

Utilization of Temple Flower Waste in Varanasi for the Generation of Economic Resources

¹Prashant Kumar, ²A K Sachan, ³Anupam Rawat

¹ Research Scholar, ²Professor, ³Assistant Professor

^{1, 2, 3}Department of Civil Engineering, MNNIT Allahabad

Corresponding Author: prashant2yk@gmail.com

Abstract

Nowadays, demand for natural dyes has been developing rapidly due to increased awareness on hazardous, toxic and allergic reactions associated with artificial dyes. Natural dyes are obtained from natural sources such as plants, insects and minerals. Among all the plant created dye sources i.e. bark, flowers, seeds etc. floral dye sources are more important for textile dyeing as it offers both dye as well as smell. This paper reviews the available floral dye sources, application and removal of colourant from flowers and effect of different mordant.

Keywords: Natural dye, Colourant, Mordant and Floral dyes

INTRODUCTION

India has a rich Biodiversity which consist of 4, 90, 000 plant species and huge amount of flower are offered in temples in India, creating a very large waste. Varanasi city of India being situated at the bank of river Ganges, its periphery is bounded by thousands of temples and hundreds of Ghats. Because of this, floral market is an important source of income for local traders. Routine disposal of flowers waste from thousands of temple

become the major issue due to shortage of dumping grounds.

A survey reports reveals that around 40% of total production of flowers are remain unsold, which are thrown in river Ganges and open areas resulted into water pollution as well as environmental pollution. Looking into the harmful impact of the improper disposal of wastes on the environment, emphasis should be given on

how we can become wealth from waste materials.

The various uses of these wasted flowers are:

1. Extraction of colourful dyes from these flowers and use it in
 - Food industry for colouring vegetables, eggs and etc.
 - Textile industry for dyeing purpose.
 - Candles industry to provide colour in candles.
2. The residual waste portion can be used as bio-fertilizers.
3. These colourful dyes are used to making Herbal Gulal (Abiir).
4. Flower can be used as veterinary feed.
5. Various flower such as marigold can be used for its medicinal values.
6. Extraction of essence from flowers.

Ethiopian Scientist D. Jothi attempted to extract natural dyes from African marigold flower for textile colouration (2008). According to him dyeing of cotton and silk with marigold flower was carried out in four stages: pre- Treatment,

Extraction of dyes from Flower, Mordanting (fixing dye with fibre) and dyeing.

Flowers from the plant source were crushed and dissolved in distilled water and boiled for 2 hours to extract the colour from flower. Silk and cotton fabrics were washed in solution containing 0.5 g/l sodium carbonate and 2g/l non-ionic detergent solution at 500C for 25 minute keeping the material to liquor ratio at 1:40.

The worn material was thoroughly washed with tap water and dried at room temperature. The scoured material was soaked in clean water for 30 minute prior to mordanting. The wetted sample was entered into mordant solution at temperature of 800C for 30 minute, after that mordanted material was rinsed with water, squeezed and dried.

The cotton and silk sample were dyed with dye extract keeping M:L ratio as 1:40. After dyeing the dyed material was dried at room temperature and washed with cold water, it was then dipped in brine for dye fixing.



Fig.1 Pre-mordant with Alum before wash

Fig.2 Pre mordant with ferrous Sulphate before wash

Fig.3 Pre mordant with Copper Sulphate before wash



Fig.4 Pre mordant after wash

In year 2009, Padma S. Vankar observed that proper extraction of colorant seemed to be the major drawback so he develops an efficient removal process using ethanol. The innovative extraction process gave better dye yield and deeper hue colour. He took 100 gm. dry crushed flower and dispersed in ethanol (500 ml) and heated to 50 0C for 1.5 hours.

After removal the extract was filtered through ordinary filter paper, the filtrate was collected and the solvent was evaporated on rotatory evaporator

recovered to dryness. The cotton fibre was scoured with the same solution as previous 5g/l of sodium carbonate and 3g/l of non-ionic detergent under boiling condition for 4 hours and then it was rinsed and air dried at room temperature before soak in clean water for 30 min prior to dying.

After scouring of cotton fibre it was treated with 2% solution of tannic acid under dipped condition for at least 4-5 hour, squeezed, dried and then treated with 2% of alum and 1% of stannous chloride on water bath at 400C for one

hour. The dyeing process was carried out for 2 hours at temperature 30-40 °C and then dipped in saturated brine solution (15 min) which act as dye fixer and then rinsed with thoroughly in tap water and dried in open air.

Furthermore A. S. M. RAJA in 2012 attempted to dye the pashmina shawl using the dye removed from saffron flower petals which is thrown as waste. The flower was collected at the morning when they are open, dried in shadow and then ground into powder. The 100gm powder was soaked in 2 litres of water and left for instant. Then, the extract was boiled for 1 hour to get a water soluble dye solution. The extract was filtered and used for dying of pashmina shawl.

