JOURNAL OF ADVANCED
BOTANY AND ZOOLOGY

Journal homepage: http://scienceq.org/Journals/JABZ.php

Research Article Open Access

Ethnobotanical Survey of Medicinal Plants Used By the Lushai Community in Bandarban District, Bangladesh

Md. Salah Uddin[1], Vashkar Chowdhury[1], Shaikh Bokhtear Uddin[1], Abdullah Al Masud Mazumder[1], Mohammad Sajid Ali Howlader[2,*]

[1]Department of Botany, University of Chittagong, Chittagong-4331, Bangladesh.

[2]Department of Biosciences, University of Helsinki, PO Box 64, Helsinki, Finland.

*Corresponding author: Mohammad Sajid Ali Howlader, E-mail: sajidpabc@gmail.com, sajid.howlader@helsinki.fi

Received: February 14, 2015, Accepted: April 3, 2015, Published: April 03, 2015.

ABSTRACT

Over the years, ethnobotanical survey has progressed and contributed with knowledge about the use of plants by indigenous communities. In fact the conservation of biomes and use of plant species in medical, pharmaceutical and biotechnological areas depend on the important indigenous information. The Lushai indigenous community living in the Bandarban hill-tracts of Bangladesh has long been an admiration of utilizes plants around them in various purposes and they depend on surrounding vegetation in their daily life. However, there was no effort to document their indigenous knowledge. For the first time ethnobotanical survey is carried out on the utilization of medicinal plants by Lushai community living in Bandarban district. The information had been documented by interviewing traditional herbalists, various elderly men and women following different ethnobotanical methods. All the plants were listed along with their scientific name, lushai name, local name, habit, family, used parts, illness treated, mode of preparation and mode of application. A total of 82 plant species in 72 genera under 44 families have been identified which are used to treat 27 different ailments by the traditional healers. Euphorbiaceae and Zingiberaceae were the most frequently used family in context to the number of species by the Lushai Community. Leaves were found as the most common used plant parts for folk medicine formulation.

Keyword: *Ethnobotanical survey, Lushai community, Bandarban district, Bangladesh.*

INTRODUCTION

The interaction between plants and people is studied in ethnobotany, a field centering on the indigenous knowledge on how the plants are used and managed for the benefits of mankind [1–4]. Specially medicinal use of plants are being popular for healing from different types of diseases [5–10] since 2500 years ago [7]. The traditional uses of those medicinal plants in health-care practices among the rural communities provide the basis for natural drug discovery development (e.g. [6, 9, 11, 12]). According to the World Health Organization (WHO), about 4 billion people in developing countries not only believe in the healing properties of plant species but also use them habitually [13]. With the modern civilization, traditional knowledge about medicinal plants turns such an increasingly fragmented knowledge, interrupted knowledge transmission from generation to generation [14, 15]. Contrast of South Asia, Bangladesh has very less effort to document the indigenous knowledge about medicinal use of plants [16–32]. Although there is an affluent ethnic tradition interms of traditional medicinal practices in Bangladesh, Lushai ethnic community of Bandarban is one of them. There are very few numbers of dedicated ethnobotanical studies in Bandarban have been published so far [20, 21, 23, 28, 29, 31, 32].

Still Lushai community in Bandarban district remains untouched for the ethnobotanical study. Therefore, an ethnobotanical survey of medicinal plants used by the traditional health practitioners (THPs) of Lushai community in Bandarban, a remote area of Chittagong Hill Tracts was conducted in order to conserve the information regarding traditional uses of medicinal plants. Herein we present our findings in details.

MATERIALS AND METHODS

The study was conducted in Bandarban district of Chittagong Hill Tract (CHT) with an area of 4,502 sq. km. It is situated in the southeast of Bangladesh and located between 21°48′N and 92°24′E [23]. Bangladesh has been gifted with a rich plant diversity base because of its heterogeneous ecologic condition such as fertile alluvial land, warm and humid climate. There are about 6000 species of indigenous and naturalized plants growing in the country [33]. According to Mia [34] more than 1000 of these plants species in Bangladesh contains medicinally active chemical substances. Compare to any other areas in Bangladesh, Bandarban is one of the richest areas interms of flora [33].

The success of ethnobotanical documentation depends on the cooperative relationship between the researcher and local informants. It is very important to locate knowledgeable

informants for the study of ethnobotany [35]. Techniques and tools of this survey were compatible with actual aims, variable field conditions and theoretical approach of the study [36]. Documentation has been made by taking random interviews of the traditional health practitioners, elderly men and women. The documentation data sheet has been prepared based on Alcorn [37], Jain [38], Martin [39] and Cotton [2]. In field interview technique, the informants accompany with the authors and data had been collected during the field work. To obtain medicinal plant use information, plant interview technique had been used in the maximum cases, because the informants were sometime too busy or don't think himself fit to accompany the authors in the field. Fresh plant samples were collected and brought to the informants. The informants identified some of the plants and describe their uses. This method is less time consuming than field interviews and the plant interview allows more informants to be included in a given period of time [40]. By adopting open-ended and semi-structured question technique were chosen for the interview process, then noted and recorded with a digital voice recorder. The reliability of information on each plant was confirmed through repeated interviews.

