Indian Journal of Traditional Knowledge
Vol. 8 (2), April 2009, pp. 169-175

Diversity and conservation of medicinal plants in Barak valley, Northeast India

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Received 8 January 2007; revised 20 August 2008

Through an ethnobotanical survey of Barak-valley, about 150 naturally growing and frequently used medicinal plants were collected. Out of these collections, 24 plant species have been highly prioritised for conservation. Among these, population of *Acorus calamus* Linn., *Aegle marmelos* Linn., *Artocarpus lakoocha* Roxb., *Costus speciosus* (Koem.ex.Retz) Sm., *Rauvolfia serpentina* (L.) Benth.ex Kurz., *Tinospora cordifolia* (Willd.) Miers., etc are reducing day-by-day due to over-exploitation for medicinal purposes, felling for timber, etc. and also due to inherent poor natural regeneration. During the exploration, emphasis was given on herbal treatment for everyday common ailments and diseases, particularly used by the local tribes of Barak-valley such as *Riang, Kachari, Hmar, Rongmai Naga, and Manipuri* and *Teagarden* community. The study gives an account on the diversity of medicinal plants and priority medicinal plants for conservation. The study also warrants an herbal policy to address public awareness, cultivation and conservation on a sustainable basis with in the environmental protection regime.

Keywords*:* Medicinal plants, *Riang, Kachari, Hmar, Rongmai Naga, Manipuri*, Barak valley, Assam, Conservation

IPC Int. Cl.[8]: A01K, A01N3/00, A61K36/00, A61P1/04, A61P1/08, A61P1/10, A61P1/16, A61P9/14, A61P13/00, A61P27/02, A61P29/00

Northeastern India has been known for its rich biological diversity, although the natural ecosystems experience threat from recurrent natural calamities. Barak valley of Assam is noted for its rich medicinal plant diversity, apart from wetlands and floodplains serving the habitat requirement of several tribes and other communities. Barak valley possesses the common features of underdevelopment of the Northeast India. Since time immemorial, Barak valley has been the meeting ground of people belonging to different ethnic groups (*Manipuri, Barman, Mizo, Riang, Hmar, Vaiphei*) communities and cultural entities and most of them are *Bengali* speaking Hindu and Muslim community. The hilly terrain in the valley is used for tea plantation and the principal crops produced in the plain areas are rice, jute, sugarcane, potato, rapeseed, mustard seed, etc. About 90% of the gross cropped area is used for cultivation of rice and tea plantation. The economy of the Barak valley is predominated by agriculture and allied sectors. More than 58% of the total working population in the valley is either cultivators or agricultural labourers. Home gardens and traditional agroforestry practices (haphazard mixture of trees, shrubs and herbs) are very common and are characterized by their complex structure and multiple functions. Traditional home gardens are the closest mimics of natural forests and support diverse wildlife species besides meeting various social and basic daily life needs. Almost all families of rural areas have such practices. Most of the medicinal plants come from these traditionally managed home gardens, as these are the sites of conservation of a large diversity of plants both wild and domesticated. In the study, ethnobotanical aspects of Barak-valley with a special emphasis on the herbal treatment of day-to-day ailments and diseases by different communities in the valley have been documented.

Methodology

The study was conducted in Cachar, Karimganj and Hailakandi districts of south Assam constituting Barak-valley (Fig. 1) with a total geographical area 6,992 km^2, representing about 9% of the total land area of Assam with a population of over 30 lakhs. The topography of the valley is heterogeneous having

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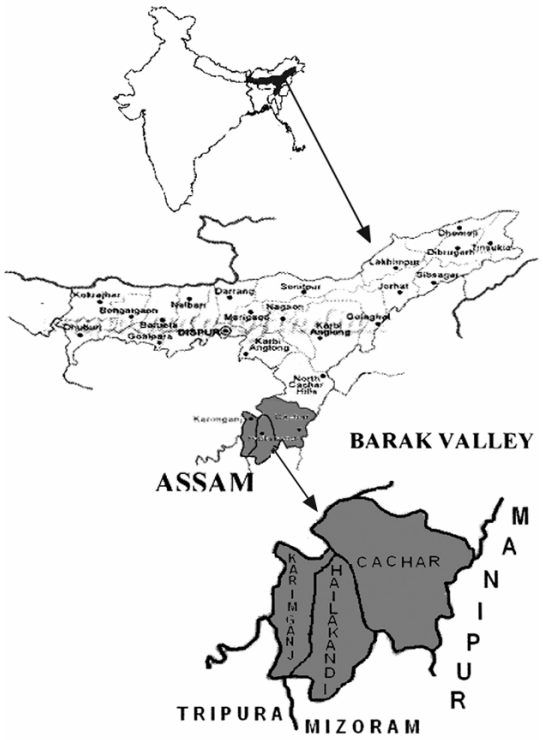