All the dyeing experiments were carried out by exhaustion method in a water bath, keeping solid to liquor ratio to 1:30 as per the standard procedure. The scoured Pashmina shawl was presented into dye bath containing 5% dye at room temperature and after some time temperature was increased to 85°C with gentle stirring. The dyeing was then sustained for one hour. The mordanting with different salts viz: Aluminium sulphate, stannous chloride and ferrous sulphate of 3% absorption was carried out

in the same bath after exhaustion of the dye. The temperature of the bath was allowable to cool below 50°C and the mordant solution of 3% concentration on the weight of the solid was added to the bath.

The temperature was then raised to 85°C and dyeing continued for another one hour. After mordanting, the tasters were taken out of the bath and thoroughly washed with water, followed by washing with detergent.

Banaras Hindu University student Akanksha Singh in 2013 attempted to define the problem of improper disposal of flowers in river Ganges in Varanasi generating foul odour as well as act as breeding centre for disease causing micro-organism. So she emphasised on aerobic composting which convert waste into organic manure rich in plant nutrients and humus.

In their study, they used Temple, farmyard and kitchen waste as feedstock. Nine opaque, rectangular plastic boxes with sizes measuring 340 cm × 160 cm × 60 cm were used for vermicomposting and 45 holes each of diameters 0.65 cm were drilled at the base of the container for agree to proper exchange of gases. The experiment was setup in a randomized

complete block design with three repetitions of each type of feedstock. Each feedstock's were kept for 2–3 days and methodically mixed before placing in the plastic boxes to avoid clumping and compaction of the substrates following addition of water.

In each of the three feedstock, mature cow dung was added at a ratio of about 1:7 to provide an direct source of food to the earthworms. Finally the boxes were covered with a layer of soil for decomposition. Adult clitellate worms, *Eisenia fetida*, reaching in length from 4 to 8 cm were added at the rate of 1.5 kg/m² through the developed cracks after 15 days of partial decay of waste to prevent worms from the thermophilic reaction going on during composting. The moisture content of the feed stocks was adjusted to $70 \pm 10\%$ at the start of vermin composting and preserved throughout the period of vermin composting by periodic sprinkling of water. Compost is prepared at the end of 100-120 days.

A study done by Kannadasan T. from Coimbatore Institute of Technology in 2013, emphasis on extraction of natural colour from Marigold flower using Conventional and Soxhlet Extraction method. In conventional Method flower

sample was taken in round bottom flask, heated in water bath for about 30, 60, 90, 120 min respectively.

After the extraction process completed the residue was separated from solvent and dried. Soxhlet extraction method in order to avoid the filtration of the solvent and excess and also to obtain better efficiency of separation .in this method, the weighed amount of feed or raw material and measured volume of solvent were taken in certain F/S ratio. The raw solid was kept in thimble of soxhlet extractor and the solvent was poured in the round bottom flask and a condenser with high flow rate of water is fitted over it.

For a particular time intervals (say 30 min) the extraction was carried out and the dye solution was then measured and absorption were calculated. They carried out trials of 1:10, 1:15, and 1:20 for 30min, 90min, 120min & 180min respectively.

Ms Papita saha and Prof. S. Datta used different flower available in West Bengal for the production of floral dye for Textile and Dye Industry. According to them, Compound shades were also became by over dyeing of yarn with two colours or by cross weaving. These natural dyes were