All voucher specimens preserved in the Chittagong University Herbarium (CTGUH) which were used for this study. Specimens were identified using several literatures and guides [41–51]. Taxonomic hierarchy of identified plants were arranged according to Cronquist [52]. All enlisted scientific names presented here verified by the world's updated database of "The Plant List (www.theplantlist.org)" [53].

RESULTS AND DISCUSSION

Plant species belonged to 72 genera and 82 species in 44 families were being used by most of the local people of Lushai community for the treatment of common diseases. The doses were prepared by using leaf, root, fruit, stem, bark, extracts and other parts of the plant. Scientific names arranged alphabetically, followed by lushai names, local names, habit, family, parts used, illness treated, mode of preparation and mode of application listed in Table 1. From the earlier times this indigenous people made use of plants for their basic needs, medicare and livelihood. Some plants used by people are cultivated while others grow in wild conditions.

According to life form (plant habit), the number of plant species were 36% herbs, 18% shrubs, 34% trees, and 12% climbers respectively (Fig. 1). Euphorbiaceae and Zingiberaceae were the most frequently used families in context to the number of species by the Lushai community. The other important families are Caesalpiniaceae, Liliaceae, Amaranthacea, Cucurbitaceae, Fabaceae, Malvaceae, Mimosaceae, Rutaceae and Solanaceae respectively (Fig. 2). Among these 82 plant species belongs to 65 dicots and 16 monocots and 1 to fern.

Leaves were most common utilized plant parts for the preparation of folk medicine which is 26.04%, then fruit 23.96%, root 11.46%, rhizome 8.33%, bark 8.33%, seed 6.25%, stem 5.21%, bulb 3.13%, whole plant 3.13%, flower 2.08% and tuber 2.08% respectively (Fig. 3). We found that bulb, rhizome, root and the whole plant had been used in formulation of folk medicine is 26.05% for the cure of diseases. These are the destructive ways of using plants because it needs to eradicate or abolish the whole plant. Moreover, the aerial parts of the plant (leaf, flower, fruit, and seed) can be used without eradicating the plant. For this, it is an outstanding way to conserve them.

The studied ethno-medicinal plant species had been used to treat various diseases (Fig. 4) like dysentery, diarrhoea, worm, cough, cold, jaundice, irregular menstruation, tonsillitis, cuts and fever. The 20.16% of total plant species were used to treat dysentery, 13.95% species for diarrhoea, 12.40-0.78% for other diseases. The most commonly mode of preparation of folk-medicines were decoction, paste, juice, extract and infusion etc. (Fig. 5).

Both external and internal methods of practice of folk-medicine have been recommended. Medicines administered orally were those claimed to be used mainly for treating diarrhoea, dysentery, cough, cold, fever, jaundice and irregular menstruation. On the other hand, medicines recommended to be applied externally included mainly for treating skin disease, cuts, wounds, inflammation, swelling, tonsillitis and eye disease.The internal use of folk-medicine is 75% whereas the external use is 25%.

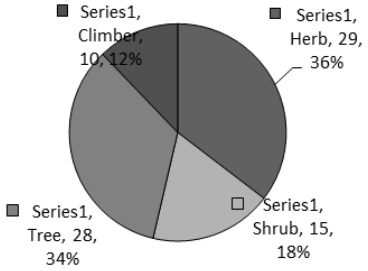

Fig. 1: Percentage of life form (plant habit) used by the Lushai community.

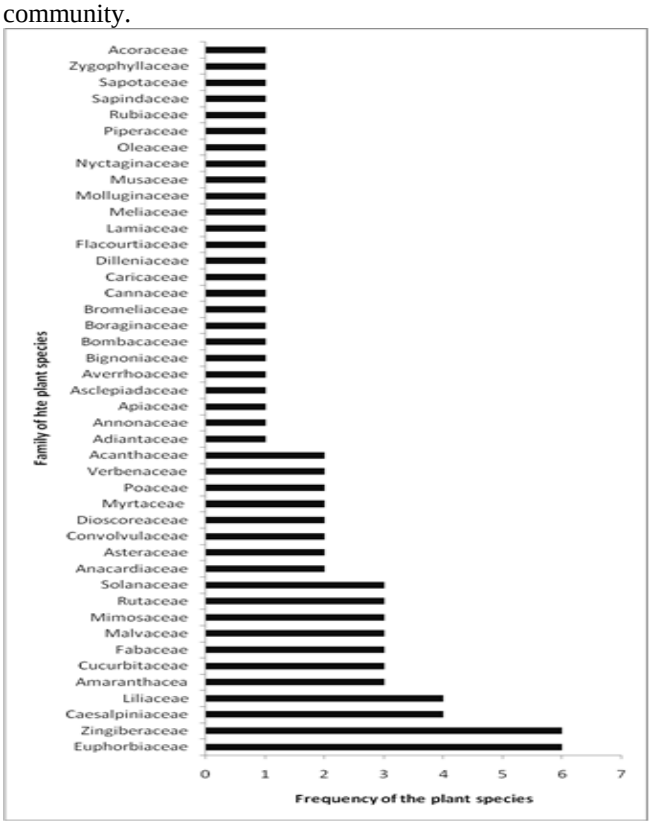

Fig. 2: Families of the ethnomedicinal plants with their frequencies.

