



Documentation on some dye-yielding plants in Ranchi District of Jharkhand

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Abstract: Extensive field trips were carried out to different village/ agriculture fields of Ranchi district and location near Ranchi University campus. Plant biodiversity of Ranchi District is rich and abundant wealth of functional germplasm resources and plant kingdom is a treasure-house of various natural products. Dyes are one of the natural products obtained from plants. The worldwide demand for natural dyes is nowadays of great interest due to the increased awareness on therapeutic properties of natural dyes among the public. Natural dyes are derived from naturally occurring sources such as plants, insects, animals and minerals. The structure and functional properties of natural dyes have been identified in the recent past. Some dyes extracted from plants have important medicinal properties like; antimicrobial activities, antifungal activities. Main objective of this paper to write the literature which is related with survey and documentation of dye-yielding plants found in Ranchi district, Jharkhand. These efforts can be helpful the development of pharmaceutical formulations.

Keywords: Dyes, Medicinal values, Natural dyes.

INTRODUCTION

The plants are used not only for maintaining the basic life sustaining needs like food, fuel, shelter, but also for making clothes and natural dye for colouring the clothes.¹ The worldwide demand for natural dyes is nowadays of great interest due to the increased awareness on therapeutic properties of natural dyes among the public. Natural dyes are derived from naturally occurring sources such as plants, insects, animals and minerals. The use of natural products for therapeutic use is as ancient as human civilization and for a long time, minerals, plants and animal products were the main sources of drugs.²

Among all the natural dyes, plant-based pigments have a wide range of medicinal values. Many of the plants used for dye extraction are classified as medicinal and some of these have recently been shown to possess remarkable antimicrobial activity.³⁻⁷

Natural dyes are not only used to impart colour to an infinite variety of materials such as textile, paper, wood, etc. but they are also widely used in the cosmetics, food, and pharmaceutical industry. Many plant and animal/ insect sources have been identified for the extraction of colour and their diversified use in textile dyeing⁸⁻¹⁰ and functional

finishing¹¹⁻¹³, food colouration¹¹, cosmetics¹⁴. They have a wide range of medicinal importance in the pharmaceutical industry.¹⁵ Apart from dye-yielding properties, some plants are also used traditionally for medicinal purposes.¹⁶

Natural dyes are environment-friendly. For example, turmeric, the brightest of naturally occurring yellow dyes is a powerful antiseptic, which revitalizes the skin. Another natural dye, wild indigo gives a cooling sensation.¹⁷

However, researches have shown that synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to human health. In 1996, Germany became the first country to ban certain azo dyes.¹⁸

Natural dye-yielding plants are found in many places of Jharkhand but research on their medicinal potential is still lacking. Unfortunately, no serious attempt has been made to document and preserve this eminent treasure of traditional knowledge of natural dye making associated with the indigenous people. The main objective of this paper is to write the literature which is related with survey and documentation of dye-yielding plants found in the Ranchi district, Jharkhand. These efforts can be helpful in the development of pharmaceutical formulations.

Study Area

The study was conducted in the Ranchi District of Jharkhand and its surrounding native areas (Fig. 1). Ranchi, the beautiful green city of waterfall, lakes and dense forest, is the capital of the Indian state of Jharkhand and is located on latitude 23.23° North and longitude 85.23° East at a mean elevation of 2100 feet above the sea level.



Fig. 1- Ranchi District in Jharkhand

METHODOLOGY

Extensive field trips were carried out to different village/ agriculture fields of the Ranchi district location near Ranchi University campus. The plants specimen was photographed and identified with the help of different flora. The herbarium of collected specimen were also made by proper methods. Chemical constituent of investigated plants was studied by reference books and eminent authors.

The tribals of Jharkhand use a variety of plants in their daily life for food, medicine, shelter, clothes, etc. However, little is documented on medicinal uses of a wide variety of plants used by the tribals. This provides sufficient scope of research in this area.

RESULTS & DISCUSSIONS

During the survey, there is documentation of 16 dye-yielding plants with their medicinal value which is mentioned in table number 2. Today, dyeing is a complex and specialized discipline. Nearly all dyestuff is now produced from synthetic compounds. Some of the synthetic dyes are found to be associated with health hazards affecting human life causing skin diseases and pulmonary problems.¹⁹

Information regarding the different plants used for dye-yielding purpose, their properties, uses and effectiveness are collected through personal interview with the farmers and villagers. Plants were collected, made into herbarium, identified using local floras.

Natural dyes are less toxic, less polluting, less health hazardous, non-carcinogenic and non-poisonous.²⁰ Natural dyes do not pose a threat to the health of users, which is not the case with synthetic dyes. Moreover, natural dyes are commonly available and because of their availability at cheaper cost these are within the reach of common man.

Many of the plants used for dye extraction are classified for medicinal use. They have a wide range of medicinal importance in the pharmaceutical industry. So, the present study would be beneficial for society by throwing light on several unexplored potentialities of dye-yielding plants grown in Ranchi district.

