

STUDY OF ETHNOMEDICINAL PLANTS USED BY THE LOCAL PEOPLE OF FENI DISTRICT, BANGLADESH

MOHAMMAD ZASHIM UDDIN¹, MD. GOLAM KIBRIA
AND MD. ABUL HASSAN

Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh.

Abstract

Ethno-medicinal study was conducted to document medicinal plants used by the local people of Feni district. The targets of the study were to identify and document plant species used for treatment of various ailments and to find out the level of consensus or agreement between informants regarding the uses of plants for particular disease categories. The study has been resulted in recording of 115 medicinal plant species with 216 formularies to treat 69 ailments. These species belongs to 55 families. Such data indicated that the study area has plenty of medicinal plants with their diversity of health care uses. Ailment category cut and wounds attained highest Fic value. Species used for this purpose are *Mikania cordata*, and *Cynodon dactylon* which were cited by many informants. Second highest Fic value was found in case of Dysentery and diarrhoea. Medicinal plants used for this purpose are *Litsea glutinosa*, *Dalbergia sissu*, *Mangifera indica*, *Scoparia dulcis*, *Holarrhena antidysenterica*, *Stephania harnandifolia* and *Centella asiatica* those were cited by a good number of informants. Since the Fic values attained highest, such plants could be recommended for further phytochemical study to isolate compounds responsible for the remedy of ailment category cut and wounds and diarrhoea and dysentery. In the present survey, 16 species has attained 100% FI values. This FI values means that the informants have a tendency to rely on one specific plant species for treating one certain ailment than several ailments. The study asserted that such species need to be protected in the study area to sustain traditional medicinal plants and culture. Finally, a number of threats to the medicinal plants have been identified and some measures for conservation have been suggested.

Key words: Ethnomedicinal plants, Local people, Feni district

Introduction

Ethnobotanical study is the gateway in identifying new plant products of potential commercial values. It also acquired traditional techniques in conserving threatened species and to find diversity of crop germplasm for future breeding program. Documented medicinal plants with high degree of consensus can serve as a basis for future investigation of modern drug (Khan *et al.* 2014). Plant based traditional medicine plays a key role in the development of novelties in drug discovery (Wright 2005). Recent studies showed that over 80% rural people of the world rely on herbal medicines (Setzer *et al.* 2006). The world market for herbal medicines based on traditional knowledge is now estimated at US\$ 60 billion (Breevot 1998). World leaders were met

¹ Corresponding author: E-mail : zashim01@gmail.com

in Rio de Janeiro during 1992 to formulate biodiversity conservation policy including agenda 21 which also gave emphasis on the documentation and sustainable utilization of traditional knowledge of medicinal plants.

Currently, Ethnomedicinal knowledge of plants has been eroding at alarming rate from the nature before proper documentation and evaluation. In order to protect such knowledge, documentation of ethnomedicinal plants is already started in Bangladesh. A number of articles published in this field included Mia and Huq (1988), Hassan and Khan (1986, 1996), Alam (1992), Alam *et al.* (1996), Uddin (2006), Uddin *et al.* (2001), Khan *et al.* (2002), Yusuf *et al.* (2002), Uddin *et al.* (2004), Uddin *et al.* (2006), Yusuf *et al.* (2006), Uddin and Roy (2007), Uddin *et al.* (2008), Uddin *et al.* (2012), Haque *et al.* (2014) and Uddin and Hassan (2014). All such articles were listed a good number of medicinal plants of particular community or particular diseases or particular areas of Bangladesh. But there are still more medicinal plants used as sources of herbal drugs by the ethnic and local people of Bangladesh yet to be discovered. Unfortunately no such works have covered the documentation of ethnomedicinal plants of rural people of Feni district. In the present study an attempt has been made to record ethnomedicinal use of plants, to determine agreement in the use of medicinal plants in the ailments categories between the plant users, to determine most frequently used medicinal plant species by local people in study area and to find culturally important medicinal plants.

Materials and Methods

Feni is a south-eastern district of Bangladesh and lies between 22°44' and 23°17' N and between 91°15' and 91°35' E. The total area of the district is about 990.36 sq. km. The district is bounded on the north by Comilla district and Tripura (India), on the east by India and Chittagong district, on the south by Chittagong and Noakhali districts and on the west by Noakhali district. The district was established in 1984. The district consists of 6 upazilas including Chhagalnaiya, Daganbhuiyan, Feni Sadar, Parshuram, Phulgazi and Sonagazi. The Feni and Muhuri are the main rivers of this district. Feni is one of the coastal districts at the fringe of the Bay of Bengal with vast char land of recent origin in the south and in the east by the river Muhuri. The area enjoys tropical climate with high rainfall and flush flood during monsoon period. In dry period the area has gone under boro cultivation using water from Muhuri project, a dam made in the estuary of Feni and Muhuri River. The vegetation type is similar to the vegetation of the lower Gangetic plain and other districts in the southern region of the country. There is no forest land in the district except the government sponsored afforestation programme for the coastal belt. The north-eastern part of the district reflects some characteristics of the Tripura State of India. However, all homesteads are usually covered by dense and lush green foliage of wide variety of both native and exotic species of trees. Both sides of the high road are covered by exotic trees.

The study area has been visited four times in different seasons of the year of 2014. The data of medicinal uses have been recorded through semi-structured interviews, key informant discussions and informal conversations with local people and also herbal practitioners (Alexiades 1996). Participant observation, plant interview, field interview and group interview were also followed to collect data (Alexiades 1996). A total of 65 informants has been interviewed. They were mostly male with the age range from 18 to 95 years old. Education levels of the informants were from illiterate up to B. Sc. Degree. Professionally they were mostly farmer and small shopkeepers. During the field survey, information on uses of plants to treat human, parts used modes of preparation and administration has been collected. The vernacular names have been collected with the help of local people. Voucher specimens for each medicinal plant have been collected and processed using standard herbarium techniques (Hyland 1972 and Alexiades 1996). The specimens were identified consulting different Floras viz., Hooker 1872-1897, Prain 1903, Uddin and Hassan 2004, Siddiqui *et al.* 2007c and Ahmed *et al.* 2008a, 2008b, 2009b, 2009c, 2009d, 2009e. Specimens available at Dhaka University Salar Khan Herbarium (DUSH) were consulted in identifying the collected plant specimens. The updated nomenclature of the species followed are Siddiqui *et al.* 2007c and Ahmed *et al.* 2008a, 2008b, 2009b, 2009c, 2009d, and 2009e. Voucher specimens are deposited at DUSH.

