

Full Length Research Paper

Uses of trees as medicine by the ethnic communities of Arunachal Pradesh, India

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Received 27 October, 2010; Accepted 14 April, 2011

Arunachal Pradesh, the largest state of North East India has been considered as one of the biodiversity 'Hotspot' areas in the world. The original inhabitants of Arunachal Pradesh are tribal people, belonging to 26 major tribes and 110 sub-tribes. The ethnic communities of the state have their own rich traditional knowledge in the use of various tree species for treatment of different diseases with a practically applied aspect of knowledge acquired through close natural observation. They are store houses of indigenous knowledge which is unexplored and unrecorded. The present paper deals with the effectiveness of folk medicine for curative, remedial and medicinal uses of 64 tree species under 48 genera and 30 families providing detail account on the plants, their vernacular name, scientific name, plants parts and their uses.

Key words: Trees, medicine, ethnic community, Arunachal, India.

INTRODUCTION

Ethnobotany is the study of plant wealth used in our day to day life for medicine, food, vegetable, fuel, fodder, furniture, ornamental purpose, worship, cultural material, preferably by the aboriginal and tribal people. It has been recognized as multidisciplinary study comprising many interesting and needful aspects of plant science, history, anthropology, culture and literature, giving us the idea of relationship between man and plants, socio-cultural relationship with their surrounding natural environment, their faith, taboos, worship and several other magico religious aspects. It is imperative to study the traditional herbal medicine being practiced in the region and document the same for proper sustained utilization. In a simple way Ethnobotany reveals the traditional knowledge

of the people about the plants surrounding them and their utility. The term traditional medicine is erroneously applied only to the organized and recognized systems of indigenous medicines viz. Ayurveda, Yunani, Siddha, Yoga as the only components of traditional medicine. It is the sum total of all the knowledge and practices, whether applicable or not, used in diagnostic, prevention for elimination of physical, mental or social imbalance and relying exclusively on practical experiences and observation handed down from generation to generation, whether verbally or in writing (Anonymous, 1978). It is also considered as a solid amalgamation of dynamic medicine known through ancestral experiences.

All systems of traditional Indian medicines have roots in

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one way or the other in folk medicines and household remedies. Some of the earliest remedies and prescriptions became widespread and were subjected to certain refinements, revisions and improvements through practices by train medicine man and thus got incorporated in organized systems of medicines. Much larger number of folk medicines remained endemic to certain regions or people in the country. Many of the earliest remedies survived only verbally from generation to generation which not only existed but is being largely practiced in many parts of the country particularly in remote rural tribal societies. About 80% of the population of the developing countries relies on traditional medicine mostly derived from plants, for their primary health care needs and 90% of the drugs used in Indian system of Medicine and Homeopathy (ISM&H) are plant based and collected from wild sources without applying scientific management techniques essential to sustain their growth and preserve their properties which determines the efficacy of the medicine.

The monumental work of Kirtikar and Basu (1918) laid the foundation for studies of medicinal plants. The North East (NE) India comprising the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim regarded as biogeographically "Gate Way" for mass of India's biological resources. They form part of the East. Himalayan region is very rich in plant biodiversity as well as in ethnic diversity and has a great traditional knowledge base in plant resources. It is endowed with forest wealth and is ideally suited to produce a whole range of plantation crops, spices, fruits and vegetables and flowers and herbs. Out of 315 families, the NE region represents more than 200 families, which is nearly 50% of the flora of the Indian subcontinent (Ramakantha et al., 1986) and is botanically interesting due to occurrence of varied kinds of floristic elements. The region is inhabited literally by hundreds of sub tribes, each having their own culture, dialect, lifestyle, rituals and customs. Due to the diversified culture and traditions in one way, along with the rich species diversity on the other, the region shows high scope and potential of ethnobotanical studies particularly ethnomedicobotanica investigation. So far information on ethno botanical knowledge of this region is available, only for 372 plant species is literature published. It is imperative to study the traditional herbal medicine being practiced in the region and document the same for proper sustained utilization. The research works carried out by some botanists from different parts of the region revealed very important information of plant utilization pattern by the traditionally rich indigenous communities and helps to document newer resources which were unknown otherwise, particularly the works carried out by Borthakur (1981, 1990, 2004) from Assam; Changkija (1999), Jamir (1990) from Nagaland; Rao (1981) from Meghalaya; Mao (1993) from Manipur; Dam and Hajra (1981) and Doley et al. (2010) from Arunachal

