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## Updated Estimates of Wild Edible and Threatened Plants of Assam: A Meta-analysis

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**Abstract:** The study reports the ethnobotany and threats to wild edible plants in Assam province of India, which is considered as a mega-biodiversity centre under two important biodiversity hotspots viz., Indo-Burma and Himalaya. The people living in remote/forest area still depend upon to a great extent on the indigenous system of medicine/cultivation. Here, we summarize the information derived through meta-analysis and present an updated estimate of the wild edible, medicinal and threatened plant species that has been reported by wide variety of taxonomic groups. Out of 3895 plant species nearly 7.34% were used as wild vegetables, fruits and ethno-medicines. In over all, 286 edible wild plant species estimated belong to 93 families and 192 genera are hitherto unknown or less known to the world. Of these, 150 species were reported to be used in traditional system of medicine. The estimates revealed that as many as 27 species were in the list of red data book, CITIES and IUCN red list threat categories due to over exploitations and these plants need a strong conservation and protection management. In the present investigation, the work that has been reported and the potential of ethno-botanical studies with particular reference to biodiversity conservation of the important wild edible plant species have been highlighted in study area.

**Key words:** Conservation, forest types, plants resource, threatened plants, wild edible plants

### INTRODUCTION

Forest is an important productive sector with significant effects on meeting national socio-economic and prospective functions especially the improvement of rural livelihoods (Mbuvi and Boon, 2009). Traditional societies have always exploited edible wild plants to provide an adequate level of nutrition, food security and income generation and for sustainable development and livelihoods management. Forests provide several life supporting commodities and as per estimate 350 million people were living within or adjacent to dense forests and depend on them for subsistence and income (Arnold, 2001). Different wild edible plants have been a significant role in all the geographical regions of the world through the human history (Sekeroglu *et al.*, 2006).

The majority of the rural communities live on less than US \$1 a day in Sub-Saharan Africa (SSA) and Asia (World Bank, 2001, 2004; FAO, 2005; CIFOR, 2002) and these people sustain their livelihoods from the forests under land-extensive cultivation, logging and over exploitation of non-wood products. Because these activities are not properly managed and controlled, they have degraded the natural environments. The erosion of plant biodiversity is a matter of global concern. The number of threatened plant species is increasing gradually and the number of threatened plants is 8457, are found at

different biodiversity regions (IUCN, 2010). Many of them serve as sources of food, fuel, fibre, timber, medicine. As per estimates 1 billion people worldwide depend on drugs derived from forest plants for their medicinal needs (World Bank, 2004).

India's recognition as one of the four mega-diversity countries of Asia are derived largely from three of its most important biodiversity hot-spots: the Himalayas, Indo Burma, Western Ghats and Sri Lanka. Northeastern region of India forms a unique biogeographic provinces comprising major biomes recognized in the world and harbours about 50% ( $\pm 8500$  sp) of the floristic wealth of India and 40% of them are endemic (Mao *et al.*, 2009). The rich diversity of northeastern India has its own importance at global level. This area supports the growth of a number of medicinal, aromatic and other valuable plants. Northeastern India is unique in its resources of flora and fauna and comprises of grassland, meadows, marshes, swamps, scrub, mixed deciduous forests, humid evergreen forests, temperate and alpine vegetation (Mao *et al.*, 2009) and this region is regarded as the place of origin of progenitors of many cultivated crops.

Assam is one of the critical priority biodiversity hotspot region of northeastern India comprising of mosaic types of vegetation (Sarma and Sarma, 2008; Sarma *et al.*, 2008). The major forest types of Assam have received international conservation efforts, based on the

levels of endemism, medicinal plants diversity and human threats. This state of India, with a forest area of 28,748 km<sup>2</sup> comprises of 3895 species of flowering plants, 293 species of orchids, 38 species of bamboos and 10 species of canes, 355 species of ferns and fern allies, 23 species of gymnosperms have been recorded till date (Chowdhury, 2005). The distinct tribes in the state (12.8% of total populations) have rich indigenous traditional knowledge system on the uses of components of biodiversity for their daily subsistence like food, fodder, shelter and healthcare.

Since, the early 1970s different groups in various institutes have been working on plant resources of the state including the exploration of new plant species and subsequent taxonomic studies were conducted and published many reports in regional levels (Saikia *et al.*, 2006; Kotoky and Das, 2008). Most of these wild vegetables, fruits and medicinal plant uses are confined at regional level and less known to the world. The recent publication of Wild Edible Plants of Assam (Patiri and Borah, 2007) provides the means to update these estimates. Here, we provided revised figures of wild edible and medicinal species available in major forest types of Assam and their sustainable uses in various parts

through meta-analysis. The focus of this correspondence was to highlights the wild edible plants resource of Assam and present status of threatened plants for the benefit of researchers.

## MATERIALS AND METHODS

**Study area:** The study site is located in the northeastern parts of India (Fig. 1). The forest types come under Assam valley tropical evergreen forest- 1B/C1, Upper Assam valley tropical evergreen forest 1B/C2 (a, b), Cachar tropical evergreen forest 1B/C3, Assam valley semi-evergreen forest 2B/C1 (a, b), Cachar semi-evergreen forest 2B/C2, Very moist sal forest 3C/C1 (a, b, c), Moist plains sal forest 3C/C2 (d) (Champion and Seth, 1968). Assam state in India expands between 89°42' E longitude to 96° E longitude and 24°8' N latitude to 28°2' N latitude covering an area of about 78,523 km<sup>2</sup> in the northeastern part of India comprising of two geographically defined area Brahmaputra and Barak valley. The altitude ranges from 30 to 680 m a.s.l, harbouring a mosaic of vegetation types. This region is characterized by a hot sub-humid (moist) to humid (inclusion of per-humid) climate with alluvial dried soil and

