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Short Research Article

Traditional Dye Yielding Plants Used by Different Communities of Manipur, North Eastern India

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Abstract

Manipur harbours rich diversity of dye-yielding plant species and some of the species are at the verse of extractions. Since time immemorial, different ethnic groups in the valley and hill regions of Manipur State have practiced the art of dyeing clothes and other items with natural dyes. The natural dyes were obtained from different plants species which have been used by weavers for imparting different shades of colour to different clothes, bamboo baskets, flower pots, fishing nets etc. The present study was undertaken to survey, document dye-yielding plants and the indigenous knowledge of preparation of natural dyes by the tribal communities of Senapati District of Manipur State. The Survey was carried out during May 2010 to April 2013 by frequent visits to different parts of district located between 24°45´-24°51´ N latitude and 93°48´-93°55´ E Longitudes at an altitude ranging from 865 m to 1785 m above mean sea level. The information on traditional knowledge of preparation of dye was collected through the interview and formal discussion with weavers/dyers. During the survey, 30 dye yielding plant species belonging to 23 families have been identified and documented used for the preparation of natural dyes by the local inhabitants of the state. *Mahonia manipurensis* Takeda, the endemic plant species belonging to the region. The present study was undertaken to explore and document availability of 30 natural dye-yielding plant species of Manipur with indigenous knowledge of preparation of natural dyes by the tribal-communities of the state.

1. Introduction

North-Eastern India harbours the rich biological diversity due to warm and humid climate conditions ranging from tropical to sub-tropical and temperate and falls in high rain region of India. The region is the part of Indo-Burma biodiversity hot spots of the world. North-East India is rich in flora and fauna diversity. There are large number of endemic dye yielding plant species have been reported from the region. The natural dyes were obtained from the plants and have been used by weavers for imparting different shades of colour to different clothes, bamboo baskets, flowerpots, fishing nets etc. Since time immemorial, different ethnic groups in the valley and hilly regions of Manipur state have practiced the art of dyeing clothes and printing items. Vegetable dyes have been reported to be used by confectioners and weavers (Ghosh, 2003; Sampath and Rao, 2003; Gokhale et al., 2004; Siva, 2007) but limited information is available in the dye yielding plants of North Eastern India (Bhuyan and Saikia, 2005; Debajit and Tiwari, 2005; Akimpou and Yadava, 2005; Sharma et al., 2005; Kar and Borthakur, 2008; Potsangbam et al., 2008; Singh et al., 2009).

There are number of plant species in Manipur which are used as dyes right from the ancient times. In Manipur, it is believed that synthetic chemical dye was introduced in around 1905 AD. First chemical dyes were found to be available in Imphal market since 1930 AD. There are large number of endemic species belonging to this region e.g. *Mahonia manipurensis* Takeda used as dye for yellow colour which is endemic to Manipur, *Strobilanthes flaccidifolius* Nees. is one such plant being traditionally used by the people of the state in preparing dyes (locally known as kum dye). Many tribes and *Meitei* community of Manipur have been using like *Bixa orellana* L., *Osbeckia chinensis* L., *Lithocarpus dealbata* Miq. Rehder, *Parkia roxburghii* G. Don, *Solanum incidum* L., *Tectona grandis* L. f., etc. Those plants are used traditionally in combination with other plants for extraction and preparation of dye utilizing indigenous process. The aim

of the present study has been to investigate the availability of natural dye-yielding plant species in Manipur and document the information on traditional knowledge system associated with extraction and use of natural dyes by the inhabitants of Senapati District of Manipur State.

2. Materials and Methods

The study area is located in between 24°45′-24°51′ N latitude and 93°48′-93°55′ E longitudes at Kangchup hills, Senapati District of Manipur state at an altitude ranging from 865 m to 1785 m above mean sea level during 2010-2013. The present investigation is based on information collected from different weavers/dyers through interviews and formal discussions concerning the traditional and indigenous dyeing techniques.The dye yielding plant specimens were collected during the survey by frequent visits to different part of the district and were identified with the help of local herbalist, experienced old persons (especially weavers/dyers) and by consulting related books on dye yielding plants and also from Botanical Survey of India (BSI), Shillong and Kolkata. Herbarium specimens were deposited to Botany Department, Institutional Level Biotech Hub, Lilong Haoreibi College, Manipur.

