Ethnobotanical survey of the Tripura tribe of Bangladesh

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Ethnobotanical survey of the Tripura tribe of Bangladesh

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ABSTRACT

The Tripuras form the third largest tribal group inhabiting the Chittagong Hill Tracts region of Bangladesh. Many believe that they are descendents of the Bodo group of people, who are considered to be the early ancestors of the peoples of Assam, Burma and Thailand. Most people of the Tripura tribe in Bangladesh have still retained their own culture and practices, which include treatment of various ailments by their own traditional healers. Each traditional healer is considered an expert on medicinal plants and preparation of formulations for effective treatment of diseases. We therefore conducted an ethnobotanical survey of the Tripura tribe to learn more about plants that they use in their traditional medicinal formulations. Interviews were conducted of the traditional healers and detailed information noted as to plant or plant parts used, formulations, dosages, and side-effects, if any. A semi-structured questionnaire was filled out by the traditional healers during the interview process. Plants were pointed out by the healers and plant specimens brought to the Bangladesh National Herbarium for complete identification. A total of 52 plants belonging to 37 families were fully identified as to their being used by the traditional healers. These plants include *Achyranthes aspera*, *Centella asiatica*, *Acorus calamus*, *Calotropis gigantea*, *Hoya parasitica*, *Eclipta prostrata*, *Synedrella nodiflora*, *Oroxylum indicum*, *Ananas comosus*, *Casuarinas equisetifolia*, *Anogeissus acuminata*, *Terminalia bellerica*, *Terminalia citrina*, *Eupatorium triplinerve*, *Mikania cordata*, *Cuscuta reflexa*, *Kalanchoe pinnata*, *Dillenia indica*, *Dryopteris filix-mas*, *Emblica officinalis*, *Euphorbia hirta*, *Erythrina variegata*, *Curculigo recurvata*, *Ajuga macrosperma*, *Hyptis capitata*, *Leucas aspera*, *Ocimum gratissimum*, *Cinnamomum obtusifolium*, *Caesalpinia digyna*, *Clitoria ternatea*, *Moghania macrophylla*, *Cassia alata*, *Acacia farnesiana*, *Lygodium flexuosum*, *Urena lobata*, *Marsilea quadrifolia*, *Melastoma malabathricum*, *Stephania japonica*, *Mimosa pudica*, *Streblus asper*, *Nymphaea nouchali*, *Zizyphus oenoplia*, *Adina cordifolia*, *Ixora parviflora*, *Mussaenda corymbosa*, *Aegle marmelos*, *Clausena heptaphylla*, *Aphania danura*, *Pterospermum semisagittatum*, *Callicarpa macrophylla*, *Clerodendrum viscosum*, and *Alpinia nigra*. The plants or plant parts are used to treat a variety of ailments like gastrointestinal disorders (loss of appetite, indigestion, acidity, flatulence, stomach pain, diarrhea, blood dysentery, constipation, hardening of stools, piles, intestinal worms), respiratory tract disorders (cough, blood with cough, fever, mucus, pneumonia, asthma, bronchitis, throat pain), skin disorders (boils, itches, eczema, scabies, infection on lips), urinary tract disorders (leucorrhea, urinary tract infections, burning sensation in urinary tract, lack of or infrequent urination, frequent urination), hepatic disorders (jaundice) as well as edema, rheumatic pain, elephantitis, toothache, dental caries, impotency, wounds, body ache, epilepsy, heart palpitations, decreased lactation after childbirth, cancer, tumors, malaria, headache, dizziness, diabetes, oral lesions, body pain, leprosy, poisonous animal and insect bites, nicotine addiction, pain and bleeding during delivery, and redness of eye. Taken together the plants and the diseases that are claimed to be cured necessitate scientific studies for validation of the claims and discovery of compounds of potential pharmacological importance.

Key words: Ethnobotanical survey, medicinal plants, Bangladesh, Tripura tribe

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Introduction

Amongst the various tribal groups inhabiting the Chittagong Hill Tracts forest region of Bangladesh, the Tripuras form the third largest group after the Chakmas and the Marmas. Although the present inhabitants came from the state of Tripura in India, the tribe is believed to be descendents of the Bodo group of people, considered as the forefathers of the peoples of Myanmar, Thailand and Assam (India). Tripuras are divided into at least 36 groups (dafas) of which 16 are in Bangladesh. Most people of the Tripura tribe in Bangladesh have still retained their culture and practices, which include treatment of various ailments by their own traditional healers using locally available medicinal plants. The traditional healers generally have extensive knowledge on plants and their uses, as well as expertise in the preparation of various formulations and dosages. We therefore conducted an ethnobotanical survey of the Tripura tribe to learn more about plants that they use in their traditional medicinal formulations.

Materials and Methods

Extensive interviews were conducted of the Tripura traditional healers with the help of a semi-structured questionnaire. The basic method followed was the guided field work as mentioned by Martin (1995) and Maundu (1995). Briefly, traditional healers were taken on field trips to areas from where they usually collected plants, while at the same time questions were asked and information noted. The information collected included formulations, ailments for which the formulations were used and dosages. Information was also collected on any particular season for collecting plants, plant parts used and whether combination of plants were used to treat any particular ailment or if any single plant was used to treat multiple ailments. For the latter, interviews were conducted as to any specific plant part used for the ailment(s) concerned.