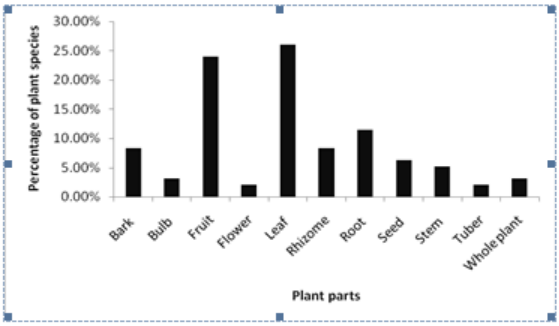

Fig. 3: Plant parts used in folk medicine preparation

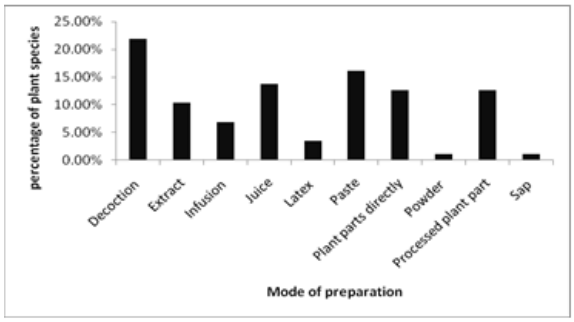

Fig. 5: Mode of preparation used in folk medicine formulation.

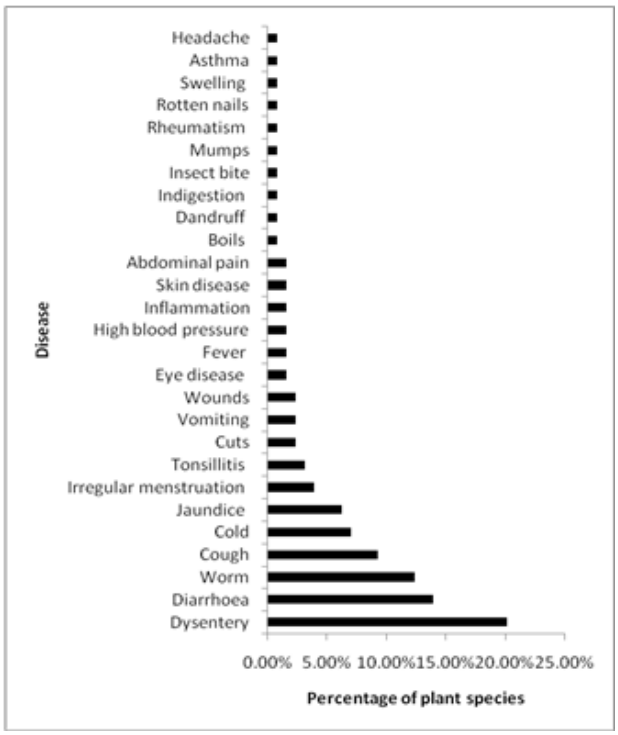

Fig. 4: Frequencies of the medicinal plant species used for various diseases.

Table 1. List of plants used in folk medicine by Lushai community.

Scientific name	Lushai name	Local name/Habit	Family	Parts used	Illness treated	Mode of preparation	Mode of application
Abelmoschus esculentus (L.) Moench.	Kelky	Dheros/Shrub	Malvaceae	Fruit	Diarrhoea, dysentery	Processed plant parts	Oral administered
Abelmoschus moschatus Medik.	Thurmui	Mushakdana/Shrub	Malvaceae	Fruit	Dysentery	Processed plant parts	Oral administered
Acacia concinna (Willd.) DC.	Vai An Thur	Boba lot/Shrub	Mimosaceae	Fruit	Dandruff	Powder	Local application
Achyranthes aspera L.	Kawp Ta Rit	Apang/Herb	Amaranthaceae	Leaf	Dysentery	Juice	Oral administered
Acorus calamus L.	Thit	Bach/Herb	Acoraceae	Rhizome	Worm, diarrhoea, dysentery	Decoction	Oral administered
Adenanthera pavonina L.	Be Ai	Rakta kambal/Tree	Mimosaceae	Seed	Swelling	Paste	Local application
Adhatoda zeylanica Medic.	Tumpang	Basak/Shrub	Acanthaceae	Leaf	Cough, cold, asthma, high blood pressure	Extract	Oral administered
Adiantum lunulatum Burm. f.	Lawngbet	Goyalelata/Herb	Adiantaceae	Whole plant	Dysentery	Plant parts directly	Oral administered
Aegle marmelos (L.) Corrêa	Thing Sharuh	Bel/Tree	Rutaceae	Fruit	Diarrhoea, dysentery	Plant parts directly	Oral administered
Allium cepa L.	Parun Sen	Piaj/Herb	Liliaceae	Bulb	Insect bite	Paste	Local application
Allium sativum L.	Parun Nau	Rasun/Herb	Liliaceae	Bulb	High blood pressure, cold, cough	Plant parts directly	Oral administered