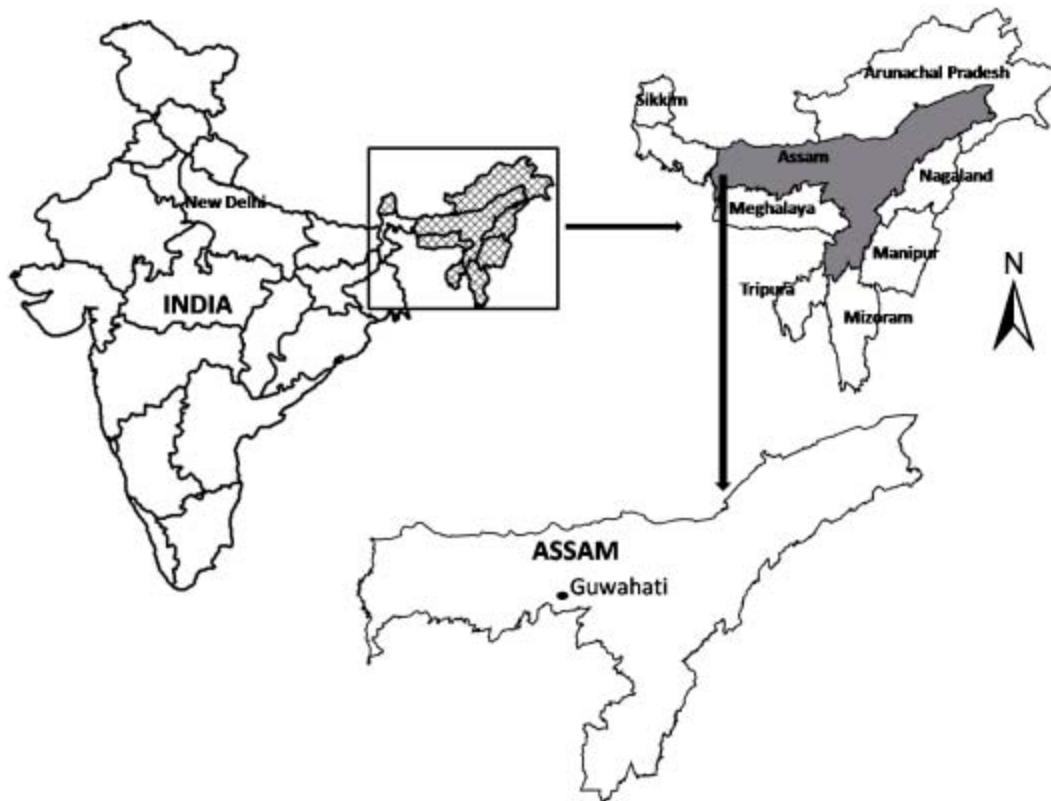


Fig. 1: Map of Assam state of India showing study area

growing periods of approximately 210+ days. Mean daily temperatures range from 20°C in January to 32°C in July and precipitation averages 1600 mm year<sup>-1</sup>. Total recorded forest area of the state is 28,748 km<sup>2</sup> out of which 359 km<sup>2</sup> come under water bodies and covers 32% of the total geographical area. On the other hand forest and tree cover is 36.67% of geographical areas including homestead forestland (Patiri and Borah, 2007).

**Methods:** This study pertains to assess wild edible, medicinal and threatened plants of Assam and for that we collected published reference materials data from 31 studies that were conducted by different researchers and reported in 17 papers and 14 monographs (published in 1934-2009). We used meta-analysis to search for wild edible plants of Assam. As our starting point we used an extensive collection of reprints, which included some 1000 publications reporting on the ethnobotanical information of various plants published in regional journals. Prospective publications were searched using Biological Abstracts (BIOSIS), Biological Sciences (CSA),

Biosis Previews (BIOSIS), CAB Abstracts (CAB International), Plant Science (CSA) and Web of Science (ISI) data bases; the last round of the search was conducted in June, 2010. We used key words that referred to wild edible plants of Assam for searching (different combinations of keywords: wild plants\*, ethnobotany\*, human\*, economic plants\*, sustainable uses\*, threatened species\*, Assam\*). These keywords produced a reasonable output that was then sorted manually and refined; however, the list is not exclusive. In addition, we checked the reference sections of all discovered publications for references to other potentially suitable studies as a cross reference. Every effort was taken to access and examine all potentially suitable data sources and prepared this updated estimates of wild edible and threatened plants of Assam.

## RESULTS AND DISCUSSION

These appendices have been compiled from various sources includes many records of plant species that has been used sustainable basis in Assam (Table 1). Out of

Table 1: Estimates of wild edible species of Assam

Species	Family	Habit	Use(s)	Medicinal
<i>Andrographis paniculata</i> Nees.	Acanthaceae	Herb	Lf, Wp <sup>2, 4</sup>	Yes <sup>2, 4</sup>
<i>Justicia adhatoda</i> L.	Acanthaceae	Shrub	Lf, Fl <sup>2, 14, 20</sup>	Yes <sup>2, 14</sup>
<i>Phlogacanthus curviflorus</i> Nees.	Acanthaceae	Shrub	Fl <sup>20</sup>	
<i>Phlogacanthus thyrsoiflorus</i> (Roxb.) Nees.	Acanthaceae	Shrub	Lf, Fl, Fr <sup>10, 13, 15, 19</sup>	Yes <sup>10, 19</sup>
<i>Phlogacanthus tubiflorus</i> Nees.	Acanthaceae	Shrub	Lf, Fl <sup>4, 10, 12, 15</sup>	Yes <sup>4, 15</sup>
<i>Strobilanthes scaber</i> Nees.	Acanthaceae	Shrub	Fl <sup>20, 21</sup>	
<i>Saurauia punctuana</i> Wall.	Actinidiaceae	Tree	Fr <sup>20, 21</sup>	
<i>Saurauia roxburghii</i> Wall.	Actinidiaceae	Tree	Fr <sup>20, 21</sup>	
<i>Achyranthes aspera</i> L.	Amaranthaceae	Undershrub	Lf, S <sup>4, 20</sup>	Yes <sup>4, 20</sup>
<i>Alternanthera philoxeroides</i> Griseb.	Amaranthaceae	Herb	Lf, St <sup>20</sup>	
<i>Alternanthera sessilis</i> (L.) DC.	Amaranthaceae	Herb	Lf, St, S <sup>4, 12, 20</sup>	Yes <sup>4, 12</sup>
<i>Amaranthus spinosus</i> L.	Amaranthaceae	Herb	Lf, S, Wp <sup>4, 16, 20</sup>	Yes <sup>4, 16</sup>
<i>Amaranthus viridis</i> L.	Amaranthaceae	Herb	Lf, S <sup>4, 14, 20</sup>	Yes <sup>4, 14</sup>
<i>Deeringia amaranthoides</i> Merr.	Amaranthaceae	Shrub	Lf, St <sup>2, 15, 20</sup>	Yes <sup>12, 15</sup>
<i>Curculigo orchoides</i> Gaertn.	Amoryllidaceae	Herb	Rh <sup>4</sup>	Yes <sup>4</sup>
<i>Mangifera indica</i> L.	Anacardiaceae	Tree	Lf, Fr <sup>1, 14, 20, 21</sup>	Yes <sup>1, 14</sup>
<i>Pegia nitida</i> Colebr.	Anacardiaceae	Shrub	Lf, St, Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Rhus chinensis</i> Miller	Anacardiaceae	Tree	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Semicarpus anacardium</i> L.	Anacardiaceae	Tree	Fr <sup>8, 21</sup>	
<i>Spondias axillaris</i> Roxb.	Anacardiaceae	Tree	Br, Fr <sup>20, 21</sup>	
<i>Spondias pinnata</i> (L.f.) Kurz.	Anacardiaceae	Tree	Lf, Fb, Fr, Br, Sd <sup>12, 14, 18, 20</sup>	Yes <sup>14</sup>
<i>Fissistigma verrucosum</i> Merr.	Annonaceae	Climber	Fr <sup>20</sup>	
<i>Cenillea asiatica</i> (L.) Urban	Apiaceae	Herb	Lf, Fr, Rt, Wp <sup>2, 7, 13, 14, 19, 20, 21</sup>	Yes <sup>2, 7, 14, 19, 20</sup>
<i>Eryngium foetidum</i> L.	Apiaceae	Herb	Lf, Rt <sup>13, 14, 15, 20, 21</sup>	Yes <sup>14</sup>
<i>Hydrocotyle sibthorpioides</i> Lam.	Apiaceae	Herb	Lf, St <sup>1, 20</sup>	Yes <sup>1</sup>
<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Tree	Lf, Br <sup>1, 4</sup>	Yes <sup>1, 4</sup>
<i>Carissa carandus</i> L.	Apocynaceae	Shrub	Fr <sup>20</sup>	
<i>Holarrhena antidysenterica</i> Wall.	Apocynaceae	Tree	Br, Sd <sup>10, 14</sup>	Yes <sup>10, 14</sup>
<i>Rauwolfia serpentina</i> Benth. ex Kurz.*	Apocynaceae	Undershrub	Lf, Rt <sup>2, 10</sup>	Yes <sup>2, 10</sup>
<i>Willoughbeia edulis</i> Roxb.	Apocynaceae	Climber	Fr <sup>20</sup>	
<i>Alocasia acuminata</i> Schott	Araceae	Herb	Lf, St, Rt <sup>20</sup>	
<i>Alocasia indica</i> (Lour.) Spach	Araceae	Herb	St, Rh, Rt, Wp, P <sup>13, 15, 20</sup>	
<i>Alocasia odora</i> (Roxb.) Koch	Araceae	Herb	Pt <sup>20</sup>	
<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Herb	Wp <sup>20</sup>	Yes <sup>20</sup>
<i>Colocasia esculenta</i> (L.) Schott	Araceae	Herb	Lf, Rh, Rt <sup>13, 14, 15, 20, 21</sup>	Yes <sup>14</sup>
<i>Homalomena aromatica</i> Schott*	Araceae	Herb	Lf, Pt, Rt <sup>12, 13, 15, 16, 20, 21</sup>	Yes <sup>12, 15, 16</sup>

