

## ORIGINAL ARTICLES

### Medicinal Plants of the Santal Tribe Residing in Rajshahi District, Bangladesh

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#### ABSTRACT

The Santals form the largest tribal group living in several districts in northern Bangladesh. They are the descendants of Austric-speaking Proto-Australoid race. The Santals, particularly their traditional healers are well known for their knowledge of medicinal plants, which they use to treat ailments of both human and cattle. In fact, settlers residing in the region but belonging outside the Santal tribe seek out Santal traditional healers to treat various ailments. We undertook an ethnobotanical survey of the Santals living in Rajshahi district, Bangladesh. Information was obtained on the medicinal plants, ailments for which the plants were prescribed, formulations, and dosages. Field trips were conducted in which the traditional healers pointed out the plants and described their uses. Plants were photographed and identified at the Bangladesh National Herbarium. Information was obtained on 26 medicinal plants distributed into 21 families. The plants (with ailments treated given in parenthesis) include *Achyranthes aspera* (severe stomach pain, excessive bleeding after menstruation), *Aerva sanguinolenta* (blood in urine), *Amaranthus viridis* (snake bite), *Crinum* sp. (stomach pain), *Centella asiatica* (lack of breast milk after childbirth), *Asparagus racemosus* (tuberculosis), *Capparis zeylanica* (pain in hands or feet, paralysis), *Cuscuta reflexa* (excessive bleeding after menstruation), *Leucas aspera* (headache), *Litsea* sp. (debility), *Abrus precatorius* (tuberculosis, throat pain), *Cajanus cajan* (jaundice), *Dalbergia sissoo* (diarrhea), *Strychnos nux-vomica* (paralysis, fever), *Dendrophthoe falcata* (rheumatism), *Hibiscus rosa sinensis* (excessive loss of weight in women), *Marsilea quadrifolia* (lack of breast milk after childbirth), *Tinospora cordifolia* (dripping of saliva from mouth, loss of movement of tongue), *Ficus benghalensis* (excessive loss of weight in women), *Polygonum orientale* (headache), *Madhuca indica* (debility, blood purifier), *Scoparis dulcis* (blood dysentery), *Datura metel* (throat pain in children), *Solanum virginianum* (tuberculosis), *Vitex negundo* (pain on one side of the forehead), and *Cissus quadrangularis* (bone fracture).

**Key words:** Ethnobotanical survey, Santals, Bangladesh, medicinal plants

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#### Introduction

The Santals form the largest tribal group residing in the Himalayan sub-mountain region in different districts of Rajshahi division. They are the descendants of Austric-speaking Proto-Australoid race. In physical feature, the Santals closely resemble some other tribal groups like the Oraons, Mundas, and the Paharias.

The Santals rely on treatment of their ailments on their traditional healers known as "ojha". The ojha combines within one person the healer as well as the diviner. The ojha drives away malevolent spirits and deities, determines the cause of a disease, and administers remedies based on his considerable practical knowledge of medicinal plants. In fact, traditional medicine is highly developed among the Santals, and this knowledge extends to more than three hundred medicinal plant species. Their making of remedies suggests a practical knowledge of chemistry.

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We are in the process of conducting an extensive ethnobotanical survey of the Santals, who currently number over two hundred thousand and are spread through a large area. The objective of the present study was to conduct an ethnobotanical survey of the Santals living in Rajshahi district, which form one of the districts within the Rajshahi division.

## Materials and methods

Ethnobotanical methods like semi-structured interviews were employed to obtain the necessary information. The basic method employed is termed as guided field walk, which as per Martin (1995) and Maundu (1995) involves observation while interviewing the informant. Typically, the informant (ojha) was taken on field trips to forest areas from where he usually collected his medicinal plants. Plants were pointed out by the ojha and their local name, ailments for which they were prescribed, part of plant used, formulations and dosages were noted down by the researcher. Information was also obtained on any specific time or month when the plant was collected, the maturity of the plant when it was deemed suitable for medicinal use, and any other plants that were being used concomitantly in the preparation of remedies.

