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A critical review on extraction of natural dyes from leaves

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Abstract

Most of the synthetic dyes are noticeably found harmful and toxic. When used on textiles they can cause allergy, skin disease, cancer etc. so, there is need to produce natural dyes. Demand for natural dyes has been growing rapidly due to increased awareness on hazardous, toxic and allergic reactions associated with synthetic dyes. Natural dyes are obtained from natural sources such as plants, insects and minerals. Among all the plant based dye sources i.e. bark, leaves, flowers, seeds etc., leaf dye sources are more important for textile dyeing as it provides dye from the source which is found in abundance but still not fully utilized. This paper reviews the available leaf dye sources, application and extraction of coloring components and colors obtained on textile material after dyeing process.

Keywords: Natural dye, colourant, mordant and leaf dyes

Introduction

These days the environmental protection has become a challenge for the textile industry because it uses a fairly large number of chemicals for dyeing and printing. These chemicals are harmful for both human as well as environment. Synthetic dyes suffer from several drawbacks. Some of the synthetic dyes which are even carcinogenic and mutagenic have been banned. In this era of green minded consumer, interest in natural dyes has grown mainly because natural dyes have been shown to possess health-promoting and eco-friendly properties.

India is one of the 17 megadiverse countries and there is no doubt that the plant diversity is a treasure-house of diverse natural products. Two such products from nature are leaf and color. India is the well-known country of colors as it harbours a wealth of various leaf resources. The preliminary study on review collection on extraction of dyes from leaves revealed that leaves could serve as promising, alternate resource of natural dye. Fresh tree leaves of each species, supplemented with different coloring components, has ability to produce different colors on textiles. In the present study, an attempt has been made to provide valuable information on leaf dye extracted from natural resources.

Natural dyes

Natural dyes obtained from various sources. These dyes can be classified as:

- Natural dyes obtained from plants - Berry, flower, bark, leaf, seed etc. (e.g. Catechu, Indigofera, Myrobalan and Pomegranate).
- Natural dyes obtained from insects – Cochineal and lac.
- Natural dyes obtained from animal – Mollusk, murex snail, cuttlefish and shellfish.
- Natural dyes obtained from mineral – Clay, ochre and malachite.

A vast array of natural colorant exists in the above sources. These colors are exhibited by various colored pigments. Color of the pigment is due to chromophores present in dye yielding plants to display the hue of the color.

Mordants

Natural dyes require an element to create a bonding between fabric and the dye particle. The mordant is known as the element which aids the chemical reaction that takes place between the

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dye and the fibre, so that the dye is absorbed. A mordant is used to fix the dye to the fabric and to increase the color fastness.

There are three types of mordants:

- Metallic mordants- Metal salts of aluminum, chromium, iron, copper and tin
- Tannins – Myrobalan and sumac
- Oil mordants- Turkey red oil

Natural dyes obtained from plants

Many natural dyestuff and stains were obtained mainly from

plants. They are dominated as sources of natural dyes, producing different colors like red, yellow, blue, black, brown and a combination of these. Almost all the parts of the plants like root, bark, leaf, fruit, wood, seed, flowers etc. produce dyes. It is interesting to note that over 2000 pigments are synthesized by various parts of which only about 150 have been commercially exploited. Nearly 450 taxa are known to yield dyes in India alone ^[1], of which 50 are considered to be the most important. Some important dye yielding leaf plants habitats are given in the table 1.

Table 1: Leaf sources of different colored dyes and mordants ^[2-21]

S. No.	Plant	Appearance	Botanical name	Family	Colour obtained	Colouring components
1	Henna		<i>Lawsonia inermis</i> L.	Lythraceae	Brown	Alpha-naphthoquinone
2	Teak		<i>Tectona grandis</i>	Verbenaceae	Pink	Tectoleafquinone
3	Malabar nut		<i>Adhatoda vasica</i> nees	Acanthaceae	Yellow	2- pyridyl methyl amine
4	Chikrasi		<i>Chukrasia tabularis</i>	Meliaceae	Red, yellow	Flavones
5	European Lily		<i>Convallaria majalis</i>	Asparagaceae	Green	Flavonoid
6	Glastum		<i>Isatis tinctoria</i> Linn	Brassicaceae	Black, blue	Indican