Table 1: Continued

Species	Family	Habit	Use(s)	Medicinal
<i>Lasia spinosa</i> (L.) Thw.	Araceae	Herb	Lf, St, Pt, Rh <sup>12, 15, 16, 20</sup>	Yes <sup>12, 15, 16</sup>
<i>Trevesia palmata</i> Vis.	Araliaceae	Tree	Lf, Fl, Fb <sup>14, 20, 21</sup>	Yes <sup>14</sup>
<i>Calamus erectus</i> Roxb.	Arecaceae	Shrub	St, Fr <sup>13, 20, 21</sup>	
<i>Calamus flagellum</i> Griff.	Arecaceae	Shrub	St, Fr <sup>20</sup>	
<i>Caryota urens</i> L.	Arecaceae	Tree	Fr, Sd <sup>20, 21</sup>	
<i>Livistona jenkinsiana</i> * Griff.	Arecaceae	Tree	Sd <sup>20</sup>	
<i>Asparagus recemosus</i> Willd.	Asparagaceae	Climber	St, Rt <sup>2, 14, 15, 20</sup>	Yes <sup>2, 14, 15</sup>
<i>Ageratum conyzoides</i> L.	Asteraceae	Herb	Lf <sup>1</sup>	Yes <sup>1</sup>
<i>Bidens pilosa</i> L.	Asteraceae	Herb	Lf, St <sup>4, 20</sup>	Yes <sup>14</sup>
<i>Blumea balsamifera</i> (L.) DC.	Asteraceae	Undershrub	Lf <sup>4, 20</sup>	Yes <sup>14</sup>
<i>Eclipta prostrata</i> L.	Asteraceae	Herb	Lf <sup>4, 20</sup>	Yes <sup>14, 20</sup>
<i>Erechthites valerianaeifolia</i> (Wolff) DC.	Asteraceae	Herb	Lf <sup>20</sup>	
<i>Eupatorium odoratum</i> L.	Asteraceae	Shrub	Lf <sup>1, 4, 20</sup>	Yes <sup>1, 4, 20</sup>
<i>Mikania micrantha</i> Kunth	Asteraceae	Climber	Lf <sup>4, 6, 14</sup>	Yes <sup>4, 6, 14</sup>
<i>Sonchus brachyotus</i> DC.	Asteraceae	Herb	Lf <sup>20</sup>	Yes <sup>20</sup>
<i>Spilanthes paniculata</i> Wall. ex DC.	Asteraceae	Herb	Lf, St, Fl <sup>4, 16, 18, 20</sup>	Yes <sup>4, 16, 18, 20</sup>
<i>Xanthium strumarium</i> L.	Asteraceae	Herb	Lf, St <sup>12, 20, 21</sup>	Yes <sup>12</sup>
<i>Averrhoa carambola</i> L.	Averrhoaceae	Tree	Fr <sup>4, 14, 20</sup>	Yes <sup>4, 14</sup>
<i>Bambusa balcooa</i> Roxb.	Bambusaceae	Tree	St <sup>20</sup>	
<i>Bambusa tulda</i> Roxb.	Bambusaceae	Tree	St, Rh <sup>14, 20</sup>	
<i>Dendrocalamus hamiltonii</i> Nees and Arn. ex Munro	Bambusaceae	Tree	St <sup>3, 13, 15, 18, 21</sup>	
<i>Begonia picta</i> Sm.	Begoniaceae	Herb	Lf <sup>20</sup>	Yes <sup>20</sup>
<i>Oroxylum indicum</i> (L.) Vent.	Bignoniaceae	Tree	Lf, St, Br, Sd <sup>1, 2, 14, 16, 17, 20</sup>	Yes <sup>1, 2, 14, 16, 17, 20</sup>
<i>Blechnum orientale</i> L.	Blechnaceae	Herb	Lf, Rh <sup>4</sup>	Yes <sup>4</sup>
<i>Stenochlaena palustris</i> Bedd.	Blechnaceae	Climber	Lf <sup>20</sup>	
<i>Cordia dichotoma</i> Forst.	Boraginaceae	Tree	Lf, Fr, Br <sup>20</sup>	Yes <sup>20</sup>
<i>Ehretia acuminata</i> R. Br.	Boraginaceae	Tree	Lf, Fr <sup>10, 20</sup>	
<i>Lepidium sativum</i> L.	Brassicaceae	Herb	Lf, St <sup>20</sup>	Yes <sup>20</sup>
<i>Buddleja asiatica</i> Lour.	Buddlejaceae	Shrub	Fl <sup>14, 20, 21</sup>	Yes <sup>14</sup>
<i>Bursera serrata</i> Wall. ex Coleb.	Bursereae	Tree	Fr <sup>20, 21</sup>	
<i>Bauhinia acuminata</i> L.	Caesalpiniaceae	Shrub	Fl <sup>20</sup>	
<i>Bauhinia malabarica</i> Roxb.	Caesalpiniaceae	Tree	Fl <sup>20</sup>	
<i>Bauhinia purpurea</i> L.	Caesalpiniaceae	Tree	Lf, Fl, Fb, Br <sup>4, 13, 14, 15, 20, 21</sup>	Yes <sup>4, 14</sup>
<i>Bauhinia variegata</i> L.	Caesalpiniaceae	Tree	Lf, Fl, Fb, Br, Sd <sup>7, 14, 18, 20, 21</sup>	Yes <sup>7, 14</sup>
<i>Cassia alata</i> L.	Caesalpiniaceae	Shrub	Lf <sup>4</sup>	Yes <sup>4</sup>