Plant specimens were photographed as well as collected, pressed and dried in the field. Local names of the plants were obtained from the informant and double-checked with other members of the Rakhain community. Plant specimens were identified at the Bangladesh National Herbarium, where voucher specimens were deposited.

## Results and discussion

### Plants and their distribution into families

Detailed information was collected on twenty six medicinal plants used by the ojhass to treat various ailments. The results are summarized in Table 1. Briefly, the plants were distributed in to twenty one families, which included Amaranthaceae, Amaryllidaceae, Apiaceae, Asparagaceae, Capparaceae, Cuscutaceae, Lamiaceae, Lauraceae, Leguminosae, Loganiaceae, Loranthaceae, Malvaceae, Marsileaceae, Menispermaceae, Moraceae, Polygonaceae, Sapotaceae, Scrophulariaceae, Solanaceae, Verbenaceae, and Vitaceae. The highest number of plants (three each) belonged to the Amaranthaceae and Leguminosae families, followed by two plants in the Solanaceae family.

**Table 1:** Medicinal plants of the Santals of Rajshahi district, Bangladesh (Note that local names of ingredients in formulations are given in bold letters; sometimes the corresponding botanical or English name is not available)

Botanical name	Family	Local name	Part(s) used	Ailment(s) and Dosage
<i>Achyranthes aspera</i> L.	Amaranthaceae	Chirchithi	Whole plant	1. Severe stomach pain. Whole plant of <i>Achyranthes aspera</i> along with leaves of <i>Aerva lanata</i> is crushed and taken with a little <b>misri</b> (sugar crystal). 2. Excessive bleeding after menstruation. Paste of <i>Cuscuta reflexa</i> is made separately with paste of whole plant of <i>Achyranthes aspera</i> . <i>Achyranthes aspera</i> paste is warmed and mixed with paste of <i>Cuscuta reflexa</i> and tied to vaginal area before sleeping for 7 days.
<i>Aerva sanguinolenta</i> (L) Blume.	Amaranthaceae	Lal bish hori	Bark	Blood in urine. The bark of <i>Aerva sanguinolenta</i> is mixed with 3 ghughura (a type of insect), 60 black peppers, crushed, made into pills and dried. The pills are taken thrice daily for one month.
<i>Amaranthus viridis</i> L.	Amaranthaceae	Gandhori ara	Whole plant	Snake bite. Crushed whole plant of <i>Amaranthus viridis</i> is applied to snake bites. At the same time juice from crushed <b>chiari gach</b> (unidentified plant) is taken.
<i>Crinum sp.</i>	Amaryllidaceae	Bon piyaz	Tuber	Stomach pain. The tuber is cut into small pieces, crushed and taken with seven slices of crushed ginger.
<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Tandi-poraioni	Whole plant	Lack of breast milk after childbirth. The whole plant of <i>Centella asiatica</i> including roots is crushed with whole plant of <i>Marsilea quadrifoliata</i> including roots and made into a paste. The paste is applied twice daily for 7 days around the nipple.
<i>Asparagus racemosus</i> Willd.	Asparagaceae	Shotomul	Root	Tuberculosis. The roots of <i>Solanum virginianum</i> are mixed with roots of <i>Asparagus racemosus</i> , roots of <b>Anantamul</b> ( <i>Hemidesmus indicus</i> R.Br.) and spices [cinnamon, cardamom, <b>gojruti</b> , root of <i>Abrus precatorius</i> L., fruit of <i>Piper cubeba</i> L., nutmeg, clove, saffron, black cumin, <i>Terminalia chebula</i> fruit], mixed, crushed and made into pills. The pills are taken with <b>chuani</b> (rice fermented wine) thrice daily for seven days.