Factor of informant consensus (Fic): In order to estimate use diversity of the medicinal plants and to determine which plants are particularly interesting in the search for bioactive compounds, factor of informant consensus (Fic) was calculated (Heinrich *et al.* 1998). Fic is thus calculated applying the following equation:

$$Fic = \frac{N_{UR} - N_{taxa}}{N_{UR} - 1}$$

Where N_{UR} is the number of use reports in each category, N_{taxa} is the number of species in each category. The relative importance of a species is evaluated by the proportion of respondents who cited it. The Fic provides a range of 0–1, where high values (close to 1) are obtained when only one or a few plant species are reported to be used by a high proportion of informants to treat a particular ailment. High Fic thus means that there is a narrow well-defined group of species used to cure a particular ailment category and/or that information is exchanged between informants. On the other hand, low Fic values (close to zero) indicate that informants disagree over which plant to use due to random choosing or lack of exchange of information about use among informant.

Citation frequency of medicinal plants (Cf%): Cf values are useful to determine most common medicinal plants in the study area. Cf values of medicinal plants were estimated using the formula: (number of people interviewed citing species/ the total number of people interviewed) x 100 (Friedman *et al.* 1986).

Fidelity level (F1): The F1 value is useful for identifying the informants most preferred species in use for treating certain ailments (Friedman *et al.* 1986). The percentage of informants claiming the use of a plant species for the same major purpose was estimated using the F1 index, $F1 = I_p/I_u \times 100$, where I_p is number of informants who indicate use of a species for the same major ailment, I_u is the total number of informants who mentioned the same plant for any other use. The F1 values range from 0 to 100%. Medicinal plants that are widely used by the local people for certain ailment have higher F1 values those that are less popular.

Results and Discussion

A total of 115 medicinal plant species belonging to 63 families with 215 formularies has been recorded from Feni. Such plants were used to treat 64 ailments. For each species scientific name, local name, parts used, ailments treated, mode of treatment and percentage of respondents (Citation) who have knowledge have been provided (Table 1). It is evident that the study area still has huge diversity of knowledge about the uses of medicinal plants. Such knowledge has been inherited orally from generation to generation. No written documents have been found during survey. One of the causes for huge diversity of medicinal knowledge is that the study area is located near to the piedmont area of Tripura hill range where different cultural groups of people have been dwelling from ancient time.

Among the medicinal plants, 40% has been represented by herbs, 32% by trees, 16% by shrubs and 12% by climbers (Fig. 1). Leaves are the majority of parts used followed by stem and bark, fruits and rhizomes and bulbs (Fig. 2). This is an indication of sustainable use of natural resources. Out 216 formularies, 74% was of internal applications and rest 36% were external applications (Fig. 3). According to informants, maximum medicinal plants (63%) they used has been collected from wild sources (Fig. 4).

The factor informant consensus was used to determine the ethnopharmacological important plant species (Heinrich *et al.* 1998). Table 2 shows that the Fic values varied from 0.583 to 0.932. The highest value (0.932) was found in case of ailments category cut and wounds. The second highest Fic value (0.898) was found for dysentery and diarrhoea followed by fever, impotence, stomach ache, jaundice, constipation, rheumatism, dermatological, constipation, diabetes, brain complain, veterinary, cardiovascular disease, dental, urinary disorder, others and anthelmintic. The high Fic value for cut and wounds indicated that relatively few taxa are used by a large proportion of the people to treat cut and wounds category of ailment. The most cited species for cut and wounds are *Mikania cordata* and *Cynodon dactylon*. In case of dysentery most cited

Table 1. Ethno-botanical data of medicinal plants with citation frequencies used by the local people of Feni. Cf means Citation frequency.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Abrus precatorius</i> L.	Sonamukhi	Fabaceae	Leaf	Constipation	Juice is taken	3.08
			Root	Cough	Juice is taken	4.62
<i>Acampe papillosa</i> (Lindl.) Lindl.	Rashna	Orchidaceae	Leaf	Cough	Juice is taken	6.15
			Leaf	Ear complain	Leaf juice is used	9.23
			Leaf	Rheumatic pain	Juice is taken	4.62
<i>Achyranthes aquatica</i> R. Br.	Thuash	Amaranthaceae	Stem	Dropsy	Cooked stem is taken	10.8
<i>Achyranthes aspera</i> L.	Upathlenga	Amaranthaceae	Root	Jaundice	Juice is taken	10.8
			Stem	Jaundice	Wreath is used	6.15
<i>Adhatoda zeylanica</i> Medikus	Bashak	Acanthaceae	Leaf	Cold fever	Juice is taken	3.08
			Leaf	Cough	Juice is taken	3.08
			Leaf	Pneumonia	Juice is taken	1.54
<i>Aegle marmelos</i> (L.) Corr.	Bel	Rutaceae	Fruit	Dysentery	Pulp is taken	9.23
			Fruit	Laxative	Pulp is taken	7.69
<i>Allium cepa</i> L.	Peaj	Liliaceae	Bulb	Cough	Juice is taken	3.08
			Bulb	Vomiting	Juice mixed with salt is taken	24.6
<i>Allium sativum</i> L.	Roshun	Liliaceae	Bulb	Chest pain	Juice is taken	26.2
			Bulb	Reduced pressure	Juice is taken	6.15
			Bulb	Ringworm	Paste is used	41.5
<i>Alocasia cucullata</i> (Lour.) G. Don	Bishkachu	Areceae	Rhizome	Rheumatic pain	Cooked rhizome is taken	12.3
<i>Alocasia macrorrhizos</i> (L.) G. Don	Mankachu	Areceae	Petiole	Dropsy	Cooked petiole is taken	4.62

Contd.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
					Cooked leaf is taken	1.54
			Leaf	Mental peace		
					Cooked rhizome is taken	1.54
			Rhizome	Rheumatic pain		
<i>Aloe vera</i> (L.) Burm. f.	Alovera	Liliaceae	Leaf	Impotence	Juice is taken	4.62
<i>Alpinia calcarata</i> (Haworth) Rosc.	Bonalachi	Zingiberaceae	Root	Bronchitis	Juice is taken	10.8
<i>Alstonia scholaris</i> (L.) R. Br.	Chatim	Apocynaceae	Bark	Cough	Juice is taken	4.62
					Cooked stem and leaf are taken	3.08
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Helencha	Amaranthaceae	Stem, Leaf	Constipation		
					Cooked stem and leaf are taken	1.54
<i>Amaranthus gangeticus</i> L.	Lalshak	Amaranthaceae	Leaf, Stem	Blood purify	Juice is taken	12.3
<i>Amaranthus spinosus</i> L.	Katanote	Amaranthaceae	Root	Cough	Juice is taken	9.23
			Root	Dog bite	Juice is taken	6.15
<i>Ananas comosus</i> (L.) Merr.	Anarash	Bromiliaceae	Fruit Young shoot	Anthelmintic Impotence	Juice is taken	9.23
					Juice is taken	32.3
<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees	Kalomegh	Acanthaceae	Leaf	Fever	Juice is taken	29.2
			Leaf	Malaria	Heated leaf is used as poultice	1.54
<i>Anthocephalus chinensis</i> (Lamk.) A. Rich ex Walp.	Kadam	Rubiaceae	Leaf	Rheumatic pain		1.54
<i>Artocarpus heterophyllus</i> Lamk.	Kanthal	Moraceae	Latex	Ringworm	Latex is applied	1.54
<i>Averrhoa carambola</i> L.	Kamranga	Averrhoaceae	Fruit	Cold fever	Juice is taken	6.15
			Fruit	Jaundice	Juice is taken	1.54
<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Leaf	Abscess	Juice is taken	12.3
			Shoot	Anthelmintic	Juice is taken	3.08
			Leaf	Diabetes	Tablet is taken	1.54

Contd.