7	Mango bark		<i>Mangifera indica</i>	Anacardiaceae	Yellow	Mangiferin
8	Peach		<i>Prunus persica</i>	Rosaceae	Many shades	Tannins and leucoanthocyanin
9	Stinging Nettle		<i>Urtica dioica</i>	Urticaceae	Green	Chlorophyll
10	Fire Flame Bush		<i>Woodfordia fruticosa</i>	Lythraceae	Pink and red	Lawson, 2-hydroxy naphthoquinone
11	Sweet Indrajao		<i>Wrightia tinctoria</i>	Apocynaceae	Blue	Indigo yielding Glucoside
12	Safed kikar		<i>Acacia leucophloea</i>	Mimosaceae	Red	Proanthrocynidin
13	Neel		<i>Indigofera cassioides</i> Rottl. ex DC.	Fabaceae	Blue	Indigo
14	Jamun		<i>Syzygium cuminii</i> (Linn.) Skeel	Myrtaceae	Red	Flavonol glycosides

15	Ber		<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Pink, red	Tannin,
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Conclusion

Due to increasing awareness among people about the harmful effects of synthetic dyes, products made from natural materials are gaining popularity. As natural dye shows non-toxic, non-allergic effects and results in less pollution as well as less side effects, it become a thrust area in the field of textile dyeing research. Although art of natural dyeing has been practiced for centuries in India, no serious attempts have been made to document and preserve this treasure of traditional knowledge of natural textile dyeing associated with the indigenous people.

In spite of being gifted with treasure of diverse flora and fauna, only a little has been exploited for the fulfillment of textile coloration. The study on review collected on natural dyes is an innovative approach towards documenting the treasure of indigenous knowledge on the utilization of resources of natural dye. Such research is collection, documentation and analysis of data on valuable leaf resources available for natural dyeing. It focuses on forming strategy for conservation of leaf dye resources.

References

- Iqbal J, Bhatti IA, Adeel S. Effect of UV radiation on dyeing of cotton fabric with extracts of henna leaves, Indian Journal of Fibre and Textile Research. 2008; 33:157-162.
- Deka B. Exploration of Plant Derived Natural Dyes in Assam, Asian Journal of Home Science. 2014; 9(1):17-20.
- The Wealth of India- A Dictionary of Indian Raw Material and Industrial Products – Raw Material Series, Revised series, Publications and Information Directorate, CSIR, New Delhi. 1988; I (1-9):1948-1975.
- Kokate CK, Purohit AP, Gokhale SB. *Pharmacognosy*, 12th Edition, Nirali Prakashan, 1999, 254.
- Pullaiah T. *Medicinal Plants in India*, Regency publications, New Delhi, 2002, 1, 2,
- Warriers PK, Nambiar VPK, Ramankutty C. (Editors), *Indian Medicinal Plants - A compendium of 500 species*, Orient Longman Ltd., Madras. 1995; I-IV:1994-96,
- Panda H. *Herbs Cultivation and Medicinal Uses*, National Institute of Industrial Research, New Delhi, 100-486.
- Khan I. *Role of Biotechnology in Medicinal and Aromatic Plants*, Ukaaz Publications, Hyderabad. 2001, I-III,
- Bhattacharjee SK. *Handbook of Medicinal Plants*, 3rd Edition, Pointer publishers Ltd. New Delhi, 1994; 15-73:118-239.
- Andrew, Chavellier, NHIMH. *The Encyclopedia of Medicinal Plants*, Dorling Kindersley, London, 1996, 162-192.
- Duke JA, Bogenschutz-Godwin MJ, Duccollier J, Duke PA. *Handbook of Medicinal Plants*. 2nd Edition, C.R.C. Press, Boca Rotton FL, 2002; 1(82):350.
- Chaudhari RD. *Herbal Drug Industry*, Eastern Publishers, New Delhi, 1999, 285-288.
- Dewick PM. *Medicinal Natural Products*, 2nd Edition, John Wiley and Sons Ltd., England, 2002; 164:251.
- Gazetteer of India, Maharashtra state, Botany, Revised Edition, Part III Miscellaneous Plants, 1961.
- Gulrajani ML, Gupta D. (Editors), *NCUTE Workshop on Dyeing and Printing of Natural Dyes*, 2001.
- Gulrajani ML, Gupta D. (Editors), *Natural Dyes and Their Applications to Textiles*, Indian Institute of Technology, New Delhi, 1992.
- Bains S, Kang S, Kaur K. Effect of combination of mordants on colour fastness properties of cotton dyed with peach (*Prunus Persica*) Dye, Man Made Textile. 2003; 46(6):230-233.
- Rastogi RP, Mehrotra BN. *Compendium of Indian Medicinal Plants*, Central Drug Research Institute, Lucknow and Publications and Information Directorates, New Delhi, 1960-1993, I-IV.
- Chopra RN, Nayar SL, Chopra IC. *Glossary of Indian Medicinal Plants*, CSIR, New Delhi, 1956, 52.
- The Merck Index XI, published by Merck and Company Inc., 1989; 721:1877-4853.
- PDR for Herbal Medicine, Medical Economics Company, New Jersey, 1st Edition, 1999; 772:1148.