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A Study of Extraction and Analysis of Dye Yielding Plants

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Abstract:

In moderate as well as ancient India concern the present research work focus on the information about dye yielding plants and producing a natural dyes. In this study near about ten different plants utilizing as a sources of natural dye. The main sources of natural dyes were plant parts like wood, bark, root, rhizome, leaves, flower, and tubers were used to produce different colors and their combinations. In this study number of dyes used for coloring the cotton and wool.The die yielding plants obtained various colors that are treated with cooking salt and finalized the proper color from them.The dye yielding plants also plays a significant role in medicine and also the common as well as civilization people utilizing this for many other purposes. In earlier period the natural dyes increased demand for their beneficial properties, awareness, prevent all from harmful effect and environmental pollution throughout the world. In various purposes the natural dye application plays a very important role in food products, textiles and cosmetics industries. Previously the ancient people moreover utilize the natural dye for coloring the fabrics but after the invention of synthetic dye plays a alternative role to natural dye in 1856.

Key Words: Kutch, Teak, Turmeric, Henna, Palas, Dye Yeilding Plants.

Introduction:

Throughout the worldin 2600 BC first natural dye was recorded. Dyes can be defined as chromophoric substances with a capacity to interact chemically or physically with substrates, leading to selective absorption of specific wavelengths of light and resulting in a display of color. Dyes are essential compound used in various industries including food, medicine, textiles, cosmetics,leather, wood, wool, silk, cotton, flax,paper, ink,pharmaceutical industries and printings to coloring the various substrate, also in other various important materials, required for human life.From thousands of year human utilized color to cloth for their ornamentation. Near about since 4000 years the Egyptian people utilize the dye for their brighten clothes. The use of natural dyes and pigments was uninterrupted until mid of 19th century, after synthesis of first synthetic dye mauve or aniline purple in 1856 by William Henry Perkin.

Many synthetic dyes have been synthesized and their production industries developed due to their high durability, large color range, and easy application and low cost of dyes. With respect to cost, the production of natural dyes is labor-intensive and time consuming requiring more

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human intervention. On the other hand, the production of synthetic dyes is generally cost-effective since the raw materials are readily available, and the manufacturing processes are highly efficient.The biodiversity of our country gives different types of basic ingredients but sustainable connection create between their utilization, cultivation and gathering. Our country's abundant biodiversity has given us access to several different types of basic ingredients, but there must be a sustainable connection established between their cultivation, gathering, and utilization.

In the world more than five hundred species obtained and gifted us from the different types of nature.Till the 19th century natural dyes were used to coloring of textiles from ancient time. The dyeing is a old fashion our civilization people.The natural dyes are obtained from a nature, including plants like log wood, kutch, oak, teak, manjista, turmeric, indigo, henna, saffron, and palas, animals like mollusks and shellfish, microbes such as rhodococcus, pseudomonas, and bacillus, minerals like clay, ochre and ferrous sulfate and insects such as lac scale insects and cochineal beetles.

Number of dyes plants considered as medicinal plants, earlier research study show that the dyes plant having antibacterial effect, the characteristic of antibacterial activity in the textile industry help the textile material live as it is longer time. In the Asian and other several countries the textile industry plays an major significant role in their own economy. In India production dyestuff in large scale near about 80%, various type of dye and pigment produced that is in the form of 80,000 ton per year, after the China, India is the second largest exporter of dyestuff throughout the world. Many regions of the world the natural dye is produced from their natural resources that is available in that region.Author are focus on to the study of dying the textile fabrics which was extracted the dye from different plant parts come under the drought prone areaof Sangola tehsil district solapur, Maharashtra. However till today no one of the agencies, researcher to study of dye yielding plants from this area, also none of any research is carry out due to this aspect consider this study from the said area.

History of Dyes

To coloring the various type of materials dye are utilized by human from thousands of years.When the development of weaving process and from the stone age many ancient civilization peoples are utilized dyes. The main sources of natural dyes were plants, animals and minerals, the plant parts like root, leaves, bark, wood, flower, seed, and fruits were used to produce different colors and their combinations. Number of dyes used for coloring the flax, grasses, human hair, wool, hemp, cotton, linen, animal hides, pottery, threads and yarns. In Neothilic times and date back dyed textiles that studied by Archeologists. In South Israel and Timna valley ancient copper and ore mining sites have been uncovered from around the 10,000 BCE. The other Archeologists invented 30, 000 year old flax textiles studied in Dzudzuana cave located in Caucasus area in Georgia and Europe. Flax can be dyed using various colors including Khaki, brown, green, violet, black, blue, red and yellow.

In Indian ancient history dye plays an significant role to gives number of dyes and techniques for achieving the vibrant colors, to fixed the particular dyes they also develop various processes and mordants. In European country Indian textiles were highly prized across the world. The

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plant *Indigofera tinctoria* give blue dye which is highly cultivated in India, Africa and Asia. The Chinese inventor the Ming (1368–1644) and Qing (1644–1911) in the subsequent years put in front of us the detailed study about the types of dye, their processes and dyeing methods. In a 2000 years Japan gives us technique about the dyeing materials i.e. wood, textiles and paper and in the 7th century make a record about the textiles dyed with blue, red and other colors. In South East Asia Batik is a wax resistance dye occurs in several places throughout the world, Indonesia and Java is native places of Batik dye, Unesco in 2009 recognize Indonesian Batik.