Scientific name	Local/Bangali name	Family	Parts used	Ailments name	Treatment mode	CF%
			Leaf	Rheumatic pain	Juice is taken	20
			Leaf	Skin diseases	Tablet is taken	9.23
<i>Blumea lacera</i> (Burm. f.) DC.	Kukurmuta	Asteraceae	Leaf	Rheumatic pain	Cooked leaf is taken	1.54
<i>Boerhaavia repens</i> L.	Pona-rupa	Nyctaginaceae	Leaf	Dropsy	Cooked leaf is taken	4.62
<i>Bombax ceiba</i> L.	Shimultula	Bombacaceae	Root	Impotence	Juice is taken	12.3
			Spine	One testicle	Spine is used	12.3
<i>Borassus flabelifer</i> L.	Tal	Arecaceae	Fruit	Metal Health	Juice is taken	6.15
<i>Bryophyllum pinnatum</i> (Lamk.) Oken	Pathorkuchi	Crassulaceae	Leaf	Gallbladder stone	Juice is taken	9.23
			Leaf	Kidney stone	Decoction is used	6.15
<i>Cajanus cajan</i> (L.) Millsp.	Orol	Fabaceae	Leaf	Jaundice	Used as bake/paste	1.54
<i>Calotropis procera</i> (Ait.) R. Br.	Apon	Asclepiadaceae	Leaf	Pain	Latex is taken	10.8
<i>Carica papaya</i> L.	Pepe	Caricaceae	Latex	Anthelmintic	Cooked fruit is taken	26.2
			Fruit	Constipation	Cooked fruit is taken	16.9
			Fruit	Gastric	Fried leaf is taken	3.08
<i>Cassia alata</i> L.	Dadraj	Caesalpiniaceae	Leaf	Anthelmintic	Juice is taken	6.15
			Leaf	Constipation	Juice is taken	4.62
			Leaf Young	Ringworm	Leaf paste applied	1.54
<i>Cassia fistula</i> L.	Sonalu	Caesalpiniaceae	shoot/fruit	Anthelmintic	Juice is taken	1.54
			Fruit	Constipation	Juice is taken	1.54
<i>Centella asiatica</i> (L.) Urban	Adamoni	Umbeliferae	WP	Brain tonic	Cooked leaf and leaf paste are taken	29.2
			WP	Dysentery		10.8

Contd.

<i>Scientific name</i>	Local/Bangali name	Family	Parts used	Ailments name	Treatment mode	Cf%
			WP	Piles	Juice is taken	1.54
<i>Chromolaena odorata</i> (L.) King & Robinson	Dumki	Asteraceae	Leaf	Cut	Juice is applied	9.23
<i>Cicca acida</i> (L.) Merr.	Orboroi	Euphorbiaceae	Fruit/Leaf	Pox	Paste is applied	3.08
<i>Cinnamomum tamala</i> Nees & Eberm.	Tejpata	Lauraceae	Leaf	Cough	Used as smoking	20
<i>Citrus grandis</i> (L.) Osbeck	Jambura	Rutaceae	Fruit	Cold fever	Fruit is taken	4.62
			Fruit	Jaundice	Fruit is taken	4.62
<i>Citrus lemon</i> (L.) Burm. f.	Lebu	Rutaceae	Fruit	Jaundice	Juice is taken	4.62
<i>Clerodendrum viscosum</i> Vent.					Juice is taken	
	Bhait	Verbenaceae	Leaf	Cold, flue		1.54
			Leaf	Cow foot disease	Juice is applied	1.54
			Leaf	Diabetes	Juice is taken	4.62
			Leaf	Pain	Heated leaf is used as poultice	3.08
			Root	Rheumatic pain	Juice is applied	3.08
			Leaf, Root	Stomach ache	Juice is taken	4.62
<i>Clinogyne dichotoma</i> (Roxb.) Salisb. ex Benth	Patipata	Merantaceae	Shoot	Ear complain	Juice is used	6.15
<i>Coccinia grandis</i> (L.) Voigt	Kelakucha	Cucurbitaceae	Leaf	Diabetes	Cooked leaf is taken	10.8
<i>Cocos nucifera</i> L.	Narikel	Arecaceae	Fruit	Diarrhoea	Water is taken	9.23
			New root	Teeth ache	Juice is used	7.69
<i>Colocasia esculenta</i> (L.) Schott	Kachu	Areceae	Leaf, Stem	Brain tonic	Cooked leaf and stem are taken	7.69
			Petiole	Cut	Juice is applied	6.15
<i>Crateva nurvala</i> Buch.-Ham.	Boruna	Lecythidaceae	Bark	Cow disease	Juice is taken	3.08

Contd.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Crinum asiaticum</i> L.	Bonroshun	Liliaceae	Fruit	Joint pain	Fried fruit is taken	1.54
<i>Crotalaria juncea</i> L.	Junjune	Fabaceae	Bulb	Liver problem	Bulb is used	63.1
<i>Curcuma</i> <i>domestica</i> Valet.	Halud	Zingiberaceae	Rhizome	Blood purify	Paste is used	1.54
<i>Cuscuta reflexa</i> Roxb.	Shunnalata	Cuscutaceae	Stem	Anthelmintic	Powder with jira is taken	32.3
			Stem	Diabetes	Juice is taken	6.15
			Stem	Jaundice	Juice is taken	3.08
			Stem	Rheumatic pain	Tablet is taken	9.23
<i>Cycas pectinata</i> Buch.-Ham	Nagraj	Cycadaceae	Leaf	Snake bite	Juice is taken	12.3
<i>Cynodon dactylon</i> (L.) Pers.	Durba	Poaceae	WP	Cut	Juice is applied	3.08
<i>Dalbergia sissoo</i> Roxb.	Shishu	Fabaceae	Leaf	Dysentery	Juice is taken	64.6
				Reduced pressure	Juice is taken	15.4
<i>Datura metel</i> L.	Dutra	Solanaceae	Seed/Root	Constipation	Juice is taken	12.3
<i>Dillenia indica</i> L.	Chailta	Dilleniaceae	Fruit	Dysentery	Juice is taken	6.15
<i>Diplazium</i> <i>esculentum</i> (Retz.) Sw.	Dekishak	Athyriaceae	Leaf	Reduce Pressure	Cooked leaf is taken	1.54
<i>Drynaria</i> <i>quercifolia</i> (L.) J. Sm.	Jungra	Polypodiaceae	Rhizome	Cow disease	Juice is taken	1.54
<i>Eclipta prostrata</i> (L.) Mant.	Keshoraj	Asteraceae	WP	Fever	Paste is applied	23.1
			WP	Hair tonic	Juice is taken	12.3
			Leaf	Impotence	Juice is taken	9.23
			Leaf	Liver tonic	Juice is taken	1.54
<i>Elaeocarpus</i> <i>robustus</i> Roxb.	Jolpai	Elaeocarpaceae	Fruit	Appetizer	Fruit is taken	6.15
					Cooked fruit is taken	6.15
<i>Ficus racemosa</i> L.	Jogdumur	Moraceae	Fruit	Diabetes		6.15

