

AQUATIC AND MARSHLAND DYE YIELDING PLANTS AND THEIR ETHNO-MEDICINAL USES FROM JHARGRAM DISTRICT, WEST BENGAL, INDIA

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ABSTRACT ■ Jhargram district is famous for its unique geographic location resulting into amalgamation of rich cultural and traditional aspects from different societies, castes, creed, and beliefs. The philosophy of use and conservation of medicinal and the dye yielding plants has evolved with the social and cultural groups of human beings. During survey 15 dye yielding plants belonging to 10 families were identified which are distributed in various aquatic and marshy places of Jhargram district. The dyeing parts of the plants are used by the local ethnic communities for various domestic purposes. People of different ethnic group of this district used these plants for the treatment of various human ailments. It has been known that these natural dyes are not harmful and eco-friendly. The present investigation focus about the intensive studies that have been conducted for documentation of the traditional knowledge and to assess the distributional pattern and present status of medicinally used dye yielding plants of this district. Conservation and judicious utilization of dye yielding plants is an urgent need for protection and preservation of biodiversity in this region.

Key words: Ethnic communities, natural dye plants, medicinal uses, Jhargram district

INTRODUCTION

Jhargram district was formed on 4th April, 2017, after bifurcation from Paschim Medinipur district as the 22nd district of West Bengal. From time immemorial, colour has an important criterion for acceptability of products like textile, cosmetics, foods and other items (Roy *et al.* 2008). In Europe, it was practiced during the Bronze age. The earliest written record of the use was found in China dated 2600 BC (Gokhle *et al.* 2004). In Indian subcontinent, dyeing was known

even in the Indus valley period (2500 BC) and had been substantiated by findings of coloured garments of cloth and traces of madder dye in the ruins of Mohenjo-Daro and Harappa civilization (3500 BC) (Aberoumand, 2011). Archaeological evidences show that dyeing was a widespread industrial enterprises in Egypt, India and Mesopotamia around third millennium BC (Roy, 1978). Use of natural colour in food known from Japan in the Shosoin text of the Nara period (8th century) which contain references regarding

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colouring soybean and adzuki bean cakes (Rymbai *et al.*, 2011). There are nearly 450 taxa known to yield dye in India (Chandramouli, 1995) and over 50 taxa have been most exploited commercially. There are the reports of nearly 150 species which yield pigments (Das *et al.*, 2011). The dyes are mostly produced from different parts of the plants like leaf, bark, root, flower, fruits and seeds, etc. It has been noticed in the development of new natural dye colourants for their uses in food industry, being consumer demand for more natural products at least in some countries (Siva *et al.*, 2011). It is estimated that local communities have used about 10% of all flowering plants on Earth to treat various infections, although only 1% have gained recognition by modern scientists (Khan *et al.*, 2009). Research has shown that the natural dyes are quite safe and environment friendly (Mohanta and Tiwari, 2005). The production of synthetic dyes depend on petrochemical sources and some of the synthetic dyes contain toxic or carcinogenic components which are not ecofriendly and detrimental to the human health. In recent years there has been an excessive use of synthetic dyes and it is estimated to be 10 lakhs tons per annum. The production and application of synthetic dyes release vast amount of unused and unfixed colorants causing serious health hazards and disturbing the ecobalance of nature (Goodarzian and Ekrami, 2010). Jhargram district has a diversity of forest flora and ethnic and local communities like Santal, Lodha, Munda, Oraon etc. The present study is to investigate the natural dye yielding plants in different regions of this district and also focus about the ethnomedicinal value of various plant parts used by the local ethnic communities of Jhargram district and gathered information about their various

