

Production of herbal dye from different plant parts used in Chikmagaluru, Karnataka, India

Kiranmae P. Nagwand

Associate Professor of Botany, Maharani's Science College for Women-Autonomous, Mysuru, Affiliated to University of Mysore, Karnataka, India-570005

Abstract—Herbal dye can be used as dyeing material for the Textile Fibre as well as making colourful powder which is eco-friendly, non-hazardous and very less cost and effective.

In India, flowers are cultivated in a huge amount. Karnataka is the 2th largest producer of flowers after Andhra Pradesh, and next is Tamilnadu. These flowers are mainly used for decorative purposes and for offering to God. A survey report reveals that 40% of the total productions of flowers are unsold and wasted everyday which are thrown in water of rivers like Ganga, ponds lakes and different water bodies or dumped which also creates water pollution as well as environmental pollution. These wasted flowers can be used in various ways & effective utilization can generate considerable amount of revenue. The organic waste obtained after dye extract can be used as fertilizer.

The various uses of these wasted flowers are:

Extraction of colourful dyes from these flowers/ Inflorescences/vegetable peels/Bark.

The residual waste portion can be used as bio-fertilizers.

Scent of flowers extract can use through distillation.

Colourful dye can also be extracted from plant parts for dyeing textile fibre, dye using in festivals.

These herbal dyes are eco-friendly, and due to herbal in origin, it has no allergic action on skin like synthetic dye.

The procedure is very cost-effective and depending on availability of plants, small scale Industry as well as Large scale Industry can be set up.

Index Terms—allergic, Holi (festival of colours-India), Eco-friendly manner, Kumkum, Bio lipstick.

I. INTRODUCTION

The chemical dyes are causes effect on nature and to be, suspected that many of the synthetic dyes are carcinogenic in nature and have effect on life systems. It's ironic in Europe that initiated the advent of synthetic dyes in the first place woke up the dangers of these agents and turning down for a few members of this class, proven to be harmful to life forms.

Herbal dyes however produced from plant part extracts are economical and solve the above problems. These herbal dyes are not toxic, non-allergic to human health, easily available and more economical. Some natural sources for dye produce truly exquisite shades and economical to purchase than chemical dyes. Up to now most of the natural dye based textiles are imported from Third World Countries and India is still a major producer of it.

It is true that herbal dyes not stick upon the fibres, and need chemicals for fixation of dye on fibre. In case of longevity of dye on textile fibre needs a mordant which may be a chemical like Alum or some mordents that are herbal based available.

In India during Holi (festival), large amounts of synthetic colours are used which may cause cancer, pollution and even blindness. But by using these herbal colours, we can not only reduce the pollution but also enjoy our celebrations in low cost as well as eco-friendly manner. Even it may introduce to Children drawing or painting purpose, so that it may not cause effect like colours sold for children drawings, crayons.

II. MATERIALS AND METHOD

Study area: Chikmagaluru is a district place in Karnataka, India. It is situated at 13°19.54.1"N 75°47'40.4"E of Karnataka covered by Western Ghats towards west. While working in IDSG Govt College, Chikmagalur, and author visited few local medical Ayurvedic practitioner for the data collection, and tried many plant part materials that were suspected to yield dye.

Several plant materials collected from plants available in Chikmagaluru during 2021 to 2023. The plant parts are as leaves, bark, flowers, seeds, pods/ Fruits, roots.

The plant materials collected from road side fallen flowers, flowers offered for God, vegetable peels, Inflorescences and some plant barks. The wood, bark parts were collected from saw mills of Chikmagalur. Wood, roots and bark of some plants were taken for dye material, which were over grown and groomed thrown as waste at road side of especially Coffee estates.

The materials were taken as fresh and dry. Fresh materials Sun dried first, powdered, the powder mixed with water 5Grams per 100ml, for colour shade appearance and identification of presence of dye in the part.