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 community. Plant specimens were identified at the Bangladesh National Herbarium, where voucher specimens were deposited.

Results and Discussion

Plants and their distribution into families

A total of 52 plants were identified by the Tripura traditional healers as to their being used for medicinal purposes. These plants were distributed into 37 families. The highest number of medicinal plants (four) belonged to the Labiatae family, followed by Combretaceae and Rubiaceae (three plants each) and Asclepiadaceae, Asteraceae, Compositae, Euphorbiaceae, Rutaceae, and Verbenaceae families (two plants each). Other families included Amaranthaceae, Apiaceae, Araceae, Bignoniaceae, Bromeliaceae, Casuarinaceae, Convolvulaceae, Crassulaceae, Dilleniaceae, Dryopteridaceae, Fabaceae, Hypoxidaceae, Leguminosae-Caesalpinioideae, Leguminosae-Mimosoideae, Lygodiaceae, Malvaceae, Marsileaceae, Melastomataceae, Menispermaceae, Mimosaceae, Moraceae, Nymphaeaceae, Rhamnaceae, Sapindaceae, Sterculiaceae, and Zingiberaceae families. The results are summarized in Table 1.

Plant parts used and ailments

Leaves formed the part of the plant most frequently used (30 plants), followed by roots (21 plants) and barks or stems (9 plants each). Surprisingly, only three plants had the whole plant used for medicinal preparations. Out of the 52 plants observed in the present survey, 20 plants (38.5%) had use of multiple parts like leaf and root or leaf and bark. Thirty eight plants (73.1%) were used to treat multiple ailments, while fourteen plants (26.9%) were used as remedy for a single ailment.

The most frequent ailment treated was gastrointestinal disorders, which included dysentery, diarrhea, stomach pain, bloating, indigestion, acidity, helminthiasis, and constipation. A total of twenty two plants were used to treat the above manifestations of gastrointestinal disorders. Twenty one plants were used to treat fevers, asthma, coughs, colds and other respiratory problems. Ten plants were used to treat skin disorders like eczema, scabies, itches, ringworm infections and abscesses. Seven plants were used as sexual stimulants. Six plants each were used to treat urinary tract problems, and rheumatism and joint pains. Other diseases treated include edema, jaundice, toothache, wounds, body sores, cancer, malaria, headache, vomiting, oral lesions, insect or animal bites, diabetes, and heart palpitations. One plant was used to reduce sleep. It is interesting that the Tripura practitioners also use a plant to destroy the effectiveness of any medicine (particularly when accidentally taken in large doses).

Table 1: Medicinal plants used by the Tripura tribe of Bangladesh

Botanical name	Family	Local name	Parts used	Disease and dosage
Achyranthes aspera L.	Amaranthaceae	Kocha-kanthi	Root	Edema. 1. On a Saturday or Tuesday the roots are plucked in one breath and tied to all the joints of the body.
Centella asiatica L.	Apiaceae	Chasta	Leaf	Gastric disorder, stomach pain, diarrhea, blood dysentery, fever, cough. 1. The leaves are made into chutneys and taken with rice. 2. Two teaspoonfuls of juice squeezed from leaves is taken twice daily for one week.
Acorus calamus L.	Araceae	Lung-hi (rhizome-like)	Root	Fever with convulsions, burning sensations in the body of adults and children, indigestion, pneumonia, cough, mucus, tingling sensations within the body. 1. Five leaves of the plant, 5 leaves of shor-ochala (*Eupatorium triplinerve* Vahl), 1" root of lung-hi (*Acorus calamus* L.), 1" root of cheba-lang, 8-10 leaves of tulshi (*Ocimum gratissimum* L.) are taken together, dried and made into tablets the size of bean seeds. Two tablets are taken twice daily till cure. 2. Juice squeezed from the ingredients (above) is taken two teaspoonfuls at a time twice daily till cure.
Calotropis gigantea L. R. Br.	Asclepiadaceae	Mourong-ha	Leaf, whole plant	Rheumatic pain in human, swelling of stomach in cattle, loss of appetite in cattle. 1. Leaves are warmed till they become a little soft and then applied to area of rheumatic pain. 2. The dense and white juice from whole plant is mixed with mustard oil in equal or slightly less proportions. The tip of a needle is wetted with the mixture and inserted repeatedly in the nerve beneath cattle ears as remedy for swelling of stomach and loss of appetite in cattle.
Hoya parasitica Wall.	Asclepiadaceae	Dupui-tha	Fruit	Hard stool, constipation. 1. Fruits are either taken with vegetables or dried, powdered and the powder taken 2-3 pinches once. Note: must not be eaten more or else diarrhea will occur.
Eclipta prostrata (L) Hassk.	Asteraceae	Tri-shorong	Leaf, root	Itch, prevent hair loss, keeping head cool, fever, skin disorders, elephantitis (abnormally large scrotum), jaundice, rheumatic fever. 1. Leaf juice is applied to itches or head 2-3 times daily for 8-10 days. 2. Root juice when taken reduces fever and rheumatic fever; when applied to skin cures skin disorders. 3. Leaf juice is taken as a remedy for jaundice. Root paste is applied to area of scrotum as remedy for elephantitis.
Synedrella nodiflora (L.) Gaertn.	Asteraceae	Atha-safang	Leaf	Itch, eczema, scabies, any type of skin disorders. 1. Leaf juice is applied to affected area several times daily for 7-8 days. Note that the juice should not be put in mouth.
Oroxylum indicum Vent.	Bignoniaceae	Tou-kharung	Bark, fruit	Scabies, eczema, skin disorders, abscess, leucorrhea, dysentery, urinary problems, toothache. 1. The fruits are dried and powdered and made into bean seed-sized pills. Two pills are taken thrice daily for 1-2 months for leucorrhea. 2. Bark juice is applied to scabies, eczema, skin disorders and tooth ache as remedy. To be applied till cure.
Ananus comosus (L.) Merr.	Bromeliaceae	Am-toi	Leaf, fruit	Anthelmintic, anti-bacterial, urinary problem, stimulate appetite. 1. Young fruits are taken as anthelmintic. 2. Ripe fruits are taken for appetite stimulation and urinary problems. 3. A combination of leaf and fruit juice is considered anti-bacterial.
Casuarina equisetifolia J.R. Forst and G. Forst.	Casuarinaceae	Aga-chom-fang	Leaf, bark	Severe stomach pain, astringent, toothache. 1. Leaf juice is taken to reduce severe stomach pain. 2. Bark juice is taken as astringent and reduce toothache.
Anogeissus acuminata Wall.ex C.B.Clarke	Combretaceae	Thori-sroi	Stem, bark	Toothache, dental caries. 1. Five handfuls of bark are boiled in 0.5 liter water till the volume is reduced to one glassful (about 200 ml). The water is gargled with thrice daily for 8-10 days. 2. Brushing the teeth with stems also is done as a remedy for toothache and dental caries.