Pradesh are note worthy. However, North-Eastern region has still remained unexplored because of various reasons particularly on accounts of its difficult terrain, poor communication facilities, mutual mistrust and hostility and prolonging insurgency conditions.

The state of Arunachal Pradesh located in Eastern Himalayan region is considered as one of the 35 hot spot areas of the world in view of its biological richness and habitat diversity. It constitutes high endemism and is comparatively endowed with diverse luxuriant vegetation with rich gene pool of both wild and domesticated plant species. The region is an abode of fascinating landscape, swift flowing streams and thick forest. It is situated between 26° 30' N to 29° 30' N latitude and 91° 30' E to 97° 30' E longitude and comprises the major part of the Eastern Himalaya with an area of 83,743 sq. km. The distinct geographical location and climatic condition makes an ideal repository of a rich biodiversity including medicinal plants. Apart from the rich diversity in flora and fauna it also shows richness in high endemism with 238 endemic species (Choudhery and Pal, 1999). Particularly the tropical and temperate forest represents a high diversity of tree flora including the gigantic species. Takhtajan (1969) considered the place as "Cradle of Flowering Plant" on the basis of the concentration of a number of primitive plants species particularly of Angiosperm. The knowledge thus gained by tribes has been passed on from generation to generation as a guarded secret which therefore, remained confined to their near and dear ones only. All over the world, there is revival to explore medicinal plants for their relatively non toxic nature without causing any side effects to body.

The state, which inhabits 26 major tribes and 110 sub tribes, is also known for its rich cultural diversity. The ethnic communities are Adi, (Ashing, Bogun, Bori, Botng, Galling, Komar, Karka, Lodung, Milang, Minyong, Padam, Pailibo, Pangi, Ramo, Shimong, Tangam), Aka, Apatani, Bangani, Khamba, Khowa, Memba, Miji, Hill miri, Mishing miri, Sherdukpen, Sulong, Singpho, Tagin, Tangsa, Wancho, Yobin (Lisu), Zakhing (Meyor) etc., having rich traditional uses of different tree species for various needs including health care. All communities are completely dependent on forest resources starting from their festival to agricultural works. In the state, about 85% of the people live in remote areas without good medical facilities along with transport and communication systems lagging behind. Most of the villagers still depend on traditional herbal medicines for diseases like Malaria, Jaundice, Diabetes, Hypertension, Diarrhea, Cholera, Gastritis, Rabies, Snake bite, Skin disease, Piles, Boils, etc. But they hardly go to the Medical doctors for treatment instead they try to cure the diseases by using their own traditional healing practices with medicinal plants available in and around them. The practice of indigenous medicine has descended through generations by way of oral inheritance or training where people live in close harmony with nature. The selection of plants for various

species is diversified. As trees are the dominant biotic component of any forest ecosystem it plays an important role in the plant kingdom and greatest contributors of food, shelter, fuel, medicine along with friendly environment for sustaining life on earth.

