

TRADITIONAL KNOWLEDGE OF MEDICINAL PLANTS IN TRIBES OF TRIPURA IN NORTHEAST,
INDIA

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Abstract

Background: The present study was carried out in Mandwi area and its outskirts of Tripura district of tribal areas Autonomous district council to document the available ethno-medicinal plants and their traditional application among Mandwi tribes.

Methodology: Field explorations were carried out during the months of March-June 2013. The ethno-medicinal survey was conducted particularly with Tripuri tribe in Mandai area, with the help of local medicine men, locally known as *bhoidho* (Tripuri). Data were collected through structure questionnaires and observations during the field visits.

Results: In the present study the local population used a total of 51 plant species belonging to 32 families to cure a variety of diseases. Of the 51 plants, 21 were herbs, followed by trees (17) and shrubs (8). Climbers and ferns had reported 2 species for each one grass species was found. Fabaceae was the dominant family with the highest number of species (6) followed by Asteraceae (4 species) and Lamiaceae (5 species). Seven other families had 2 species each and 22 families were represented by a single species. In case single diseases, the highest number of plants (7 species) was used for dysentery, followed by body pain (6 species), cough (6 species) and toothache (6 species).

Conclusion: The present study concluded that, the Tripuri tribes of the study area possess rich knowledge on the medicinal plants and their utilization. Thus the present study focuses on the documentation of the traditional knowledge of these valuable plants, which could enhance the potential of these medicinal plants to other communities as well and by understanding the importance, other communities can also be helpful for conservation of these resources for further use.

Key words: Application, dosage, disease, traditional, infection, Conservation

Introduction

North-East India consists of eight states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim, and represents approximately 8% of country's total geographical area. It is a home to about 225 tribal communities Chatterjee et al., (2006), and represents one of the biodiversity hotspots of the world, with the richest plant diversity in India (Mao et al., 2009). Tripura, a small hilly state, is situated in the southern most part of north-east India. It is a land-locked state and its geographical limits touch International boundaries with Bangladesh and national boundaries with Assam and Mizoram. The total area of state comprises only 10491 km² of 0.32% of India geographical area. Currently the state has 60.02% recorded forest area, of which 66.33% are forest reserves, 0.03% protected forests and 33.64% unclassified forests (FSI, 2011). Tripura is rich in its plant life and with 379 tree species, 320 shrubs, 581 herbs, 165 climbers, 16 climbing shrubs, 35 ferns, and 45 epiphytes registered so far (Kshirsagar and Upadhaya, 2009; Sharma et al., 2013).

The state of Tripura is inhabited by 19 tribes, namely Jamatia, Chakma, Halam, Kuki, Chaimal, Uchoi, Magh, Garo, Lushai, Bhutia, Lepcha, Bhil, Munda, Oraon, Mog, Santhal, Murasing, Reang and Tripuri. Most of these tribal communities live in and around dense forests, and have maintained their own culture, language, food habits, and socio religious traditions (Deb et al., 2013, Sharma et al. 2013). The tribes of Tripura have great knowledge of religion and culture (Sharma et al., 2014). Most of the tribal communities consider trees and bamboos as the symbols of Gods and Goddesses in their culture. Out of 19 tribal communities found in this state, Tripuri, Reang, Noatia, Jamatia, Halam, Kuki, Chaimal and Uchoi are known to have migrated to this state from outside in the historical period, and are regarded as the

original settlers of Tripura (Das et al., 2009). Of 19 tribes, Tripuri is the largest tribal community. Ethnically the Tripuris are of Indo-Mongoloid origin and linguistically belong to the Tibeto-Burman family. They are mainly Hindus and use different plant parts in religious ceremonies to drive away the spirits or defeat any malicious forces that might affect the well being of the family.

The Debbarma, also known as “old Tripuris,” were the first to migrate to this territory. They have however experiences the largest transformation in all spheres of life, especially agricultural practices, socio-cultural life, economic life, educational and health consciousness, and are now treated as superior tribal community among the tribes of Tripura. The Tripuris have their own dialects, beliefs, customs, tradition and cultural heritage. They build their house of bamboo and wood in hill tracts and cultivate cereals, pulses, fruits, etc. in *Jhum* fields. They also collect various plants from nearby forest for food, fodder, fuel, furniture and handicraft and for the treatment of different ailments, and depend on local medical practitioners, popularly known as *Ochoi* (Majumdar and Datta, 2007).