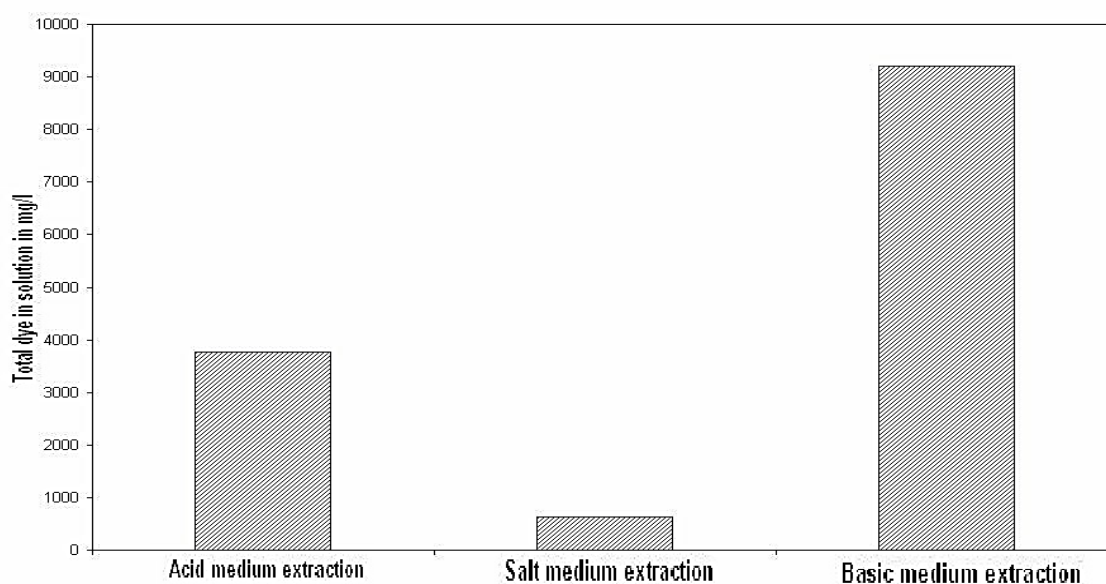
eco-friendly and more importantly non-carcinogenic, unlike the artificial dyes in use now. Flowers of Mari-gold, China rose; Butterfly Pea, Bougainvillea, Cineraria, and Alkanet etc. have been extensively used for dyeing fabric.

Dye from different flowers are extracted together in the proportion of 1:2 of flower by aqueous extraction and the extraction process is carried out at a temperature range of 80 - 85 C for 1 hour. Experimentally it is seen that at temperature range 80– 90C & time 1 hour, the extraction is better. The sample of cotton is mordanted before dying. For mordanting we use different mordanting means like Alum, Copper Sulphate, Ferrous Sulphate, Stannous Chloride, and

Alum etc. have been used. The fibre is mordanted for 1 hour at the temperature range 80 - 85 C.

After mordanting, the samples of clothes are taken out, squeezed and then immersed in the dye bath. The mordanting samples are immersed in dye bath for 2 hour at a temperature range of 80 C and after completion of dyeing; examples are taken out and dried. It is allowed to be aged for a fixed time, and after that washed with 2g/l non-ionic soap at room temperature for 10 minutes followed by rinsing and line dyeing.

Figure 4: Extraction of China rose flower dye with different Reagents



FLORAL DYE

Merit of floral dye:

1. The floral Dye is not toxic, not allergic to Human health, easily available and more economical.
2. These natural dye were eco-friendly and more importantly non-carcinogenic.
3. Huge amount of flower and various breed are available in India.

Demerit of floral dye:

1. If natural dyes have to be commercialized, they need to conform to the same stringent standards of performance that are applied to synthetic dyes.
2. Fabrics coloured using natural dye fades at faster rate in comparisons to synthetic dyes and it also fades slightly on exposed to sunlight for more than 2 hour.
3. Compound shades and multi-colour fabrics production is not up to the mark with floral dye.

CONCLUSIONS

Due to increasing awareness among people about the unsafe effects of synthetic dyes, products made from natural materials are gaining status. As natural dye shows non-toxic, no allergic effects and results in less pollution as well as less side properties, it become a thrust area in the field of textile dyeing research. In spite of being gifted with treasure of different flora and fauna, only a little has been exploited to fulfill the need of textile coloration.

The study on review collected on natural dyes is an important step towards detailing these treasures of indigenous knowledge on the utilization of capitals of natural dyes. Such review is collection, documentation and analysis of data on valuable floral resources presented for natural dyeing. It focuses on forming strategy for conservation of floral dye resources.

REFERENCES:

- 1) Jothi, D.Extraction of Natural Dyes from African marigold Flower (*Tagetes Erecta* L) For Textile Coloration. 2008.AUTEX Research Journal. 49-53.

- 2) Padma S. Vankar, Shankar. R. available in West Bengal for
Utilisation of Temple Waste Textile and Dye Industry.
Flower- Tagetus Erecta for Dyeing
of Cotton, Wool and Silk on
Industrial Scale. 2009. Journal of
Textile and Apparel Technology
and Management.1-15.

- 3) Raja A.S.M. Extraction of Natural
Dye from Saffron flower waste
and its Application on Pashmina
Fabric. 2012. Pelagia Research
Library.156-161.

- 4) Teli M. D. Flower Waste from
Temple for Dyeing of cotton and
silk.2013. Journal of the TEXTILE
Association.210-214.

- 5) Kannadas T. Extraction of Natural
Dye (Xanthophyll) From Marigold
Flower. 2013. Journal of Advanced
Scientific Resaearch.48-50.

- 6) Singh A. Solid waste management
of Temple floral offering by
Vermicomposting using Eisenia
Fetida.2013. ELSEVIER
JOURNAL.1-6.

- 7) Saha.P and Datta.S. Production of
Floral Dye from different flower