Fig. 1 — Location map of the study area

hills, low lands and plain areas. The valley covered by hill ranges from North, East and South has vast tracts of forest land in its southern side. The area has an average altitude of 27-40 m asl; falls between 24º 8´N and 25º8´N latitude and 92º15´E and 93º15´E longitude and the climate is a tropical humid type. The annual average rainfall of the valley is 670.9 mm and the mean monthly temperature ranged between 8.5º-36.2ºC. Information on the plant parts used, purpose of use, methods of processing and dosage were collected through a question survey with old people in the society. Of about 150 people surveyed, 75 were female and 75 were male. Women were comparatively more familiar with the medicinal plants and their uses than the men folks. Efforts were made to locate the plants in the wild and collect plant specimens for herbarium records. Identification of plant species collected during field studies were done through consultations with floral herbarium of Botanical Survey of India, Shillong, and consulting a number of flora and monographs.

Results and discussion

Northeastern India harbours about 50% of the total flora of India[3] (ca. 10,000 species). Besides, a good number of primitive angiosperms not reported from any other part of the country hail from this region. A few of them are *Artocarpus lakoocha*, *Cinnamomum bejolghota*, *Magnolia griffithii, Michelia champaca, Parkia roxburghii*, *Sapindus mukorossi, Sterculia villosa,* etc. Enormous timber plants, medicinal plants and other economically important plants exist in this region as it is an admixture of asiatic and peninsular Indian elements. Nonetheless, this great diversity and richness of flora is mainly due to its physical geography coupled with varied nature of rainfall, temperature and altitudes. Increasing biotic influences including socioeconomic development, unrestricted commercial exploitation of forest wealth have threatened the survival of the genetic resources amounting to a great loss of natural heritage[3]. This lead to a process called change, which is the rule of nature and the vegetation of any place is under constant modification, one type leading to the other. During this gradual process of evolution of flora, it is quite likely that certain species either get eliminated from the area or their ecological niche shrunk, whereby they have to struggle for their existence. Such species may be termed as threatened plants.

It is observed that many interesting species are poorly represented in their original localities either due to the disturbances of their habitats or excessive collection. If the current practices of human activities continue, even the unrecorded species of immense value will disappear. It is alarming, because a disappearing species can take with it 10-30 dependent species, such as insects, higher animals and other plants[4]. In the study, 150 medicinal plants encountered from the different parts of the valley used by the local people and tribes in their daily ailments from various diseases (Table 1), 52 were trees, 48 shrubs, 37 herbs and 13 were climbers. Different parts of medicinal plant species were used for curing different diseases and mostly leaves were used followed by bark, fruit etc. From this collection, 24 medicinal plants belonging to 16 families (10 trees, 4 shrubs, 8 herbs and 2 climbers) are categorized as highly prioritised medicinal plants (Table 2), as they are of immense value in curing various diseases, but are in the low niche[5]. Eventually, these species are now on the freeway towards extinction due to overexploitation, road construction, encroachment of habitats by the immigrants from the neighbouring countries. A few species reportedly endangered such as *Acorus calamus*, *Artocarpus lackoocha* and *Rauvolfia serpentine* that were also encountered