The *Ochoi* possesses very rich knowledge about the diagnosis and treatment serious to minor diseases, and are generally specialists in the art of traditional folk medicine in their community. They also perform various magical rites and worships for the treatment of diseases (Majumdar and Datta, 2007). Their knowledge is passed on from generation to generation by oral tradition, and much of the traditional knowledge has been kept secret from outsider’s world. With the passage of time, the traditional knowledge is vanishing rapidly due to lack of documentation, and loss of interest in the younger generations (Majumdar and Datta, 2007).

Most of the tribal economies are engaged in subsistence agriculture and have developed great knowledge on the use of plants and plant production in curing various ailments. The population has a deep belief in their native folklore medicine for remedies. Among the communities in Tripura each community has their unique socio-cultural heritage, language, food habits (Majumdar and Datta, 2007). Various studies have presented initial documentations of medicinal plants and their utilization by indigenous tribes on the region (Majumdar et al., 2006; Singh et al., 1997; Majumdar and Datta, 2007; Das et al., 2009, Shil and Chowdhuri, 2009). The Tripuri tribes have however hardly been studied from an ethnobotanical point of view (Majumdar et al., 2006; Deb, 1968; Singh et al., 1997; Majumdar and Datta, 2007) and the presented study attempts to add to this knowledge. The study was undertaken in Mandwi and surroundings, in Tripura district of the Tripura tribal Areas Autonomous district, to document the ethnomedicinal document the flora and its traditional application by the Mandwi tribes.

Materials and Methods

Location of the study area

The study was carried out in Mandwi town of Tripura state. Tripura is India’s third smallest state, located in the Bio-geographic zone of 9B-North East Hills between 22°56’ and 24°32’ N latitude and between 90°09’ and 92°20’E longitude. It is a land lock hilly state, altitude varying from 30-1000 m with a geographical area of 10492km², and is surrounded on three sides by a deltaic basin of Bangladesh. Temperature ranges from 10-36 °C and the annual average rainfall is about 2500 mm. Mandwi town is situated in the west sub-division of Tripura in the west Tripura district of India (Fig. 1) at 23°51’39.35N - 91°28’48.34E, at an altitude of 41m. It is under the Tripura tribal Areas Autonomous district council (TTADC). The area is dominated by Debbarma tribes, with few areas of Mandwi occupied by Noatia and Rupini, and the major occupation of the people is agriculture, government service and labor. Among the communities of this region, each community has their unique socio-cultural heritage, language, and food habits. Mandwi consists of 21 villages, of which 4 villages (Chargaria Bagan, Kairai, Old Mandwi and Mandwi) were selected at random for the present study. In each village the number of families were 451, 671, 45 and 1140 with a population of 1713, 3283, 142 and 4306 for the villages of Chargaria Bagan, Kairai, Old Mandwi, and Mandwi respectively.

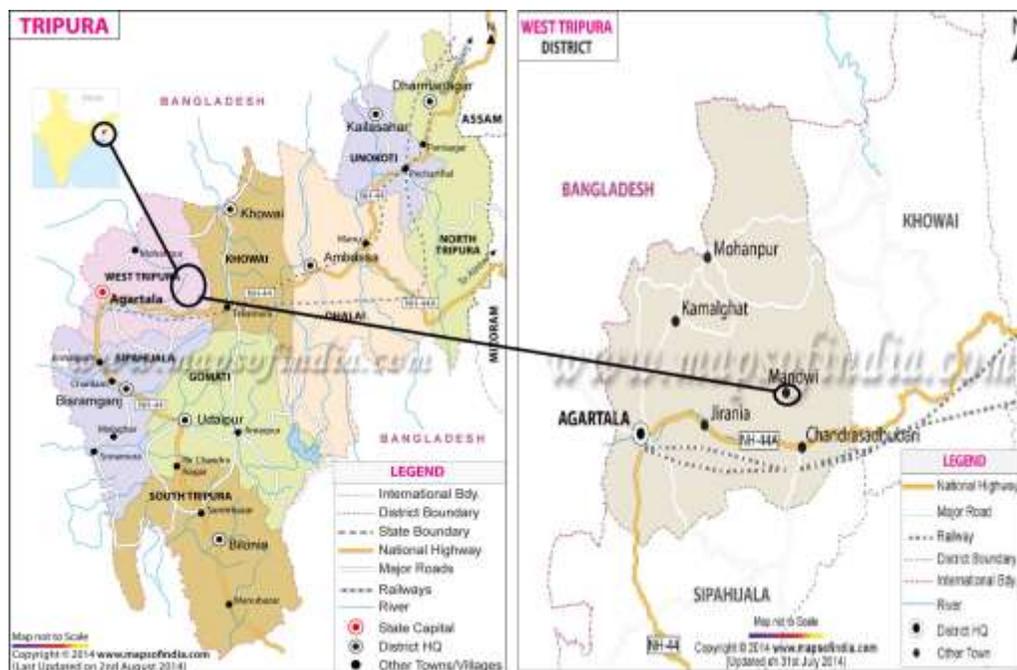


Figure 1: Location map of the study area (source: <http://www.mapsofindia.com/maps/tripura/>)

