting, in which certain species of microorganism such as earthworms are used to enhance the process of waste conversion and produce a better end product.

Padmathimma, Loretta and Kumari (2008) investigated that vermicomposting can be used as a means of reducing organic waste materials. Studies were undertaken to select the most suitable earthworm spp. for vermicomposting, to enrich vermicompost by inoculation with beneficial microbes, to standardize an economically feasible method of vermicomposting, to achieve nutrient economy through vermicompost application in acid soils and to assess the performance of vermicompost as a bioinoculant in cow pea, banana & cassava. Earthworm spp. *Eudrillus eugeniae, Eisenia foetida, Perionnyx sansibaricus, Pontoscolex earthworms & Megascolex chinensis* were compared for their efficiencies & *E.eugeniae* found to be a superb agent.
A combination of aerobic composting and vermicomposting to enhance the value of the final products was proposed by Graziano and Casalicchio(1987). The benefits of a combined system to process urban green waste could

include effective sanitization and pathogen control due to an initial brief period of thermophilic composting, enhanced rates of stabilization, plus the production of earthworms and vermicompost (Jadia and Fulekar, 2008). Stabilization of green waste such as yard waste and vegetable waste through the process of composting and vermicomposting has been carried out earlier (Jadia and Fulekar, 2008, Daniel et al, 1997 and Karthikeyan et al, 2007).

Jayanthi and Neelanarayanan (2010) conducted a study on the processed mixed leaves litter in which the litter was mixed with cured cow dung in different proportions viz., 50:50&60:40 & 70:30(each concentration in triplicates) and filled in the plastic trays, individually. Hundred *Eudrilus euginiae* adult earthworms were introduced into each of these trays. Simultaneously a control for each of these concentrations was prepared and maintained without earthworms. The conversion ratio of mixed leaves litter into vermicompost was found to be more or less similar in all the concentrations. Further, vermicompost obtained from all the three concentration has desired level of plant nutrients for uptake. The results suggest that the mixed leaves litter with cured cow dung at any of these concentrations can be used for converting into value added vermicompost by utilizing the earthworm *E.eugeniae.*

Vermicomposting of food industry sludge mixed with biogas plant slurry employing *Eisenia foetida* shows that *Eisenia foetida* was unable to survive in 100% food industry sludge. So addition of some other organic waste was necessary during vermicomposting.Final vermicompost had higher concentration of important plant nutrients. There is a significant decrease in PH, organic matter & C: N, but increase in N, P, and K was recorded after vermicomposting. (Yadav and Garg, 2010).

In Forest Research Institute a project was started on vermitechnology using the earthworm spp. *Eisenia foetida* & *Eudrilus euginiae* have been used in converting organic waste (agro waste and domestic waste refuse) into vermicompost(Aalok,Tripathi and Soni ,2008).

Vermicomposting with *Eisenia foetida* of mustard residues and sugarcane trash mixed with cattle dung in a 90 day composting experiment showed the significant reduction in C: N ratio & increase in mineral N (Bansal and Kapoor, 2000).In Bangalore, earthworms successfully decomposed sugar factory residuals and turned them into a soil nutrient that allowed farmers using the material to reduce chemical fertilizers by 50% (Logsdon, 1994).

Edwards (1995) claims that, through the vermicomposting process the important plant nutrients in the organic material particularly nitrogen, phosphorus, potassium and calcium are released and converted through microbial action into forms that are more soluble and available to plants than those in the parent compounds.

The two species of earthworm, *Eisenia foetida* and *Eudrilus eugeniae* can be employed to degrade the vegetable waste and agroresidues.Chemical analysis of the vermicomposts derived from vegetable waste showed that the quantity of organic carbon was reduced from 42.1% to 31.19 and 30.19% by *E.foetida E.eugeiniae*,respectively.The level of N,P,K,Ca was higher in vermicompost of vegetable waste processed by *E.eugeniae* than *E.foetida*.An ideal C/N ratio(27.44) was observed in vegetable vermicompost processed by *E.eugeniae*.Similarly,*E.eugeniae* worked vegetable waste vermicompost positively altered the height, number and area of leaves, fruit length and weight of Abelmoschus esculentus (Alagesan and Vasuki ,2010).