Apart from the timber yielding species, other species which are used as medicine: *Michelia champaca*, *Garcinia pedunculata*, *Oroxylum indicum*, *Emblia officinalis*, *Ficus religiosa* etc., are commonly distributed in the region and the forests are also a centre for curiosity for the botanist and taxonomist and well represented with primitive, endemic and threatened tree species. The species of the family Magnoliaceae (*Michelia*, *Magnolia*, *Talauma* etc.), Annonaceae (*Alphonsea*, *Anona*, *Polyalthia*, *Unona*, etc.), Dilleniaceae (*Dillenia*, *Delima*) are some of the primitive taxa found in the forest. In the state although the ethno botanical studies on herbs and shrubs were made from time to time but on tree species in spite of their richness and various traditional utilization by indigenous people no exploitation has been made so far. In this context, the present study has been conducted to explore the guarded secret and confined medicinal plants to some tribe for socio-economic development and conservation of plant diversity for present and future generations. Hence, the present paper highlights the medicinal uses of 64 tree species used by ethnic groups of Arunachal Pradesh.

MATERIALS AND METHODS

The survey was conducted during the year 2007–2009 including wild, naturalized and planted tree species in the region. For detailed ethno botanical inventorization, the methods suggested by Jain (1989) and Martin (1995) were followed with preparation of some pre structured questionnaires containing questions like (1) what is your name? (2) How old are you? (3) Do you know any medicinal plants in this area? (4) How do you use them? (5) Which parts of these plants are used for medicinal purposes? (6) What is the local name of these medicinal plants? etc. The information regarding the usefulness of species was gathered from the villagers as well as traditional healers, particularly the old people (40-60 years) by direct interview. The studies have been carried out only on a few selected tribes viz. Adi, Apatani, Idu-Mishimi, Monpa and Nyshi, as compared to other tribes since they are most widely distributed in the state having deep knowledge on uses of plant resources. A cross checking was made on each data collected with information on uses of the recorded plants being collected from some secondary sources (Bhutani, 2009; Singh et al., 2001; Jain 1991). The collected specimens were processed into mounted herbarium sheets following standard herbarium techniques (Jain and Rao, 1977) and deposited in the NERIST Herbarium. The identities of specimens were confirmed by the standard taxonomic procedure through taxonomic literature and consulting herbaria of Botanical Survey of India, Arunachal Circle (ARUN), Itanagar and State Forest Research Institute, Itanagr (APFH). The recorded families were arranged according to Bentham & Hooker's (1883) system of plant classification with the genera and species under each family arranged in alphabetical order.

RESULTS AND DISCUSSION

It is evident from the present study that the ethnic group

of the Arunachal Pradesh commonly uses a total number of 64 tree species under 48 genera and 30 families for medicine. Mostly the bark, fruit, root and leaves of these species have been found useful for medicine (Table 1). The bark (26 species: *Michelia champaca*, *Alstonia scholaris*, *Balakat baccata*, *Bixa orellana*, *Callicarpa arborea*, *Cinnamomum bejolghata*, *C. camphora*, *C. glaucesnce*, *C. tamala*, *Diospyros malabarica*, *Ehretia acuminata*, *Erythrina stricta*, *Ficus semicordata*, *Hibiscus tiliaceous*, *Hydnocarpus kurzii*, *Litsea monopetala*, *Mallotus phillippinensis*, *Parkia timoriana*, *Poebe cooperiana*, *P. paniculata*, *Premna bengalensis*, *Stereospermum chelonoides*, *S. hypostictum*, *Syzygium megacarpum*, *Terminalia arjuna*, *Tetrameles nudiflora* and *Thevetia peruviana*) is the most utilized part followed by fruits (9 spp.: *Averrhoa carambala*, *Canarium bengalense*, *Garcinia cowa*, *G. pedunculata*, *Grewia tiliaefolia*, *Mimusops elengi*, *Parkia timoriana*, *Phyllanthus acidus* and *Tamarindus indica*); fruits and bark (8 spp.: *Aegle marmelos*, *Aporosa octandra*, *Gynocardia odorata*, *Phyllanthus emblica*, *Spondias pinnata*, *Terminalia bellerica*, *T. chebula* and *Quercus serrata*); leaves (7 spp.: *Anacardium occidentale*, *Bauhinia variegata*, *Camellia sinensis*, *Cinnamomum glandulifera*, *Citrus paradisi*, *Murraya koenigii* and *Sarcochlamys pulcherrima*); leave and barks (7 spp.: *Azadirachta indica*, *Bauhinia purpurea*, *Bischofia javanica*, *Cinnamomum verum*, *Echinocarpus assamicus*, *Gmelina arborea* and *Litsea cubeba*); leave, bark and fruits (2 spp.: *Cassia fistula* and *Moringa oleifera*); flower (1 spp. *Mickelia oblonga*); leave and fruits (1 spp. *Psidium guajava*), root (1 spp.: *Tectona grandis*) and bark and root (1 spp. *Oroxylum indicum*) (Figure 1 and 2). These parts are used for the treatment of a high range of physical ailments like common stomach disorder (diarrhoea, dysentery, gastric, pain), kidney trouble, intestinal worm, tonsillitis, allergies, blood coagulation, sinusitis, vomiting, coughing etc. which indicate the potentiality of these species as a medicine. Each species have a diversified utility pattern. Certain number of plants was used in combination for specific diseases. During the studies it has been observed that same species are used in different way for treatment of various diseases by different communities for example, *Terminalia arjuna*, *Phoebe cooperiana* and *Ficus semicordata*.