traditional knowledge. The earliest reference on tribal knowledge system about the use of medicinal plants in this area includes Chawdhury and Pal (1975, 1976); Bhowmik, (1963); Bhowmik and Chowdhury, (1966) and Pal and Jain (1998). Prain (1903) in his Bengal Plants and Haine (1921) Botany of Bihar and Orissa had mentioned several local names and medicinal value of the plants parts which were perhaps, the first and only account of the flora. Aquatic /semiaquatic plants used in herbal remedies in the wetlands of Manipur district were reported by Jain *et al.* (2007). Medicinal plants resources of South West Bengal was enlisted by Paria (2005). Few works on medicinal plants has been done in this area prior to the previous work (Das and Mondal, 2009, 2012). Conservation aspects of medicinal plants resources through sacred groves were also reported by Bhakat (2003); Bhakat and Pandit (2003a and 2003b); Bhakat *et al.* (2008) and Bhakat and Sen (2008).

METHODOLOGY

Jhargram district is situated in south west corner of the West Bengal and this place shares border with neighboring states of Jharkhand and Odisha. It is situated between 22.45° North and 86.98° East longitude (**Map-1**) and covers an area of 3037.64 km². Extensive field survey and plants collection were undertaken from various remote areas of Jhargram district since November 2017 to October 2018 and the information was recorded gathering knowledge about traditional art and various ethno-botanical information with the help of person of making this natural dye. The surveying zone of this district are-

1. Jhargram: - 22.45° N latitude and 86.98° E longitude;
2. Belpahari: 22°41'10" N latitude and 86°36'56" E longitude;
3. Kankrajhore forest: 22°42'13" N latitude

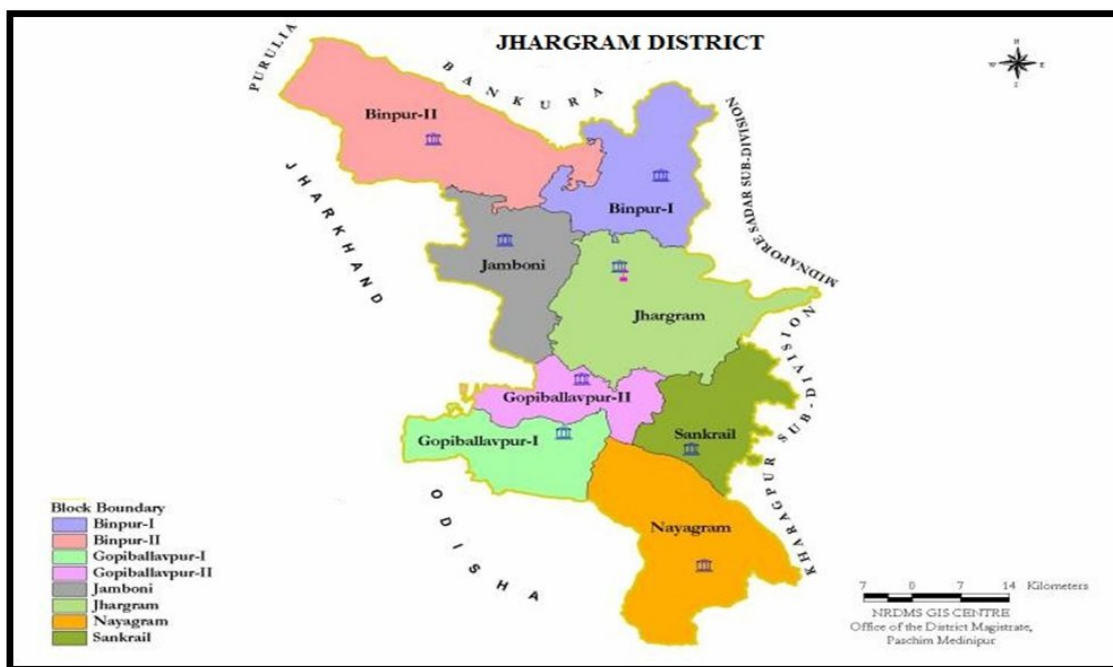
- and 86°36'24" E longitude;
4. Chilkigarh: 22°27'11" N latitude and 86°53'02" E longitude;
 5. Gopiballavpur: 22.22°N Latitude and 86.9°E E Longitude; and
 6. Nayagram: 22°01'55"N Latitude and 87°10'41"E E Longitude

Plant specimens have been collected and identified using standard literature and herbaria. Colour photographs have also been taken for some of the species and some of the arts and crafts products which used by the local communities. The information about the natural dyes and also the ethno-medicinal value of the plant parts were recorded during this study through direct observation and discussion with the local or tribal villagers. Names of the plants are arranged alphabetically and provided with correct botanical names, local names, families, habitat, habit, dye yielding parts, uses of dyes and ethno-medicinal uses in table 1.