Survey methodology

Field explorations were carried out during the months of March-June 2013. The information was gathered from the tribal medicine men and people of the tribal community, who knew well about the surrounding plants, their local names, parts used, preparation of herbal medicine, mode of administration, doses and uses in different ailments and diseases. The ethno medicinal survey was conducted particularly with Tripuri tribe in Mandai area. Seven traditional healers agreed to participate, and an additional 100 elderly people were interviewed. Interviews were conducted after obtaining oral prior informed consent from each participant. The informants were randomly selected and included both older men and women, who regularly used and visited the forests since their childhood and used plants to cure various ailments.

In the initial selection of informants, younger participants were considered, but were later excluded because initial interviews indicated that they did not have much knowledge about medicinal plant use. The interviews were conducted in the local dialect to avoid translation problems. During the interviews structured questionnaires were developed according to the possible information may be collected (Annexure-1) to obtain information on medicinal plants, including the local name of the plant, name of the disease for which a particular plant was used, part of the plant used etc. The informants were asked to show the plants in their natural habitat. Specimens of all plants were then collected and identified in the Herbarium of Department of Botany of Tripura University. Plant identification was done by collected vouchers of specimen which were deposited at the Department of Botany, University of Tripura. The ISE (International Society of Ethnobiology) Code of Ethics was followed. All scientific plant names follow TROPICOS (www.TROPICOS.org), and the nomenclature follows APG-3.

Results and Discussion

Humans and plants share an age-old relationship. Dependence on plants is still seen and it is estimated that 25% of prescription drugs contain active components derived from higher plants (Tiwari and Joshi, 1990, Das and Choudhuri, 2012). The participants from Tripura made a wide use of a large variety of plants as food and medicine. In the present investigation, a total of 51 species of plants were reported as having ethno-medicinal importance and used by local communities to cure different diseases. The recorded plants belonged to 32 families. The dominant family was Fabaceae with 6 species, followed by Asteraceae (4) and (5). Two species each was recorded in Acanthaceae, Rutaceae, Apocynaceae, Phyllanthaceae, Poaceae, Cucurbitaceae, Zingerberaceae and 1 species in each of the remaining 22 families. Our findings are very much in the range of other studies in Northern India. Kandi et al., (2013) provided information of ethnomedicinal plants used by the tribal people living in Nuapada district of Odisha, and found a total of 49 angiosperms, belonging to 29 families and 45 genera, with Fabaceae also reported dominant with 5 species. Biswas et al., (2010) studied plant use in the

Tripura community of Chitagong Hill tract and also reported that Fabaceae contained the highest number of medicinal plants, similar to Regassa (2012). Pilania et al., (2013) reported total 85 families of which the main dominating families recorded were Fabaceae and Poaceae. The co-dominant families in the present study were Asteraceae and Lamiaceae with 4 species each, also reported as dominant families by Kharkwal et al., (2009). In contrast Hooker (1897) assumed that in the north-eastern states of India, Asteraceae was the most dominant family of medicinal plants. A study carried out by Reddy et al., (2011) reported 60 plant species belonging to 33 families as of ethnobotanical interest from tribal informants in Kadapa district, Andhra Pradesh. Similarly, Choudhury et al., (2012) reported 53 plant species belonging to 33 families of angiosperms from Chorei tribe of southern Assam.

Majumdar and Datta (2009) carried out a study on use of ethnomedicinal applications of 50 plants by Tripuri tribes inhabiting hamlets on different hilly terrain and interior dense forest of South and West district of Tripura. These 50 plant species belonged to 46 genera of 31 families. Borah et al., (2012) studied medicinal plants by Mongoloid (Chutia, Sonowalkachari, Tai-Ahom) and Ao-Naga ethnic groups of Disoi Valley forest area of the Jorhat district of Assam of north-east, and reported 50 plant species from 33 families. Forty-two plant species found in our study were used individually and 8 plants in combination with other species. The number of plants used to cure single diseases is shown in Fig.2. The highest number of species (7) was used for dysentery, followed by body pain, cough, and toothache (6 species each). Five species each were used for skin diseases and gastric problems, four for curing wounds, diabetes, cold and pile. Three species each were used for curing fever, chicken pox and urinary disorders, two species each used to treat asthma and hemorrhages, and one species each was recorded to treat cuts, smallpox, jaundice, headache, epilepsy, and burns (Fig.2, Table 1).