3. Results and Discussion

3.1. Enumeration

Each species collected, has been arranged alphabetically with correct botanical name, family, local name given as *Meitei* (M), *Kuki* (K), *Vaiphei* (V) and *Rongmei* (R) along with their indigenous mode of preparation and its uses are presented (Table 1).

The present investigation has revealed that thirty (30) plant species belonging to 23 families representing 29 genera which are commonly used as natural dye by different ethnic communities of Senapati District of Manipur. Fabaceae is found to be dominant with five species followed by

Table 1: Dye yielding plant species used by different communities of Senapati district of Manipur

Sl. no.	Botanical name	Family	Local name	Parts used	Colour produced	Uses
1.	*Acacia catechu* (L.f.) Willd	Fabaceae	Kabokhajee (M)	Bark	Brown, black	Tree bark is boiled in water for about one hour. The extract dye is used in the preparation of local ink and cotton fabrics.
2.	*Achyranthus aspera* L.	Amaranthaceae	Khujumpere (M)	Whole plant	Adhesive	Whole plant is first dried, burnt to ashes and mixed with water. This dye is used as adhesive for various colours and making the colour brighter.
3.	*Amoora spectabilis* Miq.	Meliaceae	U-ngang (M)	Bark	Bright red	A pale scarlet colour is obtained from the heartwood by boiling with water and used for dyeing cotton fabrics.
4.	*Averrhoea carambola* L.	Oxalidaceae	Heinoujom (M); Rupuan (R) Theipathehi (K)	Fruit	Adhesive	Mature fruits are taken and squeezed the juice into the water containing tub. It is used as a good adhesive to the Ureirom (*Bixa orellana* L.) dye (Akimpou and Yadava, 2005).
5.	*Basella alba* L.	Basellaceae	Urok sumbal (M)	Whole plant	Deep purple	A deep purple dye is obtained from the ripe fruits. Different colours produced from the leaves and stems are used for dyeing fabrics and painting.
6.	*Bauhinia purpurea* L.	Fabaceae	Chingthrao angangba (M), Gaubeh (V)	Flower	Rose purple	The dye is obtained from the fresh flowers. Fresh petals are directly applied on the cloth or surface to be dyed.
7.	*Bixa orellana* L.	Bixaceae	Ureirom (M), Pheisangbang (R)	Seeds	Yellow orange	Fruits are collected by placing a net below the tree or directly plucked by hand. Seeds are soaked in the Utti (prepared from burnt ash of *Pisum sativum* L. and *Musa paradisiaca* L. etc.) Some seeds are taken in a thin clean clothes and then rubbed into the water with hand. The extract liquid is used for dyeing cothes or yarn threads. For durability of the dye, the clothes are again soaked for around 2 days in the liquid prepared from *Garcinia xanthochymus* Hk.f. fruits.