RESULTS AND DISCUSSION

The present investigation has revealed that 15 species (Figs. 1-15) belonging to 10 angiosperms families as commonly used as dye yielding plants by the local ethnic communities of Jhargram district for making different traditional art, dyeing cloth or as adhesive (Fig. 16). Among the 10 families, Asteraceae is with 3 species followed by Acanthaceae, Polygonaceae and Zingiberaceae having 2 species each and rest of the families having 1 species to each (Fig. 17).

Out of the 15 species 11 species are herb, 3 species are shrub and 1 species is tree. During survey it was found that only *Polygonum hydropiper* L and *Enhydra fluctuans* Lour. have distribution in the aquatic field and rest of the species are found in the marshy or marshland field in different surveying zone of this district. It was found that out of the total 15 species for dye extraction, utilized mostly 33% for whole plant then 20% of root



Map-1: Jhargram district showing the different blocks

Table-1. List of aquatic and marshland natural dye yielding plants of Jhargram district

Sl no. I	Scientific names II	Name of the families III	Local names IV	Habitat V	Habit VI	Parts used VII	Colour produce VIII	Uses of dye IX	Ethno-medicinal uses X
1.	<i>Alpinia galanga</i> (L.) Willd. (Fig. 1)	Zingiberaceae	Kulanjan, Haimabatibach (Bengali)	Marshland	Rhizomatous herb	Root and stalk	Yellow-brown	Yellow-brown used for calico printing.	Rhizome: Used to cures cephalalgia.; used as antidiabetic; antiulcer agent; antirheumatic, aphrodisiac, carminative, diuretic, expectorant, febrifuge and stimulant.
2.	<i>Commelina benghalensis</i> L. (Fig. 2)	Commelinaceae	Kanchira (Bengali); Kana arak (Santali)	Marshland	Herb	Juice of flower	Blue	Blue dye used for painting and transparencies	Leaves: Juice given to treat snakebite.
3.	<i>Diospyrus peregrina</i> (Gaertn.) Gurke. (Fig. 3)	Ebenaceae	Gab, Makarkenda (Bengali)	Terrestrial-rarely grown in marshland	Tree	Fruit rind	Brown	Brown used for colouring cotton and timber.	Bark: Useful in dysentery and diarrhoea, infusion used as a gargle in apathies and sore throat.
4.	<i>Eclipta prostrata</i> (L.) L. Syn. <i>E. alba</i> (L.) Hassk. (Fig. 4)	Asteraceae	Keshute (Bengali); Keshori, Lal kesari (Santali)	Marshland	Herb	Leaves	Black	Black dye used for dyeing hairs.	Leaves: Juice applied on head to promote hair growth. Whole plant: Fresh juice used to treat scorpion stings.
5.	<i>Enhydra fluctuans</i> Lour. (Fig. 5)	Asteraceae	Hinche, Helencha (Bengali)	Aquatic, also in marshy places as semi aquatic	Herb	Leaves	Green	Green dye used for painting.	Leaves: Juice taken in empty stomach as anti dysenteric and liver tonic to improve skin.
6.	<i>Heliotropium indicum</i> L. (Fig. 6)	Boraginaceae	Hatisur (Bengali)	Marshland	Herb	Leaves	Yellow ochre	Yellow-ochre dye used for colouring cotton fabric.	Leaves: Juice mixed with water taken in typhoid fever; paste with lime applied to treat swelling of armpits; juice applied to poisonous stings.
7.	<i>Kaempferia galanga</i> Linn. (Fig. 7, 16F)	Zingiberaceae	Bhui champa, Ekangi, Chandramuli (Bengali)	Marshland	Herb	Rhizome	Off-white	Off-white dye is used for colouring fishing net.	Tuber: With roots of <i>Iswarmul</i> (<i>Aristolochia indica</i>) taken in fever, weakness and piles.
8.	<i>Oxalis corniculata</i> L. (Fig. 8)	Oxalidaceae	Amrul, Amrul shak (Bengali); Tandichatomarak (Santali)	Marshland	Herb	Whole plant	Olive green	Olive green dye used for dyeing silk and cotton cloth.	Whole plant: Juice mixed with oil and applied as massage to remove cough; juice taken to treat low back pain, urinary troubles.

