

Dye yielding plants of Assam for dyeing handloom textile products

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Received 4 October 2007; revised 27 November 2007

Assam is floristically one of the richest states of Northeast India with more than 3,000 flowering plant species. The state is inhabited by five major tribes and nine minor tribes. The people of Assam have been using different herbs to dye their cotton, silk and woolen yarns, and garments. A survey on vegetable dye was undertaken during 2006-2007 in different parts and among different ethnic group of Assam. The paper deals with 47 dye yielding plant species and provides information on their botanical name, family, local names, plant parts used, method of preparation, colour produced, and kind of garments dyed.

Keywords: Dye yielding plants, Natural dyes, Handloom, Textile, Assam
IPC Int.Cl.⁸: D06P, D01H13/30

Assam is one of the biodiversity hotspots that occupies a special place in Northeastern India is located between 24°44'N to 27°45'N latitude and 89° 41' E to 96°02' E longitude covering 2.4% (i.e. 78,438 sq km) of the geographical area. The annual rainfall ranges from 178-305 cm and temperature ranges from 7°C-37°C with an average humidity of 83%. The state has 28,748 sq km area under forest with a diversity of about 3,017 flowering plants¹⁻³. Assam is home of various ethnic groups like *Bodo (Sonowal Kachari, Thengal Kachari, Sarania Kachari)*, *Karbi, Dimasa, Mishing, Rabha* as major tribes and *Deori Garo, Khasi, Jaintia, Tiwa (Lalungs), Kuki, Hmar, Zeme Nagas, Rengma Nagas* as minor tribes. The total population of the state is 2,66,55,528 as per 2001 census, which accounts for 12.8% of the total tribal population of India⁴.

From the dawn of civilization, mankind has shown his liking and attraction for colours. Colour increases liveliness to the dresses one wear. Colour on clothing has been extensively used since 5,000 yrs back. The primitive men made use of crude painting processes to decorate their bodies as well as their clothes⁵. Clothes dyed with *Rubia cordifolia* were discovered at Mohenjodaro, which is indicative of use of herbal dye during Indus Valley Civilization. India is endowed with a wealth of natural flora and fauna, which provide the basic resources for a rainbow of natural dyes. Natural dyes were derived not only from plants but also from insects and minerals also. The

term dye includes natural dyes, synthetic dyes, pigments and whiteners. Those colourants, obtained from animal and vegetable matters without processing is known as natural dye. Natural dyes are environment friendly; for example, turmeric, the brightest of naturally occurring yellow dyes is a powerful antiseptic and skin revitalized, while indigo yields a cooling sensation. Researches have shown that synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to human health. Ironically, Germany that discovered azo dyes became the first country to ban certain azo dyes in 1996⁵. Thus, with the environmental friendly products becoming a top priority in recent years, the dye industry has turned its attention to newer products, which cater to the fashion trend as well as to the aspects of human health. Natural dyes colourants derived from flora and fauna (Table 1) are believed to be safe because of their non-toxic, non-carcinogenic and biodegradable nature and can be handled with care and safely⁶.

Indigenous handloom textile is intrinsically associated with social and cultural life of ethnic groups of Assam. Every community of the state has their own dresses dyed with indigenous herbal dyes. Although, use of herbal dye is no longer commonly practiced but preparation of dye from locally available plants to dye their silk, cotton and woolen yarns and garments was the only option in the absence of chemical dyes a few decades back. However, in many remote areas, vegetable dyes are still in use in many parts of Assam. Therefore, the study was undertaken

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Table 1 — Dye yielding plant species of Assam