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Sl. no.	Botanical name	Family	Local name	Parts used	Colour produced	Uses
8.	*Carthamus tinctorius* L.	Asteraceae	Kusumlei (M and R)	Flower	Golden yellow	The colour is extracted from the flower using different extraction techniques. The petals are collected and kept until they become decayed or fermented. The decayed petals are rolled in the palm making into balls of thumb size. This process is referred to as leipak semba. Two to three balls are enough to dye the yarn threads for one phanek (mekhala). The concentrated yellow dye is mixed with alkalies and add the ash of *Achyranthus aspera* L. to yield a pink red dye. The dye is used for dyeing of cotton and silk clothes and also in painting.
9.	*Cassia fistula* L.	Fabaceae	Chau-hui (M)	Bark and sapwood	Red	The extract colour is used for painting and dyeing cotton fabrics. (Figure 2).
10.	*Celosia argentea* L.	Amaranthacea	Haorei angangba (M)	Flower	Pink red	The collected flowers can be used directly for painting.
11.	*Clerodendrum colebrookianum* Walp.	Verbenaceae	Kuthap angouba (M), Anphui (K, V,H)	Leaves	Pale green	The fresh leaves are crushed and boiled in water until the dye is fairly concentrated. After cooling, acidic dye mordants are added before use. Intensity of the colour depends on the amount of the leaves used. Then the thread or cloth is soaked overnight and slightly squeezed and spread in shade. The process is repeated 6 to 7 times until the desired colour is obtained (Figure 3).
12.	*Clitoria ternatea* L.	Papilionaceae	Aprajita	Flower	Blue	The dired flowers by extracting with water and filtered. The filtrate dye is used for painting.
13.	*Curcuma longa* L.	Zingiberaceae	Yaingang (M) Gachangrim (R) Iaiang (K)	Rhizomes	Chrome yellow	Fresh rhizomes are crushed into pieces and allowed to soaked in water. By adding lime water or alkali, it gives a red colour. Clothes or threads are soaked overnight and dried.
14.	*Phyllanthus emblica* L.	Euphorbiaceae	Heikru (M) Talouthai (R) Sohlhu (K), Suklu (V)	Bark, fruit	Black brown	Fresh fruits or bark are crushed and soaked in water for 4 to 5 days or boiled. The extract dye is used for dyeing fishing nets and mats etc. (Figure 4).
15.	*Garcinia xanthocymus* Hook. F.	Clusiaceae	Heibung (M) Puangthai (R) Thuppi (K)	Fruits	Adhesive	Fresh fruits are crushed into pieces and soaked in water and squeezed by using a clean piece of cloth for getting a clear liquid. Thus, the prepared liquid is used as adhesive to different dyes.
16.	*Iris bakeri* Wall	Iridaceae	Komberei (M)	Flower	Blue	The dye is used for painting and especially the flowers are also offered to God on meitie cheiraobia (*Meitei* New Year's Day Celebration).
17.	*Juglans regia* L.	Juglandaceae	Heijuga (M), Makha (K,V.)	Unripe fruits	Black	Fresh seeds peel of unripe fruits are crushed into pieces and soaked in water. The dye is used for fishing nets. ropes and painting.
18.	*Mahonia manipurensis* Takeda	Berberidaceae	U-napu (M)	Stem, root bark	Natural yellow	It is used for dyeing of cotton, silk and wool. A beautiful yellow dye is obtained from the stem and root bark by boiling in water.