Contd.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
			Fruit	Reduce Pressure	Cooked fruit is taken	12.3
<i>Glycosmis arborea</i> (Roxb.) A. DC.	Hotigira	Rutaceae	Bark	Dysentery	Juice is taken	3.08
<i>Holarrhena antidysenterica</i> (L.) Wall. ex Decne.	Kuruz	Apocynaceae	Bark	Dysentery	Juice is taken	10.8
			Bark	impotence	Juice is taken	3.08
<i>Hyptis suaveolens</i> (L.) Poit.	Tokma	Lamiaceae	Seed	Abscess	Paste is used	1.54
		Lamiaceae	Seed	Laxative	Seed is taken	12.3
		Lamiaceae	Seed	Urinary disorder	Seed id taken	6.15
<i>Ipomoea digitata</i> Linn.	Bhuikumra	Convolvulaceae	Root	Fractured bone	Paste is used	9.23
<i>Jatropha gossypifolia</i> L.	Beron	Euphorbiaceae	Seed	Rheumatic pain	Oil is used	24.6
<i>Laphortea crenulata</i> (Roxb.) Wedd.	Chutra	Euphorbiaceae	Leaf	Allergy	Cooked leaf is taken	1.54
<i>Laportea interrupta</i> (L.) Chew	BoroChutra	Articaceae	Leaf	Abscess	Paste is applied	1.54
<i>Lawsonia inermis</i> L.	Mendi	Lythraceae	Leaf	Mental peace	Paste is used	23.1
<i>Leucas aspera</i> (Willd.) Link	Dolonshak	Lamiaceae	Leaf	Abscess	Paste is applied	21.5
			Leaf	Cold	Fried leaf is taken	4.62
			Leaf	Tonsil	Paste is applied	1.54
<i>Litsea glutinosa</i> (Lour.) Robinson	Menda	Lauraceae	Leaf, Bark	Abscess	Paste is used	12.3
			Leaf, Bark	Diarrhoea	Juice is taken	4.62
			Leaf, Bark	Dysentery	Juice is taken	3.08
			Leaf, Bark	Impotence	Juice is taken	3.08
			Bark	Jaundice	Juice is taken	4.62
			Leaf, Bark	Rheumatic pain	Juice is taken	27.7
<i>Loranthus falcatus</i> L. f.	Amkuruz	Loranthaceae	Stem, Leaf	Cow Constipation	Juice is taken	36.9

Contd.

Scientific name	Local/Bangali name	Family	Parts used	Ailments name	Treatment mode	Cf%
			Bark	Impotence	Juice is taken	1.54
<i>Ludwigia repens</i> Forst.	Molsishak	Onagraceae	Leaf	Diarrhoea	Cooked leaf is taken	33.8
<i>Mangifera indica</i> L.	Aam	Anacardiaceae	seed	Diabetes	Powder is taken	9.23
			Shoot	Diarrhoea	Juice is taken	7.69
			Shoot	Dysentery	Paste is taken	6.15
<i>Mikania cordata</i> (Burm. f.) Robinson	Refugeelata	Asteraceae	Leaf	Body ache	Juice is taken	10.8
			Leaf	Cut	Juice is applied	9.23
			Leaf	Gastric pain	Juice is taken	30.8
<i>Mimosa pudica</i> L.	Lazzabati	Mimosaceae	Root	Dysentery	Juice is taken	3.08
			Root	Hernia	Root is used	1.54
			Root	Menstruation	Juice is taken	24.6
			Root	One testicle	Root is used	13.8
			Root	Rheumatic pain	Juice is taken	4.62
			Root	Teeth ache	Paste is used	4.62
			Root	Vomiting	Juice is taken	18.5
<i>Momordica charantia</i> L.	Titakorolla	Cucurbitaceae	Fruit	Diabetes	Fried fruit is taken	1.54
<i>Momordica cochinchinensis</i> (Lour.) Spreng.	Bonkorolla	Cucurbitaceae	Fruit	Constipation	Cooked fruit is taken	16.9
<i>Moringa oleifera</i> Lamk.	Shajna	Moringaceae	Leaf, Fruits	Body ache	Cooked leaf and fruit are taken	12.3
			Bark	Body ache	Juice is taken	6.15
			Leaf, Fruits	Cold	Cooked leaf and fruit are taken	1.54
<i>Mucuna pruriens</i> (L.) DC.	Bandarihola	Fabaceae	Root	Bronchitis	Root is used	1.54

Contd.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Musa paradisiaca</i> L.	Kolagach	Musaceae	Peduncle	Cholera	Juice is taken	1.54
			Peduncle	Constipation	Cooked peduncle is taken	4.62
			Fruit	Diarrhoea	Fruit is taken	6.15
			Fruit	Dysentery	Fruit is taken	3.08
			Root	Teeth ache	Root is used	1.54
<i>Nerium indicum</i> Mill.	Korobi	Apocynaceae	Fruit	Abscess	Paste is used	9.23
<i>Ocimum americanum</i> L.	Bontulshi	Lamiaceae	Leaf	Jaundice	Juice is applied	20
<i>Ocimum sanctum</i> L.	Tulshi	Lamiaceae	Leaf	Cold fever	Juice is taken	26.2
			Leaf	Cough	Juice is taken	3.08
			Leaf	Pneumonia	Juice is taken	1.54
<i>Oroxylum indicum</i> (L.) Kurz	Thona	Bignoniaceae	Bark	Constipation	Juice is taken	30.8
			Bark	Cow disease	Juice is taken	4.62
			Bark	Dysentery	Juice is taken	15.4
			Bark	Jaundice	Juice is taken	9.23
			Leaf	Rheumatic pain	Heated leaf is used as poultice	3.08
<i>Passiflora foetida</i> L.	Passiflora	Passifloraceae	Leaf	Diabetes	Juice is taken	9.23
<i>Phaederia foetida</i> L.	Vadulipata	Rubiaceae	Leaf	Diarrhoea	Juice is taken	3.08
<i>Phyllanthus emblica</i> L.	Amloki	Euphorbiaceae	Fruit	Appetizer	Juice is taken	1.54
<i>Phyllanthus reticulatus</i> Poir.	Sitki	Euphorbiaceae	Fruit	Toe infection	Juice is applied	49.2
<i>Piper betle</i> L.	Pan	Piperaceae	Leaf	Foot rot	Juice is taken	24.6
			Leaf	Rheumatic pain	Heated leaf is used as poultice	15.4
<i>Polygonum hydropiper</i> L.	Bishdoron	Polygonaceae	Leaf	Allergy	Decoction is used	1.54

Contd.