Plant name (Family)	Local name	Parts yielding dye and method of preparation	Colour produced	Kind of garments
<i>Acacia catechu</i> Willd. (Mimosaceae)	<i>Khoyar</i> (Assamese)	Dry stem bark mixed with slakes lime boiled in water.	Blackish brown	Cotton
<i>Adina cordifolia</i> Benth. & Hook.f. (Rubiaceae)	<i>Kelikadam</i> (Assamese)	Chips of heart wood boiled in water.	Yellow	Cotton, Silk
<i>Aegle marmelos</i> Correa ex Roxb. (Rutaceae)	<i>Bel</i> (Assamese)	Crushed fruit shell boiled in water.	Yellow	Cotton
<i>Albizia odoratissima</i> Benth. (Mimosaceae)	<i>Jatikoroi</i> (Assamese)	Fresh stem bark boiled in water	Brick red	Cotton
<i>Artocarpus lakoocha</i> Roxb. (Moraceae) Fig.1	<i>Ingat arong</i> (Karbi)	Chips heart wood boiled in water	Yellow	Cotton
<i>Baphicacanthus cusia</i> (Nees) Brem. (Acanthaceae)	<i>Sibu</i> (Karbi)	Dry leaves and stem powder mixed with hot water.	Dark Indigo	Cotton, Silk
<i>Basella alba</i> L. (Basellaceae)	<i>Rongapuroi</i> (Assamese)	Fresh ripe fruit mixed with alum.	Maroon	Silk, Cotton
<i>Bauhinia purpurea</i> L. (Caesalpiniaceae)Fig.2	<i>Kurial</i> (Deori)	Stem bark boiled with slake lime.	Yellow	Cotton, Silk
<i>Berberis aristata</i> DC. (Berberidaceae)	<i>Kath halodi</i> (Assamese)	Stem boiled in water.	Yellow	Cotton, Silk, Woolen
<i>Bixa orellana</i> L. (Bixaceae) Fig.3	<i>Jorot</i> (Assamese)	Dry seed powder mixed with slake lime.	Orange	Silk, Cotton
<i>Butea monosperma</i> (Lam.) Kuntze (Papilionaceae)	<i>Polash</i> (Assamese)	Dry flower powder mixed with slake lime.	Yellow	Silk, Cotton, Woolen
<i>Caesalpinia sappan</i> L. (Caesalpiniaceae)	<i>Bakam</i> (Assamese)	Stem bark and heart wood decoction in water with iron.	Red Black	Silk Cotton, Silk
<i>Croton joufra</i> Roxb. (Euphorbiaceae)	<i>Gosmahudi</i> (Mishing)	Fresh leaf paste.	Blue	Cotton, Silk
<i>Curcuma domestica</i> Valetton (Zingiberaceae)	<i>Haludi</i> (Assamese)	Rhizome boiled in water with slakes lime.	Yellow	Cotton, Silk
<i>Delonix regia</i> Raf. (Caesalpiniaceae)Fig.4	<i>Radha sura</i> (Assamese)	Gum mixed with alum.	Yellow	Cotton
<i>Eclipta prostrata</i> Linn. (Asteraceae)	<i>Keheraj</i> (Assamese)	Fresh plant paste.	Black	Cotton
<i>Emblica officinalis</i> Geartn.(Euphorbiaceae)	<i>Rong goch</i> (Assamese)	Leaf paste mixed with alum.	Black	Cotton, Silk
<i>Emblica officinalis</i> Geartn. (Euphorbiaceae) <i>Terminalia chebula</i> Retz.(Combretaceae)	<i>Amla</i> (Assamese) <i>Silikha</i> (Assamese)	Dry fruits of both the plants boiled in water.	Black	Silk, Cotton
<i>Ervatamia divaricata</i> (Linn.) Alston (Apocynaceae) Fig. 10	<i>Togor</i> (Assamese)	Fruit pulp around the seeds boiled in water.	Yellow	Silk
<i>Garcinia morella</i> Desr. (Clusiaceae)	<i>Kuji thkera</i> (Assamese)	Gum from ripe fruit mixed with alum.	Yellow	Silk
<i>Garcinia xanthochymus</i> Hk. f. (Clusiaceae) Fig.5	<i>Teportenga</i> (Assamese)	Stem bark & fruit gum grinded and boiled in water.	Yellow	Silk
<i>Gossypium herbaceum</i> L. (Malvaceae)	<i>Kopah</i> (Assamese)	Fresh flowers paste.	Yellow	Silk, cotton
<i>Impatiens balsamina</i> L. (Balsaminaceae)	<i>Ushahul</i> (Bodo)	Stem & leaves crushed into paste. Flower paste used.	Orange Red	Silk, Wool, Cotton
<i>Indigofera tinctoria</i> L. (Papilionaceae)	<i>Sibu</i> (Karbi)	Leaves & twigs paste mixed with slake lime.	Blue	Cotton, Silk
<i>Lawsonia inermis</i> L. (Lythraceae)	<i>Jetuka</i> (Assamese)	Leaves crushed with leaves of <i>Indigofera tinctoria</i> for paste.	Bluish-black	Silk, Cotton
<i>Mallotus philippensis</i> (Lamk.) Muell.- Arg. (Euphorbiaceae)	<i>Gongai</i> (Deori)	Ripe fruits crushed and boiled in water.	Orange	Cotton, Silk