Table 1 — Diversity of medicinal plants of Barak valley

Plant name	Family	Local name	Habit
Adhatoda vasica Nees.	Acanthaceae	*Sadabasak/Kawldai*	S
Adhatoda beddomei Clarke.	Acanthaceae	*Kalabasak*	S
Andrographis paniculata Nees Ebern	Acanthaceae	*Kalmeg*	H
Acalypha indica Linn.	Amaranthaceae	*Muktajuri*	H
Achyranthes aspera Linn.	Amaranthaceae	*Kathapatta*	H
Amaranthus spinosa Linn.	Amaranthaceae	*Caulai*	H
Polyanthes tuburosa Linn.	Amaryllidiaceae	*Rajanigondha*	S
Mangifera indica Linn	Anacardiaceae	*Aam*	T
Mangifera sylvatica Roxb.	Anacardiaceae	*Bon-aam*	T
Spondia pinnata (Linn) Kurz.	Anacardiaceae	*Thaisuiphang*	T
Artobotrys hexapetalus R.Br.	Annonaceae	*Katchampa*	T
Annanas squamosa Linn.	Annonaceae	*Athafol*	T
Centella asiatica (Linn) Urban.	Apiaceae	*Thunkuni*	H
Alastonia scholaris (Linn) Brown.	Apocynaceae	*Chatim*	T
Catharanthus roseus Linn.	Apocynaceae	*Nayantara*	H
Ervatemia diverticata (Linn.) Alston.	Apocynaceae	*Togar*	S
Nerium indicum Mill.	Apocynaceae	*Korobi*	S
Rauvolfia serpentina Benth.	Apocynaceae	*Sarpagondha*	S
Tabernemontana divercatum (Linn)	R. Br. Apocynaceae	*Chakraphul*	S
Alocasia indica (Roxb.) Schoot.	Aracaceae	*Mankochu*	H
Borassus flabellifer Linn.	Aracaceae	*Tal*	T
Colocasia esculenta (Linn) Schot.	Araceae	*Panikochu*	H
Acorus calamus Linn.	Araceae	*Daruga*	H
Calotropis gigentea (Linn) R. Br.ex	Ait Asclepiadaceae	*Akand*	S
Ageratum conyzoides Linn.	Asteraceae	*Ucchanti*	S
Eclipta prostrata Linn.	Asteraceae	*Karaiya*	C
Elephntopus scaber Linn.	Asteraceae	*Gugialata*	C
Enhydra fluctuans Lour.	Asteraceae	*Helencha*	C
Eupatorium ayapana Linn.	Asteraceae	*Motmoti*	S
Eupatorium odoratum Linn.	Asteraceae	*Bon-mothmothi*	S
Helianthus annus Linn.	Asteraceae	*Kaibroi*	S
Mikania micrantha Kunth.	Asteraceae	*Refugeelota*	C
Wedelia calendulacea Less.	Asteraceae	*Bhingaraj*	H
Xanthium strumarium Linn.	Asteraceae	*Bichaphul*	S
Oroxylon indicum Vent.	Bignoniaceae	*Kawarnow*	T
Bombax ceiba Linn.	Bombacaceae	*Simul*	T
Annanas comosus (Linn.) Merr.	Bromaliaceae	*Anaras*	H
Canarium bengalense Roxb.	Burseraceae	*Dhuna*	T
Bauhinia variegata Linn.	Caesalpiniaceae	*Kanchan*	T
Caesalpinia pulcherrima Swartz.	Caesalpinaceae	*Krishnachura*	T
Cassia fistula Linn.	Caesalpinaceae	*Sundali/Chauui*	T
Cassia nodosa Linn.	Caesalpinaceae	*Bandorlathi*	T