Table 1: Continue

Terminalia belerica Roxb.	Combretaceae	Ammai	Fruit	Long-term fever, loss of appetite, sexual stimulant. 1. Fruits of *Terminalia belerica* Roxb., *Terminalia citrina* Roxb. ex Flem. *And Emblica officinalis* Gaertn. are taken in equal proportions, cut into small pieces, dried and powdered. Three teaspoon fulls of powder are mixed with 2-3 drops of honey and taken twice daily for 7 days or till the desire of the patient.
Terminalia citrina Roxb. ex Flem.	Combretaceae	Bokhla	Fruit	Long-term fever, loss of appetite, sexual stimulant. 1. Fruits of *Terminalia belerica* Roxb., *Terminalia citrina* Roxb. ex Flem. and *Emblica officinalis* Gaertn. are taken in equal proportions, cut into small pieces, dried and powdered. Three teaspoon full of powder are mixed with 2-3 drops of honey and taken twice daily for 7 days or till the desire of the patient.
Eupatorium triplinerve Vahl.	Compositae	Shor-ochola		Fever with convulsions, burning sensations in the body of adults and children, indigestion, pneumonia, cough, mucus, tingling sensations within the body. 1. Five leaves of the plant, 5 leaves of shor-ochala (*Eupatorium triplinerve* Vahl), 1" root of lung-hi (*Acorus calamus* L.), 1" root of cheba-lang, 8-10 leaves of tulshi (*Ocimum gratissimum* L.) are taken together, dried and made into tablets the size of bean seeds. Two tablets are taken twice daily till cure. 2. Juice squeezed from the ingredients (above) is taken two teaspoonfuls at a time twice daily till cure.
Mikania cordata (Burm. F.) B. L. Robinson	Compositae	Kelakhi	Vine, leaf	Stop bleeding from wounds, astringent, chest pain after eating, acidity, dysentery. 1. Paste of leaves is applied to cuts and wounds to stop bleeding. 2. Juice from the leaf is taken for chest pain after eating, acidity, and dysentery.
Cuscuta reflexa Roxb.	Convolvulaceae	Kio-grow	Vine	Edema, body ache, sexual stimulant, maintain good hepatic functions, jaundice. 1. Vines are cut into small pieces and boiled in 2 glassful of water till the volume is reduced to one glass. Half glass of the water is to be drunk every morning for edema, body ache and as sexual stimulant. 2. Leaf paste is made into bean seed-size pills. 2 pills are taken thrice daily to maintain good hepatic function and as a remedy for jaundice.
Kalanchoe pinnata (Lam.) Pers.	Crassulaceae	Bli-ir-jama	Leaf	Coughs, mucus, fever, sudden loss of consciousness (epilepsy-like), constipation, piles. 1. Juice squeezed from the leaves is taken two teaspoonfuls twice daily for coughs, mucus, fever, and sudden loss of consciousness. 2. Paste of leaves is applied to rectum for constipation and piles.
Dillenia indica L.	Dilleniaceae	Thai-plo-fang	Leaf, bark, fruit	Edema, abscess, appetite stimulant. 1. Leaf paste is applied to areas with edema. 2. Bark paste is applied to abscess to induce bursting of abscess and relieve pain from abscess. 3. Fruits are eaten to stimulate appetite.
Dryopteris filix-mas (L.) Schott	Dryopteridaceae	Moi-khun-doi	Leaf	To destroy effectiveness of any medicine if ingested in large amounts or if the wrong medicine is taken. 1. The leaves are cooked and taken as vegetable. Precaution: not to be eaten while on medication unless necessary.
Emblica officinalis Gaertn.	Euphorbiaceae	Amlai	Fruit	Long-term fever, loss of appetite, sexual stimulant. 1. Fruits of *Terminalia belerica* Roxb., *Terminalia citrina* Roxb. ex Flem. and *Emblica officinalis* Gaertn. are taken in equal proportions, cut into small pieces, dried and powdered. Three teaspoonfuls of powder are mixed with 2-3 drops of honey and taken twice daily for 7 days or till the desire of the patient.
Euphorbia hirta L.	Euphorbiaceae	Abu-tuing-thi	Top two leaves on any stem, whole plant, leaf	Increase lactation after childbirth, body sores, asthma and chronic bronchitis. 1. The two leaves along with a betel leaf, a betel nut are cut into small pieces and are to be taken besides a mountain stream while looking up or at the sky. The hands are to be wetted in the stream and the breasts touched with wet hands while thinking of increased lactation due to beneficial effects of stream water. This is to be done for 3 days. 2. The milk-like juice of the leaf is also taken for increased lactation. 3. Juice squeezed from the leaves is applied to affected areas for body sores or any infection. 4. The whole plant is boiled in water and the water taken as remedy for asthma and chronic bronchitis.