The present study provides a number of new information on medicinal uses of tree species along with the additional uses of already reported species. It provides new sources for exploring new species and high value medicinal plants from the state for better future. Though tree is mainly considered for sources of timber only but the present studies revealed the medicinal value of the tree species. Thus, the present paper highlights the medicinal aspects of tree species in the state.

Conclusion

It is evident from the present study that the tree species

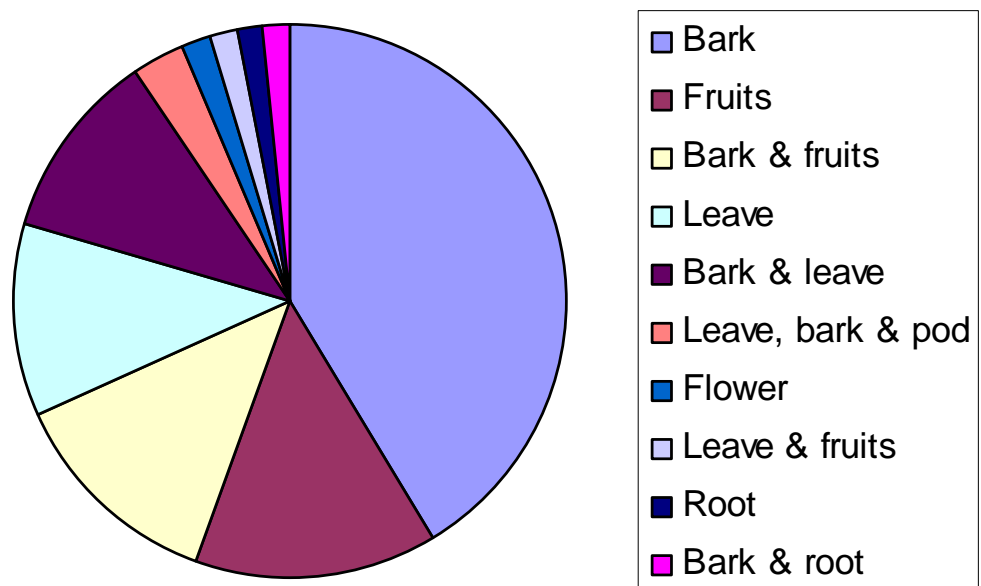


Figure 1. Pie diagram of parts used in percentage (%).