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Sl. no.	Botanical name	Family	Local name	Parts used	Colour produced	Uses
19.	*Melanorrhoea usitata* Wall.	Anacardiaceae	Khe-U (M)	Wood, root	Oily black	The tree is used for furniture as it gives natural colour.
20.	*Osbeckia chinensis* L.	Melastomaceae	Melastomaceae	Ripe Fruits, leaves, flower	Dark black	Basically the dark blackish red fruits of the plant are used for staining teeth in olden days by the Meiteis and the Maring tribes of Manipur. Though the practice has stop in present among the Meiteis, the Maring tribe still use the fruit for staining teeth in dark blackish red till date. It means for strengthening the teeth and protect from gum diseases and cavities. However, the method that can be successfully employed for the extraction of dye from the fruit. The ripe fruit is boiled in water and filtered. Fresh leaf parts is used for cuts and wounds and the flowers are used to ease stomacheache, root decoction is taken for measles (Figure 5).
21.	*Parkia roxyburhii* G. Don (*P. javanica* L.)	Mimosaceae	Yongchak (M), Kampai (R), Yonglha (K) Jongtah (V)	Fruit (Pod skin), Bark	Dark brown	In olden Manipur, dye extracted from tree bark and fruit skin was also used in different fishing nets called Nupa eel (fishing net of male), nupi eel (fishing net of female), and Longthrakgi eel (fishing net used by throwing) etc. the fruits are reported to be useful in bleeding piles and concoction of the bark in dycentry and diarrhoea. Various other works on the plant's morphology nutritional content of the fruit/pod and the medicinal values of the various other plant parts have been reported (Salam et al., 1995; Utarabhand and Akkayanont, 1995) (Figure 6).
22.	*Lithocarpus dealbata* Miq. Rehder.	Fagaceae	Kuhi (M) Shehlhing (V, K), Dunge (R)	Bark	Dark brown	Tree bark is cut into pieces and soaked in a pitcher containing water for one week and then ready for dyeing. It is used to obtain black colour and dark brown colour. For pure balck, the thread or cloth is alternately soaked in strobilanthes cusia Nees. Imaly (kum) liquid and *L. dealbata* (kuhi) liquid until the desired colour is obtained. And for dark brown colour, it is soaked in Kuhi (*L. dealbata*) prepared liquid. The extract have also been used in potteries and in fishing hets (Figure 7).
23.	*Lithocarpus fenestrata (Roxb.)* Redhder	Fagaceae	Sahi (M), Tha (R)	Tree bark	Dark brown	The bark is cut into pieces and soaked in a pitcher containing water. It is used as a substitute for Kuhi (*L. dealbata*) plant. The dye obtained from this plant is considered inferior to the kuhi dye.
24.	*Plumbago indica* L.	Plumbaginaceae	Mukaklei (M and R) Pungkoh pah (K)	Flower	Pale red	The collected petals are crushed and soaked in water. Clothes or yarn threads dipped into this liquid gives pale red colour. This is not regularly used due to collection of large amount of flowers.
25.	*Polygonum chinense* L.	Polygonaceae	Angom yensil (M)	Whole plant	Adhesive	Whole plant is crushed and soaked in water for 2-3 days and the prepared liquid is used as dye. It is used as adhesive for dark colour.
26.	*Psidium guajava* L.	Myrtaceae	Pungton (M, K, V), Bungtonthai (R)	Mature fruit	Adhesive	Fresh mature fruits is crushed and soaked in water for 2-3 days and is used as adhesive for the black brown colour.

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Sl. no.	Botanical name	Family	Local name	Parts used	Colour produced	Uses
27.	*Punica granatum* L.	Punicaceae	Kaphoi (M), Puclei-thai (R)	Bark, fruit skin	Adhesive	Bark or fruit skin is cut into pieces and soaked in water for 2-3 days. It is used as adhesive for the black and brown colour (Figure 8).
28.	*Solanum incidum* L.	Solanaceae	Khamu (M)	Fruit	Deep chocolate purple	Purple dye was prepared from the plant was used for making artistic design of Khamenchappa (a specific cloth which was reserved for the use of kings and noblemen). The colour of Khamenchappa, was based on the colour used by each of the seven clans of Manipur (Figure 2). It is an identification mark of a clan which is used as a costume of the noblemen. It is also used as dance costume of Lai-Haraoba (festival of worshipping Gods), martial arts and wrestling (Mukna), Polo (Sagol Kangjei) and hunting games. For deep chocolate dye, the ripen fruits of Khamu are cut into pieces or powdered to which water is added (about 1 litre of of water into ½ kg of the sample). The solution is stirred with the help of stick and kept for about 6 hrs. and then filtered using a coarse cloth. The filtrate could be used for dyeing turban, dhoti and chadar which are used by noblemen.
29.	*Strobilanthes flaccidifolius* Nees.	Acanthaceae	Kumna (M) Kheimbang (R)	Mature leaves	Black	In Manipur, the preparation of the various dye-stuffs is based on the traditional methods being practiced by the people of the state. The process of dyeing is also different for different dye stuffs, depending on the nature of the dye to be prepared and the plants to be used. Mature leaves are collected and soaked in a pitchers (Kharung) containing water and then the pitcher is covered by clothes, the process is known as kum yeiba. The pitcher is kept at the cornmer of the open room where proper air and light are available (not direct sunlight). The pither is kept in safety place until the leaves get completely decayed. The uncovered pitcher is stirred with a multi pronged stick known as yakabi or kumsu-chei (Manipuri) or Khim lat-tai (Rongmei). Solid things are removed while stirring, then khum-sunu (ashes taken from burning oyster shell along with dry cow dung and hay, the traditional fashin of calcinations) is added and stirred continuously. The bubbles so formed were removed from time to time. The stirring was continued until the solution became reddish in colour. Then the clear kum liquid is ready for dyeing clothes and threads. The plant is used for imparting dark purplish blue and black colour Different lighter and darker shades of black are obtained by adding other dye plants.
30.	*Tectona grandis* L.f.	Verbenaceae	Chingsu (M), Chuangbang (R)	Leaves, bark	Red, yellow, black	Different parts of the plant produced different colour. Leaves are used as source of red dye for dyeing silk. Red dye is mainly obtained from young leaves, whereas the yellow dye is obtained from mature leaves and black dye is obtained from bark. In olden days, the dyes were extracted either by storing the plant parts in water for not less than 2 hrs, and also by boiling for not less than 15 minutes. The extract was then filtered, liquor from *Garcinia xanthochymus* (Heibung) and sodium chloride were added to it before using for dyeing fabrics.