Existing documented works suggest that natural dye-yielding plants have a wide range of medicinal importance to the pharmaceutical industry. Natural dyes find use in the colouration of textiles, food, drugs and cosmetics. These plants have also been reported to exhibit inhibitory activities against different fungi and bacteria. Antioxidant activity of natural dye has also been reported. Medicinal uses of various types of natural dye-yielding plants include treating skin disorder, diarrhoea dysentery, cancer, cough, tumour, etc.

Table 1- Plants taxa collected from different areas of Ranchi District

S.No.	Plants Species	Places of Collection	Dates of Collection
1	<i>Lawsonia inermis</i> L.	Vikas Vidyalaya Ranchi	05.09.2021
2	<i>Bougainvillea glabra</i>	Vikas Vidyalaya Ranchi	05.09.2021
3	<i>Nyctanthes arbour tristis</i>	Vikas Vidyalaya Ranchi	25.10.2021
4	<i>Hibiscus rosa-sinensis</i> L.	Vikas Vidyalaya Ranchi	05.09.2021
5	<i>Hibiscus sabdariffa</i>	Vikas Vidyalaya Ranchi	06.01.2022
6	<i>Tagetes erecta</i> L.	Vikas Vidyalaya Ranchi	10.09.2021
7	<i>Mallotus philippensis</i> Muell.	Vikas Vidyalaya Ranchi / Ranchi University Ranchi Campus	18.02.2022
8	<i>Helianthus annuus</i> L.	Vikas Vidyalaya Ranchi	25.10.2021
9	<i>Spathodea companulata</i>	Nucleus Mall Ranchi	02.03.2022
10	<i>Allium cepa</i> L.	Vikas Vidyalaya Ranchi	06.03.2022
11	<i>Bixa orellena</i> L.	Vikas Vidyalaya Ranchi / Ranchi University Ranchi Campus	18.02.2022
12	<i>Butea monosperma</i> Lam. Taubert.	BIT Mesra, Bundu	20.03.2022
13	<i>Solanum lycopersicum</i> L.	Vikas Vidyalaya Ranchi	05.03.2022
14	<i>Artocarpus heterophyllous</i> Lam.	Vikas Vidyalaya Ranchi	02.03.2022
15	<i>Curcuma longa</i> L.	Vikas Vidyalaya Ranchi	22.02.2022
16	<i>Punica granatum</i> L.	Vikas Vidyalaya Ranchi	25.10.2021

Table 2- Some important dye-yielding plants with its medicinal values and pictures

Details	Pictures
<p>Botanical Name: <i>Lawsonia inermis</i> L. (Fig. No. 2) Family Name: Lythraceae Common Name: Henna Habit: Shrub Parts used: Leaves Colour Obtained: Red-orange Medicinal Uses: Antibacterial, antifungal, anti-parasitic, antiviral, anticancer, antidiabetic, anti-inflammatory, antifertility and wound healing properties.</p>	 <p>(Fig. No. 2)</p>
<p>Botanical Name: <i>Bougainvillea glabra</i> (Fig. No. 3) Family Name: Nyctaginaceae Common Name: Bougainvillea Habit: Evergreen climber Parts used: Flowers Colour Obtained: Grey Medicinal Uses: To treat diarrhoea, reduces acidity, cough and sore decoction of dried flowers for the blood vessels and leucorrhoea and decoction of the stem in hepatitis.</p>	 <p>(Fig. No. 3)</p>
<p>Botanical Name: <i>Nyctanthes arbour tristis</i> Linn. (Fig. No. 4) Family Name: Oleaceae Common Name: Harsingar (Night Jasmine) Habit: Tree Parts used: Flowers Colour Obtained: Yellow Medicinal Uses: It provides treatments for Dengue, Chikungunya, Malaria and Arthritis. It prevents gas, radical damage, treats cough, fights breathing problems, etc. Additionally, it has anti-bacterial, anti-viral and anti-fungal properties which make it fight various infections in the body.</p>	 <p>(Fig. No. 4)</p>
<p>Botanical Name: <i>Hibiscus rosa-sinensis</i> L. (Fig. No. 5) Family Name: Malvaceae Common Name: Chinese hibiscus Habit: Evergreen shrub Parts used: Flowers Colour Obtained: Deep red Medicinal Uses: Treatment in swelling, pain, mumps, fever.</p>	 <p>(Fig. No. 5)</p>
<p>Botanical Name: <i>Hibiscus sabdariffa</i> (Fig. No. 6) Family Name: Malvaceae Common Name: Kudrum / Roselle Habit: Herb or Woody-based subshrub Parts used: Fruits / Calyxes Colour Obtained: Red Medicinal Uses: Used to lower blood pressure, relieve dry coughs, and topically treat skin afflictions.</p>	 <p>(Fig. No. 6)</p>