Egyptian and Persian country produce red dye from Madder, yellow dye from Safflower, blue dyes from Indigo and purple dye from Murex for coloring the linen textile and fabrics. The Batik and tie dyeing techniques develops in African countries with the help of earth, annatto, indigo and brown color.In ancient time Roman, Greek and civilization peoples are utilized plant and animal for dyeing the textile. The plant material are used civilization people from British Isles and Western Europe to create diverse dye colors. Indigenous Northern Americans peoples used number of plants to create wide range of dyes colors mainly from black walnut, alder, bloodroot, sumac and cottonwood. From the thousands of years the Australia produce dyes from plants, animals and minerals to coloring the fibers used in textiles knotting, basket weaving and many other products.

Objectives of Dyes

1. In shortest possible time fix the color.

2. Isolate the dyes from root, rhizome, tubers, leaves, bark, wood, leaves, flower and fruits.

3.To dye food, medicine, textiles, cosmetics,Cloth,leather, wood, wool, silk, cotton, flax,paper, ink,pharmaceutical industries and printings to colouring the various substrate.

4.To study the application of natural dyes on textiles fabrics.

5. To study and use the various type of mordants.

6. Using minimum prize dyes and dyeing procedure for coloring the substrate.

Material and Method

Collection of plant material

The wood of (Kutch) *Acacia catechu* (L.) Willd., Oliv., Bark of (Teak) *Tectona grandis* L.f.,Root and Rhizome of (Termeric) *Curcuma longa* L.,Leaves of (Heena) *Lawsonia inermis* L., floral parts of (Palas) Butea monosperma(Lam.) Taub.,(Gokarna) *Clitoria ternatea* L., (Jangal Jyot) *Ixora coccinea* L., (Zendu) *Tagata erecta* L., tubers of (Beetroot) *Beta vulgaris* L. and Leaves of (Korpad) *Aloe barbadensis* L. all the plant collection made in Sangoa, District Solapur, Maharashtra, India. The plant specimens was identified by inventor Tembhurne et. al.

Extraction of Dye

Extraction of dye is made in between collected plant specimens. Take a 100 gms of the cleaned samples of plant material for crushed and dissolved in high degree of purity of water near about

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2 hrs for rapid extraction, the total color was extracted after the two hrs, double filter it and then use for further study.

Dyeing Materials

dye food, medicine, textiles, cosmetics,Cloth,leather, wood, wool, silk, cotton, flax,paper, ink,pharmaceutical industries and printings to coloring the various substrate.

Chemical Used

In the present study researcher utilizing Cooking Salt for mordant the cotton and wool.

Mordant dyeing

Cotton and Wool were treated with the chemical like cooking salt for mordants. The extract filtered very well and that are used for dying cotton and wool. Those material used for dyeing that are washed carefully with clean water. The material transmit in following chemical and boil it for 1 hr. at 40°C, 50°C, 60°C and 70°C temperature subsequently. All the material then transferred into the dye bath for 1 hr. then dried with the help of sunlight. After the sundried material further identified its color and finally wash with 15% soap water.

Result and Discussion

Research team select and collect moreover ten dye yielding plants from different study area of tehsil Sangola, Solapur, Maharashtra. Main object of this study to extract natural dye from the various plants parts like tubers, rhizome, roots, wood, barks, leaves and flowers. The practically extraction is carried out in the laboratory to giving heat to various plant parts near about 2 hrs, after two hours cool the extraction and filterate it properly. Then wool and cotton deep inside them for coloring and finally recorded the proper color before and after the mordant. In ancient time natural dye are utilized in large scale in the textile but when the invented of synthetic dye in 1856 the rate of natural dye decreased. In this experimental study Brown color produced from wood of Kath (Acacia catechu (L.) Willd. Oliv.), Yellow color obtained from Bark of Sagwan (*Tectona grandis*L.f.), Leaves of Korpad (*Aloe barbadensis* L.) and Root of Halad (*Curcuma longa*L.), Leaves of Mehandi (*Lawsonia inermis*L.) gives red-orange color, Yellow/orange color obtained from Flower of Palas (*Butea monosperma*(Lam.) Taub.), Blue color produced from Flower of Gokarna (*Clitoria ternatea* L.), Red color obtained from Flower of Ixora (*Ixora coccinea* L.), Yellow or orange red color obtained from Flower of Zendu (*Tagata erecta* L.)and Purple red color produced from Tubers of Beet root (*Beta vulgaris* L.) respectively.

Table No.1 Showing the diversity of Dyes Yeilding Plants from Sangola, Solapur District, Maharashtra, India.