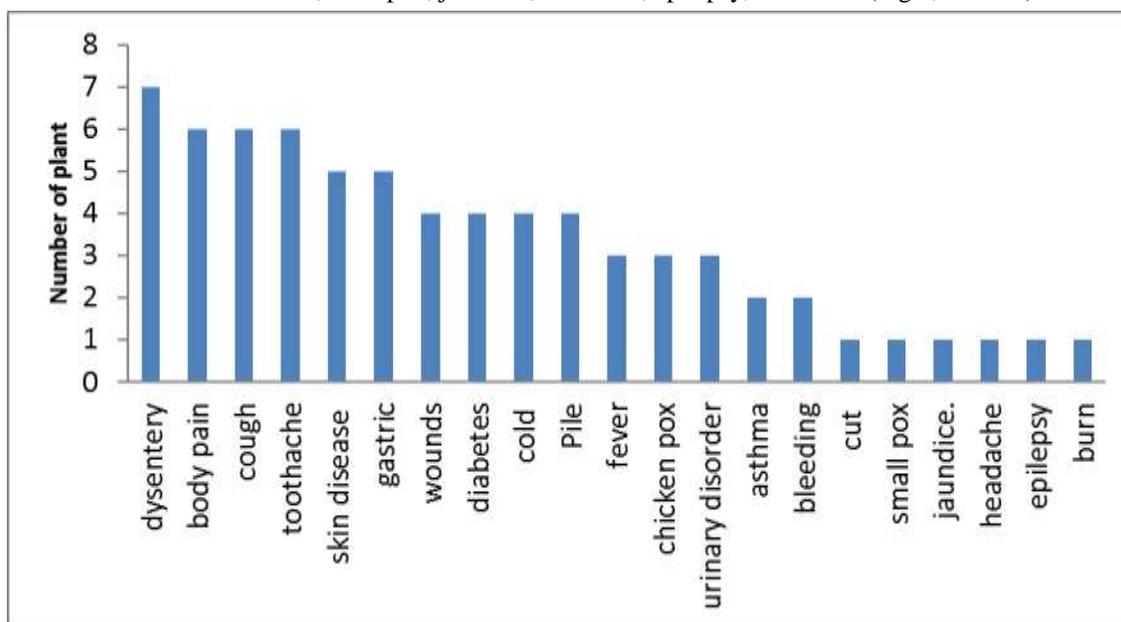


Figure 2: Number of plants used for different disease curing

Biswas et al., (2010) found in their study among the local tribal herbalists in the Chakma, Marma and Tripura community of Chitagong Hill tract, that most medicinal species were used for curing dysentery, including two common plants *Holarrhena antydysentria* and *Psidium guajava*. Choudhury et al., (2012) founds in infections, boils, eczema, constipation, and kidney stones as the most common diseases treated with medicinal plants by the Chorei tribe in Southern Assam. A total of 53 different medicinal plants belonging to 33 families, with Verbenaceaeas the dominant family (with 5 species) were recorded. Eighteen species were used for treatment of skin related infections, 7 for constipation and jaundice, 4 to cure cough, cold, and diabetes (Choudhuri et al. (2012). Bhardwaj and Gakhar (2005) reported that 17 species belonging to 14 families were used by the tribes of Mizoram for cuts and wounds.

Table 1:Traditional uses of medicinal plants

SN.	Family	Scientific name	Collection number	Life form	Parts used	Uses
1	Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees.	MD-TU-3	H	Leaves	6-7 leaves of sirata are mixed with 6-7 leaves of samsota (<i>Centella asiatica</i>) with little salt and juice is made out of it and given to the person who suffers from Dog bite. Mostly ochai used to treat dog bite with some mantra and they used powder rice to apply on it. It is also used in dysentery and diarrhea.
2	Acanthaceae	<i>Phlogacanthus thyrsoiflorus</i> Nees	MD-TU-45	S	Leaves	The leaf juice is taken as syrup for cough, cold and bronchial asthma. The leaf is also boiled without any oil in curry.
3	Amaranthaceae	<i>Achyranthes aspera</i> L.	MD-TU-2	H	Root	2-3cm of the root is tied to the person in case of shivering or epilepsy.
4	Anacardiaceae	<i>Mangifera indica</i> L.	MD-TU-36	T	Bark, root	Bark and root boiled with water is used for toothache.
5	Apiaceae	<i>Centella asiatica</i> (L.) Urban	MD-TU-17	H	Whole plant	The whole plant is boiled to produce a dark juice as mouthwash before brushing teeth at night.
6	Apocynaceae	<i>Alstonia scholaris</i> (L.) R.Br.	MD-TU-7	T	Latex, shoot	The latex is used in the preparation of piles medicine. According to local believe bhoidho, the shoots are used for increasing the milk of mother.
7	Apocynaceae	<i>Holarrhena antidysentria</i> (L.) Wall. ex G.Don.	MD-TU-31	T	Leaves	Bark is soaked overnight in a glass of water and taken in empty stomach in morning for 3-4 days for dysentery, diarrhea, and as anthelmintic.
8	Araceae	<i>Homalonema aromatic</i> (Spreng.) Schott	MD-TU-32	H	Stem	Stem cooked and consumed as vegetable for cough.
9	Asclepiadaceae	<i>Calotropis gigantea</i> (L.) R.Br. ex Schult.	MD-TU-14	S	Leaves, latex	During rheumatism the leaf is warm and massage is done. The latex is given to the person suffering from snake bite; it is considered bitter as long as poison is present in the body but the taste of latex turn sweet when