Allium tuberosum Rottler *ex* Spreng.	Mang Purun	Banga-gandina/Herb	Liliaceae	Bulb	Cold, cough	Decoction	Oral administered
Aloe vera (L.) Burm.f.	Chladoro	Ghrita Kumari/Herb	Liliaceae	Leaf	Infllammation	Juice	Local application
Alpinia nigra (Gaertn.) Burtt	Bawngkawr	Jangli Ada/Herb	Zingiberaceae	Rhizome	Cough, cold	Juice	Oral administered
Amaranthus spinosus L.	Bualing Nei	Katanotey/Herb	Amaranthaceae	Root	Dysentery	Juice	Oral administered
Anacardium occidentale L.	Guestunut	Kaju/Tree	Anacardiaceae	Bark	Diarrhoea, dysentery	Decoction	Oral administered
Ananas comosus (L.) Merr.	Lakhuthei	Anaras/Herb	Bromeliaceae	Leaf	Worm	Paste	Oral administered
Annona reticulata L.	Thei Kel Ek	Nona/Tree	Annonaceae	Fruit	Diarrhoea, dysentery	Plant parts directly	Oral administered
Asclepias curassavica L.	Dingdi Par	Kakturi/Shrub	Asclepiadaceae	Root	Jaundice	Processed plant parts	Oral administered
Averrhoa carambola L.	La Hat Thei	Kamranga/Tree	Averrhoaceae	Fruit	Jaundice	Plant parts directly	Oral administered
Azadirachta indica A.Juss.	Vawizum	Neem/Tree	Meliaceae	Leaf, bark, root	Worm, skin disease	Paste, decoction	Local application
Bombax ceiba L.	Phun Chawng Kung	Shimul/Tree	Bombacaceae	Bark	Skin disease	Decoction	Local application
Butea monosperma (Lam.) Taub.	Tuang Toa Par	Palas/Tree	Fabaceae	Bark	Cold, cough	Decoction	Oral administered
Caesalpinia pulcherrima (L.) Sw.	Sen Ri Te Par	Radhachura/Shrub	Caesalpiniaceae	Leaf	Irregular menstruation	Decoction	Oral administered
Canna indica L.	Bawngkawr	Kalaboti/Herb	Cannaceae	Rhizome	Worm	Extract	Oral administered
Carica papaya L.	Thingfangma	Pepe/Tree	Caricaceae	Fruit, seed	Diarrhoea, worm	Processed plant parts, paste	Oral administered
Citrus aurantiifolia (Christm.) Swingle	Ser Thur	Lebu/Shrub	Rutaceae	Fruit	Vomiting, headache	Juice	Oral administered
Citrus maxima (Burm.) Merr.	Umphur	Jambura/Tree	Rutaceae	Fruit	Worm, jaundice, vomiting	Juice	Oral administered
Coix lacryma-jobi L.	Mimte	Tasbi/Herb	Poaceae	Root	Irregular menstruation	Juice	Oral administered
Cordia dichotoma G.Forst.	Mekthing	Bohari/Tree	Boraginaceae	Leaf, fruit	Cold, cough	Decoction	Oral administered
Curcuma caesia Roxb.	Ai Dum	Kalahaldi/Herb	Zingiberaceae	Rhizome	Diarrhoea, dysentery, tonsillitis	Decoction, paste	Oral administered Local application
Curcuma longa L.	Ai Eng	Halud/Herb	Zingiberaceae	Rhizome	Tonsillitis	Paste	Local application
Dalbergia sissoo DC.	Chimim	Sisu/Tree	Fabaceace	Leaf	Dysentery, inflammation	Extract, paste	Oral administered Local application
Dillenia indica L.	Kawr Thing Dawng	Chalta/Tree	Dilleniaceae	Fruit	Diarrhoea, dysentery	Plant parts directly	Oral administered