<i>Cassia fistula</i> L.	Caesalpiniaceae	Tree	Fb, Fl, Fr, Br <sup>12, 14, 20</sup>	Yes <sup>12, 14, 20</sup>
<i>Cassia occidentalis</i> L.	Caesalpiniaceae	Undershrub	Lf, Sd <sup>4</sup>	Yes <sup>4</sup>
<i>Cassia tora</i> L.	Caesalpiniaceae	Undershrub	Lf, St, Sd, Rt <sup>4, 9, 12, 20</sup>	Yes <sup>4, 9, 12, 20</sup>
<i>Saraca asoca</i> (Roxb.) de Wilde	Caesalpiniaceae	Tree	Fr, Br <sup>4, 14, 20</sup>	Yes <sup>4, 14, 20</sup>
<i>Tamarindus indica</i> L.	Caesalpiniaceae	Tree	Lf, Fr, Sd <sup>4, 14, 20, 21</sup>	Yes <sup>4, 14</sup>
<i>Stixis suaveolens</i> (Roxb.) Pierre	Capparaceae	Climber	Fr <sup>20, 21, 22</sup>	
<i>Sambucus hookeri</i> Rehd.	Caprifoliaceae	Shrub	Lf, Rt <sup>20</sup>	Yes <sup>20</sup>
<i>Drymaria cordata</i> Willd ex Schult.	Caryophyllaceae	Herb	Lf, St, Rt, Wp <sup>12, 19, 20, 25</sup>	Yes <sup>12, 19, 20, 25</sup>
<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	Herb	Lf, St <sup>20</sup>	Yes <sup>20</sup>
<i>Garcinia cowa</i> Roxb. ex DC.	Clusiaceae	Tree	Lf, Fr, Sd, Br <sup>14, 15, 20</sup>	Yes <sup>14, 15, 20</sup>
<i>Garcinia lanceifolia</i> Roxb.	Clusiaceae	Tree	Lf, St, Fr <sup>20</sup>	
<i>Garcinia morella</i> (Gaertn.) Desr.	Clusiaceae	Tree	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Garcinia paniculata</i> Roxb.	Clusiaceae	Tree	Fr <sup>20, 21</sup>	
<i>Garcinia pedunculata</i> Roxb.*	Clusiaceae	Tree	Lf, Fr <sup>1, 13, 14, 15, 20, 21</sup>	Yes <sup>1, 14</sup>
<i>Garcinia xanthochymus</i> Hook. f.	Clusiaceae	Tree	Fr <sup>20, 21</sup>	
<i>Combretum decandrum</i> Roxb.	Combretaceae	Climber	Br, Fr <sup>9, 20, 21</sup>	
<i>Terminalia arjuna</i> (Roxb. ex DC.) W. and A.	Combretaceae	Tree	Lf, Br <sup>4, 14, 20</sup>	Yes <sup>4, 14, 20</sup>
<i>Terminalia bellirica</i> Roxb.	Combretaceae	Tree	Fr, Br <sup>2, 9</sup>	Yes <sup>2, 9</sup>
<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Fr, Sd <sup>1, 2, 4, 7, 14, 15, 20, 25</sup>	Yes <sup>1, 2, 4, 7, 14, 15, 20, 25</sup>
<i>Terminalia citrina</i> Roxb. ex Flem.	Combretaceae	Tree	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	Lf, St <sup>20</sup>	
<i>Argyrea minor</i> (Gaertn.) Alston.	Connaraceae	Climber	Fr, Rt <sup>20, 24</sup>	Yes <sup>24</sup>
<i>Argyrea nervosa</i> (Burm. f.) Boj.	Convolvulaceae	Climber	Lf <sup>10, 13, 20, 21</sup>	
<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Climber	Wp <sup>7, 10</sup>	Yes <sup>7, 10</sup>
<i>Erycibe paniculata</i> Roxb.	Convolvulaceae	Climber	Fr, Br <sup>10, 20</sup>	Yes <sup>10, 20</sup>
<i>Ipomoea batatas</i> (L.) Lamk.	Convolvulaceae	Climber	Lf, St, Rt <sup>12, 18, 20, 21</sup>	
<i>Merremia umbellata</i> Hallier f.	Convolvulaceae	Climber	Lf, St <sup>10, 20</sup>	Yes <sup>10, 20</sup>
<i>Costus speciosus</i> (Koen. ex Retz.) Sm.	Costaceae	Herb	St, Rh, Rt <sup>1, 15, 20</sup>	Yes <sup>1, 15, 20</sup>
<i>Bryophyllum pinnatum</i> (Lam.) Kurz	Crassulaceae	Herb	Lf <sup>4, 20</sup>	Yes <sup>4, 20</sup>
<i>Cycas pectinata</i> * Griff.	Cycadaceae	Tree	Lf, St, Fr <sup>12, 20, 21</sup>	Yes <sup>12, 20</sup>
<i>Dillenia indica</i> L.	Dilleniaceae	Tree	Lf, Fr, Br, C <sup>13, 14, 15, 20, 21</sup>	Yes <sup>14</sup>
<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tree	Lf, Fr, Br, C <sup>14, 20, 21</sup>	Yes <sup>14</sup>