The dye extract is filtered, and then dried under Sun; yielded powder is stored as dye. This may mixed with water for future production of Dye. Fresh materials may use for urgent require, if taken, grind to paste V/V. The plant extract that give colour are identified and listed. Here are the list of plants and plant parts from which we can extract dye:

III.RESULT

From the collected data, there are about seventy nine plant parts were given results, among them, fourteen plant parts were given Red shades, eleven plant parts were given Brown colour, Ten plant parts were given Orange shades, Nine plant parts were given Pink shades, Nine plant parts were given Black shades, sixteen plant parts were given Yellow shades. The listed Table 1 includes plant Botanical name, family, part from which Dye can be obtained and given what colour.

Table 1: Plants from dye obtained from part and colour of dye. (Plant parts collected were mentioned in table as College means IDSG Govt College, Chikmagalur and AIT College, Chikmagalur campus, road side mean towards Coffee estates/ Kadur road.)

S. No	Botanical Name	Part used	Colour	Source
1.	<i>Althia rosea</i>	flower	Red shades	Road side Fallen flowers
2.	<i>Beta vulgaris</i>	Napiform root	Red shades	Vegetable peel from market
3.	<i>Caesalpinia sappan</i>	wood	Red shades	Saw mill
4.	<i>Lawsonia inermis</i>	leaf	Red shades	Fresh leaves

5.	<i>Morinda citrifolia</i>	Bark	Red shades	Fallen logs in College
6.	<i>Rubia cardifolia</i>	root	Red shades	Removed, thrown, over growing plant part
7.	<i>Impatiens balsamina</i>	flowers	Red shades	Fallen flowers
8.	<i>Tectona grandis</i>	Young leaves	Red shades	Especially used for lipsticks
9.	<i>Bixa orellana</i>	seeds	Red shades	Fresh seeds
10.	<i>Amaranthus tenella</i>	leaves	Red shades	Fresh leaves
11.	<i>Cassia fistula</i>	bark	Red shades	Saw mill
12.	<i>Hibiscus rosasinensis</i>	flowers	Red shades	Fallen/offered flowers
13.	<i>Euphorbia mollis</i>	flower	Red shades	Fallen flowers
14.	<i>Momordica charantia</i>	Ripen fruits	Red shades	Dehiscent fruits
15.	<i>Hippeastrum reginae</i>	petals	Red shades	Fallen flowers
16.	<i>Casuarina</i>	bark	Brown	From road side grooming
17.	<i>Acacia catechu</i>	wood	Brown	From College ground
18.	<i>Cassia fistula</i>	Bark/fruit	Brown	From road side grooming
19.	<i>Emblica officinalis</i>	Bark/fruit	Brown	market
20.	<i>Zingiber officinale</i>	rhizome	Brown	Peels of rhizome
21.	<i>Mimusops elengi</i>	bark	Brown	From road side grooming
22.	<i>Phyllanthus emblica</i>	bark	Brown	From road side grooming
23.	<i>Rubus fruticosus</i>	berries	Brown	Fallen fruits
24.	<i>Lawsonia alba</i>	leaves	Brown	Fresh leaves
25.	<i>Azadirachta indica</i>	bark	Brown	Saw mill
26.	<i>Erythrina suberosa</i>	Flower/bark	Brown	From road side grooming
27.	<i>Terminalia chebula</i>	Bark/root	blue	Fallen logs
28.	<i>Indigofera tinctoria</i>	Fermented plant	blue	Road side plants
29.	<i>Jatropha curcas</i>	bark	blue	From College campus
30.	<i>Clitoria ternata</i>	flower	blue	Fallen flowers
31.	<i>Commelina benghalensis</i>	flower	blue	Fallen flowers
32.	<i>Keirginelia</i>	fruit	blue	Road side fallen fruits
33.	<i>Syzygium jambulina</i>	fruit	blue	Road side fallen fruits
34.	<i>Thunbergia erecta</i>	flowers	blue	Road side fallen flowers
35.	<i>Jacaranda acutifolia</i>	flowers	blue	Road side fallen flowers
36.	<i>Nyctanthus arbur-tristis</i>	pedicel	orange	From AIT College campus
37.	<i>Allium cepa</i>	skin	orange	Thrown veg waste