Scientific name	Local/Bangali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Psidium guajava</i> L.	Peara	Myrtaceae	leaf	Rheumatic pain	Decoction is used	10.8
<i>Punica granatum</i> L.	Dalim	Punicaceae	Fruit	Diarrhoea	Juice is taken	23.1
<i>Ricinus communis</i> L.	Keron	Euphorbiaceae	Bark	Impotence	Juice is taken	1.54
<i>Saccharum officinarum</i> L.	Akh	Poaceae	Stem	Jaundice	Juice is taken	4.62
<i>Scoparia dulcis</i> L.	Bondhania	Scrophulariaceae	Leaf	Diarrhoea	Juice is taken	20
			Leaf	Dysentery	Juice is taken	55.4
			Leaf	Impotence	Juice is taken	1.54
<i>Sida acuta</i> Burm. f.	Bailladigach	Malvaceae	Leaf	Abscess	Paste is used	1.54
<i>Smilax zeylanica</i> L.	Koiralata	Smilacaceae	Shoot	Importance	Juice is taken	1.54
<i>Spilanthes acmella</i> Murr.	Topful	Asteraceae	Flower	Teeth ache	Paste is applied	1.54
<i>Spondias pinnata</i> (L. f.) Kurz	Amra	Anarcardiaceae	Bark	Liver complain	Juice is taken	6.15
			Fruit	Reduce Pressure	Juice is taken	3.08
<i>Stephania japonica</i> (Thunb.) Miers	Muchchanilata	Minispermaceae	Leaf	Dysentery	Juice is taken	16.9
			Leaf	Ear complain	Juice is applied	12.3
			Leaf	Lactation increase	Cooked leaf is taken	20
<i>Sterculia villosa</i> Roxb. ex Smith	Udal	Sterculiaceae	Petiole	Impotence	Juice is taken	4.62
<i>Streblus asper</i> Lour.	Horpa	Moraceae	Root	Pox	Juice is applied	7.69
<i>Swietenia mahagoni</i> Jacq.	Mehogoni	Meliaceae	Seed	Diabetes	Powder is taken	3.08
<i>Syzygium cumini</i> (L.) Skeels	Jam	Myrtaceae	Fruit,	Diabetes	Juice is taken	1.54
			Seed	Diabetes	Juice is taken	1.54
<i>Tamarindus indica</i> L.	Tentul	Caesalpiniaceae	Fruit	Dysentery	Powder is taken	1.54
			Fruit	Constipation	Juice is taken	1.54
			Fruit	Dysentery	Juice is taken	3.08
			Seed	Impotence	Powder is taken	12.3
			Fruit	Reduced pressure	Juice is taken	7.69

Contd.

<i>Scientific name</i>	Local/Bangali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Tectona grandis</i> L. f.	Shegun	Verbenaceae	Leaf	Teeth ache	Juice is applied	15.4
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Arjun	Combretaceae	Bark	Chest pain	Juice is taken	9.23
			Bark	Cold fever	Juice is taken	6.15
			Bark	Diabetes	Juice is taken	3.08
			Bark	impotence	Juice is taken	15.4
			Bark	Jaundice	Juice is taken	3.08
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Bohera	Combretaceae	Fruit	Appetizer	Fruit juice is taken	1.54
			Fruit	Stomach clear	Fruit juice is taken	1.54
<i>Terminalia chebula</i> Retz.	Horitaki	Combretaceae	Fruit	Appetizer	Fruit is taken	1.54
					Juice is taken	1.54
<i>Thea sinensis</i> L.	Cha	Theaceae	Leaf	Diarrhoea		
<i>Tinospora crispa</i> (L.) Hook. f. & Thoms.	Padnaguruz	Menispermaceae	Leaf	Diabetes	Juice is taken	18.5
			Stem/Leaf	Stomach disorder of cow	Juice is taken	6.15
<i>Urena lobata</i> L.	Bandari	Malvaceae	Leaf	Cut	Paste is used	61.5
<i>Vitex negundo</i> L.	Nishinda	Verbenaceae	Leaf	Abscess	Paste is used	1.54
			Leaf	Insect repellent	Kept at home	1.54
			Leaf	Isma	Juice is taken	9.23
			Stem, Leaf	Rheumatic pain	Paste is used	1.54
			Stem, Leaf	Teeth brush	Stem is used	1.54
<i>Vitis quadrangularis</i> Wall. ex Wight & Arn.	Harbangalata	Vitaceae	Stem	Fractured bone	Paste is applied	15.4
			Stem	Rheumatic pain	Cooked stem is taken	12.3
<i>Xanthosoma violaceum</i> Schott	Kalakachu	Areceae	Latex	Cut	Juice is applied	9.23

Contd.

<i>Scientific name</i>	Local/Bang ali name	Family	Parts used	Ailments name	Treatment mode	Cf%
<i>Zingiber officinale</i> Rosc.	Ada	Zingiberaceae	Rhizome	Stomach clear	Juice is taken	3.08
<i>Ziziphus mauritiana</i> Lamk.	Boroi	Rhamnaceae	Leaf	Rheumatic pain	Decoction is used	3.08

species is *Litsea glutinosa*, *Dalbergia sissu*, *Mangifera indica*, *Scoparia dulcis*, *Holarrhena antidysenterica*, *Stephania harnandifolia* and *Centella asiatica*. Fic is relatively low for anthelmintic indicating that there is low consensus on the treatment of anthelmintic problem in the study area. The plants with high agreement of use among the local people could be recommended for the phytochemical analysis to isolate desired compounds.