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9.	<i>Peristrophe tinctoria</i> Nees; Syn. <i>P. vivalis</i> Merrill (Fig. 9, 16 B-C)	Acanthaceae	Batrang, Rang gach (Bengali)	Marshland	Herb	Whole plant	Red	Red dye used in colouring mat crafts.	Leaves: Pounded leaves applied as a poultice to skin troubles.
10.	<i>Plumbago indica</i> L. Syn. <i>Plumbago rosea</i> L. (Fig. 10)	Plumbaginaceae	Raktachita (Bengali)	Marshland	Shrub	Stem chips	Red	Red colour used for dyeing cotton threads.	Root: Decoction taken to treat odema; crushed root with warm water taken in drowsy.
11.	<i>Polygonum chinense</i> L. (Fig. 11)	Polygonaceae	Phelnup, Kukur thotne (Bengali)	Marshland	Herb	Whole plant	Dark-brown	Dark-brown dye used for colouring different matters	Whole plant: Used as tonic, vulnerary and antiscorbutic.
12.	<i>Polygonum hydropiper</i> L. (Fig. 12)	Polygonaceae	Packurmul, Panimaricha (Bengali)	Aquatic	Herb	Whole plant	Dark-grey	Dark-red dye used in adhesive purposes.	Whole plant: Decoction with paste of long peppers and common salt is given to women for treatment of scanty menstruation.
13.	<i>Rhinacanthus nasutus</i> (L.) Kurz; Syn. <i>Rhinacanthus communis</i> Nees (Fig. 13, 16A)	Acanthaceae	Juipana, Palak jui (Bengali)	Marshland	Under shrub	Whole plant	Brown	Brown dye used in colouring mat crafts.	Root and Leaves: Fresh roots and leaves bruised and mixed with lime, applied externally in eczema, ring worm, and dhobi's itch.
14.	<i>Toddalia asiatica</i> (L.) Lam. (Fig. 14, 16D)	Rutaceae	Kadatodali, Hi-Marcha (Bengali)	Marshland	Shrub	Root	Orange-yellow	Orange-yellow dye used for dyeing cotton cloth.	Roots: Bark of roots used as antiperiodic, antipyretic, diaphoretic, stimulant, stomachic and tonic; infusion used as stimulating tonic.
15.	<i>Wedelia chinensis</i> Merrill (Fig. 15, 16E)	Asteraceae	Bhringaraj, Kesharaj, Bhimra (Bengali)	Marshland	Herb	Root	Black	The black dye used for adhesive for brown and black colour.	Leaves: Juice externally applied on scalp to promote hair growth and applied to treat skin disease.



Fig. 1: *Alpinia galanga* (L.) Willd



Fig. 2: *Commelina benghalensis* L.



Fig. 3: *Diospyros peregrina* (Gaertn.) Gurke



Fig. 4: *Eclipta prostrata* (L.) L.



Fig. 5: *Enhydra fluctuans* Lour.



Fig. 6: *Heliotropium indicum* L.



Fig. 7: *Kaempferia galanga* L.



Fig. 8: *Oxalis corniculata* L.