**Table 1:** Continue

<i>Capparis zeylanica</i> L.	Capparaceae	Acharia	Bark	1. Pain in hands or feet. Bark of plant is blended with about ½ inch zinger rhizome. The paste is slightly warmed and applied to area of pain. 2. Paralysis. Bark of <i>Capparis zeylanica</i> along with roots of <b>Barogira gach</b> (unidentified plant) is fried in 100g clarified butter ( <b>ghee</b> ) and applied to the paralyzed area.
<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae alt. Convolvulaceae	Swarna lota, Alok lota	Whole vine	Excessive bleeding after menstruation. Paste of <i>Cuscuta reflexa</i> is made separately with paste of whole plant of <i>Achyranthes aspera</i> . <i>Achyranthes aspera</i> paste is warmed and mixed with paste of <i>Cuscuta reflexa</i> and tied to vaginal area before sleeping for 7 days.
<i>Leucas aspera</i> (Willd.) 1- Link.	Lamiaceae	Durfā	Leaf	Headache. Leaves are crushed, mixed with a little salt and 2 drops of the juice applied to the nose.
<i>Litsea</i> sp.	Lauraceae	Pipulti, Poj	Leaf	Debility. The leaves are soaked in water, slightly crushed and taken with <b>misri</b> (sugar crystal) in the morning.
<i>Abrus precatorius</i> L.	Leguminosae alt. Fabaceae	Sona kuchi	Root, stem, leaf	1. Tuberculosis, throat pain. The roots and stems of <i>Abrus precatorius</i> are crushed with leaves of <i>Tinospora cordifolia</i> , made into a paste, slightly warmed and taken for tuberculosis. The same paste is applied to throat for throat pains. 2. Dripping of saliva from mouth and loss of movement of tongue. The leaves and roots of <i>Tinospora cordifolia</i> are made into a paste with <b>horitoki</b> (fruit of <i>Terminalia chebula</i> Retz.), <b>bohera</b> (fruit of <i>Terminalia bellerica</i> Roxb.), <b>kantakhor</b> (an unidentified plant), chandan wood ( <i>Santalum album</i> L., family Santalaceae), leaf of <i>Abrus precatorius</i> and leaf of <i>Andrographis paniculata</i> , dried, powdered and made into pills. The pills are taken thrice daily for seven days.
<i>Cajanus cajan</i> (Linn.) Millsp.	Leguminosae -Papilionoideae	Arhal	Leaf	Jaundice. Leaf juice is taken with molasses twice daily for seven days.
<i>Dalbergia sissoo</i> Roxb. Ex. DC.	Leguminosae -Papilionoideae	Shishu	Young stems	Diarhea. The young stems are soaked overnight in water. The following morning they are taken on an empty stomach along with a sherbet of <b>misri</b> (sugar crystal) or molasses. This is done for seven days.
<i>Strychnos nux-vomica</i> L.	Loganiaceae	Kuchlo	Bark	1. Paralysis. A paste is made from bark and oil of <b>Goma snake</b> ( <i>Varanus salvator</i> ) and applied to paralyzed area for 15 days. The bark is crushed, made into a paste. Pills are made of the paste, the size of gram seeds. The pills are taken thrice daily for 10 days. 2. Fever. The bark is crushed, made into a paste. Pills are made of the paste, the size of gram seeds. The pills are taken thrice daily for 10 days.
<i>Dendrophthoe falcata</i> (L.f) Etting.	Loranthaceae	Dhaira	Whole plant	Rheumatism. Crushed whole plant is mixed with fat from <b>Darash</b> snake ( <i>Xenochropis piscator</i> ) and applied to affected areas twice daily for 7-8 days.
<i>Hibiscus rosa sinensis</i> L.	Malvaceae	Joba baha	Flower buds	Puerperal fever (resulting in excessive loss of weight in women). Flower buds of <i>Hibiscus rosa sinensis</i> , aerial roots of <b>bot</b> ( <i>Ficus benghalensis</i> ), one <b>lobongo</b> (clove), and gum from <b>babla</b> ( <i>Acacia arabica</i> ) is blended together and taken with a small amount of ginger juice.
<i>Marsilea quadrifoliata</i> L. syn. <i>Marsilea quadrifolia</i>	Marsileaceae	Chatom ara	Whole plant	Lack of breast milk after childbirth. The whole plant of <i>Centella asiatica</i> including roots is crushed with whole plant of <i>Marsilea quadrifoliata</i> including roots and made into a paste. The paste is applied twice daily for 7 days around the nipple.
<i>Tinospora cordifolia</i> Miers	Menispermaceae	Heru-awar	Leaf, root	Dripping of saliva from mouth and loss of movement of tongue. The leaves and roots of <i>Tinospora cordifolia</i> are made into a paste with <b>horitoki</b> (fruit of <i>Terminalia chebula</i> Retz.), <b>bohera</b> (fruit of <i>Terminalia bellerica</i> Roxb.), <b>kantakhor</b> , <b>chandan</b> wood ( <i>Santalum album</i> L., family Santalaceae), leaf of <i>Abrus precatorius</i> and leaf of <i>Andrographis paniculata</i> , dried, powdered and made into pills. The pills are taken thrice daily for seven days.
<i>Ficus benghalensis</i> L.	Moraceae	Bot	Aerial root	Puerperal fever (resulting in excessive loss of weight in women). Flower buds of <i>Hibiscus rosa sinensis</i> , aerial roots of <b>bot</b> ( <i>Ficus benghalensis</i> ), one <b>lobongo</b> (clove), gum from <b>babla</b> ( <i>Acacia arabica</i> ) is blended together and taken with a small amount of ginger juice.