Dioscorea alata L.	Ram Bara	Chupri Alu/ Climber	Dioscoreaceae	Tuber	Worm	Processed plant parts	Oral administered
Dioscorea bulbifera L.	Thing kawng	Ratalu/ Climber	Dioscoreaceae	Tuber	Diarrhoea, dysentery, worm	Processed plant parts	Oral administered
Erythrina variegata L.	Fartua	Madar/Tree	Fabaceae	Leaf, bark, root	Dysentery, irregular menstruation	Paste	Oral administered
Eupatorium odoratum L.	Kalang sam	Assam lata/Herb	Asteraceae	Leaf	Cuts, wounds	Paste	Local application
Euphorbia antiquorum L.	Huanpal	Tiktasij /Shrub	Euphorbiaceae	Stem	Tonsillitis	Latex	Local application
Euphorbia hirta L.	Buimit	Dudhiya/Herb	Euphorbiaceae	Stem	Eye disease	Latex	Local application
Excoecaria agallocha L.	Gawrthing	Gewa/Tree	Euphorbiaceae	Leaf	Rheumatism	Juice	Local application
Flacourtia jangomas (Lour.) Raeusch.	Riam Shang	Paniala/Tree	Flacourtiaceae	Fruit	Diarrhoea	Plant parts directly	Oral administered
Foeniculum vulgare Mill.	Deihnak	Mouri/Herb	Apiaceae	Seed	Cough	Paste	Oral administered
Glinus oppositifolius (L.) Aug.DC.	Bakchen	Gima/Herb	Molluginaceae	Whole plant	Diarrhoea, dysentery	Processed plant parts	Oral administered
Gmelina arborea Roxb.	Thlangbawng	Gamari/Tree	Verbenaceae	Leaf, root	Cough, abdominal pain	Juice, decoction	Oral administered
Gomphrena globosa L.	Cheai Lo Par	Botam Phul/Herb	Amaranthaceae	Leaf	Cough	Infusion	Oral administered
Hedychium coronarium J.Koenig	Sawl Eng Par	Dolon Chapa/Herb	Zingiberaceae	Rhizome	Worm	Juice	Oral administered
Ipomoea quamoclit L.	Tawngka	Tarulata/ Climber	Convolvulaceae	Leaf	Boils	Paste	Local application
Jasminum sambac (L.) Aiton	Thuang Thum Par	Beli/Shrub	Oleaceae	Root, leaf	Irregular menstruation	Decoction	Oral administered
Kaempferia rotunda L.	Tuk Tin Par	Bhui Champa/Herb	Zingiberaceae	Rhizome	Cuts, wounds	Paste	Local application
Litchi chinensis Sonn.	Raite	Lichu/Tree	Sapindaceae	Flower	Mumps, tonsillitis	Decoction	Local application
Luffa acutangula (L.) Roxb.	Umpawng	Jhinga/Climber	Cucurbitaceae	Fruit, Seed	Worm	Plant parts directly	Oral administered
Mangifera indica L.	Theihai	Aam/Tree	Anacardiaceae	Bark, leaf	Diarrhoea	Infusion	Oral administered
Manihot esculenta Crantz	Mangbal	Shimal alu/Herb	Euphorbiaceae	Root	Jaundice	Extract	Oral administered
Manilkara zapota (L.) P.Royen	Nazak	Safeda/Tree	Sapotaceae	`Fruit	Rotten nails	Latex	Local application
Mikania cordata (Burm.f.) B.L.Rob.	Zaganlau	Assam Lata/Climber	Asteraceae	Leaf	Cutting wounds	Extract	Local application
Mimosa pudica L.	Belhzak	Lajjaboti/Shrub	Mimosaceae	Root	Dysentery, jaundice	Extract	Oral administered
Mirabilis jalapa L.	Arpa Khuang Pa	Shandhamaloti /Herb	Nyctaginaceae	Leaf	Inflammation	Paste	Local application

Momordica charantia L.	Changkha	Korolla/Climber	Cucurbitaceae	Fruit, seed, leaf	Worm, diarrhoea, dysentery.	Infusion	Oral administered
Musa paradisiaca L.	Banhla	Kola/Herb	Musaceae	Fruit	Dysentery	Processed plant parts	Oral administered
Neolamarckia cadamba (Roxb.) Bosser	Zawng par	Kadam/Tree	Rubiaceae	Bark	Diarrhoea	Infusion	Oral administered
Nicotiana tabacum L.	Vaihlo	Tamak/Herb	Solanaceae	Leaf	Pain	Processed plant parts	Local application
Ocimum americanum L.	Vawipanha	Ban Tulshi/Herb	Lamiaceae	Leaf	Cold, cough, diarrhoea, dysentery	Extract, infusion	Oral administered
Operculina turpethum (L.) Silva Manso	Kainem	Dudh Kalmi/Climber	Convolvulaceae	Root	Worm	Extact	Oral administered
Oroxylum indicum (L.) Kurz	Thlengkawng	Thona/Tree	Bignoniaceae	Bark	Jaundice	Processed plant parts	Oral administered
Phyllanthus acidus (L.) Skeels	Thei Pang Kei	Arboroi/Tree	Euphorbiaceae	Fruit	Jaundice	Processed plant parts	Oral administered
Phyllanthus emblica L.	Suan Lu	Amloki/Tree	Euphorbiaceae	Fruit	Cough, cold, diarrhoea, dysentery, jaundice	Processed plant parts	Oral administered.
Piper betle L.	Pan Nah	Pan/Climber	Piperaceae	Leaf	Indigestion	Juice	Oral administered
Psidium guajava L.	Kawl Thei	Piyara/Tree	Myrtaceae	Fruit	Diarrhoea	Plant parts directly	Oral administered
Saccharum arundinaceum Retz.	Lailuang	Teng/Herb	Poaceae	Whole plant	Dysentery	Decoction	Oral administered
Senna alata (L.) Roxb.	Aicia Kung	Dadmardan/Shrub	Caesalpiniaceae	Leaf	Worm	Juice	Oral administered
Senna occidentalis (L.) Link	Micia Kung	Kalkasunde/Shrub	Caessalpiniaceae	Leaf, root	Worm, fever	Decoction	Oral administered
Solanum melongena L.	Bawk Bawn	Begun/Shrub	Solanaceae	Flower	Fever	Decoction	Oral administered
Solanum torvum Sw.	Linghawi	Tit Begum/Shrub	Solanaceae	Fruit	Worm	Processes plant parts	Oral administered
Syzygium fruticosum DC.	Mui	Puti jam/Tree	Myrtaceae	Leaf	Dysentery	Extract	Oral administered
Tamarindus indica L.	Teng Ta Re	Tetul/Tree	Caesalpiniaceae	Fruit	Dysentery, diarrhoea	Infusion	Oral administered
Tectona grandis L.f.	Clawn Pang	Shegun/Tree	Verbenaceae	Stem	Dysentery	Decoction	Oral administered
Thunbergia grandiflora (Roxb. ex Rottl.) Roxb.	Zawng Hawi Leng	Nillata/Climber	Acanthaceae	Stem	Eye pain	Sap	Local application
Tribulus terrestris L.	Kawl Thei	Gokkhur/Herb	Zygophyllaceae	Fruit	Dysentery	Decoction	Oral administered
Trichosanthes cucumerina L.	Berul	Chichinga/Climber	Cucurbitaceae	Fruit, seed	Irregular menstruation	Processed plant parts	Oral administered
Urena lobata L.	Rampurun	Banokra/Shrub	Malvaceae	Stem	Abdominal pain	Decoction	Oral administered