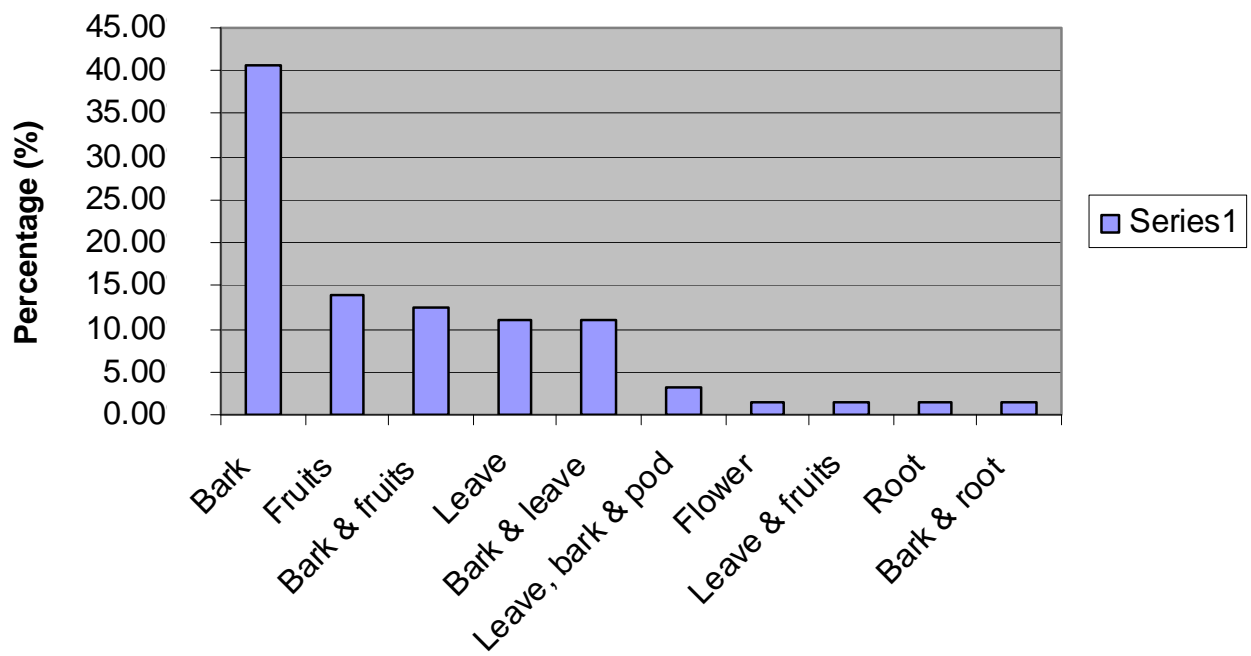


Figure 2. Column diagram of parts used in percentage (%).

served as useful resources for the local communities of the state and also have commercial potential. Hence these species can be promoted for cultivation in various agro forestry systems for their sustainable uses and conservation. The phytochemical investigation for medicinal properties of the species may be worthy attempts for

attempts for medicinal plant sector of the country.

ACKNOWLEDGEMENT

The authors are grateful to UGC, New Delhi for financial

Table 1. Some medicinal plants and their uses.