						the poison is no more.
10	Asteraceae	<i>Ageratum conyzoides</i> L.	MD-TU-5	H	Leaves	Leaf paste is applied on cut and wounds.
11	Asteraceae	<i>Enydra fluctuans</i> Lour.	MD-TU-24	H	Shoot	Eaten as vegetable for stomach, problems and skin disease.
12	Asteraceae	<i>Eupatorium odoratum</i> L.	MD-TU-25	H	Leaves	Leaf juice is applied on fresh wounds to stop bleeding.
13	Asteraceae	<i>Spilanthes paniculata</i> Wall. ex DC.	MD-TU-53	H	Root	Just root paste is sufficient to cure toothache, boil.
14	Athyriaceae	<i>Diplazium polypodioides</i> Blume	MD-TU-22	F	Leaves	For piles; available March-September. Leaf paste is also taken for gastric, and stomach problems, sore throat, diabetes.
15	Capparaceae	<i>Crataeva nurvula</i> Buch.-Ham.	MD-TU-20	T	Bark	Bark paste and is used for high fever, headache and for cooling.
16	Caryophyllaceae	<i>Polycarpon prostratum</i> (Forssk.) Asch. & Schweinf. ex Asch.	MD-TU-47	H	Whole plant	Leaf juice is ingested for diabetes. For sore throat the juice is mixed with little salt and taken until recovery. Also for gastric and stomach problems
17	Crassulaceae	<i>Kalanchoe pinnata</i> (Lam.) Pers.	MD-TU-33	H	Leaves	The leaf paste is applied on wounds and burns, and leaf juice is taken during vomiting. The leaf extract is used in bloody dysentery.
18	Cucurbitaceae	<i>Coccinia grandis</i> (L.) Voigt	MD-TU-18	C	Leaves	The leaf is consumed as dish against diabetes.
19	Cucurbitaceae	<i>Momordica cacharantia</i> L.	MD-TU-38	C	Leaves and fruits	Bitter guard leaf is mixed with uswngdwi (<i>Spilanthes paniculata</i>) root for hand pimples or foot pimples ('Bishojonom').
20	Euphorbiaceae	<i>Ricinus communis</i> L.	MD-TU-50	S	Leaves	Petiole burnt for 5 min. Leaf paste is used for swellings and rheumatism.
21	Fabaceae	<i>Acacia concinna</i> (Willd.) DC	MD-TU-1	T	Fruits, root, bark	The fruit is used as vegetable and medicine, boiled fish, for treating diabetes. Root decoction is used for toothache and body pain.
22	Fabaceae	<i>Cajanus cajan</i> (L). Hutch.	MD-TU-12	S	Leaves	The leaf is chew for toothache and leaf extract is taken for jaundice.
23	Fabaceae	<i>Cassia fistula</i> L.	MD-TU-14	T	Fruits	Fruit pulp used as laxative.
24	Fabaceae	<i>Cassia occidentalis</i> L.	MD-TU-16	S	Leaves	Leaf paste useful in skin disease like