Fig. 9: *Peristrophe tinctoria* Nees



Fig. 10: *Plumbago indica* L.



Fig. 11: *Polygonum chinense* L.



Fig. 12: *Polygonum hydropiper* L.



Fig. 3: *Rhinacanthus nasutus* (L.) Kurz



Fig. 14: *Toddalia asiatica* (L.) Lam.



Fig. 15: *Wedelia chinensis* Merrill

and leaves each followed by 7% each of fruit rind, rhizome, stem chips and 6% of flower (Fig. 18).

Among all these 15 dye yielding plant species *Rhinacanthus nasutus* is of rare occurrence in natural and *Alpinia galanga*, *Kaempferia galanga*, *Peristrophe tinctoria*, *Plumbago indica*, *Toddalia asiatica*, *Wedelia chinensis* are less common and other plants are common in this area. This study reveals that the tribal people

also use different plant parts like roots, leaves, barks, flowers and fruits, etc for the treatment of various common diseases. The parts of these plants could be used alone or in combination with other herbal materials in the fresh or dried forms. The local or tribal people of this area follow the mode of application of medicinal herbs by the help of local Vaidyas and Kabiraj or following their own traditional experiences. Conservation of



Fig.16: Different plant parts and their production of natural dyes: A. *Rhinacanthus nasutus*; B-C. *Peristrophe tinctoria*; D. *Toddalia asiatica*; E. *Wedelia chinensis*; F. *Kaempferia galanga*