38.	<i>Butea monosperma</i>	petals	orange	Road side fallen flowers
39.	<i>Mussaenda glabrata</i>	flower	orange	College campus
40.	<i>Epidendrum radicans</i>	petals	orange	Fallen flowers, College
41.	<i>Tagetes erecta</i>	petals	orange	Offered flowers to God
42.	<i>Spathodia campanulata</i>	petals	orange	Road side fallen flowers
43.	<i>Carthamus tinctorius</i>	petals	orange	From crop field, fallen
44.	<i>Saraca asoca</i>	flowers	orange	Fallen flowers, College
45.	<i>Gloriosa superba</i>	petals	orange	Fallen flowers, Collage
46.	<i>Bauhinia variegata</i>	petals	pink	Fallen flowers, Collage
47.	<i>Criptostegia grandiflora</i>	petals	pink	Fallen flowers, Collage
48.	<i>Polygonum</i>	inflorescence	pink	Road side near Dantaramakki lake
49.	<i>Argyria cuniata</i>	flowers	pink	Fallen flowers, Collage
50.	<i>Barleria involucreata</i>	petals	pink	Fallen flowers, Collage
51.	<i>Setarium nepalensis</i>	flowers	pink	Fallen flowers Seetalayyanagiri Mountain
52.	<i>Tabebuia rosea</i>	flowers	pink	Road side fallen flowers
53.	<i>Barleria cristata</i>	petals	pink	Road side fallen flowers
54.	<i>Lagerstromia lanceolata</i>	petals	pink	Road side fallen flowers
55.	<i>Annona reticulata</i>	Unripe n fruits	black	Fallen fruits from College
56.	<i>Wedelia chinensis</i>	roots	black	Thrown over grown plant
57.	<i>Shorea robusta</i>	bark	black	Saw mill
58.	<i>Abrus precatorius</i>	seeds	black	Road side climber, AIT College
59.	<i>Acacia nilotica</i>	bark	black	Road side, AIT College
60.	<i>Lantana chemara</i>	fruits	black	Road side
61.	<i>Semecarpus anacardium</i>	fruit	black	Road side, AIT College
62.	<i>Solanum nigrum</i>	seeds	black	Road side, AIT College
63.	<i>Aegle marmelose</i>	fruit	black	Kadur road side
64.	<i>Thevisia nerifolia</i>	flowers	yellow	Road side flowers
65.	<i>Thunbergia alata</i>	flowers	yellow	Road side flowers
66.	<i>Moonia arnotiana</i>	petals	yellow	Near Dantaramakki lake
67.	<i>Thunbergia mysorensis</i>	flowers	yellow	Park near Dist. Court
68.	<i>Aloe vera</i>	leaves	yellow	From College
69.	<i>Thespesia populanea</i>	Young fruit	yellow	Road side
70.	<i>Curcuma longa</i>	rhizome	yellow	Crop field

71.	<i>Mussaenda leuatiola</i>	flowers	yellow	From College
72.	<i>Tagetes lucida</i>	petals	yellow	Offered flowers
73.	<i>Bidens pilosa</i>	leaves	yellow	Road side flowers
74.	<i>Artocarpus heterophyllus</i>	Stem/root	yellow	Saw mill powder
75.	<i>Cassia auriculata</i>	petals	yellow	Fallen flowers
76.	<i>Tribulus terrestris</i>	petals	yellow	From College
77.	<i>Hiptis saviolens</i>	bark	yellow	Road side
78.	<i>Gardenia gummifera</i>	fruits	yellow	From road side AIT
79.	<i>Gossypium hirsutum</i>	petals	yellow	Crop fields

IV.DISCUSION

Dyes are of common use in Indian culture as the Kumkum, turmeric in different offerings to God. Similarly several artificial dyes are also in use along with herbal usage for fabrics and other use. Especially during Holi festival, showering of colours on people observed in throughout India. Few dyes like young leaves of Teak, seeds of *Bixa* used as Lipstick. Applications of chemical dyes cause irritation and other effects on hair, eyes and skin in many cases and tar based lipsticks are carcinogenic. This may be replacing with herbal derivatives of dye for usage. This is not effects health and also eco-friendly. A total of seventy nine plant parts were identified that are useful in extraction of dye. The extraction is also easy method by using water as solvent, derive the dye. This can be everywhere usage of dye because many of plant parts are easily available.