						ringworm and for piles.
25	Fabaceae	<i>Mimosa pudica</i> L.	MD-TU-37	H	Leaves, Root	The root juice is given to the person suffering from urinary disorders.
26	Fabaceae	<i>Parkia javanica</i> (Lam.) Merr.	MD-TU-44	T	Fruits (mature)	The fruit is cook with fish ('gudok') for gastric problems.
27	Lamiaceae	<i>Leucas aspera</i> (Willd.) Link.	MD-TU-34	H	Leaves and flower	Leaf paste is directly consumed or the leaves are cooked and taken as vegetable for pain relive, gastric problem, joint pain with swelling.
28	Lamiaceae	<i>Ocimum basilicum</i> L.		H	Leaves, bark	Leaves are crushed and half a cup of extract is given with boiled milk to treat rheumatism and to induce deep sleep. The leaf is used as a treatment for gastric and stomach problem.
29	Lamiaceae	<i>Ocimum sanctum</i> L.	MD-TU-43	H	Leaves	The leaf juice is taken during cough and cold.
30	Lamiaceae	<i>Premna</i> sp.	MD-TU-48	H	Leaves	Leaf paste is prescribed for ant bite.
31	Lauraceae	<i>Litsea glutinosa</i> (Lour.) C.B. Rob.	MD-TU-35	T	Bark and leaves	Paste of leaves or bark paste is applied for 3-4 days and covered with a banana leaf in case of bone fracture or muscle pain.
32	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	MD-TU-30	S	Root, leaves, bud	The leaf juice used by women to treat infertility. Root is used for mouth wash and. Bud and root paste along with rice water is prescribed for irregular menstruation.
33	Malvaceae	<i>Sterculi avillosa</i> Roxb.	MD-TU-54	T	Fresh leaves, root	Root is soaked in water whole night and taken on empty stomach for urinary disorders and kidney stones. The fresh leaves are soaked in a full glass of water overnight and taken on empty stomach for women suffering from menstruation pain.
34	Meliaceae	<i>Azadirachta indica</i> A. Juss.	MD-TU-9	T	Leaves	Fresh leaves are consumed during stomach problem, cough, cold, pimples, fever, small pox and chicken pox.
35	Moraceae	<i>Streblus asper</i> Lour.	MD-TU-55	T	Leaves	It is used in the preparation of stone medicine and also used for the treatment of dysentery by making leaf

						paste and same technique is used even for cow.
36	Moringaceae	<i>Moringa oleifera</i> Lam.	MD-TU-39	T	Fruits and leaves	The fruit and leaf are locally consumed as vegetable. The leaf is considered to have a cooling effect on the body.
37	Myrtaceae	<i>Psidium guajava</i> L.	MD-TU-49	T	Leaves	Tender shoots are taken directly either by chewing or paste for the treatment of diarrhea, dysentery, piles, and vomiting.
38	Oleaceae	<i>Nyctanthes arbor-tristis</i> L.	MD-TU-41	T	Leaves	Juice of young leaves is mixed with honey and hot cow milk and given to children twice daily for 2 weeks in case of bronchitis, asthma and whooping cough. Leaves and young branches are used against stomach disorder
39	Phyllanthaceae	<i>Aporosa octandra</i> (Buch.-Ham. ex D. Don) Vickery	MD-TU-8	S	Leaves	Leaf paste is made along with rice, garlic, (<i>Markamiastipulate</i>) chuwanlai's leaf, chindrama, and <i>Artrocarpus heterophyllum</i> leaf. They are applied in the form of plaster on affected area during serious bone injury and changed alternately after 1 day for about 6 to 7 days. Sometimes 5-6 leaves are tied upon the injured area.
40	Phyllanthaceae	<i>Phyllanthus acidus</i> (L.) Skeels	MD-TU-46	T	Fruits and leaves	Leaf paste is applied on skin in case of chicken pox. Leaves are also scattered on patients' bed when suffering from chicken pox.
41	Plantaginaceae	<i>Scoparia dulcis</i> L.	MD-TU-51	H	Leaves	Leaf juice is extracted, filtered and taken for body pain
42	Poaceae	<i>Bambusa</i> sp.	MD-TU-10	G	Internode	The inner skin of the internodes is directly applied to fresh wounds wound and wrapped with cloth to stop bleeding.
43	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	MD-TU-21	H	Whole plant	Leaves are chewed before brushing teeth during serious toothache.
44	Polypodiaceae	<i>Drynaria quercifolia</i> (L.) J. Sm.	MD-TU-23	F	Rhizome	Rhizome paste is applied on swellings.

45	Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa	MD-TU-4	T	Fruits (both green and ripe) and leaves	A thick juice is made of the fruit and taken on an empty stomach everyday for gastric problems. Leaf paste is used for high fever during malaria.
46	Rutaceae	<i>Murraya paniculata</i> (L.) Jack.	MD-TU-40	S	Root	Hot water extract of leaves used for tooth wash during toothache. Root decoction along with 1-2 spoonful sugar and garlic juice is used as sexual stimulant.
47	Salicaceae	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	MD-TU-29	T	Thorn and seeds	Thorn is mixed with thaisumu seed and is used for sudden pain in ribs and bones.
48	Solanaceae	<i>Solanum indicum</i> L.	MD-TU-52	H	Fruits	Fruit is cook as dish and consumed for dysentery and diarrhea.
49	Xanthorrhoeaceae	<i>Aloe barbadensis</i> Mill.	MD-TU-6	H	Leaves	It is just applied on burn skin, pimples, burning sensation all over the body, cooling, dysentery (khenchu), sadashrapetc in local dialect.
50	Zingiberaceae	<i>Costus speciosus</i> (J. Koenig) Sm.	MD-TU-19	H	Rhizome	Rhizome juice used for cold, cough.
51	Zingiberaceae	<i>Curcuma zeodaria</i> Roxb.	MD-TU-13	H	Rhizome	Rhizome is smashed, juice is extracted and drunk a minimum of 3 days on empty stomach for urinary disorder.