Table 1: Continue

Erythrina variegata L.	Fabaceae	Mada-kamia -mafang	Bark, flower	Anthelmintic, scabies, eczema, cancer, malaria, fever. 1. Half teaspoonful of bark juice is taken as anthelmintic. 2. Bark juice is applied topically to any sort of skin disorders. 3. Flowers are boiled in water and the water strained through cloth and drunk with a little sugar for cancer. 4. Bark paste is made into pills and the pills taken for malaria and fevers.
Curculigo recurvata W. T. Aiton	Hypoxidaceae	Lerudong	Root,	Rheumatism, waist and/or joint pain, sexual stimulant. root cluster1. Root cluster is powdered after thorough cleansing and made into pills the size of bean seeds. Three pills are taken twice daily as sexual stimulant. 2. Paste of root cluster is applied to area of rheumatism or joint pain followed by mild warming of the affected area.
Ajuga macrosperma Wall. Ex Benth.	Labiatae alt. Lamiaceae	Shi-priee	Root	Asthma, pneumonia, breathing difficulty, respiratory problems. 1. The roots are dries, powdered and made into tablets the size of bean seeds. Two tablets are to be taken twice daily for a month.
Hyptis capitata Jacq. Lamiaceae	Labiatae alt.	Si-priyi	Leaf	Fever, cooling of head, reducing burning sensations of the body. 1. Half kg of leaf is boiled in 4 kg of water till amount is reduced to 2 kg. The patient is bathed in the cold water.
Leucas aspera (Willd.) Link	Labiatae	Thuik-chom	Root	Coughs, blood with cough, colds and associated problems. 1. One teaspoon full of root juice is mixed with 3-4 drops of honey and taken thrice daily till cure. While on this medication, crabs, shrimps and eggplant cannot be eaten.
Ocimum gratissimum L.	Labiatae	Tulshi	Leaf	Fever with convulsions, burning sensations in the body of adults and children, indigestion, pneumonia, cough, mucus, tingling sensations within the body. 1. Five leaves of the plant, 5 leaves of shor-ochala (*Eupatorium triplinerve* Vahl), 1" root of lung-hi (*Acorus calamus* L.), 1" root of cheba-lang, 8-10 leaves of tulshi (*Ocimum gratissimum* L.) are taken together, dried and made into tablets the size of bean seeds. Two tablets are taken twice daily till cure. 2. Juice squeezed from the ingredients (above) is taken two teaspoonfuls at a time twice daily till cure.
Cinnamomum obtusifolium (Roxb.) Nees.	Lauraceae	Mimigru, tojbol, gau-aure	Root	Headache, dizziness. 1. Root paste is applied to the forehead.
Caesalpinia digyna Rottler	Leguminosae	Mukhoi-chechai	Leaf	To keep head cool. 1. Half kilogram of leaves are boiled in a closed vessel for a long time. The juice that is obtained is cooled and applied to the head and massaged well whenever necessary. Heart palpitations, frequent diarrhea, and frequent defecation. 1. 2" amount of roots from Inshuk-jauma, *Adina* sp., *Callicarpa macrophylla* Vahl., *Antidesma* sp., and *Caesalpinia digyna* Rottler is grounded in water in which rice has been washed. The juice from the decoction is to be taken twice daily two teaspoonfuls at a time.
Clitoria ternatea L.	Leguminosae	Umaio	Leaf, root	Urinary tract infections, burning sensation in urinary tract, lack of urination, frequent urination. 1. Water in which rice has been rinsed is mixed with about 2" portion of root and grounded to obtain juice. The juice is taken two spoonfuls at a time 2-3 times daily till cure. 2. The leaf is cooked and eaten as vegetable.
Moghania macrophylla (Willd.) Kuntze	Leguminosae alt. Fabaceae	Blumai-kongda	Root	Frequent urination, lack of or infrequent urination, urinary tract problem and diabetes. 1. Powder obtained from grounded roots is mixed with a little water and taken one teaspoonful at a time twice daily till cure.
Cassia alata L. Caesalpinioideae	Leguminosae-	Khachua-fang	Leaf	Ringworm. 1. Leaf juice is applied to ringworm-affected spot 5-6 times daily till cure.
Acacia farnesiana (L.) Willd.	Leguminosae-Mimosoideae	Wilfa	Leaf, stem, bark, flower	Fear in children, vomiting or urge to vomit, strengthen gums, toothache. 1. The leaves, stems and flowers are boiled in water followed by bathing of children in that water to reduce fear. 2. Half teaspoon full of bark juice is taken to stop vomiting or to stop urge to vomit. 3. Teeth brushed with a branch reduce toothache and strengthens gums.