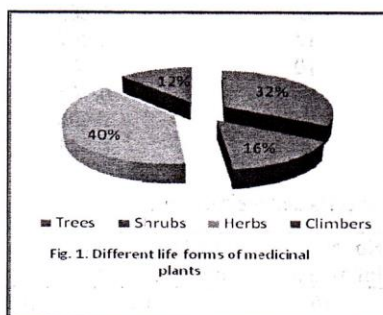


Fig. 1. Different life forms of medicinal plants

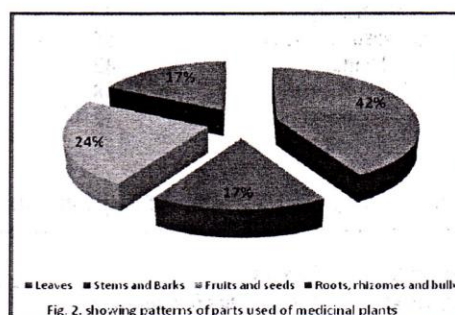


Fig. 2. showing patterns of parts used of medicinal plants

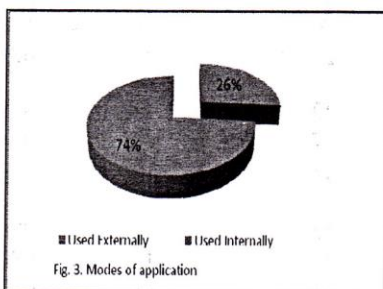


Fig. 3. Modes of application

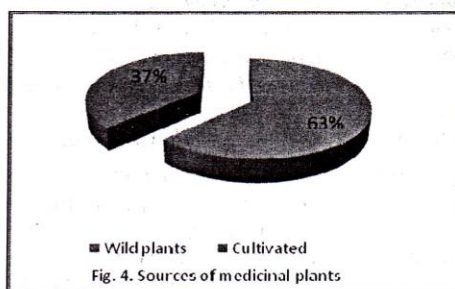


Fig. 4. Sources of medicinal plants

The fidelity level is useful for identifying the local people's most preferred species in the use for treating certain ailments (Friedman *et al.* 1986). The analyzed results indicated that FI values varied from 42.3 up to 100% (Table 3). Medicinal plants recorded in the study area, 39 species have been identified those have FI values more than 50%. Among them, 16 species attained the FI values 100%. These species are *Crinum asiaticum*, *Allocasia cuculata*, *Anthocephalus chinensis*, *Blumea lacera*, *Calotropis procera*, *Cajanus cajan*, *Sterculia villosa*, *Aloe vera*; *Andrographis paniculata*, *Dalbergia sissou*, *Coccinia grandis*, *Chromolaena odorata*, *Cynodon dactylon*, *Alstonia scholaris*, *Phyllanthus emblica* and *Terminalia chebula*. Such high FI values mean that the informants have a tendency to rely on one specific plant species for treating one certain ailment than several ailments.

Table 2. Consensus of agreement on the uses of medicinal plants among informants

Ailments	No. of Use Report	No. of Taxa	Fic
Cut and wounds	104	8	0.932
Dysentery and diarrhoea	207	22	0.898
Fever and cold	147	17	0.89
Impotence	115	14	0.886
Stomach ache	104	14	0.874
Jaundice	70	11	0.855
Rheumatism	134	21	0.85
Dermatological	137	22	0.846
Constipation	78	13	0.844
Diabetes	62	12	0.82
Brain complain	23	5	0.818
Veterinary	27	6	0.808
Cardiovascular disease	58	12	0.807
Dental	42	10	0.78
Urinary disorder	18	5	0.765
Others	12	5	0.636
Anthelmintic	13	6	0.583

Table 3. Fidelity level (FI) values of frequently cited plant species and their major uses.

Ailments	Species	No. of Informants	Total no. informants	Fidelity level %
Appetizer	<i>Terminalia chebula</i> Retz.	16	16	100
Appetizer	<i>Phyllanthus emblica</i> L.	17	17	100
Cough	<i>Alstonia scholaris</i> (L.) R. Br.	8	8	100
Cut	<i>Cynodon dactylon</i> (L.) Pers. <i>Chromolaena odorata</i> (L.) King & Robinson	24	24	100
Cut	Robinson	13	13	100
Diabetes	<i>Coccinia grandis</i> (L.) Voigt	12	12	100
Dysentery	<i>Dalbergia sissoo</i> Roxb. <i>Andrographis paniculata</i> (Burm. F.)	18	18	100
Fever	Wall. Ex Nees	13	13	100
Impotence	<i>Aloe vera</i> (L.) Burm. F.	10	10	100
Impotence	<i>Sterculia villosa</i> Roxb. Ex Smith	21	21	100
Jaundice	<i>Cajanus cajan</i> (L.) Millsp.	16	16	100
Liver problem	<i>Crinum asiaticum</i> L. <i>Andrographis paniculata</i> (Burm. F.)	20	20	100
Malaria	Wall. Ex Nees	4	4	100
Pain	<i>Calotropis procera</i> (Ait.) R. Br.	32	32	100
Rheumatic pain	<i>Blumea lacera</i> (Burm. F.) DC.	13	13	100
Rheumatic pain	<i>Anthocephalus chinensis</i> (Lamk.) A. Rich ex Walp.	8	8	100
Rheumatic pain	<i>Alocasia cucullata</i> (Lour.) G. Don <i>Mikania cordata</i> (Burm. F.)	10	10	100
Cut	Robinson	41	43	95.3

Contd.

Ailments	Species	No. of Informants	Total no. informants	Fidelity level %
Cough	<i>Adhatoda zeylanica</i> Medikus	40	42	95.2
Diabetes	<i>Ficus racemosa</i> L.	16	17	94.1
Impotence	<i>Bombax ceiba</i> L.	15	16	93.6
	<i>Bryophyllum pinnatum</i> (Lamk.)			
Kidneystone	Oken	10	11	90.9
Dysentery	<i>Stephania japonica</i> (Thunb.) Miers	19	21	90.4
Skin diseases	<i>Azadirachta indica</i> A. Juss.	36	40	90
Constipation	<i>Cassia fistula</i> L.	20	23	87
Dysentery	<i>Centella asiatica</i> (L.) Urban	17	20	85
Appetizer	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	17	21	80
Dysentery	<i>Mangifera indica</i> L.	21	27	77.8
Laxative	<i>Aegle marmelos</i> (L.) Corr.	12	16	75
Cough	<i>Ocimum sanctum</i> L.	19	27	70.4
	<i>Terminalia arjuna</i> (Roxb. Ex DC.)			
Chest pain	Wight & Arn.	27	40	67.5
Cut	<i>Colocasia esculenta</i> (L.) Schott	16	25	64
Dysentery	<i>Litsea glutinosa</i> (Lour.) Robinson	42	66	63.6
Diarrhoea	<i>Scoparia dulcis</i> L.	13	21	61.9
Jaundice	<i>Cuscuta reflexa</i> Roxb.	22	37	59.5
Constipation	<i>Musa paradisiaca</i> L.	13	23	56.5
Ringworm	<i>Cassia alata</i> L.	10	18	55.6
Reduced pressure	<i>Tamarindus indica</i> L.	7	13	53.8
Cold	<i>Leucas aspera</i> (Willd.) Link	15	29	51.7
Fever	<i>Eclipta prostrata</i> (L.) Mant.	14	33	42.4
Stomach ache	<i>Clerodendrum viscosum</i> Vent.	11	26	42.3
Rheumatic pain	<i>Acampe papillosa</i> (Lindl.) Lindl.	10	24	41.7
	<i>Holarrhena antidysenterica</i> (L.)			
Dysentery	Wall. Ex Decne.	4	12	33.3
Menstruation	<i>Mimosa pudica</i> L.	7	30	23.3

Citation frequency values varied from species to species as indicated in the Table 4. Four species attained the Cf values of more than 50% including *Litsea glutinosa*, *Mikania cordata*, *Adhatoda zeylanica* and *Azadirachta indica*. High Cf data of medicinal plants is the indication of popular and common species in the study area which can be used for further analysis to find new drugs.