Zingiber officinale Roscoe	Sawhthing	Ada/Herb	Zingiberaceae	Rhizome	Cough, cold, dysentery, vomiting, worm	Decoction	Oral administered

The time of taking, dose and duration of practice of these folk-medicines are varied from traditional health practitioners to practitioners and on the basis of disease. The establishment of community clinic is in many rural areas and that may change gradually the existing pattern of indigenous knowledge based system of healthcare. Recently, they are losing their precious heritage of plant use indigenous knowledge because of, industrialization and urbanization. At present younger generation lost the interest to continue their parental tradition because it does not provide them proper financial support for their livelihood. If these conditions continue; their traditional knowledge of plant uses will be lost rapidly. Now, it is a burning necessity to document their ethno-medicinal use information to protect them from disappearing. This information can be the source and help the modern researchers in the discovery of new drugs (e.g. [9, 10]).

However, measures should be taken to train up the Traditional Health Practitioners (THPs) regarding the harmful effects of irrational uses of plants in order to ensure safe therapy. The gradual increase of the commercial demand of medicinal plants has been increasing which results in careless plant collection activities. So we should carry out necessary steps for protect the vulnerable plant species from being endangered.

ACKNOWLEDGEMENTS

The authors are cordially grateful to the Lushai communities inhabiting in different localities of Bandarban district because of their kind support and co-operation during the field surveys. A lot of thanks to all the Lushai Traditional Health Practitioners and people involved in the interviews for providing information about the medicinal applications of the plants. A lot of appreciations are acknowledged for the help and the administrative facilities provided by the local governmental authorities during the survey.