Sr. No's	Scientific Name	Family	Vernacular Name	Medicinal Uses	Part Used	Color
1	*Acacia catechu* (L.) Willd., Oliv.	Fabaceae	Katha	Skin disease	Wood	Brown
2	*Tectona grandis*L.f.	Lamiaceae	Sagwan	Brochitis	Bark	Yellow

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3	*Curcuma longa*L.	Zingiberaceae	Halad	Cough	Root and Rhizome	Yellow
4	*Lawsonia inermis*L.	Lytharaceae	Mehandi	Hair dye	Leaves	Red-Orange
5	*Aloe barbadensis* L.	Liliaceae	Korpad	Soap	Leaves	Yellow
6	*Butea monosperma*(Lam.) Taub.	Fabaceae	Palas	Anthelmintic	Flower	Yellow/Orange
7	*Clitoria ternatea* L.	Fabaceae	Gokarna	Liver problem	Flower	Blue
8	*Ixora coccinea* L.	Rubiaceae	Jangal Jyot	Respiratory	Flower	Red
9	*Tagata erecta* L.	Asteraceae	Zendu	Digestive problem	Flower	Yellow or Orange Red
10	*Beta vulgaris* L.	Amaranthaceae	Beetroot	Improve blood	Tubers	Purple red

Dye Yielding Plants Dyeing of Clothes

Research Team

Acacia catechu (L.) Willd., Oliv.

*Tectona grandis*L.f.

Wool **Cotton**

Cooking Salt

Wool and Cotton

Cooking Salt

Wool **Cotton**

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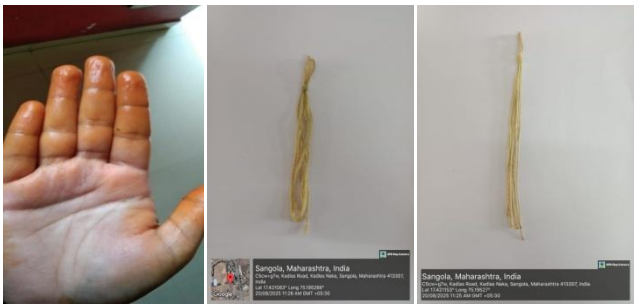
Curcuma longa L. Cooking Salt

Finger **Wool**

Cotton



*Lawsonia inermis*L. **Cooking Salt**

Wool **Cotton**

Aloe barbadensis L. **Cooking Salt**

Wool **Cotton**

Butea monosperma(Lam.) Taub. Cooking Salt

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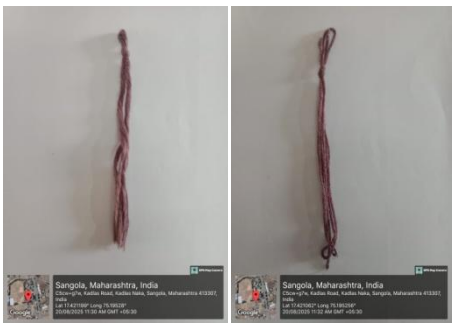
Wool **Cotton**

Clitoria ternatea L.

Cooking Salt

Wool **Cotton**



Ixora coccinea L.

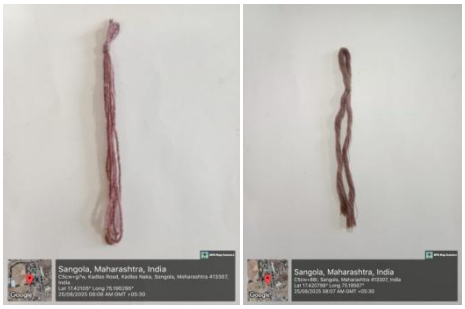
Cooking Salt

Wool Cotton

Tagata erecta L.

Cooking Salt

Wool Cotton



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Beta vulgaris L. Cooking Salt

Conclusion

In the present investigation dyes are extracted from the various ten plants from the said area. Among this plants (Brown) Acacia catechu (L.) Willd. Oliv.), (Yellow) *Tectona grandis*L.f.), *Aloe barbadensis* L. and *Curcuma longa*L.,*Lawsonia inermis*L. (red-orange), (Yellow/orange) *Butea monosperma*(Lam.) Taub.), (Blue) *Clitoria ternatea* L., (Red) *Ixora coccinea* L., (Yellow or orange red) *Tagata erecta* L. and (Purple red) *Beta vulgaris* L. The cotton and wool treated with salt it gives various good colors after washing with fresh water. At the end of this study investigators gives the proof of use of natural dyes throughout the world should be increased and that prohibited the synthetic dyes with other harmful effects. In the textile industries natural dyes are the best alternative for natural colorants so that textile industries focus on natural dyes to achieve and eco friendly responsive for production process. During the 18th century A. D. French reported that the Indian cotton painting were extracted from rind of fruit.In India, availability of minerals, animals and dye yielding plants shows the rich diversity. Thus, large production can be achieved after advancement in cultivation.The natural dyes extracted in many countries like Egypt, Italy, China and India. The rich diversity of plant species offers a vast palette of colors and properties that can be effectively harnessed in printing,food applications,textile and cosmetics.

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