S/ No	Scientific name	Family	Local name	Part used	Uses
1	<i>Michelia champaca</i> L.	Magnoliaceae	Tita sopa (A)	Bark	Gastric
2	<i>M. oblonga</i> Wall. ex H. f. & Th.	-	Scrio- changne (Adi)	Flower	Stomach problem
3	<i>Bixa orellana</i> L.	Bixaceae	Hat ranga (Adi)	Bark	Diabetes
4	<i>Gynocardia odorata</i> R. Br.	Flacaurtiaceae	Takuk-changne (Adi)	Fruits and bark	Diarrhea
5	<i>Hydnocarpus kurzii</i> (King) Warb.	-	Talo –asing (N)	Bark	Gastric and stomach problem
6	<i>Garcinia cowa</i> Roxb. ex DC	Clusiaceae	-	Fruits	Gastric, dysentery and diarrhea
7	<i>G. pedunculata</i> Roxb.	-	Blachung changne (N)	Fruits	Gastric, dysentery and diarrhea
8	<i>Camellia sinensis</i> L.	Theaceae	Cha (A)	Leave	Wound healing
9	<i>Hibiscus tiliaceus</i> L.	Malvaceae	Stalpadma (A)	Bark	Headache
10	<i>Grewia tiliaefolia</i> Vahl.	Tiliaceae	Mekuri tai (Adi)	Fruits	Diarrhea
11	<i>Echinocarpus assamicus</i> Benth.	Elaeocarpaceae	Tophen-changne (N)	Bark and leave	Loose motion
12	<i>Averrhoa carambola</i> L.	Averrhoaceae	Kordoi (A)	Fruits	Jaundice
13	<i>Citrus paradisi</i> MacF.	Rutaceae	Naya-changne (N)	Leave	Vomiting
14	<i>Aegle marmelos</i> Correa.	-	Bel (A)	Fruits and bark	Tonic and diarrhea
15	<i>Murraya koenigii</i> (L.) Sprang.	-	Nara singha (A)	Leave	Indigestion of food
16	<i>Canarium bengalense</i> Roxb.	Burseraceae	Komker changne (IM)	Fruits	Wound healing
17	<i>Azadirachta indica</i> A. Juss	Meliaceae	Neem (A)	Leave and bark	Itching, coughing and against hook worm
18	<i>Anacardium occidentale</i> L.	Anacardiaceae	Kaju badam (A)	Leave	Indigestion
19	<i>Spondias pinnata</i> L.f.) Kurz.	-	Ansiari (G)	Fruits and bark	Gastric, jaundice and dysentery
20	<i>Moringa oleifera</i> Lam.	Moringaceae	Sajina (A)	Leave, bark and pod	Indigestion
21	<i>Bauhinia purpurea</i> L.	Fabaceae	Gyese yeali (Ap)	Leave and bark	Diarrhea and dysentery
22	<i>B. variegata</i> L.	-	Gayesen yaphu (N)	Leave	Diarrhea
23	<i>Cassia fistula</i> L.	-	Sunaru (A)	Leave, bark and pod	Constipation
24	<i>Erythrina stricta</i> Roxb.	-	Tanyumta sen (N)	Bark	Headache
25	<i>Parkia timoriana</i> (A. DC.) Merr.	-	-	Fruits	Indigestion
26	<i>Tamarindus indica</i> L.	-	Tetuli (A)	Fruits	Tonic, jaundice & diarrhea
27	<i>Terminalia arjuna</i> W. & A.	Combretaceae	Arjuna (N/A/IM/Adi)	Bark	Jaundice and diabetes
28	<i>T. bellerica</i> (Gaertn.) Roxb.	-	Sudumpona (N)	Bark and fruits	Gastric, dysentery, diarrhea and cough
29	<i>T. chebula</i> Retz.	-	Hilika (A)	Bark and fruits	Gastric, dysentery, diarrhea and cough
30	<i>Syzygium megacarpum</i> (Craib) Rath. & Nair.	Myrtaceae	Kurak (N)	Bark	Dysentery
31	<i>Psidium guajava</i> L.	-	Madhuriam (A)	Leave and fruits	Gastric, dysentery and diarrhea
32	<i>Punica granatum</i> L.	Punicaceae	Dalim (A)	Root	Piles
33	<i>Tetrameles nudiflora</i> R. Br.	Datisceae	Shiilyo (Ap)	Bark	Itching
34	<i>Mimusops elengi</i> L.	Sapotaceae	Bokul (A)	Fruits	Tonsillitis
35	<i>Diospyros malabarica</i> Kostel.	Ebenaceae	Kendu (A)	Bark	Wound healing
36	<i>Alstonia scholaris</i> R. Br.	Apocynaceae	Sing-gar changne (N)	Bark	Boil eruption
37	<i>Thevetia peruviana</i> Juss.	-	Parijat (A)	Bark	Boil eruption
38	<i>Ehretia acuminata</i> Roxb. Br.	Boraginaceae	Changi-more (G)	Bark	Gastric
39	<i>Oroxylum indicum</i> (L.) Vent.	Bignoniaceae	Tapatale (M)	Bark and root	Diabetes, dysentery and cough
40	<i>Stereospermum chelonoides</i> DC.	-	Mano (M)	Bark	Gastric

Table 1. Contd.