Major nutrient status of vermicompost of vegetable market waste and floral waste processed by three species of earthworms namely, *Eudrilus eugeniae, Eisenia foetida* & *Perionyx excavatus* & its simple compost was assessed and it was found out that nutrient status of the vermicomposts of all the earthworm species produced from both the wastes were more than that of the compost (Pattnaik and Reddy, 2009). The nutrient status of the different agro industrial waste such as pressmud, bagasse, coir waste, rice husk & ground shell was also assessed and it was found out that vermicompost samples prepared from agro industrial waste recorded fairly higher level of nutrients. (Kitturmath, Giraddi and Basavaraj, 2007**).**

Vermicomposting has been studied in most of the biodegradable wastes. To the best of my knowledge less work has been done on floral waste. This study aims at vermicomposting of floral waste because the most important objective of the study is waste management of the temples wherein the maximum waste is in the form of floral waste. It is a familiar scene in every temple heaps of flowers, wilting or rotting, long after offerings have been given and taken away by worshippers or thrown into the temple tanks or streams nearby, with no suitable mode of disposal. A few temples in Mumbai are now combining the best practices of faith and sustainable living, turning everyday floral offerings into compost, ensuring a dignified disposal that in turn, enriches the soil. The initiative came from Vishwa, an organization dedicated to sustainable measures for conserving the environment, which convinced a few temples in the area to convert the ‘Nirmalya’ (floral offerings) into manure by composting it.

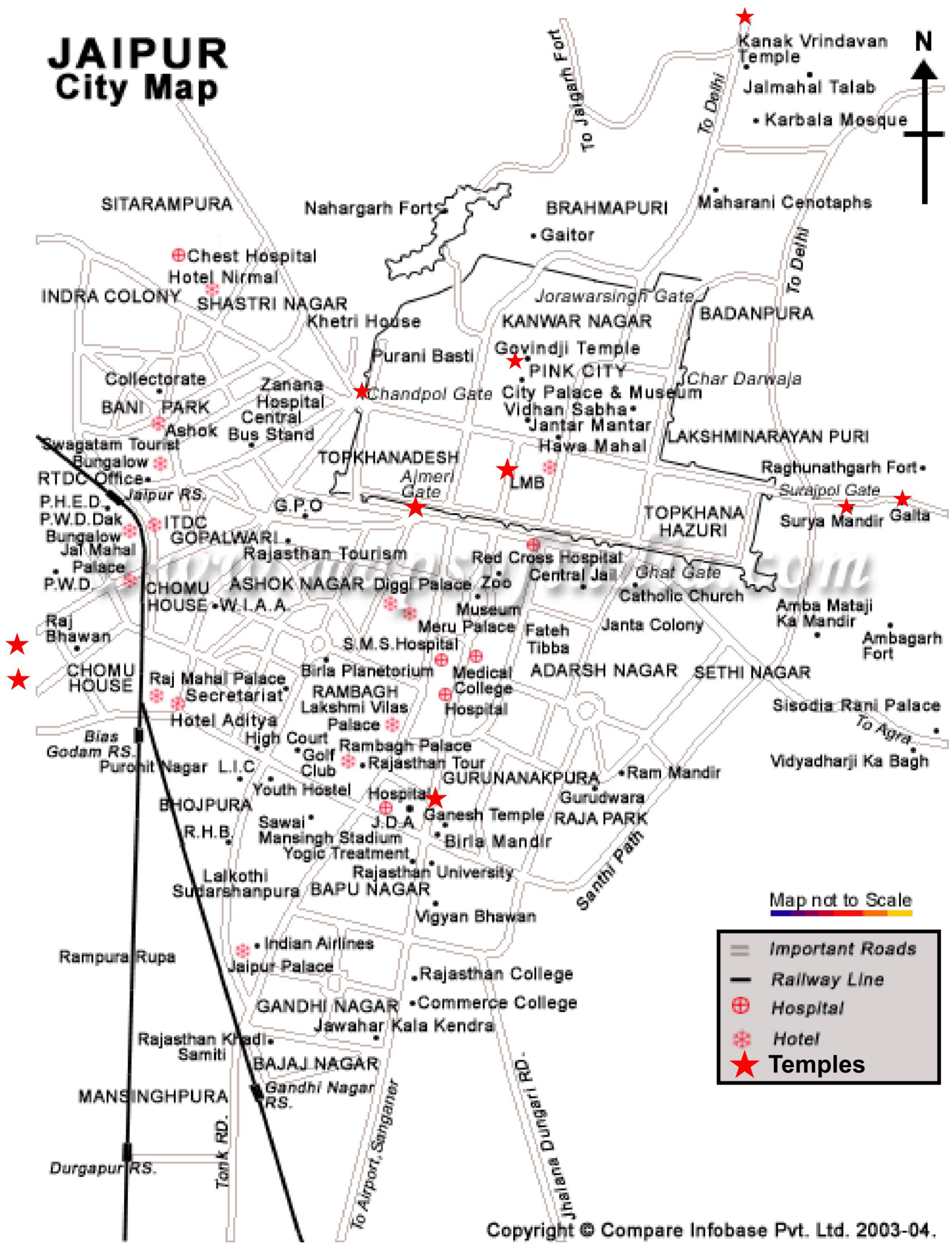
Certain temples in Mumbai have become sites of an initiative that's not entirely religious. *Nirmalaya*, floral offerings made by devotees, is composted at these temples and the manure is sold for Rs 20 per kilograms. *Nirmalaya* manure has become quite a hit among devotees. The project is the brainchild of Prathibha Bawlekar, vice chairperson of Mumbai Grahak Panchayat (mgp). "Mumbai's temples generate about 15 tonnes of *Nirmalaya* waste every day. Earlier, much of this made its way to the sea despite a ban on such disposal. Many local train passengers would carry the flowers in polybags and throw them out in the Mithi River. Waste from Siddhi Vinayak and Parleshwar temple is being composted by Bawlekar.