Table 1: Continue

Lygodium flexuosum (L.) Sw.	Lygodiaceae	Mukhra-tala	Leaf, stem	To reduce sleep (stay awake). 1. The plant is wrapped around the neck like a garland to stay awake.
Urena lobata L. var. *glauca* (Blume)	Malvaceae	Chathai	Leaf, root, flower	Skin disorders like scabies, eczema, and itches, infection on lips, fever. 1. Flower paste is applied to lip infections. 2. A combination of leaf and flower paste is applied to skin disorders. 3. The roots are thoroughly boiled in water; alternately root juice is taken 1 teaspoon full at a time thrice daily for 5-6 days as remedy for fever.
Marsilea quadrifolia L.	Marsileaceae	Chui-apaima	Leaf	Lesions on tongue or within the mouth, rheumatism. 1. With one breath several leaves are to be plucked and the squeezed juice from the leaves massaged to all ten tendons of the body twice daily for 2-3 days.
Melastoma malabathricum L.	Melastomataceae	Tai-tong	Leaf, root	Any sort of body pain, diarrhea, dysentery, scabies, abscess, leucorrhea, urinary problems. 1. One teaspoon full of root juice is taken twice daily for 8-10 days for body pain, leucorrhea, urinary problems, diarrhea and dysentery. 2. Leaf juice or leaf paste is applied to scabies and abscesses.
Stephania japonica (Thunb. Ex Murray) Miers.	Menispermaceae	Dufai-u-che-^{n}a	Leaf, stem	Fever in small children. 1. Boil stems and leaves in water. Bathe children in water when water becomes cold. To be done several times.
Mimosa pudica L.	Mimosaceae	Salai	Leaf	Large abscess, lack of pus within abscess, pain in abscess. 1. Leaf paste is applied to mouth and surrounding areas of abscess. This will lead to pus formation. The pus will come out and relieve pain.
Streblus asper Lour.	Moraceae	Sarwa	Root, stem, bark	Any type of tooth problem, malaria, fever with convulsions, diarrhea. 1. Juice from the bark is taken for malaria, fever with convulsions, and diarrhea. 2. Brushing teeth with the stem is done for all type of tooth problems.
Nymphaea nouchali Burm.f. var. *mutandaensis* Verdc.	Nymphaeaceae	Fodom-ba	Root cluster	Urinary problem, burning sensations in urinary tract, leucorrhea in women. 1. Paste of root cluster is applied to lower abdomen; alternately soil from the bottom of earthenware is taken in small amounts, mixed with root cluster and thoroughly grounded and applied to lower abdomen for urinary problems and as remedy for burning sensation in urinary tract. 2. Root clusters are dried, powdered and made into pea-sized pills. Three pills are to be taken twice daily for a month for leucorrhea in women.
Zizyphus oenoplia (L.) Mill.	Rhamnaceae	Boroi	Root	Urinary disorders like burning sensation in urinary tract, less urination, frequent urination. 1. The roots on the eastern side of the plant are to be plucked in one breath and powdered. One teaspoon full of the powder is mixed with a little water and taken twice daily for 7 days or till cure.
Adina cordifolia Hook. f.	Rubiaceae	Pro^{n}-om-fang	Bark	Antibacterial, eczema, scabies. 1. Bark paste is applied to eczema, scabies or bacterial infections on the skin.
Ixora parviflora Vahl.	Rubiaceae	Hokhu-chutri	Root, leaf, stem	Scabies, leprosy, pus formation, eczema. 1. Five handfuls of leaves and roots are boiled in 2 liter water. The decoction is added to a bucketful of water and the patient given a bath with the water. This is to be done till cure of leprosy, pus formation, scabies, and eczema. 2. Bark from the roots and stems are dried, powdered and applied to affected areas. Prior to application, the affected area is scratched till a little blood comes out.
Mussaenda corymbosa Roxb.	Rubiaceae	Shamor-maw-o	Root	Poisonous insect and animal bites. 1. Roots are powdered and several pinches of powder applied to area of bite thrice daily for 3-4 days.
Aegle marmelos L.	Rutaceae	Shill-fol	Fruit, root, leaf	To keep body cool, diarrhea, dysentery, constipation, astringent, repeat fevers, contagious fevers, frequent urination (diabetes). 1. Sherbet of fruits when taken keeps the body cool, the fruits are also used as astringent, unripe fruits are taken during diarrhea and dysentery, ripe fruits are consumed during constipation.