Contd —

Table 1 — Dye yielding plant species of Assam — *Contd*

Plant name (Family)	Local name	Parts yielding dye and method of preparation	Colour produced	Kind of garments
<i>Mangifera indica</i> L. (Anacardiaceae) <i>Psidium guajava</i> L. (Myrtaceae) <i>Terminalia chebula</i> Retz. (Combretaceae) Fig 6 <i>Syzygium cuminii</i> (L.) Skeels (Myrtaceae)	<i>Aam Madhuri</i> <i>Hilikha Jamun</i> (Assamese)	Dried stem bark of all the four plants powdered and boiled.	Black	Silk, Cotton
<i>Mirabilis jalapa</i> L. (Nyctaginaceae)	<i>Godhuli gopal</i> (Assamese)	Flower paste boiled in water.	Red	Cotton
<i>Morinda angustifolia</i> Roxb. (Rubiaceae)	<i>Achu</i> (Assamese)	Stem chips treated with lime. Root and slake lime boiled in water.	Red Yellow	Cotton, Silk Silk
<i>Mussaenda frondosa</i> L. (Rubiaceae) Fig.7	<i>Chubaiata</i> (Assamese)	Leaves boiled in water.	Yellow	Cotton, Silk
<i>Myrica esculenta</i> Buch.-Ham. (Myricaceae)	<i>Noga tenga</i> (Assamese)	Stem bark boiled with slake lime.	Yellow	Cotton, Silk
<i>Nyctanthes arbor-tristis</i> L. (Nyctanthaceae)	<i>Sewali</i> (Assamese)	Fresh flower paste boiled in water to which alum is added.	Orange	Silk, Cotton
<i>Piper betle</i> L. (Piperaceae)	<i>Pan</i> (Assamese)	Leaves and root paste mixed with slake lime.	Blue	Silk
<i>Poinsettia pulcherrima</i> Graham (Euphorbiaceae)	<i>Rongapotia gos</i> (Assamese)	Flower boiled in water with alum.	Red	Silk
<i>Pterospermum lanceaefolium</i> Roxb. (Sterculiaceae)	<i>Bonbogori</i> (Assamese)	Stem bark, leaves, gum grinded and boiled in water.	Orange	Silk
<i>Rauwolfia tetraphylla</i> L. (Apocynaceae) Fig. 8	<i>Arsontita</i> (Bodo)	Fruit juice mixed with alum.	Black	Cotton, Silk
<i>Rubia cordifolia</i> L. (Rubiaceae)	<i>Majathi</i> (Assamese)	Root crushed by adding water.	Red	Silk, cotton, Woolen
<i>Sarcochlamys pulcherrima</i> Gaud. (Urticaceae) Fig. 9 <i>Albizia</i> <i>odoratissima</i> Benth. (Mimosaceae)	<i>Mesaki Jati koro</i> (Assamese)	Leaves and stem bark boiled in water.	Dark brown	Cotton, Silk
<i>Symplocos cochinchinensis</i> Moore (Symplocaceae)	<i>Noga bhmloti</i> (Assamese)	Leaves & Stem bark boiled in water.	Yellow	Cotton
<i>Symplocos oxyphylla</i> Wall. (Symplocaceae)	<i>Tam tingali</i> (Assamese)	Stem bark boiled in water.	Yellow	Silk
<i>Syzygium cuminii</i> (L.) Skeels (Myrtaceae)	<i>Jamun</i> (Assamese)	Stem bark boiled in water and slake lime.	Black	Cotton, Silk
<i>Tectona grandis</i> L.f. (Verbenaceae)	<i>Sagoon</i> (Assamese)	Stem bark boiled in water to produce dye.	Yellow	Cotton, Silk
<i>Terminalia catappa</i> L. (Combretaceae)	<i>Silikha</i> (Assamese)	Fruit with alum boiled in water.	Black	Silk, cotton,
<i>Trema orientalis</i> Blume. (Ulmaceae)	<i>Machmai</i> (Assamese)	Stem bark boiled in water.	Brown	Cotton, Silk
<i>Trifolium pratense</i> L. (Papilionaceae)	<i>Rongalong</i> (Assamese)	Flowers boiled with alum.	Yellow	Silk, Cotton
<i>Woodfordia fruticosa</i> Kurz (Lythraceae) Fig. 11	<i>Dhaiphool</i> (Assamese)	Flowers paste in little water.	Reddish yellow	Silk

to collect first hand information on different plants used as source of vegetable dyes by local peoples, mainly by *Assamese*, *Bodo*, *Karbi*, *Deori* and *Mishing* communities. The information available on dye yielding plants in Northeast India is scanty⁷⁻¹¹. The aim of the study was to investigate the availability of natural dye yielding plant species in Assam and gather information on traditional knowledge system associated with extraction and use of natural dyes by

the ethnic groups. Organic dye not only helps to preserve the traditional art of weaving and design, but also provides employment and yields economic and ecological benefits.