In the present study some of the plants such as *Psidium guajava*, *Centella asiatica*, and *Ageratum conyzoides* were common, and also reported by Hynniewta and Kumar (2008) as used in Khasiin Meghalaya. Das et al., (2009) found that the Tripuri and Reang tribes of Tripura used some plants common to our study, especially *Crataeva unguiculata*, *Cynodon dactylon*, *Enydra fluctuans*, *Sterculia villosa*. *Cynodon dactylon* was used during serious tooth ache in our study however, while Das et al., (2009) found that *Cynodon dactylon* was used for abortions. Similarly, *Sterculia villosa* was used for urinary disease, kidney stone and menstruation pain in our study area, whereas Das et al. (2009) found the plant used for seminal weakness. Faruque and Uddin (2011) found 43 medicinal species in 41 genera, belonging to 35 families in other areas in Tripura. Of these *Aegle marmelos*, *Cassia fistula*, and *Ocimum sanctum* were used for the same purpose as in our study. Majumdar and Datta (2007) reported *Ageratum conyzoides*, *Costus speciosus*, and *Eupatorium odoratum* as used to cure the diseases as in the present study, with *Aporosa octandra*, and *Curcuma zedoaria* used for different purposes. Pandey and Mavinkurve (2014) found *Achyranthes aspera* and *Centella asiatica* used by the Chakma tribe of Tripura for different purposes.

In the other parts of India Kumar et al., (2011) reported 57 plants in Garhwal Himalaya, where common species like *Achyranthes aspera*, *Aegle marmelos*, *Ageratum conyzoides*, *Cassia fistula*, *Cynodon dactylon*, and *Holarrhena antydysentria* were also used medicinally. Kumar et al. (2011) reported that *Achyranthes aspera* was used for malaria fever, delivery, dropsy, bronchitis, while the same species was used for shivering and epilepsy in the present study. Similarly, *Cassia fistula* was used in Gharwal as antiseptic, for ashtam, and respiratory disorder, and in the present study the fruit pulp was used for laxative purposes. *Cynodon dactylon* was used for fever in Gharwal, and in the present study for toothache. Some of the common species such as *Ageratum conyzoides* and *Aegle marmelos* had similar uses.

The number of plants parts used for the purposes of curing different diseases is shown Fig. 3. Leaves were most frequently used (of 31 species), followed by roots (8 species) and fruits (8 species), and bark (5 species), roots (3 species), whole plant or latex (2 species), and internodes, seeds, stems, buds and thorns of one species each. Chellaiah et al. (2006) also found leaves as most important in an ethnobotanical survey from traditional healers in Kancheepuram district of Tamil Nadu, followed by the whole plant, fruit, stem, root, stem and root bark, seed, flower and latex. Tripathi et al., (2013) recorded 45 species in South West Bengal, of which 10 species were becoming rare due to overuse. Leaves were used in majority of the cases (24 species) followed by fruit (7 species), root (6 species), bark (5 species), whole plant (3 species). Pala et al. (2012) also reported leaves as the dominant plant part used in traditional medicine in Garhwal Himalaya. Pandey and Mavinkurve (2014) found in their study of ethnomedicinal plants used by the Chakma tribe of Tripura state, India, that 19 angiosperms and one pteridophyte species were used. Eight species were herbs, one a tree, seven shrubs, one a climber and one a cactus. Again, leaves were the most important plant part used.

In the present study 21 species used were herbs, followed by trees (17 species) and shrub (8 species). Climbers and ferns had 2 species each, and one grass was also used medicinally (Fig. 4). This is in the range of Sharma et al. (2013) who found of 59 plant species belonging to 42 families, with 37 trees, 11 herbs, 4 grasses, 3 climbers, and one shrub, vine, woody climber in villages of different blocks of West Tripura and Khowai districts of Tripura. Chellaiah et al., (2006) reported 39 species of herbs, followed by trees (21 species), shrubs (14 species) and climbers (11 species) in Tamilnadu. Outside India Abiyu Enyew et al., (2014) found herbs as the dominant plant group used (43.87%), followed by shrubs (35.48%). Regassa (2012) also found leaves as most important in Hawassa city, southern Ethiopia (31.9%), followed by seeds (19%), roots (15.3%), bulb (5.52%), shoot tip (4.29%), stem and stem bark (3.68%), fruits (1.84%), latex of stem, rhizome, flowers, gum of stem and whole plant (1.23%) and others (8.6%). Other studies (Dawit and Estifanos 1991; Mirutse and Gobena 2003) in Ethiopia reported that leaves were commonly used plant parts to treat various health problems.