Table 1 — Diversity of medicinal plants of Barak valley — *Contd.*

Plant name	Family	Local name	Habit
Crataeva roxburghii R.Br.	Capparidaceae	*Barun*	T
Carica papaya Linn.	Caricaceae	*Kophol*	S
Chenopodium album Linn.	Chenopodiaceae	*Bathuasag*	H
Garcinia cowa Roxb. ex DC	Clusaceae	*Bonthekra*	T
Mesua ferrea Linn.	Clusaceae	*Nagaeshar*	T
Terminalia arjuna (Roxb.) Weight & Arn.	Combretaceae	*Arjun*	T
Terminalia bellerica Roxb.	Combretaceae	*Boyra*	T
Terminalia chebula Retz.	Combretaceae	*Harithaki*	T
Ipomoea aquatica Forsk.	Convolvulaceae	*Kalmisag*	H
Ipomoea batatus Lamk.	Convolvulaceae	*Misthialu*	H
Bryophyllum calycinum Salisb.	Crassulaceae	*Patherkuchi*	H
Bennincasa cerifera Savi.	Cucurbitaceae	*Chalkumra*	C
Luffa acutnagula Roxb.	Cucurbitaceae	*Jhinga*	C
Momordica charantia Linn.	Cucurbitaceae	*Titakorala*	C
Trichosanthes cordata Roxb.	Cucurbitaceae	*Chirchinga*	C
Cyathea gigentea (Wall ex. Hook.) Mottum.	Cyathaceae	*Uchagrang*	S
Cyperus kyllingia Endl.	Cyperaceae	*Nirbish*	H
Dillenia indica Linn.	Dilleniaceae	*Chalta*	T
Dioscorea bulbifera Linn.	Dioscoreaceae	*Kathalu*	C
Drosera burmanni Vahl.	Droseraceae	*Drosera*	H
Elaeocarpus floribundus Blume.	Elaeocarpaceae	*Belphor*	T
Elaeocarpus rugosus Roxb. ex. G.	Don Elaeocarpaceae	*Jangalichampa*	T
Baccaurea sapida Muell.	Euphorbiaceae	*Lotka*	T
Codium variegatum	Euphorbiaceae	*Pathabahar*	S
Embalica officinalis Gaertn.	Euphorbiaceae	*Amlaki*	T
Euphorbia neriifolia Linn.	Euphorbiaceae	*Mansasij*	S
Jatropa cureas Linn.	Euphorbiaceae	*Bagbarenda*	S
Phyllanthus griffithi Muell.	Euphorbiaceae	*Bhuiamla*	H
Phyllanthus indicus Muell.	Euphorbiaceae	*Ningthouthai*	H
Phyllanthus simplex Retz.	Euphorbiaceae	*Bonbabreri*	S
Ricinus communis Linn.	Euphorbiaceae	*Veranda*	S
Crotalaria juncea Linn..	Fabaceae	*Shon*	S
Crotalaria striata D.C.	Fabaceae	*Sankarupai*	S
Tamarindus indica Linn.	Fabaceae	*Tathul*	T
Flacortia cataphracta Roxb.	Flacortiaceae	*Lukluki*	T
Argemone mexicana Linn.	Fumariaceae	*Sialkhata*	S
Elsholtzia blanda Benth.	Lamiaceae	*Bontulsi*	S
Leucas aspera Linn.	Lamiaceae	*Don-kolosh*	H
Mentha arvensis Linn.	Lamiaceae	*Pudina*	H
Ocimum sanctum Linn.	Lamiaceae	*Tulsi*	S
Cinnamomum bejolghota Sweet.	Lauraceae	*Janglitejpatha*	T
Cinnamomum tamala Nees Ebern.	Lauraceae	*Tejpatha*	T

Table 1 — Diversity of medicinal plants of Barak valley — *Contd.*

Plant name	Family	Local name	Habit
Smilax macrophyla Roxb.	Liliaceae	*Kumarilota*	C
Lawsonia inermis Linn.	Lyrthaceae	*Mehandi*	S
Lagerostromia flosreginae Retz.	Lyrthaceae	*Jarul*	T
Punica granatum Linn.	Lyrthaceae	*Dalim*	T
Michelia champaca Linn.	Magnoliaceae	*Champa*	T
Hibiscus mutabilis Linn.	Malvaceae	*Sthalpadma*	S
Hibiscus rosachinensis Linn.	Malvaceae	*Jaba*	S
Urena lobata (Linn) Mast.	Malvaceae	*Agra*	S
Melastoma malabathricum Linn.	Melastomaceae	*Thung*	S
Azadiracheta indica A. Juss.	Meliaceae	*Neem*	T
Dysoxylum binectiferum Hk.f.	Meliaceae	*Bandordima*	T
Tinospora cordifolia Miers.	Menispermaceae	*Gulancha*	C
Mimosa pudica Linn.	Mimosaceae	*Choyamora*	H
Parkia roxburghii G. Don.	Mimosaceae	*Bandoruri*	T
Artocarpus chama Buch-Ham.	Moraceae	*Chamkathal*	T
Artocarpus lakoocha Roxb.	Moraceae	*Dewacham*	T
Ficus benghalensis Linn.	Moraceae	*Bot*	T
Ficus hispida Linn.	Moraceae	*Kakdumor*	T
Ficus religiosa Linn.	Moraceae	*Ashtwa*	T
Morianga pterygosperma Gaertn.	Moringaceae	*Sajna*	T
Musa paradisica Linn.	Musaceae	*Chapmakhola*	S
Eugenia jambolana Lamk.	Myrtaceae	*Kalajam*	T
Psidium guajava Linn.	Myrtaceae	*Chopri*	T
Nyctanthes arbortristis Linn.	Nyctaginaceae	*Safalika*	S
Jasminum scandens Vahl.	Oleaceae	*Swarnajui*	S
Averrhoea carombola Linn.	Oxalidaceae	*Kapranga*	T
Oxalis corniculata Linn.	Oxalidaceae	*Amrulsak*	H
Butea frondosa Roxb.	Papilionaceae	*Palas*	S
Cajanus cajan (Linn) Millsp.	Papilionaceae	*Arhar*	S
Clitoria ternatea Linn.	Papilionaceae	*Aparijita*	C
Dalbergia sisso Roxb.	Papilionaceae	*Sisso*	T
Pongamia glabra Vent.	Papilionaceae	*Jaitun*	T
Cynodon dactylon Pers.	Poaceae	*Durba*	H
Polygonum glabrum Willd.	Polygonaceae	*Bhihongi*	H
Polygonum assamicum Meissn.	Polygonaceae	*Bekh*	H
Zizyphus jujuba Lamk.	Rhamnaceae	*Boroi*	T
Gardenia jasminoides Ellis.	Rubiaceae	*Gondharaj*	S
Paederia foetida Linn.	Rubiaceae	*Padrapatha*	C
Aegle marmelos Correa.	Rutaceae	*Bel*	T
Citrus decumana Linn.	Rutaceae	*Pathinembu*	T
Citrus medica Linn.	Rutaceae	*Chatninembu*	T
Glycosmis pentaphylla Corr.	Rutaceae	*Bonjameer*	S

