Original Research Paper

Volume - 13 | Issue - 08 | August - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Textile Design

A REVIEW ON RECENT DEVELOPMENTS IN NATURAL DYE APPLICATIONS : A REVIEW

Sanjana. G* Research Scholar Department of costume design and fashion, PSG College of Arts and Science, Coimbatore. *Corresponding Author

Dr. R. Geetha Devi Supervisor and Assistant Professor Department of costume design and fashion, PSG College of Arts and Science, Coimbatore.

ABSTRACT A very vast amount of colours can be obtained from the natural sources such as plants, insects, animals, microbes. It has been scrutinized in recent for the use of different kinds/methods of application. The scope of natural dyes in traditional and advanced application has been greatly widening for their processing is eco-friendly and cost-efficient. This review encompasses the summary of research that has been performed in last 15 years with the different types of application of natural dyes. Review also explains the specific reference of technical development in natural textile dyeing and use of natural dyes in finishing of textiles.

KEYWORDS : Natural source, Eco-friendly, Application, Development

1.INTRODUCTION

The industries of textile have huge variety of synthetic dyes. There are different types of reactive dyes of fabric dyeing in cotton fabric. This requires a very huge amount of water which creates environmental pollution. According to the survey it is said that synthetic dyes have hazardous characteristics. To avoid the pollution and hazardous health, it is essential for the alternative ideas of synthetic dyes. This would make our environment and hazardous safe. The alternative solution for this environmental degradation is natural dyes. There are so many sources for natural dyes. It can be obtained from plants, animals, insects, fruits and vegetables. Some of the sources of natural dyes are discussed below[1]

2. An Overview Of Natural Dyes

Classification of natural dyes based on sources[2]

1. Vegetable source
2. Biological and animal source
3. Mineral source

2.1.Vegetable Source Of Natural Dye

The best source of vegetable natural dyes are onion skin, red cabbage, teak leaf, peppermint leaf, carrots, gamboges tree, chestnut hulls, hibiscus, bamboo, beets, red and pink roses, etc,. Also fruit dyes are pomegranate rind, lichen, gold lichen, berries, cherries, black berries, myrobalan fruit.

Root Source Of Natural Dye

The best source of root dyes are turmeric, madder root, logwood, sorrel roots, iris root, etc,.

2.2. Biological Source Of Natural Dyes

Cochineal insects	red, purple, scarlet, crimson
Cow urine	Indian yellow
Lac insect	red, violet
Murex Snails	purple
Octopus	sepia brown

2.3. Mineral Source Of Natural Dye

The dyes which are obtained from natural earth pigments are mineral source natural dyes. The properties of these source are tinctorial by the presence of oxides or hydrate oxides of manganese. Since they are insoluble in water there is a necessary of binder for fibre surface. Many mineral colorants are poisonous in nature, they have limited applications. Colours obtained from this are extremely resistant to light[5] . Some of the mineral dyes are as follows: chrome yellow, iron buff, nankin yellow, Prussian blue, manganese brown.

3. Comparison Between Natural And Synthetic Dye

3.1.Natural Dyes

They are costlier compared to Synthetic dyes, since they cannot produce large in quantities. The application process of natural dye is less costly than synthetic. Natural dyes produce wide range of good lustrous, gentle, soft and biodegradable colours. By using different types of mordants different kinds of colours can be made with natural dyes. These dyes help to preserve environment and it is completely biodegradable. Mordants are required for some natural dyes. Natural dyes do not contain any kind of toxic or chemical additives substance. [5]

3.2. Synthetic Dyes

They are easy to produce and its cheaper. These dyes produce major effect on environment and labourers. The integral part in garment industry is chemical dyes. These synthetic dyes contain toxic substances that can cause skin allergies and irritations. These dyes allow in immense volume of production in textile apparel industry and provides consistent colouring results. Petroleum – based dyes are hazardous to the ocean and these result in deaths of many animals, Since most waste and residues of these chemicals ends in seas and oceans.

4. Characterisation Of Natural Dyes

There is a need of standardized dyeing technique for the characterization of natural dyes.

4.1.UV- Visible spectroscopy

It is to identify the ability of dye to absorb UV wavelength and fading characteristics of dyes. It is helpful in deciding the hue of a dye.

Name of the dye	Wavelength of maximum absorption
Neem bark extraction	275 & 374 nm
Beet sugar	220, 280 & 530 nm
Ratanjot at acidic pH	520 & 525 nm
Alkaline Ph	570, 610 & 615 nm
Red sandal wood	288 nm

4.2.Chromatographic technique

It is a technique in which it enables the separation, identification and purification of the components of a mixture for qualitative and quantitative analysis. The dye-ligand affinity chromatography often uses **triazine dyes** to purify albumin and blood proteins as well as enzymes and pharmaceutical proteins.[3]

5. Natural Dyes And Pigment – Current Scenario

At present synthetic colorants are used widely by humans for various applications. However this effects the human health and environment. Natural dyes avoids the bad effects of the dye, so that there is need of many researchers to optimize the production of natural dyes. The usage of natural mordants may increase the effect of colorants. At present natural dyes are used in all fields.[4]

6. New Application Of Natural Dye

In future anti microbial will play a major role in natural dyes of textiles, U.V. Shielding textiles, deodorizing finishing, insect-repellant textiles. Applications of natural dyes and pigments are also used in :

- Cell imaging – beetroot dye
- Dye- sensitized solar cells – chlorophyll pigment kratom
- Indicator substances – grape peel extract
- Biosensors - indigo
- Cancer therapy – punica granatum
- Corrosion inhibitors – berberine

7. CONCLUSION

This work provides a review of the recent developments in natural dye and application. The details of natural colorants, pigments, current scenario, new application has been discussed. The major conclusion are followed:

1. A brief history of natural colorants and their classification.
2. Extraction methods from where the dyes are.
3. Substitute of synthetic colorants and their biodegradability.
4. Some of the newer application.
5. Availability of natural dyes from plants, animals, biological, mineral.
6. Use of natural mordant's for increased coloration.

REFERENCES

1. Arun Guha, southeast university Bangladesh, January 2019, "a review on sources and application of natural dyes in textiles", research gate publication.
2. Md. Imran Hossian, February 26, 2021, "Sources and applications of natural dyes", textile focus, focusing textile and apparel.
3. Virendra Kumar Gupta, 22 December 2019, "Fundamentals of natural dyes and its application on textile substrates", Intechopen .
4. Shailendra Yadav, Kanha Singh Tiwari [a], Chitrasen Gupta [b], Mahendra Kumar Tiwari [c], Arbaj Khan [a], Sankatha P. Sonkar [a]

a Department of chemistry, basic science, AKS University, Satna 485001, MP, India
b Department of chemistry, Kutir P.G. College, Chakkey, Jaunpur 222146, UP, India
c Department of Environmental Science, AKS University, Santa 485001, MP, India

5. https://themazi.com/blogs/news/natural-dyes-vs-synthetic-dyes-8-differennces
3. https://www.intechopen.com/chapters/70564