Table 1: Continue

				2. Juice from roots, alternately roots boiled in water followed by drinking of the water acts as a remedy for frequent fevers and contagious fevers. Consumption of ripe fruits also reduces fever. 3. Sherbet made from leaves, when taken acts as a remedy for frequent urination (diabetes).
Clausena heptaphylla Roxb. ex DC.	Rutaceae	Shaty-kiyi	Leaf	Fever, remove nicotine addiction, remove foul odor from mouth, chewed with betel leaf. 1. The leaves are boiled in water followed by bathing in the water. Fresh leaves are chewed and eaten or discarded following chewing.
Aphania danura (Voigt.) Radlk.	Sapindaceae	Krak-sidong	Leaf, bark	Stomach pain, feeling of stone like substance within stomach, reduction of delivery pain in women, stop bleeding during delivery. 1. Two teaspoon full of leaf juice is taken twice daily as remedy for stomach pain or feeling of stone in stomach. 2. Half teaspoon full of root paste is mixed with 3 drops honey to reduce delivery pain and excessive bleeding during child birth.
Pterospermum semisagittatum Buch.-Ham. ex Roxb.	Sterculiaceae	Nola-bang	Root	Fever, body ache. 1. Roots are slightly smashed and applied to the head or in the armpits with a little water. 2. Root juice is mixed with water in which rice has been washed and taken.
Callicarpa macrophylla Vahl.	Verbenaceae	Jama-thoi	Root	Heart palpitations, frequent diarrhea, and frequent defecation. 1. 2" amount of roots from Inshuk-jauma, *Adina* sp., *Callicarpa macrophylla* Vahl., *Antidesma* sp., and *Caesalpinia digyna* Rottler is grounded in water in which rice has been washed. The juice from the decoction is to be taken twice daily two teaspoonfuls at a time.
Clerodendrum viscosum Vent.	Verbenaceae	Kung-sroi-ma	Leaf, root, whole plant	Stomach pain, acidity, redness of eye, malaria fever, fever, cough, anthelmintic, respiratory problem, aphrodisiac, analgesic. 1. Leaf juice is taken for stomach pain and acidity. 2. Meristem juice is passed through clean cloth and two drops are applied to eyes as remedy for redness of eyes. 3. Leaf juice taken one teaspoon full 3 times daily for a week acts as a remedy for malaria fever, fever, coughs, intestinal worms (anthelmintic), and respiratory problems. 4. Juice from the whole plant acts as an analgesic. 5. One teaspoon full of juice from root, alternately pills made from dried and powdered roots are taken twice daily for 7-9 days as an aphrodisiac.
Alpinia nigra (Gaertn.) B. L. Burtt.	Zingiberaceae	Pui-dagro	Leaf, stem, root	Gastrointestinal problem, indigestion, stomach pain, bloating, acidity. 1. Juice from the root (tuber like part) is squeezed; alternately roots are powdered, mixed with half tablespoon of water and taken twice daily in the morning and evening on an empty stomach for 7-8 days. 2. Young stems are taken and the bark discarded. The remaining portion is taken as a vegetable. 3. The young stems are taken bark discarded and the juice from the rest of the stem is taken. 4. The stems are taken, dried and powdered and made into pills the size of bean seeds. Pills are taken twice daily in the morning and evening on an empty stomach for 7 days or till cure.

Discussion

The Tripura tribal medicinal practitioners use quite a large number of plants in their indigenous medicinal system. The use of some of the plants is supported by modern scientific research. For instance, *Achranthes aspera*, which is used to treat edema by the Tripuras has been shown to possess antiinflammatory activity (Gokhale *et al*., 2002). *Centella asiatica* is used primarily for gastric disorders. A number of studies have revealed the protective effect of this plant on chemical factors-induced gastric ulceration in rats (Cheng and Koo, 2000; Sairam *et al*., 2001; Cheng *et al*., 2004). Both antibacterial activity and anticonvulsive effects have been reported for *Acorus calamus*, which may account for its use in fever with convulsions (Aqil and Ahmad, 2007; Anonymous (no authors listed), 2005). *Calotropis gigantea* is used by the Tripuras as remedy for

rheumatic pain in humans as well as cattle diseases. Antiinflammatory activity has been demonstrated in the whole plant (Adak and Gupta, 2006). The Tuaregs of Niger use the plant in ethnoveterinary treatments of camel diseases (Antoine-Moussiaux *et al*., 2007). *Anogeissus acuminata* is used by the Tripuras for toothache and dental caries. The same plant is used in Nigerian traditional medicine as chewing sticks for maintenance of good teeth (Taiwo *et al*., 1999).

Terminalia belerica, used by the Tripuras as remedy for loss of appetite has been demonstrated to protect against gastric ulceration as well as having anti-enteric potential against multi-drug resistant *Salmonella typhi* (Bhattacharya *et al*., 2007; Rani and Khullar, 2004). *Mikania cordata* is also used by the Tripuras for gastrointestinal disorders like chest pain after eating and acidity. The plant has been shown in a number of studies as to having a protective effect against gastric ulceration (Bishayee and Chatterjee, 1994; Mosaddik and Alam, 2000; Paul *et al*., 2000). *Euphorbia hirta* has been reported to demonstrate analgesic, antipyretic and antiinflammatory properties besides inhibiting early and late phase allergic reactions (Lanhers *et al*., 1991; Singh *et al*., 2006). The plant is used by the Tripuras for body sores, asthma and chronic bronchitis. *Ocimum gratissimum*, used by the Tripuras for fevers, colds, and pneumonia has been shown to have antimicrobial properties (Ngassoum *et al*., 2003). *Clitoria ternatea* leaves and roots are used as remedy for urinary tract infections and lack of urination. Fever is a usual occurrence during urinary tract infections. Scientific studies have shown the plant root to possess antiinflammatory, analgesic, antipyretic and diuretic activities (Devi *et al*., 2003; Piala *et al*., 1962).