Table 1: Continued

Species	Family	Habit	Use(s)	Medicinal
<i>Dillenia scabrella</i> Roxb.	Dilleniaceae	Tree	Fr <sup>20, 21</sup>	
<i>Dioscorea alata</i> L.	Dioscoreaceae	Climber	Rt <sup>4, 14</sup>	Yes <sup>4, 14</sup>
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Climber	Rt <sup>14, 20</sup>	Yes <sup>14</sup>
<i>Dioscorea esculenta</i> (Lour.) Burkill	Dioscoreaceae	Climber	Rt <sup>12, 20</sup>	
<i>Dioscorea pentaphylla</i> L.	Dioscoreaceae	Climber	Rt <sup>12, 20</sup>	
<i>Diospyros kaki</i> L.	Ebenaceae	Tree	Fr <sup>20, 21</sup>	
<i>Diospyros lancaefolia</i> Roxb.	Ebenaceae	Tree	Fr <sup>20, 21</sup>	
<i>Diospyros malabarica</i> (Desr.) Kostel.	Ebenaceae	Tree	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Elaeagnus latifolia</i> L.	Elaeagnaceae	Shrub	Fr <sup>15, 20</sup>	
<i>Elaeagnus pyriformis</i> Hook. f.	Elaeagnaceae	Shrub	Fr <sup>20, 21</sup>	
<i>Elaeocarpus floribundus</i> Bl.	Elaeocarpaceae	Tree	Fr <sup>20, 21, 23</sup>	
<i>Antidesma acidum</i> Retz.	Euphorbiaceae	Tree	Lf, St, Fr <sup>12, 13, 20</sup>	Yes <sup>12</sup>
<i>Antidesma acuminatum</i> Wall.	Euphorbiaceae	Shrub	Fr <sup>20</sup>	
<i>Antidesma bunius</i> (L.) Spreng.	Euphorbiaceae	Tree	Lf, Fr <sup>11, 20, 21</sup>	
<i>Antidesma ghaesemilla</i> Gaertn.	Euphorbiaceae	Tree	Fr <sup>11, 20, 21</sup>	
<i>Antidesma khasianum</i> Hook. f.	Euphorbiaceae	Shrub	Fr <sup>11, 20, 21</sup>	
<i>Aporosa roxburghii</i> Baill.	Euphorbiaceae	Tree	Fr <sup>20</sup>	
<i>Baccaurea ramiflora</i> Lour.	Euphorbiaceae	Tree	Fl, Fr, Br <sup>13, 14, 20, 21</sup>	Yes <sup>14</sup>
<i>Bischofia javanica</i> Bl.	Euphorbiaceae	Tree	Lf, St, Fr <sup>14, 20</sup>	Yes <sup>14</sup>
<i>Bridelia stipularis</i> (L.) Bl.	Euphorbiaceae	Shrub	Fr <sup>11, 20, 21</sup>	
<i>Drypetes assamica</i> (Hook. f.) Paxet and Hoffm.	Euphorbiaceae	Tree	Fr <sup>11, 20, 21</sup>	
<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herb	Lf, St, Wp <sup>7, 18, 20</sup>	Yes <sup>7</sup>
<i>Mallotus philippinensis</i> (Lam.) Muell.-Arg.	Euphorbiaceae	Tree	Fr <sup>11, 13, 14, 15, 21</sup>	Yes <sup>11, 14</sup>
<i>Phyllanthus acidus</i> (L.) Skeels	Euphorbiaceae	Tree	Fr <sup>14, 20</sup>	Yes <sup>14</sup>
<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Tree	Fr, Br <sup>2, 4, 11, 14, 15, 20, 21</sup>	Yes <sup>2, 4, 11, 14, 20</sup>
<i>Phyllanthus fraternus</i> Webster	Euphorbiaceae	Herb	Lf, St, Fr, Wp <sup>14, 20</sup>	Yes <sup>14, 20</sup>
<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Lf, Sd <sup>4, 7, 14, 19</sup>	Yes <sup>4, 7, 14, 19</sup>
<i>Casearia esculenta</i> Roxb.	Flacourtiaceae	Tree	Lf, St <sup>8, 20</sup>	
<i>Casearia glomerata</i> Roxb. ex DC.	Flacourtiaceae	Tree	Lf, St <sup>8, 20</sup>	
<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Flacourtiaceae	Tree	Fr <sup>8, 20, 22</sup>	
<i>Rhynchosyche ellipticum</i> (Wall. ex Dietr.) DC.	Gesneriaceae	Undershrub	Lf <sup>10, 13, 15, 18, 20, 21</sup>	
<i>Gnetum montanum</i> Markgr.	Gnetaceae	Climber	Fr, Sd <sup>13, 20, 21</sup>	
<i>Hypericum japonicum</i> Thunb. ex Murr.	Hypericaceae	Herb	Wp <sup>20</sup>	Yes <sup>20</sup>
<i>Natsiatum herpeticum</i> Buch.-Ham.	Icacinaceae	Climber	Lf, St <sup>8, 20, 21, 24</sup>	
<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Herb	Lf, Sd <sup>16, 20</sup>	Yes <sup>16, 20</sup>
<i>Leucas aspera</i> L.	Lamiaceae	Herb	Lf, Fb <sup>12, 20</sup>	Yes <sup>20</sup>
<i>Ocimum basilicum</i> L. var. <i>purpurascens</i>	Lamiaceae	Herb	Lf <sup>10, 20</sup>	Yes <sup>10, 20</sup>
<i>Perilla frutescens</i> (L.) Brit.	Lamiaceae	Herb	Lf, St <sup>20</sup>	
<i>Plectranthus ternifolius</i> D. Don	Lamiaceae	Shrub	St <sup>20</sup>	
<i>Pogostemon benghalensis</i> Kuntze	Lamiaceae	Herb	Lf <sup>20</sup>	
<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees and Eberm.	Lauraceae	Tree	Lf, Br <sup>4, 14, 20, 21</sup>	Yes <sup>4, 14</sup>
<i>Litsea citrata</i> Bl.	Lauraceae	Tree	Br, Fr <sup>14, 17</sup>	Yes <sup>14, 17</sup>
<i>Careya arborea</i> Roxb.	Lecythidaceae	Tree	Fl, Fr, Br <sup>20</sup>	Yes <sup>20</sup>
<i>Leea macrophylla</i> Roxb.	Leeaceae	Herb	Lf, Fr, Rt <sup>8, 20, 21</sup>	Yes <sup>8</sup>
<i>Tokypanthus involucratus</i> (Roxb.) Tiegh	Loranthaceae	Shrub	Fr <sup>20</sup>	
<i>Medinilla erythrophylla</i> Lindl.	Melastomataceae	Shrub	Lf, Fr <sup>20</sup>	
<i>Melastoma malabathricum</i> L.	Melastomataceae	Shrub	Lf, Fr, Rt <sup>4, 9, 14, 20, 21</sup>	Yes <sup>4, 14, 20</sup>
<i>Azadirachta indica</i> A. Juss.	Meliaceae	Tree	Lf, St, Br, Sd <sup>4, 7, 8, 13, 15, 20, 21</sup>	Yes <sup>4, 7, 8</sup>
<i>Melia azeedarach</i> L.	Meliaceae	Tree	Lf, Fl, Fr <sup>7, 8, 14, 20</sup>	Yes <sup>7, 8, 14, 20</sup>
<i>Albizia lebbek</i> (L.) Benth.	Mimosaceae	Tree	Sd, Br, Rt <sup>7</sup>	Yes <sup>7</sup>
<i>Parkia roxburghii</i> G. Don	Mimosaceae	Tree	Fr <sup>9, 14, 20</sup>	Yes <sup>14</sup>
<i>Artocarpus chama</i> Buch.-Ham.	Moraceae	Tree	Fr, Br <sup>14, 20</sup>	Yes <sup>14</sup>
<i>Artocarpus lakoocha</i> Buch.-Ham.	Moraceae	Tree	Fl, Fr, Br <sup>14, 20, 21</sup>	Yes <sup>14</sup>
<i>Ficus curiculata</i> Lour.	Moraceae	Tree	Fr <sup>20, 21</sup>	
<i>Ficus geniculata</i> Kurz.	Moraceae	Tree	Lf <sup>11, 20, 21</sup>	
<i>Ficus hirta</i> Vahl.	Moraceae	Tree	Lf, Fr <sup>11, 20, 21</sup>	
<i>Ficus hispida</i> L.	Moraceae	Tree	Lf, St, Fr <sup>11, 12, 13, 15, 20</sup>	Yes <sup>20</sup>
<i>Ficus nervosa</i> Heyne ex Roth.	Moraceae	Tree	Fr <sup>20</sup>	
<i>Ficus pomifera</i> Wall. ex King.	Moraceae	Tree	Lf, Fr <sup>11, 20</sup>	
<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	Moraceae	Tree	Lf, St, Fr <sup>20</sup>	
<i>Morus australis</i> Poir.	Moraceae	Tree	Fr, Rt <sup>4, 19, 20</sup>	Yes <sup>4</sup>
<i>Poikilospermum suaveolens</i> (Bl.) Merr.	Moraceae	Climber	Lf, St <sup>20</sup>	
<i>Streblus asper</i> Lour.	Moraceae	Tree	Lf, St, Fr <sup>11, 20</sup>	Yes <sup>11</sup>
<i>Moringa oleifera</i> Lamk.	Moringaceae	Tree	Lf, Fl, Fr, Rt <sup>1, 13, 20, 21</sup>	Yes <sup>1</sup>
<i>Myrica esculenta</i> Buch.-Ham.	Myricaceae	Tree	Fr <sup>20, 21</sup>	
<i>Horsfieldia amygdalina</i> (Wall.) Warb	Myristicaceae	Tree	Sd <sup>20, 21</sup>	
<i>Horsfieldia kingii</i> (Hook. f.) Warb.	Myristicaceae	Tree	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Ardisia thrysiiflora</i> D. Don.	Myrsinaceae	Shrub	Fr <sup>20</sup>	