**Table 1:** Continue

<i>Polygonum orientale</i> L.	Polygonaceae	Bish-katali	Leaf	Headache. The leaves are crushed with ten black peppers and taken through the nose.
<i>Madhuca indica</i> Gmel.	Sapotaceae	Moa, Matkom	Fruit	Debility, blood purifier. The fruits are boiled with unripe gram and sugar added till the decoction takes a blood red color. The decoction is taken for debility and is also assumed to purify blood.
<i>Scoparia dulcis</i> L.	Scrophulariaceae	Chini alo	Leaf	Blood dysentery. The leaves of the plant are crushed and taken.
<i>Datura metel</i> L.	Solanaceae	Dhutura	Rind of fruit	Throat pain in children. The inner portions of the fruit are discarded and the inside filled with mustard oil, warmed and applied to the throat and chest.
<i>Solanum virginianum</i> L.	Solanaceae	Kontho-keyari	Root	Tuberculosis. The roots of <i>Solanum virginianum</i> are mixed with roots of <i>Asparagus racemosus</i> , roots of <b>Anantamul</b> ( <i>Hemidesmus indicus</i> R.Br.) and spices [cinnamon, cardamom, <b>gojruti</b> , root of <i>Abrus precatorius</i> L., fruit of <i>Piper cubeba</i> L., nutmeg, clove, saffron, black cumin, <i>Terminalia chebula</i> fruit], mixed, crushed and made into pills. The pills are taken with <b>chuani</b> (rice fermented wine) thrice daily for seven days.
<i>Vitex negundo</i> L. Sinduari	Verbenaceae	Nishinda,	Leaf	Pain on one side of the forehead. Leaves are crushed, mixed with water and put within the nostrils.
<i>Cissus quadrangularis</i> L.	Vitaceae	Harjora	Whole plant	Bone fracture. Whole plant of <i>Cissus quadrangularis</i> , whole plant of <i>Evolvulus nummularius</i> , whole plant of <i>Cyperus rotundus</i> , and 7 slices of ginger are crushed and made into a paste. The paste is warmed and applied to fractures in the form of a poultice.