Likewise Nearly 15 to18 quintals of flowers, offered each day at the Ajmer Sherif Dargah of Khwaja Moinuddin Chishti, used to be dumped in a well till last year. Now, the flowers are not only recycled, but also helps to 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 on the outskirts of Ajmer.

METHODOLOGY

Study Area

- Jaipur is known as the city of temples. The temples are located in almost all parts of the city but concentrated in the old city. The cultural roots of Jaipur are reflected in these temples.
- The city houses several temples, which depict the religious nature of the pink city dwellers. Here, all religions are equally appreciated, but as Hindus dominate the city, there are number of temples in Jaipur.
- Amongst the others, temples like *Jharkhand Mahadev, Moti Dungri*,*khole ke hanumanji,kale hanumanji, Surya temple* and *Govind Deo Ji Tadkeshwar temple,Hanuman vatika*,*Shila Mata temple* and *Chandpole wale Hanumanji* are worth mentioning. These above mentioned temples are selected for the study.
- *Galtaji* is a holy pilgrimage of India, located 10 kms away from Jaipur in Rajasthan. The vast complex of *Galta Ji* has several temples in it. The Temple of *Galtaji* is famous for its natural water springs. *Galta Ji* Temple is dedicated to sun god.
- *Govind Devji* Temple represents the royal past of Jaipur. The Temple is dedicated to *Govind Dev Ji* (Other name of Lord Krishna). *Govind Devji* Temple of Jaipur is situated in the City Palace complex, between the Chandra Mahal and Badal Mahal.
- *Moti Dungri* is a small hill, centrally located in the city of Jaipur. The term *Moti Dungri* means Hill of Pearls or Pearl Hill. The hill is occupied by a palace and a temple. The temple of *Moti Doongri* is dedicated to Lord Ganesha.
- *Shila Mata* Temple, also known as the Kali Temple, is an intriguingly astounding temple of the 16th century dedicated to the goddess Kali. This temple is located in the breathtakingly beautiful Amber Palace complex..*Khole ke Hanumanji,Kale Hanumanji* are the old Hanuman temples.