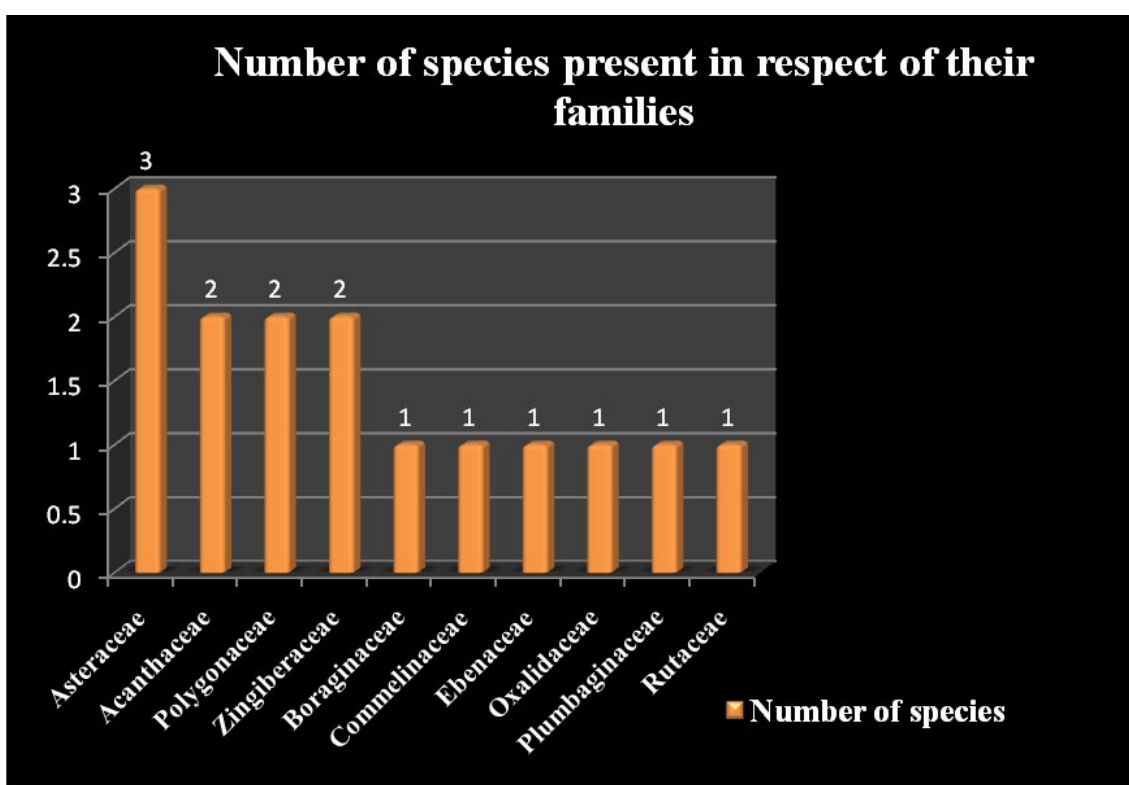


Fig. 17: Number of dye yielding plant species present in respect of their families.

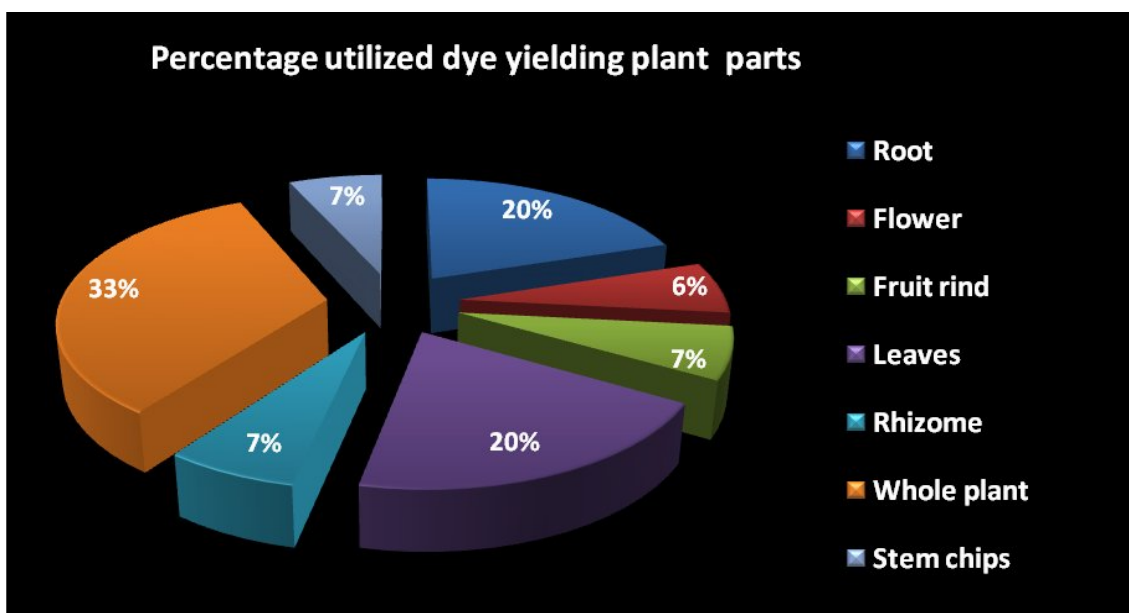


Fig. 18: Percentage wise presentation of utilized dye yielding plant parts

ethno-medicinally dye yielding plant species is required which is becoming rare and less common in various aquatic and marshy places of this district. Encouragement of herbal use in the local and ethnic people should be provided to protect their traditional system of medicine.

CONCLUSION

Nowadays, fortunately, there is increasing awareness among people to use the natural dyes and dye yielding plants. Natural dyes are used in day to day food products and in pharmaceutical industries due to their non toxic properties, less side effect, more medicinal properties.

It is the present need to arrange some workshop and campaign with the discussion of the benefit of the use of natural dyes and the harmful effect of synthetic dyes. Moreover, there should have the awareness meeting to the sustainable uses of natural dye yielding plants by which these species can also be conserved in nature. Similarly the marsh and aquatic lands should be restored for the natural habitat condition of these plants. More survey is needed to know more information about the traditional knowledge for the local and tribal communities of Jhargram district. The young generation should also be encouraged to learn this traditional knowledge to preserve it otherwise we are bound to lose our indigenous knowledge forever.

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