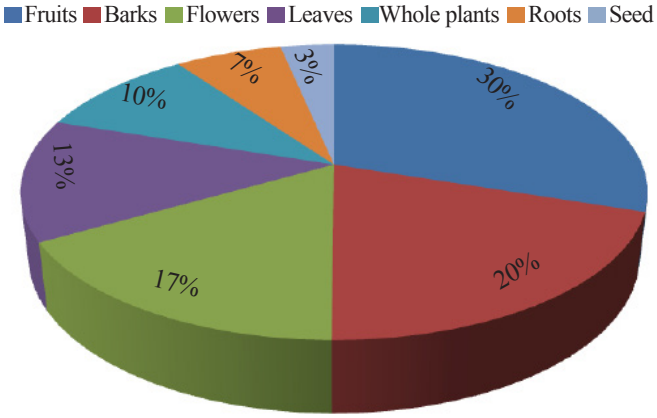

Figure 1: Representative of plant parts used in preparation of natural dyes

Figure 2: *Cassia fistula* L.

Figure 3: *Clerodendrum colebrookianum* Walp.

Figure 4: *Phyllanthus emblica* L.

Figure 5: *Osbeckia chinensis* L.

Figure 6: *Parkia roxburhii* G.Don

Figure 7: *Lithocarpus dealbata* Miq. Rehder

Figure 8: *Punica granatum* L.

Amaranthaceae, Fagaceae and Verbenaceae with two species. The remaining nineteen families have one species each.

Various plant parts were found to be employed traditionally by the *Meitei* and other tribal communities of Manipur under the study for extracting dyes utilizing indigenous extraction techniques. Among the plant parts used, fruits were the maximum source of natural dyes contributing 30% followed by barks (20%), flowers (16.6%), leaves (13.3%), whole plant (10%), roots (6.6%) and seeds (3.3%) respectively (Figure 1).

4. Conclusion

The species like *Mahonia manipurensis* Takeda endemic to Manipur used as dye for yellow colour *Bixa orellana* L.*, Osbeckia chinensis* L.*, Lithocarpus dealbata* Miq. Rehder*, Parkia roxburghii* G. Don.*, Solanum incidum* L.*,* and *Strobilanthes flaccidifolius* Nees are good resources of natural dyes used by local communities for dyeing through indigenous process and techniques. Therefore it is essential to protect and conserve the dye yielding plant resources and commercialisation of natural dye can be successful in the state to improve the socio-economy of the people of the state.

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