JAIPUR
City Map
N
Kanak Vrindavan Temple
Jalmahal Talab
Karbala Mosque
To Jaigarh Fort
To Delhi
SITARAMPURA
Nahargarh Fort
BRAHMAPURI
Maharani Cenotaphs
Gaitor
Chest Hospital
Hotel Nirmal
INDRA COLONY
SHASTRI NAGAR
Jorawarsingh Gate
BADANPURA
Khetri House
KANWAR NAGAR
Purani Basti
Govindji Temple
PINK CITY
Char Darwaja
Collectorate
Zanana Hospital
Chandpol Gate
City Palace & Museum
BANI PARK
Central Bus Stand
Vidhan Sabha
Ashok
Jantar Mantar
LAKSHMINARAYAN PURI
Swagatam Tourist Bungalow
Hawa Mahal
TOPKHANADESH
Raghunathgarh Fort
RTDC Office
Ajmeri Gate
LMB
Surajpol Gate
Jaipur RS.
P.H.E.D.
G.P.O
TOPKHANA HAZURI
Surya Mandir
Galta
P.W.D.Dak Bungalow
ITDC
GOPALWARI
Jal Mahal Palace
Rajasthan Tourism
Red Cross Hospital
P.W.D.
Central Jail
Ghat Gate
CHOMU HOUSE
ASHOK NAGAR
Diggi Palace
Zoo
Catholic Church
W.I.A.A.
Amba Mataji Ka Mandir
Museum
Raj Bhawan
Meru Palace
Fateh Tibba
Janta Colony
Ambagarh Fort
S.M.S.Hospital
CHOMU HOUSE
Birla Planetorium
Medical College Hospital
ADARSH NAGAR
SETHI NAGAR
Raj Mahal Palace
Secretariat
RAMBAGH
Lakshmi Vilas Palace
Sisodia Rani Palace
Hotel Aditya
To Agra
High Court
Rambagh Palace
Bias Godam RS.
Golf Club
Rajasthan Tour
Vidyadharji Ka Bagh
Purohit Nagar
L.I.C
GURUNANAKPURA
Ram Mandir
Youth Hostel
Hospital
Gurudwara
BHOJPURA
Ganesh Temple
RAJA PARK
Sawai Mansingh Stadium
J.D.A.
R.H.B.
Birla Mandir
Yogic Treatment
Santhi Path
Rajasthan University
Lalkothi
Sudarshanpura
BAPU NAGAR
Map not to Scale
Vigyan Bhawan
Important Roads
Railway Line
Hospital
Hotel
Temples
Rampura Rupa
Indian Airlines
Jaipur Palace
Rajasthan College
GANDHI NAGAR
Commerce College
Jawahar Kala Kendra
Rajasthan Khadi Samiti
BAJAJ NAGAR
MANSINGHPURA
Gandhi Nagar RS.
Tonk RD.
To Airport, Sanganer
Jhalana Dungari RD.
Durgapur RS.
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Present Methods of disposal-

According to the preliminary survey of some of the popular temples of Jaipur city, it has been observed that-

- The storage of all kinds of waste at the source of its generation is neglected.
- There is no proper segregation of waste at the source of generation.
- The composite wastes are stored in plastic/paper bags or in bins, which are maintained poorly.
- Some times waste collected in plastic/paper bags is thrown in community bins located nearby or on streets, footpaths, open spaces, drains and other water bodies or near trees.
- This creates nuisance, choking of drains, water pollution and sometimes hurts the feeling of the people.

The present study will involve the following steps-

- **Selection of Temples-**

  Popular temples have been selected.

- **Visit to Temples-**

  Regular visit to the selected temples will be made for collecting primary and secondary data.

- **Collection of data-**

  The questions will be asked regarding visitors, the quantity of the waste generated in a month and during festive season and the method of disposal used by different temples.

- **Collection of waste-**

  Floral Waste will be collected from the selected temples.

- **Characterization of waste-**

The waste that is coming out of the temples contains flower, cotton, matchsticks, incense sticks, kumkum, food items, coconut etc.This waste will be characterized as biodegradable and nonbiodegradable.