Table 1: Continued

Species	Family	Habit	Use(s)	Medicinal
<i>Ardisia polycephala</i> Wall. ex DC.	Myrsinaceae	Tree	Lf, St, Fr <sup>10, 20, 21</sup>	
<i>Embelia nagushia</i> D. Don.	Myrsinaceae	Climber	Lf <sup>0, 20, 21</sup>	
<i>Embelia subcoriacea</i> (Cl.) Mez.	Myrsinaceae	Climber	Lf <sup>0, 20, 21</sup>	
<i>Maesa chisia</i> Buch.-Ham. ex D. Don	Myrsinaceae	Shrub	Lf, St, Fr <sup>10, 20</sup>	
<i>Maesa indica</i> (Roxb.) DC.	Myrsinaceae	Shrub	Lf, Fr <sup>10, 20, 21</sup>	
<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Tree	Lf, Fr, Br, Sd <sup>4, 7, 14, 20, 21</sup>	Yes <sup>4, 7, 14, 20</sup>
<i>Syzygium formosum</i> (Wall.) Masam	Myrtaceae	Tree	C <sup>20, 21</sup>	
<i>Syzygium fruticosum</i> DC.	Myrtaceae	Tree	Fr <sup>20, 21</sup>	
<i>Syzygium operculatum</i> (Roxb.) Nied.	Myrtaceae	Tree	Fr <sup>20, 21</sup>	
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Herb	Lf <sup>20</sup>	Yes <sup>1</sup>
<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Tree	Lf, St, Fl <sup>4, 10, 12, 20</sup>	Yes <sup>4, 10, 12</sup>
<i>Helminthostachys zeylanica</i> (L.) Hk.	Ophioglossaceae	Herb	Lf <sup>20</sup>	
<i>Ophioglossum reticulatum</i> L.	Ophioglossaceae	Herb	Wp <sup>20</sup>	
<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb	Lf, St, Wp <sup>4, 12, 13, 14, 20</sup>	Yes <sup>4, 12, 14, 20</sup>
<i>Pandanus fascicularis</i> Lam.	Pandanaceae	Tree	Fr <sup>20</sup>	
<i>Argemone mexicana</i> L.	Papaveraceae	Herb	Rt <sup>4</sup>	Yes <sup>4</sup>
<i>Butea monosperma</i> (Lam.) Taub.	Papilionaceae	Tree	Fl, Br, Sd <sup>7, 14</sup>	Yes <sup>7, 14</sup>
<i>Dalbergia rimosa</i> Roxb.	Papilionaceae	Shrub	Sd <sup>9, 20, 21</sup>	
<i>Dalbergia stipulacea</i> Roxb.	Papilionaceae	Shrub	Sd <sup>20</sup>	
<i>Dalbergia tamarindifolia</i> Roxb.	Papilionaceae	Climber	Br <sup>9, 20</sup>	
<i>Derris elliptica</i> (Roxb.) Benth.	Papilionaceae	Climber	Br, Rt <sup>9, 20</sup>	Yes <sup>9</sup>
<i>Desmodium triquetrum</i> (L.) DC.	Papilionaceae	Under shrub	Lf <sup>9, 20</sup>	
<i>Mucuna pruriens</i> (L.) DC.	Papilionaceae	Climber	Lf, Sd <sup>16, 20</sup>	Yes <sup>16, 20</sup>
<i>Pueraria phaseoloides</i> Benth.	Papilionaceae	Climber	Rt <sup>20</sup>	
<i>Pueraria thomsonii</i> Benth.	Papilionaceae	Climber	Rt <sup>20</sup>	
<i>Sesbania grandiflora</i> (L.) Poir.	Papilionaceae	Tree	Fl <sup>12, 20</sup>	
<i>Vigna vexillata</i> Benth.	Papilionaceae	Climber	Sd, Rt <sup>9, 20, 21</sup>	
<i>Passiflora foetida</i> L.	Passifloraceae	Climber	Fr <sup>20</sup>	
<i>Phytolacca acinosa</i> Roxb.	Phytolaccaceae	Herb	Lf <sup>20, 21</sup>	
<i>Peperomia pellucida</i> (L.) H.B.K.	Piperaceae	Herb	Lf, Fr, Wp <sup>15, 20, 21</sup>	Yes <sup>20</sup>
<i>Piper longum</i> L.	Piperaceae	Climber	Fr, Wp <sup>2, 20, 21</sup>	Yes <sup>2, 20</sup>
<i>Piper thomsonii</i> Hook. f.	Piperaceae	Climber	Lf <sup>20</sup>	Yes <sup>20</sup>
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Herb	Lf, Wp <sup>1, 4</sup>	Yes <sup>1, 4</sup>
<i>Saccharum spontaneum</i> L.	Poaceae	Herb	St, Rh <sup>20</sup>	
<i>Fagopyrum cymosum</i> Meissn.	Polygonaceae	Herb	Lf, St <sup>8, 20, 21</sup>	Yes <sup>18</sup>
<i>Polygonum auriculatum</i> Meissn.	Polygonaceae	Herb	Lf, St <sup>20</sup>	
<i>Polygonum chinense</i> L.	Polygonaceae	Herb	Lf, St <sup>3, 20, 21</sup>	
<i>Polygonum microcephalum</i> D. Don	Polygonaceae	Herb	Lf, St <sup>20</sup>	
<i>Polygonum minus</i> Huds.	Polygonaceae	Herb	Lf <sup>20</sup>	
<i>Polygonum orientale</i> L.	Polygonaceae	Herb	Lf, St <sup>3, 20</sup>	
<i>Polygonum perfoliatum</i> L.	Polygonaceae	Climber	Lf, St <sup>20</sup>	
<i>Polygonum plebejum</i> R. Br.	Polygonaceae	Herb	Lf, St <sup>20</sup>	
<i>Polygonum runcinatum</i> Ham.	Polygonaceae	Herb	Lf, St <sup>20</sup>	
<i>Monochoria hastata</i> (L.) Sloms	Pontederiaceae	Herb	Lf, St, Fl, Pt <sup>13, 15, 20, 21</sup>	
<i>Portulaca oleracea</i> L.	Portulacaceae	Herb	Lf, St, Fr <sup>12, 13, 15, 20, 21</sup>	Yes <sup>12, 20</sup>
<i>Hovenia dulcis</i> Thunb.	Rhamnaceae	Tree	Fr <sup>20</sup>	
<i>Zizyphus mauritiana</i> Lamk.	Rhamnaceae	Tree	Fr, Rt <sup>7, 14, 20, 21</sup>	Yes <sup>7, 14</sup>
<i>Zizyphus rugosa</i> Lamk.	Rhamnaceae	Tree	Fr <sup>20, 21</sup>	
<i>Carallia brachiata</i> (Lour.) Merr.	Rhizophoraceae	Tree	Fr <sup>14, 20</sup>	
<i>Fragaria indica</i> Andr.	Rosaceae	Herb	Lf, Fr <sup>1, 20</sup>	Yes <sup>1</sup>
<i>Prunus jenkinsii</i> Hk. f. and Th.	Rosaceae	Tree	Fr <sup>20, 21</sup>	
<i>Rubus alceifolius</i> Poir.	Rosaceae	Climber	Fr <sup>20, 21</sup>	Yes <sup>20</sup>
<i>Rubus ellipticus</i> Smith	Rosaceae	Shrub	Fr <sup>13, 20, 21</sup>	
<i>Rubus lucens</i> Focke.	Rosaceae	Shrub	Fr <sup>20</sup>	
<i>Gardenia campanulata</i> Roxb.	Rubiaceae	Tree	Lf, Fr <sup>10, 20, 21</sup>	
<i>Hedyotis corymbosa</i> (L.) Lamk.	Rubiaceae	Herb	Lf, Wp <sup>1, 20</sup>	Yes <sup>1, 20</sup>
<i>Hedyotis diffusa</i> Willd.	Rubiaceae	Herb	Lf <sup>3, 15, 20</sup>	Yes <sup>15, 20</sup>
<i>Hedyotis scandens</i> Roxb.	Rubiaceae	Climber	Lf, Rt <sup>10, 15, 20</sup>	Yes <sup>10, 15</sup>
<i>Paederia foetida</i> L.	Rubiaceae	Climber	Lf, St <sup>0, 12, 16, 20, 21</sup>	Yes <sup>10, 12, 16, 20</sup>
<i>Pavetta subcapitata</i> Hk. f.	Rubiaceae	Shrub	Lf, St <sup>0, 20, 21</sup>	
<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Tree	Lf, Fr, Rt, Br <sup>4, 5, 14, 20, 21</sup>	Yes <sup>4, 5, 14</sup>
<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Tree	Fr <sup>20, 21</sup>	
<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Shrub	Lf <sup>12, 20, 21</sup>	Yes <sup>12</sup>
<i>Zanthoxylum oxyphyllum</i> Edgw.	Rutaceae	Shrub	Lf, St, Fr <sup>18, 20, 21</sup>	
<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	Rutaceae	Tree	Lf, Fr <sup>5, 20, 21</sup>	Yes <sup>5</sup>
<i>Pyralia edulis</i> (Wall.) DC.	Santalaceae	Tree	Fr <sup>20, 21</sup>	
<i>Aphania rubra</i> Radlk.	Sapindaceae	Tree	Fr <sup>20, 21</sup>	
<i>Chrysophyllum lanceolatum</i> (Bl.) D.C.	Sapotaceae	Tree	Fr <sup>20</sup>	