#### Plant parts used and mode of preparation

Leaves formed the part of the plant most frequently used (eight plants), followed by use of the whole plant (seven plants) for treatment of ailments. The roots, tubers or rhizomes of six plants were also used by the ojhas. Flowers were least used; the flower of only one plant was used as remedy. The usual mode of use of the plants or plant parts involved crushing the plant and collecting the juice. Other remedies included making paste of plant or plant parts, soaking the plant or plant part in water followed by straining the water through cloth, and boiling the plant or plant part in water to form a decoction.

The Santal ojhas typically mix several ingredients in the preparation of their remedies. These ingredients can be parts of other plants, spices, or sugar. For instance, as remedy for stomach pain whole plant of *Achyranthes aspera* along with leaves of *Aerva lanata* is crushed and taken with a little crystalline sugar. The whole plant of *Centella asiatica* is crushed with whole plant of *Marsilea quadrifolia* and given as a remedy to mothers, who are lacking in breast milk after childbirth. On occasions, the number of ingredients may be substantial. For instance, the concoction that the ojhas use as remedy for tuberculosis include roots of *Solanum virginianum*, roots of *Asparagus racemosus*, roots of *Hemidesmus indicus*, roots of *Abrus precatorius*, fruits of *Piper cubeba*, fruits of *Terminalia chebula*, along with a number of spices including cinnamon, cardamom, nutmeg, clove, saffron, black cumin and a locally obtained unidentified Santal spice called gojruti. Pills made from all these ingredients are taken with chuani (rice fermented wine). As remedy for dripping of saliva from mouth and loss of movement of tongue, the leaves and roots of *Tinospora cordifolia* are made into a paste with fruits of *Terminalia chebula*, fruits of *Terminalia bellerica*, wood from *Santalum album*, leaves of *Abrus precatorius*, leaves of *Andrographis paniculata*, and whole plant of kantakhor (an unidentified plant), dried, powdered, and made into pills, which are taken thrice daily for seven days. For puerperal fever resulting in excessive loss of weight in women, the ojhas administer to women a concoction made from the flower buds of *Hibiscus rosa sinensis*, aerial roots of *Ficus benghalensis*, clove and gum from *Acacia arabica* along with a small amount of ginger juice.

A review of the available scientific literature suggests that the Santal remedies could be sometimes effective for treatment of the disease itself; at other times, the remedies may be considered as symptomatic treatments. The whole plant of *Achyranthes aspera* along with leaves of *Aerva lanata* and a little crystalline sugar is used to treat stomach pain. Since *Achyranthes aspera* has been reported to possess anti-inflammatory activity (Gokhale *et al.*, 2002; Vetrichelvan and Jegadeesan, 2003), it is possible that stomach pain arising out from ulceration or inflammation of the stomach can be remedied through use of this plant. The same is true for *Crinum* sp., the tubers of which are taken with crushed ginger during stomach pain. Although it was not possible to fully identify the *Crinum* sp. used by the Santals, other species of this genus have an analgesic and anti-inflammatory properties. For instance, aqueous extract of *Crinum glaucum* have been reported to possess analgesic and anti-inflammatory activities (Okpo *et al.*, 2001). Anti-inflammatory, analgesic and anti-lymphocytic

activities have also been reported for aqueous extract of *Crinum giganteum* (Kapu *et al.*, 2001). The bark of *Capparis zeylanica* is used by Santal ojhās as remedy for pain in hands or feet. Recent research has found evidences of analgesic and antipyretic effects of leaves of this plant (Ghule *et al.*, 2007). The leaves of *Leucas aspera* are used as remedy for headache by the Santals. The roots of this plant reportedly possess antinociceptive, antioxidant and cytotoxic activities (Rahman *et al.*, 2007), while the flowers are known to have antimicrobial activity (Mangathayaru *et al.*, 2005). It is possible that while it has not so far been reported, the leaves of the plant may also possess antinociceptive properties, which may lead to direct relief of headache, or contain antimicrobial substances, which can contribute to symptomatic relief of headache caused as a result of bacterial infection. The leaves of *Vitex negundo* are also used as remedy for headache. The leaves particularly, as well as the seeds of this plant reportedly possess anti-inflammatory and analgesic activities (Chawla *et al.*, 1992; Dharmasiri *et al.*, 2003; Gupta and Tandon, 2005; Tandon and Gupta, 2006), which can account for the relief of headache.