Methodology

During the survey, vegetable dye used by the different communities of Assam, viz. *Assamese*, *Bodo*, *Karbi*, *Deori* and *Mishing* were documented.



Fig.1 *Artocarpus lakoocha* Roxb.



Fig.2 *Bauhinia purpurea* L.



Fig.3 *Bixa orellana* L.



Fig.4 *Delonix regia* (Boj.) Raf.



Fig.5 *G. xanthochymus* Hk. & f.



Fig.6 *Terminalia chebula* Retz.



Fig.7 *Rauvolfia canaescence* L.



Fig.8 *Sarcoclamys pulcherrima* Gaud.



Fig.9 *Tabernaemontana coronaria* R.Br.



Fig.10 *Mussaenda frondosa* L.



Fig.11 *Woodfordia fruticosa* Kurz.

The collected specimens were made into herbarium following standard herbarium techniques¹². Herbarium specimens were identified with the help of references and herbarium specimens of Botanical Survey of India, Shillong (ASSAM) and the voucher specimens of the study have been deposited in the herbarium of Gauhati University, Department of Botany.

Result and discussion

In the study, 47 dye yielding plants prevalent among five communities of Assam, viz. *Assamese*, *Bodo*, *Karbi*, *Mishing* and *Deori* have been documented (Figs 1-11). Of the 47 species documented, 1 species belongs to Monocotyledon and 46 species belong to 28 families of dicotyledon. Euphorbaceae represents 6 species followed by Rubiaceae, Caesalpiniaceae, and Papilionaceae with 3 species each and Combretaceae with 2 species. These plants have been used to dye silk, cotton and woolen yarns and garments by the five communities. Altogether, 8 different methods of preparation for 12 different colours from 10 different plant parts have been recorded. Different formulations either as fresh extracts or in paste forms were used. Additional items like slake lime and alum are frequently used to get required shed of a particular dye and/ or to make a dye fast or light and for longitivity of the natural dye in the clothes. Some of the dyes yielding plants (*Berberis aristata*, *Rubia cordifolia*) are exchanged with ethnic groups from Arunachal Pradesh, the neighbouring state of Assam. Although some years back these were available in the state but due to overexploitation these plants are now no longer available in the state. Dye yielding plants, with local name, family, parts used, method of preparation, kind of garments or yarn dyed have been enumerated (Table 1).

Conclusion

Among the communities of Assam, a wealth of traditional knowledge relating to dye yielding plants and their uses have been remained confined. The availability of cheap chemical dyes, the traditional practice of preparation of dye and their use have been loosing their popularity. Indigenous knowledge of extraction, processing and practice of using of natural dyes has do away to a great extent among the new generations of the ethnic groups due to availability of cheap synthetic dyes. It has been observed that the traditional knowledge of dye preparation is now

confined only to the surviving old people of the ethnic groups and only a few of them still practice the process. Unfortunately, no such serious attempts have been made to document, preserve and take advantage of this immense treasure of traditional knowledge of natural dye preparation confined to the indigenous people. It is the high time to document these treasures of indigenous knowledge systems. Otherwise, we are bound to lose this vital information on the utilization of natural resources around us. The indigenous knowledge system and methods of traditional utilization of bioresources of the ethnic groups of the state need to be documented to rescue them from being lost forever. Commercialization of some of the natural dyes can be of successful venture to the rural population of the state through systematic and scientific approach with identification of resources, extraction, purification, chemical structure and promotion of use of natural dyes, thereby enhancing their economy. As a whole, systematic approaches with scientific inputs would help in conserving the important plant resources, in addition to the rich indigenous knowledge base confined to the ethnic groups of Assam.

Acknowledgement

Authors are thankful to the local dye producers, local informants and village headmen, who have cooperated in carrying out the field work.

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