From observations in the field and discussions with local people, a good number of threats to medicinal plants have been identified. The most serious threats are exotic timber species plantation in and around homestead, fallow lands, roadsides and even in the edges cultivated lands. *Acacia auriculiformis*, *Acacia mangium*, *Eucalyptus camadulensis*, *Dalbergia sissu*, *Laeucaena leucocephala*, *Switenia mahagoni* and *Cassia siamea* are most preferred plant species for plantation. According to local people perception such species are very selfish plants and they do not support native species

under their canopy. Lack of awareness among the local people about impact of exotics on native plants and environment is another threat to medicinal plants. Availability of the modern medicines which promotes the negligence of use of herbal medicines among the local people in the study area is also threats to medicinal plants. Senior people with herbal knowledge do not like to share their knowledge with juniors. Due to sudden death of such people, herbal knowledge of the area is lost forever. According to local people such event is great threat to medicinal plants and traditional knowledge.

Table 4. Citation frequency of some selected medicinal plants.

Medicinal plants	Ailments	Use report	Cf (%)
<i>Litsea glutinosa</i> (Lour.) Robinson	Dysentery	42	64.62
<i>Mikania cordata</i> (Burm. F.) Robinson	Cut and wound	41	63.08
<i>Adhatoda zeylanica</i> Medikus	Cough	40	61.54
<i>Azadirachta indica</i> A. Juss.	Skin diseases	36	55.39
<i>Calotropis procera</i> (Ait.) R. Br.	Pain	32	49.23
<i>Terminalia arjuna</i> (Roxb. Ex DC.) Wight & Arn.	Chest pain	27	41.54
<i>Cynodon dactylon</i> (L.) Pers.	Cut and wound	24	36.92
<i>Cuscuta reflexa</i> Roxb.	Jaundice	22	33.85
<i>Sterculia villosa</i> Roxb. Ex Smith	Impotence	21	32.31
<i>Mangifera indica</i> L.	Dysentery	21	32.31
<i>Crinum asiaticum</i> L.	Liver problem	20	30.77
<i>Cassia fistula</i> L.	Constipation	20	30.77
<i>Stephania japonica</i> (Thunb.) Miers	Dysentery	19	29.23
<i>Ocimum sanctum</i> L.	Cough	19	29.23
<i>Dalbergia sissoo</i> Roxb.	Dysentery	18	27.69
<i>Phyllanthus emblica</i> L.	Appetizer	17	26.15
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Appetizer	17	26.15
<i>Centella asiatica</i> (L.) Urban	Dysentery	17	26.15
<i>Cajanus cajan</i> (L.) Millsp.	Jaundice	16	24.62
<i>Terminalia chebula</i> Retz.	Appetizer	16	24.62
<i>Ficus racemosa</i> L.	Diabetes	16	24.62
<i>Colocasia esculenta</i> (L.) Schott	Cut and wound	16	24.62
<i>Eclipta prostrata</i> (L.) Mant.	Hair tonic	15	23.08
<i>Bombax ceiba</i> L.	Impotence	15	23.08
<i>Leucas aspera</i> (Willd.) Link	Cold	15	23.08
<i>Eclipta prostrata</i> (L.) Mant.	Fever	14	21.54
<i>Andrographis paniculata</i> (Burm. F.) Wall. Ex Nees	Fever	13	20
<i>Blumea lacera</i> (Burm. F.) DC.	Rheumatic pain	13	20
<i>Chromolaena odorata</i> (L.) King & Robinson	Cut and wound	13	20
<i>Musa paradisiaca</i> L.	Constipation	13	20
<i>Scoparia dulcis</i> L.	Diarrhoea	13	20

A list of conservation measures has been made based on present survey results and observations. Distribution map of all culturally important medicinal plant species in the study area could be made. Population status of such species across the habitats could be

determined. Current rate exploitation by local people could be calculated. If it seems that medicinal plants are vulnerable in the natural habitats, necessary measures could be taken for *ex situ* conservation. Awareness programs among the local influential persons who can make change could be created.

The present survey probably is the first effort to document enthomedicinal plants of Feni district. The data indicated that the study area has plenty of medicinal plants (115 species) and diversity health care uses (69 ailments with 216 formularies) of such plants. Using modern mathematical tools Fic values on the uses of medicinal plants have been determined. Ailment category cut and wounds attained highest Fic value. Species used for this purpose are *Mikania cordata*, and *Cynodon dactylon* which cited by many informants. Second highest Fic value has attained by dysentery and diarrhoea. Medicinal plants used for this purpose are *Litsea glutinosa*, *Dalbergia sissu*, *Mangifera indica*, *Scoparia dulcis*, *Holarrhena antidysenterica*, *Stephania harnandifolia* and *Centella asiatica* which were cited by a good number of informants. Since the Fic values attained highest, such plants could be recommended for further phytochemical study to isolate compounds responsible for the remedy of ailment category cut and wounds and diarrhoea and dysentery. Culturally important medicinal plants have been determined based on FI values. In our survey, 16 species have attained 100% FI values. These are *Crinum asiaticum*, *Allocaasia cuculata*, *Anthocephalus chinensis*, *Blumea lacera*, *Calotropis procera*, *Cajanus cajan*, *Sterculia villosa*, *Aloe vera*, *Andrographis paniculata*, *Dalbergia sissoo*, *Coccinia grandis*, *Chromolaena odorata*, *Cynodon dactylon*, *Alstonia scholaris*, *Phyllanthus emblica* and *Terminalia chebula*. Such species needs to be protected in the study area to sustain traditional medicinal plants and culture.

Acknowledgements

The authors acknowledge the Biotechnology Research Centre, University of Dhaka for financial support for the research. The authors also remember the contribution of informants in the data collection process during field works in Feni district.

References

- Ahmed, Z.U., Begum, Z.N.T., Hassan, M.A., Khondker, M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2008a. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 6. Angiosperms: Dicotyledons (Acanthaceae – Asteraceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-408.
- Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2008b. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 12. Angiosperms: Monocotyledons (Orchidaceae – Zingiberaceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-552.
- Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2009b. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 7. Angiosperms: Dicotyledons (Balsaminaceae – Euphorbiaceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-546.

- Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2009c. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 8. Angiosperms: Dicotyledons (Fabaceae – Lythraceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-478.
- Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M. and Ahmed, A.T.A. (Eds). 2009d. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 9. Angiosperms: Dicotyledons (Magnoliaceae – Punicaceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-488.
- Ahmed, Z.U., Hassan, M.A., Begum, Z.N.T., Khondker, M., Kabir, S.M.H., Ahmad, M., and Ahmed, A.T.A. (Eds). 2009e. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 10. Angiosperms: Dicotyledons (Ranunculaceae – Zygophyllaceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-580.
- Alam, M.K. 1992. Medical ethno-botany of the Marma tribe of Bangladesh. *Economic Botany* **46**(3): 330-330.
- Alam, M.K., Choudhury, J. and Hassan, M.A. 1996. Some folk formularies from Bangladesh. *Bangladesh J. Life Sci.* **8**(1): 49-63.
- Alexiades, M.N. (ed.). 1996. *Selected Guidelines for Ethno botanical Research: A Field Manual*. The New York Botanical Garden, New York. 305pp.
- Breevot P. 1998. The booming of US botanical market: A new overview of herbal gram **44**: pp 33-46.
- Chambers R. 1994. Participatory Rural Appraisal (PRA): Analysis of experience. *World Development* **22**(9): 1253-1268.
- Firedman, J., Yaniv, Z. Dafni, A. Palewitch, D. 1986. A preliminary classification of healing potential plants, based on a rational analysis of an ethno pharmacological field survey among Bedouins in the Negev Desert, Israel. *Journal of ethno pharmacology* **16**: 275-287.
- Haque T., Uddin M Z, Saha M. L, Mazid M.A and Hassan M.A. 2014. Propagation, antibacterial activity and phytochemical properties of *Litsea glutinosa* (Lour.) C. B. Robinson Dhaka Univ. J. Biol. Sci. **23**(2): 165-171.
- Hassan, M.A. and Khan, M.S. 1986. Ethnobotanical record of Bangladesh-1: Plants used for healing fractured bones. *J. Asiatic Soc. Bangladesh. (Sci.)* **12**(1&2): 33-39.
- Hassan, M.A. and Khan, M.S. 1996. Ethnobotanical record of Bangladesh-2. Plants used for healing cuts and wounds. *Bangladesh J. Plant Taxon.* **3**(2): 49-52.
- Heinrich, M., Ankli, A., Frei, B., Weimann, C. 1998. Medicinal plants in Mexico: healers consensus and cultural importance. *Social Science and Medicine* **47**, 1859–1871.
- Hooker J.D. 1872-1897. *Flora of British India Vol 1-7. First Indian Reprint 1973* Bishen Singh Mahendra Pal Singh, Dehra Dun. India.
- Hyland, B.P.M. 1972. A technique for collecting botanical specimens in rain forest. *Flora Malesiana Bulletin* **26**: 2038-2040.
- Khan I, Abdelsalam N.M., Fouad, H, Tariq, A, Ullah R. and Adnan, M. 2014. Eviden-Based complementary and alternative medicine: Article ID 635371, p21 Hindwai.
- Khan, M.S., Hassan, M.A. and Uddin, M.Z. 2002. Ethnobotanical survey in Rema-Kalenga Wildlife Sanctuary (Habiganj) in Bangladesh. *Bangladesh J. Plant Taxon.* **9**(1): 51-60.
- Martin, G.J. 1995. *Ethnobotany: A Methods Manual*. Chapman & Hall, London. 267pp.
- Mia, M.M.K. and Huq, A.M. 1988. A preliminary ethno-botanical survey in the Jointiapur, Tamabil and Jafflong area, Sylhet, Bangladesh National Herbarium Bull. **3**: 1-10.
- Prain, D. 1903. *Bengal Plants. 1-2*: 1-1013pp. First Indian Reprint 1963, Bishen Singh Mahendra Pal Singh Dehra Dun.
- Setzer, M.S., Werka J.S, Irvine A.K., Jackes B.R. and Setzer, W.N. 2006. Biological activity of rain forest plant extracts from far north Queensland, Australia. In: Williams L.A.D. (ed.).

- Biologically active natural products for 21st century. Trivandrum, India: Research Signpost: p 21-46.
- Siddiqui, K.U., Islam, M.A., Ahmed, Z.U., Begum, Z.N.T., Hassan, M.A., Khondker, M., Rahman, M.M., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A. and Haque, E.U. (Eds). 2007c. *Encyclopedia of Flora and Fauna of Bangladesh*, Vol. 11. Angiosperms: Monocotyledons (Agavaceae -Najadaceae). Asiatic Society of Bangladesh, Dhaka, pp. 1-399.
- Trotter, R.T. and Logan, M.H. 1986. Informant census: A new approach for identifying potentially effective medicinal plants. Page 91-112 in L.N. Etkin, ed., *Plants in indigenous medicine and diet*. Redgrave, Bedford Hill, New York.
- Uddin M.Z. and M.A. Hassan 2014. Determination of informant consensus factor of ethnomedicinal plants used in kalenga forest, Bangladesh. *Bangladesh j. plant taxon.* **21**(1): 83-91.
- Uddin, M. Z. and Hassan, M. A. 2004. *Flora of Rema-Kalenga Wildlife Sanctuary*. IUCN Bangladesh Country Office, Dhaka, Bangladesh, vi+120pp.
- Uddin, M. Z., Hassan, M. A., Rahman, M. M., and Arefin, M. K., 2012. Ethno-medico-botanical study in Lawachara National Park, Bangladesh. *Bangladesh J. Bot.* **41**(1): 97-104.
- Uddin, M.Z. and Roy, S. 2007. Collection and Management of Selected Medicinal Plants in Rema-Kalenga Wildlife Sanctuary. In: *Making Conservation Work: Linking rural livelihoods and protected area management in Bangladesh* edited by Fox, J. Bushley, B. R., Dutta S. and Quazi, S. A. 2007. Monograph of East-West Center, Hawaii, USA: 66-83pp
- Uddin, M.Z. Roy, S., Hassan, M.A. and Rahman, M.M. 2008. Medicobotanical report on the Chakma people of Bangladesh. *Bangladesh J. Plant Taxon.* **15** (1): 67-72
- Uddin, M.Z., Hassan, M.A. and Sultana, M. 2006. Ethnobotanical survey of medicinal plants in Phulbari Upazila of Dinajpur District, Bangladesh. *Bangladesh J. Plant Taxon.* **12**(1): 63-68.
- Uddin, M.Z., Khan, M.S. and Hassan, M.A. 2001. Ethno medical plants records of Kalenga forest range (Habiganj), Bangladesh for malaria, jaundice, diarrhea and dysentery. *Bangladesh J. Plant Taxon.* **8**(1): 101-104.
- Uddin, S.N., 2006. Traditional uses of ethnomedicinal plants of the Chittagong Hill Tracts. *Bangladesh National Herbarium, Dhaka.* 879p.
- Uddin, S.N., Uddin, M.Z., Hassan, M.A. and Rahman, M.M. 2004. Preliminary ethno-medical plant survey in Khagrachari district, Bangladesh. *Bangladesh J. Plant Taxon.* **11**(2): 39-48.
- Wright C.W. 2005. Plant derived antibacterial agents: new leads and challenges, *Phytochemistry Reviews* **4** (1): pp 55-61.
- Yusuf, M., Rahman, M.A., Choudhury, J.U. and Begum, J. 2002. Indigenous knowledge about the use of Zingibers in Bangladesh. *J. Econ. Taxon. Bot.* **26**(3): 566-570.
- Yusuf, M., Wahab, M. A., Choudhury, J.U. and Begum, J. 2006. Ethno-medico-botanical knowledge from Kaulkhali proper and Betunia of Rangamati district. *Bangladesh J. Plant Taxon.* **13**(1): 55-61.

(Revised copy received on 29.11.2015)