The roots of *Asparagus racemosus* are used with other plant parts and spices by the Santals as remedy for tuberculosis. The root of this plant reportedly has anti-bacterial properties (Mandal *et al.*, 2000). The roots and stems of *Abrus precatorius* are taken during tuberculosis and throat pains. It is interesting that the roots have been reported to contain four anti-bacterial compounds (Zore *et al.*, 2007), and the plant as a whole has been reported to possess anti-bacterial activity against clinical pathogens (Adelowotan *et al.*, 2008), immunopotentiating activity (Ramnath *et al.*, 2002), as well as anti-tubercular and anti-plasmodial constituents (Limmatvapirat *et al.*, 2004). Thus the use of this plant as remedy for tuberculosis appears to be scientifically validated.

The leaves of *Cajanus cajan* (synonym of *Cajanus indicus*) is taken for jaundice, which is a disorder of the liver. The hepatoprotective effect of this plant, particularly against various hepatotoxic compounds has been thoroughly documented (Sarkar and Sil, 2006; Sarkar *et al.*, 2005; Ghosh *et al.*, 2006; Ghosh and Sil, 2006; Sarkar *et al.*, 2006; Manna *et al.*, 2007a,b).

The fruits of *Madhuca indica* are taken as a remedy by the Santals for debility and further considered to “purify blood”. “Toxicity of blood” is considered by many traditional medicinal practitioners in Bangladesh as the cause for various ailments, for which medicines are taken, which are considered to “purify blood”. It is possibly safe to assume that the above terms are symptomatic descriptions of disorders of blood like low hemoglobin, or lower than normal number of various blood cells, or other infections for which the assumption is made that blood plays an important role. It is noteworthy that *Madhuca indica* contains protobassic glycosides named madhucoisides A and B, with inhibitory activity on free radical release from phagocytes (Pawar and Bhutani, 2004).

Modern scientific studies validate to a certain extent the use of *Scoparia dulcis* by the Santals to treat blood dysentery. The plant is known to possess anti-microbial components (Latha *et al.*, 2006); *in vivo* inhibition of gastric acid secretion by aqueous extract of the plant has also been reported in rodents (Mesia-Vela *et al.*, 2007).

The scientific validation of the use of *Cissus quadrangularis* in healing bone fractures, as well as its analgesic and anti-inflammatory properties has been widely documented (Udupa *et al.*, 1961; Udupa and Prasad, 1962; Singh and Udupa, 1962; Prasad and Udupa, 1963; Udupa and Prasad, 1964a,b; Chopra *et al.*, 1976; Shirwaiker *et al.*, 2003; Panthong *et al.*, 2007). In our ongoing studies on the ethnobotanical survey of each district and each tribe in Bangladesh, we have observed that every district or tribe that we have surveyed uses this plant for healing bone fractures.

### Conclusion

The Santals have a well-established system of administration of traditional medicine based mainly on plants by their traditional healers or ojhās for treatment of diverse ailments. This study forms part of our ongoing studies on the Santals, and gives the results of our ethnobotanical survey of the Santals of Rajshahi districts. The study is already providing enough information for further scientific studies to be conducted on medicinal plants used by the Santals, since the use of a number of plants has already been validated through modern scientific research. The once densely forested regions that the Santals inhabited are largely gone, and efforts need to be made by all quarters to save what is left of this fast dwindling medicinal plant resources.

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