REFERENCES

1. G.T. Prance (1991). What is ethnobotany today?, Journal of ethnopharmacology, 32(1): 209-216.
2. C.M. Cotton (1996). Ethnobotany: principles and applications, John Wiley & Sons, Baffins Lane Chichester West Sussex PO191UD Engl., pp. 423.
3. G.M. Figueiredo, H.F. Leitao-Filho, A. Begossi (1993). Ethnobotany of Atlantic Forest coastal communities: Diversity of plant uses in Gamboa (Itacuruçá Island, Brazil), Human Ecology, 21(4): 419-430.
4. A.M. Abbasi, M.H. Shah, M.A. Khan (2015). Ethnobotany and Ethnomedicine. In Wild Edible Vegetables of Lesser Himalayas, Springer International Publishing, pp. 19-29.
5. T. Arakawa, D.K. Chong, W.H. Langridge (1998). Efficacy of a food plant-based oral cholera toxin B subunit vaccine, Nature biotechnology, 16(3): 292-297.
6. J. Mann (2002). Natural products in cancer chemotherapy: past, present and future. Nature Reviews Cancer, 2(2): 143-148.
7. A. Saklani, S.K. Kutty (2008). Plant-derived compounds in clinical trials, Drug discovery today, 13(3): 161-171.
8. I. Raskin, D.M. Ribnicky, S. Komarnytsky, N. Ilic, A. Poulev, N. Borisjuk, B. Fridlender (2002). Plants and human health in the twenty-first century, TRENDS in Biotechnology, 20(12): 522-531.
9. K. Lewis, F.M. Ausubel (2006). Prospects for plant-derived antibacterials, Nature Biotechnology, 24(12): 1504-1507.
10. D.J. Newman, G.M. Cragg, K.M. Snader(2000). The influence of natural products upon drug discovery (Antiquity to late 1999), Nat. Prod. Rep., 17(3): 215–234.
11. W. Runguphan, X. Qu, S.E. O'Connor (2010). Integrating carbon-halogen bond formation into medicinal plant metabolism. Nature, 468(7322): 461-464.
12. J. Liu, E. Manheimer, K. Tsutani, C. Gluud (2003). Medicinal herbs for hepatitis C virus infection: a Cochrane hepatobiliary systematic review of randomized trials, The American journal of gastroenterology, 98(3): 538-544.
13. L.K. Rai, P. Prasad, E. Sharma (2000). Conservation threats to some important medicinal plants of the Sikkim Himalaya, Biological Conservation, 93(1): 27-33.
14. H.V. Kuhnlein, O. Receveur (1996). Dietary change and traditional food systems of indigenous peoples, Annual review of nutrition, 16(1): 417-442.
15. P. Sheng-Ji (2001). Ethnobotanical approaches of traditional medicine studies: some experiences from Asia, Pharmaceutical biology, 39(s1): 74-79.
16. M. Rahmatullah, K.R. Biswas (2012). Traditional medicinal practices of a Sardar healer of the Sardar (Dhangor) community of Bangladesh, The Journal of Alternative and Complementary Medicine, 18(1): 10-19.
17. M. Rahmatullah, S.R. Pk, M. Al-Imran, R. Jahan (2013). The Khasia tribe of Sylhet district, Bangladesh, and their fast-disappearing knowledge of medicinal plants. The Journal of Alternative and Complementary Medicine, 19(7): 599-606.
18. M. Rahmatullah, Z. Khatun, S. Saha, M.A. Tuly, A. Hossain, A. Roy, R. Jahan (2014). Medicinal plants and formulations of Tribal healers of the Chekla clan of the Patro tribe of Bangladesh, The Journal of Alternative and Complementary Medicine, 20(1): 3-11.
19. M. Rahmatullah, Z. Khatun, D. Barua, M.U. Alam, S. Jahan, R. Jahan (2013). Medicinal plants used by traditional practitioners of the Kole and Rai tribes of Bangladesh, The Journal of Alternative and Complementary Medicine, 19(6): 483-491.
20. M. Rahmatullah, M.S. Hossan, A. Hanif, P. Roy, R. Jahan, M. Khan, T. Rahman (2009). Ethnomedicinal applications of plants by the traditional healers of the Marma tribe of Naikhongchhari, Bandarban District, Bangladesh. Adv Nat Appl Sci, 3(Adv. in Nat. Appl. Sci): 392-401.
21. M.M. Rashid, F.B. Rafique, N. Debnath, A.Rahman, S.Z. Zerin, H. Rashid, M.A. Islam, Z. Khatun, M. Rahmatullah (2012).Medicinal plants and formulations of a community