41	<i>Stereospermum hypostictum</i> Miq.	-	Duyu (N)	Bark	Diarrhea
42	<i>Callicarpa arborea</i> Roxb.	Verbenaceae	Yarphu-changne (N)	Bark	Toothache
43	<i>Gmelina arborea</i> L.	-	Gomari (A)	Leave and bark	Constipation and indigestion
44	<i>Premna bengalensis</i> Clarke	-	-	Bark	Diabetes
45	<i>Tectona grandis</i> L.	-	Segun (A)	Root	Diabetes
46	<i>Cinnamomum bejolghata</i> Buch.- Ham.	Lauraceae	Barbah changne (N)	Bark	Cough, diarrhea and dysentery
47	<i>C. camphora</i> Nees & Eber.	-	Carpur (A)	Bark	Insecticide and itching
48	<i>C. glandulifera</i> Meisn.	-	Barbah changne (N)	Leave	Wound healing
49	<i>C. glaucesnce</i> Drury.	-	Dokhopulo namgam (A)	Bark	Diarrhea
50	<i>C. tamala</i> Fr. Nees.	-	Jangang changne (N)	Bark	Dysentery and diarrhea
51	<i>C. verum</i> J. S. Presl.	-	Dalchini (A)	Leave and bark	Gastric and diarrhea
52	<i>L. cubeba</i> (Lour.) Pers.	-	Meinjin (Adi)	Leave and bark	Cough, diarrhea and dysentery
53	<i>L. monopetala</i> (Roxb.) Pers.	-	Tapit pirwar asing (IM)	Bark	Diabetes and gastric
54	<i>Poebe cooperiana</i> U.N. Kanjilal ex A. Das	-	Chang-check (Adi/Ap/N)	Brak	Itching
55	<i>P. paniculata</i> Nees.	-	Tak-lalang (N)	Bark	Cough and diabetes
56	<i>Aporosa octandra</i> (Buch.-Ham. ex D.Don) Vick.	Euphorbiaceae	-	Bark and fruits	Tonsillitis and diabetes
57	<i>Balakat baccata</i> (Roxb.) Esser.	-	Pukto asing (M)	Bark	Boil eruption and kidney treatment
58	<i>Bischofia javanica</i> Blume.	-	Mebu-changne (N)	Leave and bark	Gastric and jaundice
59	<i>Mallotus philippinensis</i> Muell.-Arg.	-	Yuduk-changne (N)	Bark	Piles and indigestion
60	<i>Phyllanthus acidus</i> (L.) Skeels.	-	Bhui amla (A)	Fruits	Indigestion and gastric
61	<i>P. emblica</i> L.	-	Amalakhi (A)	Bark and fruits	Indigestion, gastric, diarrhea, jaundice and cough
62	<i>Ficus semicordata</i> Buch-Ham. ex J. E. Sm.	Moraceae	Tukusen (Adi/N/M)	Bark	Toothache and diarrhea
63	<i>Sarcochlamys pulcherrima</i> Gaud.	Urticaceae	Ombe (Adi)	Leave	Indigestion
64	<i>Quercus serrata</i> Thunb.	Fagaceae	Siang asing (IM)	Bark and fruits	Tonsillitis

Adi=Adi, Ap=Apatani, A= Assamese, IM=Idu-Mishimi, M=Monpa and N=Nyshi.

assistance. We are also grateful to the local communities for their help during the field survey and collection of specimens.

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