<p>Botanical Name: <i>Tagetes erecta</i> L. (Fig. No. 7) Family Name: Asteraceae Common Name: Marigold Habit: Herb Parts used: Flowers Colour Obtained: Dark yellow Medicinal Uses: Internally to treat indigestion, colic, severe constipation, dysentery, cough, and fever and externally to treat sores, ulcers, eczema, sore eyes and rheumatism.</p>	
<p>Botanical Name: <i>Mallotus philippensis</i> Muell. (Fig. No. 8) Family Name: Euphorbiaceae Common Name: Kamala tree Habit: Evergreen tree Parts used: Fruits Colour Obtained: Red Medicinal Uses: Treatment of bronchitis, abdominal diseases, spleen enlargement, etc.</p>	
<p>Botanical Name: <i>Helianthus annuus</i> L. (Fig. No. 9) Family Name: Asteraceae Common Name: Wild Sunflower Habit: Herbs Parts used: Flower, leaves and seeds Colour Obtained: Red, Deep Purple and White Medicinal Uses: Flower tea is used for lung ailments and malaria. Leaf tea reduces high fevers and has astringent properties. Leaf poultice may be used on snakebites and insect bites. Leaves are also diuretic and expectorant, as are seeds.</p>	
<p>Botanical Name: <i>Spathodea companulata</i> (Fig. No. 10) Family Name: Bignoniaceae Common Name: African Tulip, Rugtoora Habit: Tree Parts used: Flower Colour Obtained: Brown Medicinal Uses: Used for treatment of malaria, diabetes, stomach, ulcers, wounds, skin infections and viral diseases.</p>	
<p>Botanical Name: <i>Bixa orellana</i> L. (Fig. No. 11) Family Name: Bixaceae Common Name: Sindoor Plant / Lipstick tree Habit: Tree Parts used: Seeds Colour Obtained: Orange, Red Medicinal Uses: Used for diabetes, diarrhoea, fevers, fluids retention, heartburn, malaria and hepatitis.</p>	
<p>Botanical Name: <i>Butea monosperma</i> Lam. Taubert. (Fig. No. 12) Family Name: Fabaceae Common Name: Flame of the forest / Palash Habit: Small Tree Parts used: Flowers Colour Obtained: Yellow, Orange Medicinal Uses: Used for piles, tumour and menstrual disorders, Gum is astringent and used in diarrhoea.</p>	

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<p>Botanical Name: <i>Allium cepa</i> L. (Fig. No. 13) Family Name: Amaryllidaceae /Liliaceae Common Name: Onion Habit: Herbs Parts Used: Skins Colour Obtained: Yellow, Orange Medicinal Uses: Onion is used for treating digestion problems including loss of appetite, upset stomach, and gallbladder disorders; for treating heart and blood vessels problems including chest pain(angina) and high blood pressure; and for preventing atherosclerosis.</p>	 <p align="center">(Fig. No. 13)</p>
<p>Botanical Name: <i>Solanum lycopersicum</i> L. (Fig. No. 14) Family Name: Solanaceae Common Name: Tomato Habit: Herbs Parts Used: Fruits Colour Obtained: Red Medicinal Uses: Antibacterial, antifungal, anti-mutagenic, used in prostate cancer.</p>	 <p align="center">(Fig. No. 14)</p>
<p>Botanical Name: <i>Artocarpus heterophyllous</i> Lam. (Fig. No. 15) Family Name: Moraceae Common Name: Jackfruit Habit: Tree Parts Used: Leaves and Wood Colour Obtained: Yellowish Brown & Bark Brown Medicinal Uses: Anti-aging, Diabetics, Detoxification, Anti-oxidants, Control blood pressure and weight losses.</p>	 <p align="center">(Fig. No. 15)</p>
<p>Botanical Name: <i>Curcuma longa</i> L. (Fig. No. 16) Family Name: Zingiberaceae Common Name: Turmeric Habit: Herbs Parts Used: Roots/ Rhizomes Colour Obtained: Yellow Medicinal Uses: Anti-oxidant, anti-inflammatory, anti-cancer, anti-fungal, anti-bacterial effects and anti-septic agent.</p>	 <p align="center">(Fig. No. 16)</p>
<p>Botanical Name: <i>Punica granatum</i> L. (Fig. No. 17) Family Name: Punicaceae / Lythraceae Common Name: Pomegranate Habit: Shrubs Parts Used: Fruits Colour Obtained: Yellow Medicinal Uses: Fruits contains anti-carcinogenic, anti-microbial and anti-viral compounds.</p>	 <p align="center">(Fig. No. 17)</p>

CONCLUSION

From this research work, it can be concluded that due to their non-toxic properties, low pollution and less side effects, natural dyes are used in day-to-day food products. Unfortunately, no serious attempts have been made to document and preserve this immense treasure of traditional knowledge of natural dye-making associated with the indigenous people.

To conclude, there is an urgent need for proper collection, documentation, assessment and characterization of dye-yielding plants and their dyes, as well as research to overcome the limitation of natural dyes.

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