Table 1 — Diversity of medicinal plants of Barak valley — *Contd.*

Plant name	Family	Local name	Habit
Glycosmis pentaphylla Corr.	Rutaceae	*Bonjameer*	S
Murraya exotica Linn.	Rutaceae	*Kamini*	S
Murraya koenigii Spreng.	Rutaceae	*Norsing*	S
Mimusops elengi Linn.	Sapotaceae	*Bokul*	T
Bacopa monneri (L) Pennell.	Scrophulariaceae	*Brahmisag*	H
Datura stromonium Linn.	Solanaceae	*Datura*	S
Solanum khasianum Clark.	Solanaceae	*Bekoir*	S
Solanum nigrum Linn.	Solanaceae	*Kak-machi*	S
Corchorus capsularis Linn.	Tiliaceae	*Mithanali*	S
Corchorus olitorius Linn.	Tiliaceae	*Tithanali*	S
Clerodendrum colebrookianum Walp.	Verbenaceae	*Bhati*	S
Clerodendrum infortunatum Gaertn.	Verbenaceae	*Nafafu*	S
Gmelina arborea Roxb.	Verbenaceae	*Gamair*	T
Vitex negundo Linn.	Verbenaceae	*Nisinda*	S
Vitis quadrangularis Linn.	Vitaceae	*Hartura*	S
Alpinia galanga Willd.	Zingiberaceae	*Kulajan*	H
Amomum aromaticum Roxb.	Zingiberaceae	*Bodoelachi*	H
Costus speciosus (Koening.) Sm.	Zingiberaceae	*Kewpachla*	H
Costus variegata Linn.	Zingiberaceae	*Kewpachla*	H
Cucurma amada Roxb.	Zingiberaceae	*Amada*	H
Cucurma aromatica Salisb.	Zingiberaceae	*Jangli-holud*	H
Kaempferia rotunda Linn.	Zingiberaceae	*Bhuichampa*	H