Table 1: Continued

Species	Family	Habit	Use(s)	Medicinal
<i>Houttuynia cordata</i> Thunb.	Saururaceae	Herb	Lf, Rt, Wp <sup>13, 14, 16, 18, 20, 21</sup>	Yes <sup>14, 16, 20</sup>
<i>Scoparia dulcis</i> L.	Scrophulariaceae	Herb	Lf <sup>4, 20</sup>	Yes <sup>4, 20</sup>
<i>Smilax ovalifolia</i> Roxb.	Smilacaceae	Climber	Lf <sup>20</sup>	
<i>Smilax zeylanica</i> L.	Smilacaceae	Climber	Lf <sup>20</sup>	
<i>Solanum indicum</i> L.	Solanaceae	Shrub	Fr <sup>10, 20, 21</sup>	Yes <sup>10, 20</sup>
<i>Solanum khasianum</i> Cl.	Solanaceae	Undershrub	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Solanum kurzii</i> Brace ex Prain	Solanaceae	Shrub	Fr <sup>10, 17, 20, 21</sup>	Yes <sup>17</sup>
<i>Solanum nigrum</i> L.	Solanaceae	Herb	Lf, Fr, Sd <sup>4, 7, 12, 13, 18, 20</sup>	Yes <sup>4, 7, 12, 20</sup>
<i>Solanum spirale</i> Roxb.	Solanaceae	Undershrub	Lf, Fr, Rt <sup>12, 20, 21</sup>	Yes <sup>20</sup>
<i>Solanum surattense</i> Burm. f.	Solanaceae	Herb	Fr <sup>20</sup>	Yes <sup>20</sup>
<i>Solanum torvum</i> Swartz.	Solanaceae	Shrub	Fr, Sd <sup>4, 12, 14, 20</sup>	Yes <sup>4, 12, 14</sup>
<i>Sterculia alata</i> Roxb.	Sterculiaceae	Tree	Sd <sup>20</sup>	
<i>Sterculia coccinea</i> Roxb.	Sterculiaceae	Tree	Fr, Sd <sup>20, 21</sup>	
<i>Sterculia foetida</i> L.	Sterculiaceae	Tree	Fr <sup>20</sup>	
<i>Sterculia roxburghii</i> Wall.	Sterculiaceae	Tree	Sd <sup>20, 21</sup>	
<i>Sterculia versicolor</i> Wall.	Sterculiaceae	Tree	Sd <sup>20, 21</sup>	
<i>Sterculia villosa</i> Roxb.	Sterculiaceae	Tree	Sd, Rt <sup>4, 20, 21</sup>	Yes <sup>4</sup>
<i>Grewia elastica</i> Royle	Tiliaceae	Tree	Fr <sup>20, 21</sup>	
<i>Grewia hirsuta</i> Vahl	Tiliaceae	Shrub	Fr, Rt <sup>20, 21</sup>	Yes <sup>20</sup>
<i>Grewia sapida</i> Roxb.	Tiliaceae	Undershrub	Fr <sup>20, 21</sup>	
<i>Grewia sclerophylla</i> Roxb. ex G. Don	Tiliaceae	Shrub	Fr <sup>20, 21</sup>	
<i>Debregeasia hypoleuca</i> Wedd.	Urticaceae	Shrub	Fr <sup>11, 20</sup>	
<i>Debregeasia longifolia</i> (Burm. f.) Wedd.	Urticaceae	Shrub	Fr <sup>11, 20, 21</sup>	
<i>Laportea cremulata</i> Gaud.	Urticaceae	Shrub	Fl <sup>20</sup>	Yes <sup>20</sup>
<i>Sarcochlamys pulcherrima</i> Gaud.	Urticaceae	Tree	Lf, St, Fr <sup>11, 18, 20, 21</sup>	
<i>Callicarpa arborea</i> Roxb.	Verbenaceae	Tree	Fl, Br <sup>4, 10, 12, 14, 20, 21</sup>	Yes <sup>4, 14</sup>
<i>Callicarpa rubella</i> Lindl.	Verbenaceae	Shrub	Br, Rt <sup>10, 20, 21</sup>	
<i>Callicarpa vestita</i> Wall.	Verbenaceae	Tree	Br, Rt <sup>10, 20</sup>	
<i>Clerodendrum colebrookianum</i> Walp.	Verbenaceae	Shrub	Lf, Fl <sup>4, 14, 18, 20</sup>	Yes <sup>4, 14, 20</sup>
<i>Clerodendrum indicum</i> Kuntze	Verbenaceae	Shrub	Lf, St <sup>12, 20</sup>	Yes <sup>12</sup>
<i>Clerodendrum serratum</i> (L.) Spreng	Verbenaceae	Undershrub	Lf, St, Fl, Fr <sup>10, 12, 20, 21</sup>	Yes <sup>10, 12, 20</sup>
<i>Gmelina arborea</i> Roxb.	Verbenaceae	Tree	Lf, Fl, Fr, Rt, Br <sup>10, 14, 20, 21</sup>	Yes <sup>10, 14</sup>
<i>Premna latifolia</i> Roxb.	Verbenaceae	Tree	Br <sup>10, 20</sup>	
<i>Vitex negundo</i> L.	Verbenaceae	Shrub	Lf, Fl, Rt, Br <sup>1, 4, 7, 10, 12, 20</sup>	Yes <sup>1, 4, 7, 10, 12, 20</sup>
<i>Cissus quadrangularis</i> L.	Vitaceae	Climber	Lf, St, S <sup>1, 12, 20, 24</sup>	Yes <sup>1, 12, 20, 24</sup>
<i>Cissus repens</i> Lam.	Vitaceae	Climber	Lf, St <sup>16, 20, 24</sup>	Yes <sup>16</sup>
<i>Tetrastigma lanceolarium</i> Planch.	Vitaceae	Climber	Fr <sup>20</sup>	
<i>Tetrastigma thomsonianum</i> Planch.	Vitaceae	Climber	Lf, St <sup>20, 24</sup>	
<i>Vitis repens</i> W. and A.	Vitaceae	Climber	Lf, St <sup>21</sup>	
<i>Diplazium esculentum</i> (Retz.) Sw.	Woodsiaceae	Herb	Lf <sup>4, 13, 20</sup>	
<i>Achasma loroglossum</i> (Gagnep.) Larsen	Zingiberaceae	Herb	Rh <sup>20</sup>	
<i>Alpinia nigra</i> (Gaertn.) Burt.	Zingiberaceae	Herb	Lf, St, Rh <sup>20</sup>	
<i>Curcuma amada</i> Roxb.	Zingiberaceae	Herb	Rh <sup>20</sup>	Yes <sup>20</sup>
<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	Herb	Rh <sup>4, 15</sup>	Yes <sup>4, 15</sup>