V.CONCLUSION

Usage of herbal dye can reduce the carcinogenic effect of chemical dye usage in different textile industries, water paints, and other dye used purposes. The plant materials from which the dye extract can be possible are listed and a typical extraction method also given. Herbal wastes are natural degradable products, we can use them for dye extraction, and waste after dye extraction is as biodegradable, useful for production of vermicomposting, and other manure productions.

Future implications: Analysis of dye percentage from each plant part is a major scope of this article. Research is going on few plant products.

ACKNOWLEDGEMENT

Author as working staff in College, is thankful to IDSG Govt College, Chikmagalur for the collection of plant material and lab technology, thankful to local practitioner Gowregowda from Sakharayapatna, Chikmagalur, given some knowledge about dyes used locally and about herbal dyes as lipstick, and thankful to the students who were studying degree in the College, for collecting wood, bark from sawmills.

CITATION

- [1] Chandra Mohan, Thiripura Salini, Thiagarajan. A, Dyeing of Cotton with Natural Dye Obtained from Flower of *Tecoma stans*, Feb 2012, 2(1):41-46.
- [2] Ms Papita Sahaa and Prof. S. Datta b, Production of Floral Dye from different flowers available in West Bengal for Textile & Dye Industry, https://folk.ntnu.no/skoge/prost/proceedings/ecce6_sep07/upload/386.pdf

REFERENCE

- [1] Araceli R, Juan G, Gabriel O & Maria M. *Journal of Hazardous Material* 2009; 172(2-3): 1311-1320.
- [2] Bechtold T, Turcanu A, Ganglberger E., & Geissler S. *Natural dyes in modern textile dyehouses — how to combine experiences of two centuries to meet the demands of the future?*. *Journal of Cleaner Production* 2003; 11(5): 499-509.
- [3] Bevilacqua T, Goncalves TF, Venturini CG & Machado VG. *Solute-solvent and solvent-solvent interactions in the preferential solvation of 4-[4 (dimethylamino)styr-Textile Dyeing: Environmental Friendly Osage Orange Extract on Protein Fabrics* <http://dx.doi.org/10.5772/54410229y1>]-1-methylpyridinium iodide in 24 binary solvent mixtures. *Spectrochim Acta, Part A* 2006; 65 (3): 535-542.
- [4] Bruce RL, Broadwood NV & King DG. *Kinetics of Wool Dyeing with Acid Dyes*. *Textile Research Journal*. 2000; 70 (6): 525-531.
- [5] Borland VS. *Natural resources: animal and vegetable fibers for the 21st century* American. *Textile. Industry* 2000; 29: 66-70
- [6] Bruce RL, Broadwood NV & King DG. *Kinetics of Wool Dyeing with Acid Dyes*. *Textile Research Journal*. 2000; 70 (6): 525-531.