H-Herb, T-Tree, S-Shrub, C-Climber

Table 2 — Highly prioritised medicinal plants of Barak valley

Plant name/Family	Uses
Achyranthes aspera Amaranthaceae	Leaf juice extract used internally in otorrhea; young twig paste used as bandage in external wounds & injury.
Aegle marmelos Rutaceae	Ripen fruit shake used in stomach troubles; leaf paste used in forehead against intermittent fever; root & leaf extract used in diarrhoea & blood dysentery.
Acorus calamus Araceae	Dried powder mixed with honey is taken in the morning before food as stimulant.
Alpinia galangal Zingiberaceae	Plant extract is used as abortifacient; paste used for curing ringworm & rheumatic pain.
Andrographis paniculata Acanthaceae	Leaf extract is used in asthma & bronchitis; whole plant is soaked in water overnight and the same water is taken in empty stomach for curing worms & stomach pain.
Artocarpus chama Moraceae	Bark extract is used in jaundice; dried fruit powder is used in diabetes.
Artocarpus lakoocha Moraceae	Dried leaf and bark powder are used in malaria; fruit is used in stomach troubles.
Bacopa monnieri Scrophulariaceae	The plant juice is used as nerve tonic & asthma; paste is bandaged as snake antidote.
Cinnamomum tamala Lauraceae	Soaked leaf is used as carminative; leaf and bark extracts are used in diarrhoea & chronic dysentery.
Cinnamomum bejolghota Lauraceae	Leaf & bark extracts are used in cough, cold & liver troubles; bark paste in toothache.
Clerodendrum infortunatum Verbenaceae	Root paste is used as bandage in swelling; leaf extract is used in stomach pain & malaria.
Clerodendrum colebrookianum Verbenaceae	Leaf decoction is used in hypertension, rheumatism & also as general tonic.
Costus speciosus Zingiberaceae	Dried powdered leaf & young stems mixed with lukewarm water is taken in empty stomach for a month for curing piles.

Table 2 — Highly prioritised medicinal plants of Barak valley — *Contd.*

Plant name/Family	Uses
Costus variegata Zingiberaceae	Leaf & stem extracts are taken for curing piles.
Garcinia cowa Clusaceae	Leaf juice is used in diarrhoea; raw fruits are used in dysentery.
Oroxylon indicum Bignoniaceae	Bark extract is used as hair tonic; dried powdered root is used as anti-helminthic & carminative.
Rauvolfia serpentina Apocynaceae	Leaf juice is taken as soup for curing & controlling high blood pressure.
Smilax macrophyla Liliaceae	Stem & young leaf extract is taken as general tonic; dried powder is used against jaundice & urinary diseases.
Swertia chirayita Gentianaceae	Leaf & young stem soaked overnight in water is taken early morning in empty stomach as general tonic, stomachic, in chronic fever, bronchial asthma & liver troubles.
Swertia paniculata Gentianaceae	Whole plant soaked overnight in water is used in liver troubles, intestinal worms & malaria.
Terminalia arjuna Combretaceae	Bark, young stem & leaf extract is used as cardiotonic, in high blood pressure & liver complaints.
Terminallia bellerica Combretaceae	Leaf and young stem juice is used in urinary troubles; fruit juice is used for curing liver disorders & indigestion.
Terminalia chebula Combretaceae	Bark & fruit juice is used as cardiotonic & purgative; bark paste is used in skin ulcer & toothache.
Tinospora cordifolia Menispermaceae	Leaf extract is used in diarrhoea & dysentery; dried powdered stem is used in anaemia and urinary troubles.

sporadically in Barak valley. Thus, viable conservation strategies are needed for preserving the germplasm. Seeds banks or tissue culture can help in the preservation efforts. Free exchange of germplasm material with in a regional perspective may be permitted in order to avoid the risk of catastrophic loss of genetic material at one centre resulting in the total extinction of the species.

Harvesting from the wild should be stopped; appropriate agrotechniques are needed for effective cultivation of medicinal plants in large scale and are as a part of the home gardening. In this context, kitchen medicinal garden concept could be a viable strategy as well. Establishment of protected areas, medicinal plant sanctuaries, medicinal/herbal forests, etc. is essential for *in situ* conservation of rare herbs. Further, public awareness on ecological niche regime of several medicinal plants could help in a long term conservation perspective. In addition, rich knowledge on ethnobotanical services is residing with traditional societies, who opt to inherent over generations. However, with modernization, these valuable knowledge getting eroded and therefore lead to loss of herbal heritage. Hence, documentation and collection of herbs and herbal dosages become important. Therefore, herbal policy is urgently required to upload the significance of these natural resources to be utilized on a sustainable basis for the human welfare.

Acknowledgement

Authors thank the Head of the Department of Life Science, Assam University Silchar for providing valuable help. The villagers' especially old aged people of Barak Valley, South Assam deserve special thanks for sharing their valuable information. Authors thank the anonymous reviewer for valuable comments, which helped in improving the quality of the paper. ARB thanks Dr UK Sahoo, Department of Forestry, Mizoram University, Aizawl, Mizoram for cooperation and help.

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