- **Segregation of Biodegradable waste(flowers):**

From the biodegradable waste, flowers will be segregated from this the different flower will further be separated.

- **Sample Processing—Pre-Composting-**

The selected floral waste will be air dried spreading over a polythene sheet for 48 hours. The air dried samples will then be pre-composted for three weeks before putting into vermicomposting and composting process. Pre-composting is the pre processed and pretreated practice of raw waste. The pre-composting because of its thermophilic nature prior to vermicomposting will help in mass reduction and pathogen reduction (Nair, Sekiozoic, & Anda, 2006). The waste materials, in the pre-composting process will be decomposed aerobically by the active role of bacteria.

- **Experimental Design**-

In each pot a measured amount of the substrate (floral waste), mixed with cow dung (will act as inoculant) in different proportions viz., 50:50, 60:40,70:30,80:20 and 90:10 will be taken for vermicomposting and composting. The cow dung will be used as an inoculant in the vermicomposting process to enhance the quality of feeding resource attracting the earthworms and to accelerate the breakdown of wastes (Suthar and Singh, 2008).

All the above ratios will be in triplicates and a control (without worms) will be maintained in the same proportion. All the pots will be covered on the top by a jute cloth and a wire mesh to prevent and protect the earthworms from the predators—centipedes, moles and shrews.

Small holes will be drilled at the bottom of each pot for air circulation and easy drainage. The process of vermicomposting and composting will be carried out for a period of 60 days. The temperature and moisture content will be maintained by sprinkling adequate quantity of water at frequent intervals.

- **Physico-Chemical Analysis-**

The compost and vermicompost samples will be monitored at regular intervals (30,45 & 60 days) and compost and vermicompost so obtained will be collected after 60 days from each replicate pot and will then be sieved, air dried and analyzed for the following parameters:

- Organic Carbon (OC)
- Total nitrogen (N)
- Available phosphorus (P)
- Exchangeable potassium (K)
- Calcium (Ca)
- Magnesium (Mg).
- Temperature (°C)
- Moisture (%)
- pH
- Electrical conductivity (EC)

Temperature will be noted and moisture content will be measured gravimetrically. The pH and EC of samples will be recorded by a digital pH meter and conductivity meter, respectively. Organic Carbon of the samples will be measured by Walkey-Black method (1934), Total Nitrogen will be estimated by the Kjeldahl method and P and K contents of the samples will be analyzed by calorimetric method and flame photometric method, respectively. The Ca and Mg contents of the samples will also be analyzed by using atomic absorption spectrophotometer. The C: N ratio will be calculated from the measured values of C and N (Maiti, 2003).

Statistical Analysis-

Two-way analysis of variance (ANOVA) will be computed to test the level of significance of difference between the vermicompost to be produced and compost samples with respect to the physico-chemical parameters. Besides this the result obtained will be compared with similar parameters of vermicompost and compost produced from other organic wastes.

Plan of Work

Selection of Temples

↓

Regular visit to temples

↓

Data will be collected through questionnaire regarding the quantity of the floral waste generated and methods of disposal used.

↓

Characterization of waste

↓

Flowers will be segregated from the pile of waste, than the flower present in the maximum amount will be selected for analysis

↓

Floral waste will be shredded, air dried and precomposted

↓

The earthen pots with the hole at the bottom for aeration will be used

↓

Verm beds will be prepared by mixing the processed waste with cow dung in different proportions viz., 50:50, 60:40,70:30,80:20 and 90:10

↓

Control (floral waste+cowdung) experimental medium will also be prepared in the same proportion

↓

Experiments will be carried out in triplicates

↓

Pots will be left undisturbed for 60 days and regular monitoring will be done at 30, 45 & finally 60 day.

↓

Watering will be done once in a day

↓

Vermicompost will be collected, sieved, air dried and analyzed

↓

Quality of vermicompost will be assessed through analysis and will be compared with other organic wastes.

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By composting, the offerings get dignity and in the bargain, the environment gets enriched as well

prayer should not be conducted at the cost of the environment

many in the temple did not want the offerings to be carted away to a municipal dustbin but the other option was to dump it in the sea, which would draw flak from the municipality.