- [7] Clementi C, Nowik W., Romani A, Cibin F & Favaro G. *A spectrometric and chromatographic approach to the study of ageing of madder (Rubia tinctorum L.) dyestuff on wool*. *Analytica Chimica Acta*. 2007; 596 (1): 46-54 230.
- [8] De Santis D. & Moresi M. *Production of alizarin extracts from Rubia tinctorum and assessment of their dyeing properties*. *Industrial Crops and Products* 2007; 26 (2):151-162.
- [9] Esra Kupeli, Ilkay Orhan, Gulnur Toker, & Erdem Yesilada. *Anti-inflammatory and antinociceptive potential of Maclura pomifera (Rafin.) Schneider fruit extracts and its major isoflavonoids, scandenone and auricularisin*. *Journal of Ethno pharmacology* 2006; 107 (2): 169-174.
- [10] Feng XX, Zhang LL, Chen JY, & Zhang JC. *New insights into solar UV protective properties of natural dyes*. *Journal of Cleaner Production* 2007; 15 (4): 366-372.
- Georgiou D, Melidis PAivasidis A & Gimouho-poulos K. *Dyes and pigments* 2002; 52 (2): 69-78.
- [11] Giles CH. & McKay RB. *The light fastness of Dyes*. *Textile Research Journal* 1963; 33 (7): 528-77.
- [12] Hameed BH & El-Khaiary MI. *Journal of Hazardous Materials*. 2008; 154(1-3): 639-648
- [13] Heba Mansour, *Textile Dyeing: Environmental Friendly Osage Orange Extract on Protein Fabrics*, chapter 8, <http://dx.doi.org/10.5772/54410>.
- [14] Kamel MM, El-Shishtawy RM, Youssef BM & Mashaly H. *Ultrasonic assisted dyeing. IV. Dyeing of cationised cotton with lac natural dye*. *Dyes and Pigments* 2007; 73 (3): 279-284.
- [15] Kongkachuichaya P, Shitangkoonb, A, & Chinwongamorna N. *Studies on Dyeing of Silk Yarn with Lac Dye: Effects of Mordants and Dyeing Conditions*. *Science Asia* 2002; 28: 161-166.
- [16] Mansour HF & Heffernan S. *Environmental aspects on dyeing silk fabric with sticta coronata lichen using ultrasonic energy and mild mordants*. *Clean Technologies and Environmental Policy*. 2010; DOI: 10.1007/s10098-010-0296-2.
- Mansour HF. *Environment and energy efficient dyeing of woollen fabric with sticta coronata*. *Clean Technologies and Environmental Policy*. 2009; DOI: 10.1007/s10098-009-0267-7
- [17] Mansour HF. *Ultrasonic Efficiency on the Photo Fading of Madder Dyed Silk Using Egg Albumen and Aluminium Ions Chelating*. 2009 6th International

Textile Conference, NRC, Egypt. Maiwa 2008.
<http://www.maiwa.com/stores/supply/mordants.html>

[18] Martins Teixeira D, Teixeira da Costa C. *Novel methods to extract flavanones and xanthenes from the root bark of Maclura pomifera*. Journal of Chromatography 2005; 1062: 175–181.

[19] Muhammad R A, Ahmed SA, and Muhammad K. *Solvent effect on the spectral properties of Neutral Red*. Chemistry Central Journal 2008; 2:2-19

[20] Nadiger GS, Kaushal Sharma P, & Probhaker J. *Screening of Natural Dyes*. Colourag 2004; 51, annual :130-137.

[21] Oliveira CS, Bronco KP, Baptista MS & Indig GL. *Solvent and concentration effects on the visible spectra of tri-para-dialkylamino-substituted triarylmethane dyes in liquid solutions*. Spectochim Acta, Part A 2002; 58 {13}2971-2982.

[22] Onal A. *Extraction of Dyestuff from Onion (Allium Cepa L.) and its application in the dyeing of wool, Feathered, Leather and Cotton*. Turkish Journal of Chemistry 1996; 20: 201.

[23] Padma Vankar S, Shanker R, Mahanta D & Tiwari SC *Ecofriendly sonicator dyeing of cotton with Rubia cordifolia Linn. Using biomordant. Dyes and Pigments*. 2006; 76 (1): 207-212.

[24] Patel B H, Agarwal B J, & Patel H M. *Novel padding technique for dyeing Babool dye on cotton*. Colourage 2003; January: 21–26.

[25] Singh R V. *Healthy hues. Down to Earth* 2002; 11: 25–31.

[26] Tian Li, Jack Blount W & Richard Dixon A. *Phenylpropanoid glycosyltransferases from osage orange (Maclura pomifera) fruit*. FEBS Letters 2006; 580: 6915–6920.

[27] Tsui LS, Roy WR & Gole MA. *Coloration Technology* 2003; 119 (1): 14-8.