of theTonchongya tribe in Bandarban District of Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 6:292–298.
22. A. Hasan, M.S.H. Shaown, R.J. Ripa, A. Khatun, M.A. Asif, S. Akter, M. Rahmatullah (2013). Ethnomedicinal plants of two villages in Natore district, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 7(4): 282-289.
23. M. Mohiuddin, M.K. Alam, S.R. Basak, M.K. Hossain (2012). Ethno-medico botanical study among the four indigenous communities of Bandarban, Bangladesh, Bangladesh Journal of Plant Taxonomy, 19(1): 45-53.
24. S. Seraj, M. Rahmatullah, M. Monjur-E-Khudha, S.A. Aporna, M.S.H. Khan, R. Jahan (2011). Amulets and other uncommon treatments prescribed by traditional medicinal practitioners of the Bede community residing in Porabari village of Dhaka district, Bangladesh. The Journal of Alternative and Complementary Medicine, 17(11): 987-993.
25. M. Rahmatullah, M.A. Rahman, M.S. Hossan, M. Taufiq-Ur-Rahman, R. Jahan, M.A.H. Mollik (2010). A pharmacological and phytochemical evaluation of medicinal plants used by the harbang clan of the tripura tribal community of Mirsharai area, Chittagong district, Bangladesh. The Journal Of Alternative And Complementary Medicine, 16(7): 769-785.
26. M.S. Rana, M.M. Islam, S.N. Bosunia, S.R. Mahmud, S.A. Santa, S.H. Snigdha, M. Rahmatullah (2014). A Survey of Medicinal Plants used by a Village Folk Medicinal Practitioner in Sreemangal Upazila of Maulvibazar District, Bangladesh. American-Eurasian Journal of Sustainable Agriculture, 8(1): 1-9.
27. M.H. Kabir, N. Hasan, M.M. Rahman, M.A. Rahman, J.A. Khan, N.T. Hoque, M. Rahmatullah (2014). A survey of medicinal plants used by the Deb barma clan of the Tripura tribe of Moulvibazar district, Bangladesh. Journal of ethnobiology and ethnomedicine, 10(1): 19.
28. M.F. Kadir, M.S.B. Sayeed, N.I. Setu, A. Mostafa, M.M.K. Mia (2014). Ethnopharmacological survey of medicinal plants used by traditional health practitioners in Thanchi, Bandarban Hill Tracts, Bangladesh. Journal of ethnopharmacology, 155(1): 495-508.
29. D. Miah, M.S.H. Chowdhury (2003). Indigenous healthcare practice through medicinal plants from forests by the Mro tribe in Bandarban region, Bangladesh. Indilinga African Journal of Indigenous Knowledge Systems, 2(2): p-61.
30. M.S.H. Chowdhury, M.A. HALIM, N.U.R. Muhammed, M. Koike, S. Biswas (2009). Indigenous Knowledge in Natural Resource Management by the Hill People: A Case of the Mro Tribe in Bangladesh. Forests, Trees and Livelihoods, 19(2): 129-151.
31. M. Mohiuddin, M.K. Alam, S.R. Basak, M.K. Hossain (2012). Ethnobotanical studies of the plant used by the tribals of Bandarban Hill District, Bangladesh. Indian Forester, 138(1): 84-89.
32. M. Rahmatullah, M. S. Hossan, A. Hanif, P. Roy, R. Jahan, M. Khan, T. Rahman (2009). Ethnomedicinal applications of plants by the traditional healers of the Marma tribe of Naikhongchhari, Bandarban District, Bangladesh. Adv Nat Appl Sci, 3(Adv. in Nat. Appl. Sci), 392-401.
33. W.T. Banglapedia (2003). National Encyclopedia of Bangladesh. Web Page Address: http://www. banglapedia. net/HT/W_0034. HTM, 2, 5.
34. M.M.K. Mia (1990). Traditional medicines of Bangladesh. In: Ghani, A. (Ed.), Traditional Medicines. Jahangirnagar University, Dhaka.
35. D.R. Given, W. Harris (1994). Techniques and methods of ethnobotany: as an aid to the study, evaluation, conservation and sustainable use of biodiversity. Commonwealth Secretariat Publications.
36. C.R.Vogl, B. Vogl-Lukasser, R.K. Puri (2004). Tools and methods for data collection in ethnobotanical studies of homegardens. Field methods, 16(3): 285-306.
37. J.B. Alcorn (1984). Huastec Mayan ethnobotany. Huastec Mayan ethnobotany.
38. S.K. Jain (Ed.). (1989). Methods and approaches in Ethnobotany.
39. G.J. Martin (2010). Ethnobotany: a methods manual. Routledge.
40. M.N. Alexiades (1996). Protocol for conducting ethnobotanical research in the tropics, Advances in Economic Botany, 10: 5-18.
41. J.D. Hooker (1872-1897). Flora of British India. 1-7, Reeve and Co. London.
42. D. Prain (1903). Bengal Plants. 1 & 2. Govt. press, Culcutta, India.
43. J.D. Heining (1925). List of Plants of Chittagong Collectorate and Hill tracts. Darjeeling, India.
44. M.A. Hasan (1988). Traditional Herbal Medicine of Bangladesh (in Bengali), Hassan Book House, Dhaka, Bangladesh.
45. Z.U. Ahmed, Z.N.T. Begum, M.A. Hassan, M. Khondker (eds.). 2008. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 6. Angiosperms: Dicotyledons (Acanthaceae-Asteraceae). Asiatic Society of Bangladesh, Dhaka.
46. Z.U. Ahmed, M.A. Hassan, Z.N.T. Begum, M. Khondker (eds.). 2008. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 7. Angiosperms: Dicotyledons (Balsaminaceae-Euphorbiaceae). Asiatic Society of Bangladesh, Dhaka.
47. Z.U. Ahmed, M.A. Hassan, Z.N.T. Begum, M. Khondker (eds.). 2009. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 8. Angiosperms: Dicotyledons (Fabaceae-Lythraceae). Asiatic Society of Bangladesh, Dhaka.
48. Z.U. Ahmed, M.A. Hassan, Z.N.T. Begum, M. Khondker (eds.). 2009. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 9. Angiosperms: Dicotyledons (Magnoliaceae-Punicaceae). Asiatic Society of Bangladesh, Dhaka.
49. Z.U. Ahmed, M.A. Hassan, Z.N.T. Begum, M. Khondker (eds.). 2009. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 10. Angiosperms: Dicotyledons (Ranunculaceae-Zygophyllaceae). Asiatic Society of Bangladesh, Dhaka.
50. K.U. Siddiqui, M.A. Islam, Z.U. Ahmed, Z.N.T. Begum, M.A. Hassan, M. Khandaker, M.M. Rahman, S.M.H.

Kabir, M. Ahmed, A.T.A. Ahmed, A.K.A. Rahman, E.U. Haque (eds.). 2007 Encylopedia of Flora and Fauna of Bangladesh Vol. 11. Angiosperms: Monocotyledons (Agavaceae-Najadaceae). Asiatic Society of Bangladesh, Dhaka. 399 pp.
51. Z.U. Ahmed, M.A. Hassan, Z.N.T. Begum, M. Khondker (eds.). 2008. Encyclopedia of Flora and Fauna of Bangladesh, Vol. 12. Angiosperms: Monocotylendons (Orchidaceae-Zingiberaceae). Asiatic Society of Bangladesh, Dhaka.
52. A. Cronquist (1982). An Integrated System of Classification of flowering Plants, Columbia University Press, Columbia
53. The Plant List (2010). Version 1. Published on the internet; http://www.theplantlist.org
.

Citation: Mohammad Sajid Ali Howlader et al.. (2015). Ethnobotanical Survey of Medicinal Plants Used By the Lushai Community in Bandarban District, Bangladesh. J. of Advanced Botany and Zoology, V2I4.04. DOI: 10.5281/zenodo.912318.