Cassia alata, a plant used to treat ringworm infections is also considered to be a plant of dermatologic importance in Nigeria (Ajose, 2007). *Urena lobata*, used for treatment of skin disorders like scabies, eczema, and itches, as well as infection on lips, and fever reportedly possesses antibacterial activity (Mazumder *et al*., 2001), which may justify its use in the above disorders. *Melastoma malabathricum*, used for any sort of body pains reportedly demonstrated antinociceptive, antiinflammatory and antipyretic properties in scientific studies (Sulaiman *et al*., 2004; Zakaria *et al*., 2006). *Streblus asper* is used by the Tripuras for any type of tooth problem, malaria, fever with convulsions, and diarrhea. The leaf extract of the plant has been shown to have a positive effect during subgingivial irrigation in chronic peridontitis (Taweechaisupapong *et al*., 2006). Leaf extract also demonstrated antimicrobial activity (Wongkham *et al*., 2001), while anti-malarial properties were evidenced in murine malarial model (Das and Beuria, 1991). The fruits of *Aegle marmelos* are used by the Tripuras as remedy for gastrointestinal disorders like diarrhea and constipation, while the leaves are taken as remedy for diabetes. The roots are used during fevers. A number of scientific studies have demonstrated analgesic, anti-pyretic, anti-diarrheal, and hypoglycemic properties in various parts of the plant used by the Tripuras (Arul *et al*., 2005; Dhuley, 2003; Ponnachan *et al*., 1993; Sabu and Kuttan, 2004). *Clausena heptaphylla*, used by the Tripuras as remedy for fevers has been shown to possess antimicrobial activities (Chakraborty *et al*., 1995; Sohrab *et al*., 2001).

Conclusion

The use of a number of medicinal plants by the Tripura tribal medicinal practitioners as remedy for various ailments has been validated by modern scientific studies. The tribal people of Bangladesh are fast losing their ethnic customs and the traditional ways of treatment are also fast disappearing. As the forest sizes dwindle, a number of medicinal plants are becoming extinct or endangered. On the other hand, modern allopathic medicine is turning more and more towards natural sources for treatment of diseases. It is therefore essential to make thorough scientific studies of the medicinal plants used by the Tripuras before they are lost.

References

Adak, M. and J.K. Gupta, 2006. Evaluation of anti-inflammatory activity of *Calotropis gigantea* (AKANDA) in various biological system. Nepal Medical College Journal, 8(3): 156-161.

Ajose, F.O., 2007. Some Nigerian plants of dermatologic importance. International Journal of Dermatology, 46(1): 48-55.

Anonymous (no authors listed), 2005. Anticonvulsive from calmus root? Praxis (Bern 1994), 94(24-25): 1047.

Antoine-Moussiaux, N., B. Faye and G.F. Vias, 2007. Tuareg ethnoveterinary treatments of camel diseases in Agadez area (Niger). Tropical Animal Health and production, 39(2): 83-89.

Aqil, F. and I. Ahmad, 2007. Antibacterial properties of traditionally used Indian medicinal plants. Methods and Findings in Experimental and Clinical Pharmacology, 29(2): 79-92.

Arul, V., S. Miyazaki and R. Dhananjayan, 2005. Studies on the anti-inflammatory, antipyretic and analgesic properties of the leaves of *Aegle marmelos* Corr. Journal of Ethnopharmacology, 96(1-2): 159-163.

Bhattacharya, S., S.R. Chaudhuri, S. Chattopadhyay and S.K. Bandyopadhyay, 2007. Healing properties of some Indian medicinal plants against indomethacin-induced gastric ulceration of rats. Journal of Clinical Biochemistry and Nutrition, 41(2): 106-114.

Bishayee, A. and M. Chatterjee, 1994. Protective effects of *Mikania cordata* root extract against physical and chemical factors-induced gastric erosions in experimental anumals. Planta Medica, 60(2): 110-113.

Chakraborty, A., C. Saha, G. Podder, B.K. Chowdhury and P. Bhattacharyya, 1995. Carbazole alkaloid with antimicrobial activity from *Clausena heptaphylla*. Phytochemistry, 38(3): 787-789.

Cheng, C.L. and M.W. Koo, 2000. Effects of *Centella asiatica* on ethanol induced gastric mucosal lesions in rats. Life Sciences, 67(21): 2647-2653.

Cheng, C.L., J.S. Guo, J. Luk and M.W. Koo, 2004. The healing effects of *Centella* extract and asiaticoside on acetic acid induced gastric ulcers in rats. Life Sciences, 74(18): 2237-2249.

Das, M.K. and M.K. Beuria, 1991. Anti-malarial property of an extract of the plant *Streblus asper* in murine malaria. Transactions of the Royal Society of Tropical Medicine and Hygiene, 85(1): 40-41.

Devi, B.P., R. Boominathan and S.C. Mandal, 2003. Anti-inflammatory, analgesic and antipyretic properties of *Clitoria ternatea* root. Fitoterapia, 74(4): 345-349.