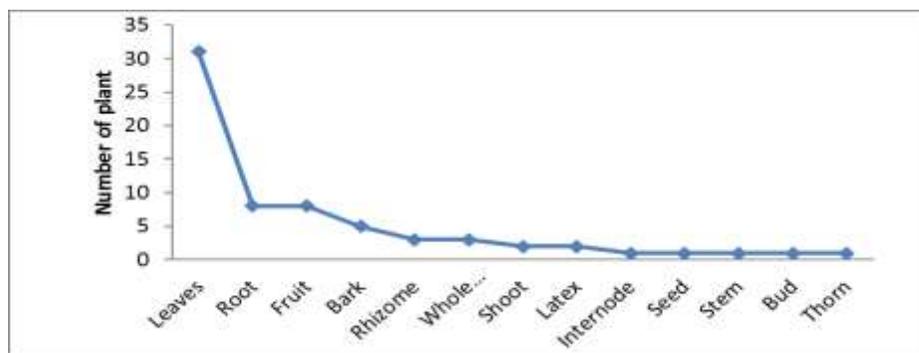


Figure 3: Plants parts used

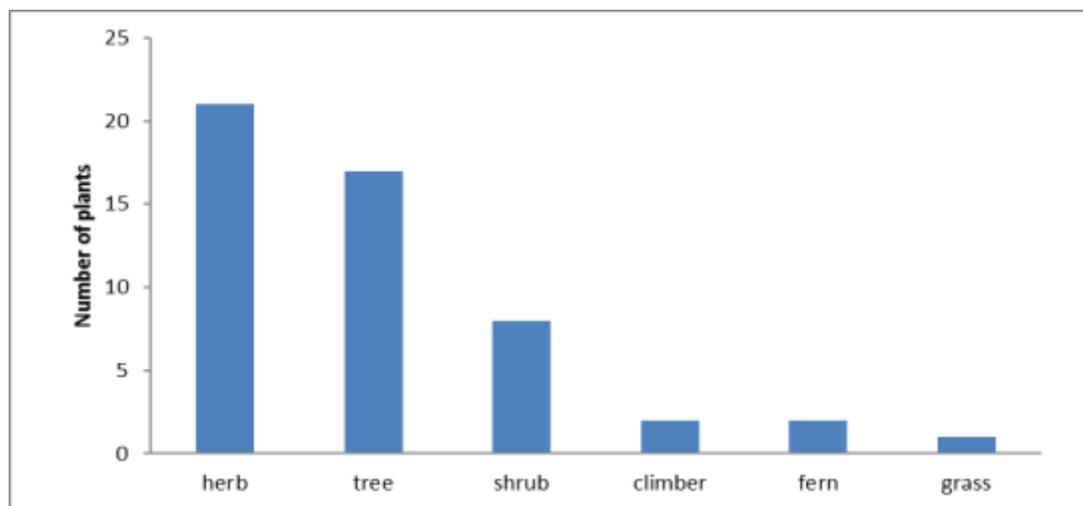


Figure 4: Life forms of ethnomedicinal species

Conclusions

Although a variety of studies had been conducted in the Tripura area, we found that the plant knowledge of the local population is still under-documented. Even common species were often used for different purposes than in other study areas. The fact that leaves were the most frequently used plant part is important from a conservation perspective, because local use modalities are already in place to avoid over-exploitation, e.g. by root or bark collection. The documentation of the ethnomedicinal flora, and repatriation of the knowledge to the local population, is the more important because otherwise this orally transmitted knowledge might get lost in the near future.

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Annex 1: Questionnaire used to collect information on ethnomedicinal plants

Informant detail

Name:

Sex:

Age:

Village:

Panchyat:

Block:

District:

Main Occupation:

Subsidiary occupation:

Education:

Ethnomedicinal uses of plants

- Local/Vernacular name of plant:
- Scientific name of plant
- Plant part used:
- Name of ailment for which plant used:
- Mode of preparation:
- Use (externally/internally):
- Plant habitat:
- Any cause of declining ethnomedicinal plants
- Conservation practices on ethno medicinal plant

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