Dhuley, J.N., 2003. Investigation on the gastroprotective and antidiarrhoeal properties of *Aegle marmelos* unripe fruit extract. Hindustan Antibiotics Bulletin, 45-46(1-4): 41-46.

Gokhale, A.B., A.S. Damre, K.R. Kulkami and M.N. Saraf, 2002. Preliminary evaluation of anti-inflammatory and anti-arthritic activity of *S. lappa*, *A. speciosa* and *A. aspera*. Phytomedicine, 9(5): 433-437.

Lanhers, M.C., J. Fleurentin, P. Dorfman, F. Mortier and J.M. Pelt, 1991. Analgesic, antipyretic and anti-inflammatory properties of *Euphorbia hirta*. Planta Medica, 57(3): 225-231.

Martin, G.J., 1995. Ethnobotany: a 'People and Plants' Conservation Manual. Chapman and Hall, London. 268.

Maundu, P., 1995. Methodology for collecting and sharing indigenous knowledge: a case study. Indigenous Knowledge and Development Monitor, 3: 3-5.

Mazumder, U.K., M. Gupta, L. Manikandan and S. Bhattacharya, 2001. Antibacterial activity of *Urena lobata* root. Fitoterapia, 72(8): 927-929.

Mosaddik, M.A. and K.M. Alam, 2000. The anti-ulcerogenic effect of an alkaloidal fraction from *Mikania cordata* on diclofenac sodium-induced gastrointestinal lesions in rats. Journal of Pharmacy and Pharmacology, 52(9): 1157-1162.

Ngassoum, M.B., J.J. Essia-Ngang, L.N. Tatsadjieu, L. Jirovetz, G. Buchbauer and O. Adjoudji, 2003. Antimicrobial study of essential oils of *Ocimum gratissimum* leaves and *Zanthoxylum xanthoxyloides* fruits from Cameroon. Fitoterapia, 74(3): 284-287.

Paul, R.K., A. Jabbar and M.A. Rashid, 2000. Antiulcer activity of *Mikania cordata*. Fitoterapia, 71(6): 701-703.

Piala, J.J., H. Madissoo and B. Rubin, 1962. Diuretic activity of roots of *Clitoria ternatea* L. in dogs. Experientia, 18: 89.

Ponnachan, P.T., C.S. Paulose and K.R. Panikkar, 1993. Effect of leaf extract of *Aegle marmelose* in diabetic rats. Indian Journal of Experimental Biology, 31(4): 345-347.

Rani, P. and N. Khullar, 2004. Antimicrobial evaluation of some medicinal plants for their anti-enteric potential against multi-drug resistant *Salmonella typhi*. Phytotherapy Research, 18(8): 670-673.

Sabu, M.C. and R. Kuttan, 2004. Antidiabetic activity of *Aegle marmelos* and its relationship with its antioxidant properties. Indian Journal of Physiology and Pharmacology, 48(1): 81-88.

Sairam, K., C.V. Rao and R.K. Goel, 2001. Effect of *Centella asiatica* Linn on physical and chemical factors induced gastric ulceration and secretion in rats. Indian Journal of Experimental Biology, 39(2): 137-142.

Singh, G.D., P. Kaiser, M.S. Youssouf, S. Singh, A. Khajuria, A. Koul, S. Bani, B.K. Kapahi, N.K. Satti, K.A. Suri and R.K. Johri, 2006. Inhibition of early and late phase allergic reactions by *Euphorbia hirta* L. Phytotherapy Research, 20(4): 316-321.

Sohrab, M.H., M.A. Mazid, E. Rahman, C.M. Hasan and M.A. Rashid, 2001. Antibacterial activity of *Clausena heptaphylla*. Fitoterapia, 72(5): 547-549.

Sulaiman, M.R., M.N. Somchit, D.A. Israf, Z. Ahmad and S. Moin, 2004. Antinociceptive effect of *Melastoma malabathricum* ethanolic extract in mice. Fitoterapia, 75(7-8): 667-672.

Taiwo, O., H.X. Xu and S.F. Lee, 1999. Antibacterial activities of extracts from Nigerian chewing sticks. Phytotherapy Research, 13(8): 675-679.

Taweechaisupapong, S., K. Intaranongpai, W. Suwannarong, W. Pitiphat, S. Chatrchaiwiwatana and N. Wara-aswapati, 2006. Clinical and microbiological effects of subgingivial irrigation with *Streblus asper* leaf extract in chronic peridontitis. Journal of Clinical Dentistry, 17(3): 67-71.

Wongkham, S., P. Laupattarakasaem, K. Pienthaweechai, P. Areejitranusorn, C. Wongkham and T. Techanitiswad, 2001. Antimicrobial activity of *Streblus asper* leaf extract. Phytotherapy Research, 15(2): 119-121.

Zakaria, Z.A., R.N. Raden Mohd Nor, G. Hanan Kumar, Z.D. Abdul Ghani, M.R. Sulaiman, G. Rathna Devi, A.M. Mat Jais, M.N. Somchit and C.A. Fatimah, 2006. Antinociceptive, anti-inflammatory and antipyretic properties of *Melastoma malabathricum* leaves aqueous extract in experimental animals. Canadian Journal of Physiology and Pharmacology, 84(12): 1291-1299.