Acharya and Sharma (2004)<sup>1</sup>; Bhuyan (2000)<sup>2</sup>; Bhuyan *et al.* (2000)<sup>3</sup>; Das *et al.* (2008)<sup>4</sup>; Hajra *et al.* (1997)<sup>5</sup>; Hajra *et al.* (1995)<sup>6</sup>; Kala *et al.* (2004)<sup>7</sup>; Kanjilal *et al.* (1934)<sup>8</sup>; Kanjilal *et al.* (1938, 1939, 1940)<sup>9, 10, 11</sup>; Kar and Borthakur (2008)<sup>12</sup>; Kayang (2007)<sup>13</sup>; Lalramghinglova (1996)<sup>14</sup>; Maikhuri and Gangwar (1993)<sup>15</sup>; Majumdar and Datta (2007)<sup>16</sup>; Mao *et al.* (2009)<sup>17</sup>; Murtem (2000)<sup>18</sup>; Panda (1996)<sup>19</sup>; Patiri and Borah (2007)<sup>20</sup>; Sawian *et al.* (2007)<sup>21</sup>; Sharma and Balakrishnan (1993)<sup>22</sup>; Sharma and Sanjappa (1993)<sup>23</sup>; Singh *et al.* (2000)<sup>24</sup>; Sundriyal *et al.* (1998)<sup>25</sup>; Critically endangered\*. Endangered\*. Vulnerable\*. Lf: Leaf; St: Shoot; Fl: Flower; Fr: Fruit; Rt: Root and tuber; Br: Bark; Sd: Seed; Fb: Flower bud; Wp: Whole plant; Rh: Rhizome; Pt: Petiole; S: Stem; C: Calyx

3895 plant species nearly 7.34% of species in Assam were used as wild vegetables, fruits and in ethno-medicines. In over all, 286 edible wild plants species estimated belong to 93 families and 192 genera which have potential economic value available in major forest types of Assam. Of these, 150 species were reported to be used in traditional system of medicine. The present estimates reports that out of the 286 wild edible plants, 247 species were in dicots, 32 in monocots, 5 in ferns and 2 in gymnosperms. The nature of habit in the estimated plants species revealed that tree occupied highest positions next to the herb (Fig. 3). Leaves are the most dominant parts

and as per results the leaves of 149 species are vital source of leafy vegetables. Fruits placed in the second positions next to the leaves that have been produced by 132 species (Fig. 2).

There is an international effort to identify species that face extinction in order to make conservation efforts more efficient (CITES, 2010). The Red Data Book of Indian Plants (RDB), published by the Botanical Survey of India (Nayar and Sastry, 1987, 1988, 1990), focuses exclusively on the Indian flora, more precisely on threatened angiosperms, gymnosperms and pteridophytes. In this correspondence we presented here a list of 27 plants



Table 2: Updated estimate of threatened plants species of major forest types of Assam. Data source (Nayar and Sastry, 1987, 1988, 1990, CITES, 2010, IUCN, 2010)

Species name	Family	Status	Habit	Endemism
<i>Adiantum soboliferum</i> Wall. ex Hook.	Adiantaceae	Possibly Extinct	Herb	
<i>Livistona jenkinsiana</i> Griff.	Arecaceae	Endangered	Tree	Northeastern India
<i>Ceropegia lucida</i> Wall.	Asclepiadaceae	Endangered	Climber	
<i>Synotis simonsii</i> (Cl.) Jeffrey et Chen	Asteraceae	Indeterminate	Shrub	
<i>Begonia tessaricarpa</i> Clarke	Begoniaceae	Indeterminate	Herb	Assam
<i>Euonymus assamicus</i> Blakelock	Celastraceae	Endangered	Tree	Assam
<i>Salacia jenkinsii</i> Kurz	Celastraceae	Endangered	Climber	
<i>Christensenia assamica</i> (Griff.) Ching	Christensiaceae	Vulnerable	Herb	
<i>Scleria alta</i> Boeck.	Cyperaceae	Indeterminate	Herb	
<i>Carex fuscifructus</i> Clarke	Cyperaceae	Indeterminate	Herb	Assam
<i>Ixonanthes khasiana</i> Hook. f.	Ixonanthaceae	Vulnerable	Tree	Northeastern India
<i>Lagerstroemia minuticarpa</i> Debb. ex P. C. Kanjilal	Lythraceae	Endangered	Tree	Northeastern India
<i>Albertisia mecastophylla</i> (Miers) Foman	Menispermaceae	Indeterminate	Climber	
<i>Coelogyne rossiana</i> Reichb.f.	Orchidaceae	Vulnerable	Epiphyte	
<i>Dendrobium aurantiacum</i> Reichb.f.	Orchidaceae	Endangered	Epiphyte	
<i>Pholidota watti</i> King et Pantl.	Orchidaceae	Rare	Epiphyte	Northeastern India
<i>Acranthera tomentosa</i> R. Br. ex Hook. f.	Rubiaceae	Vulnerable	Undershrub	Northeastern India
<i>Hedyotis brunonis</i> Merr.	Rubiaceae	Rare	Herb	
<i>Hedyotis scabra</i> Wall. ex Kurz	Rubiaceae	Rare	Herb	
<i>Ophiorrhiza hispida</i> Hook. f.	Rubiaceae	Endangered	Herb	
<i>Ophiorrhiza tingens</i> Cl. ex Fischer	Rubiaceae	Vulnerable	Herb	
<i>Cycas pectinata</i> Griff.	Cycadaceae	Endangered	Tree	
<i>Alsophila spinulosa</i> (Wall. ex Hook.) Tryon	Cyatheaceae	Endangered	Tree	
<i>Dioscorea deltoidea</i> Wall. ex Kunth	Dioscoreaceae	Endangered	Climber	
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Endangered	Undershrub	
<i>Gnetum montanum</i> Markgr.	Gnetaceae	Threatened	Climber	
<i>Aquilaria malaccensis</i> Lam.	Thymelaeaceae	Endangered	Tree	

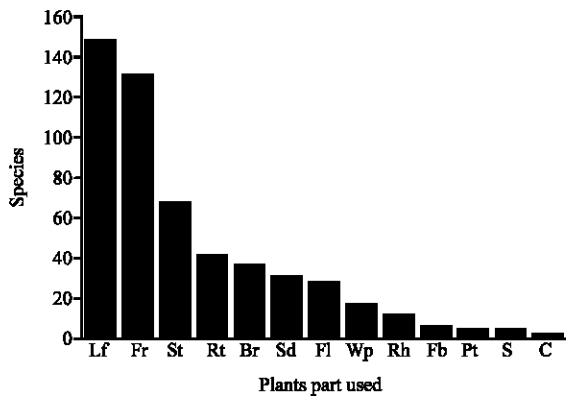


Fig. 2: Different usable parts of the wild edible plants of Assam

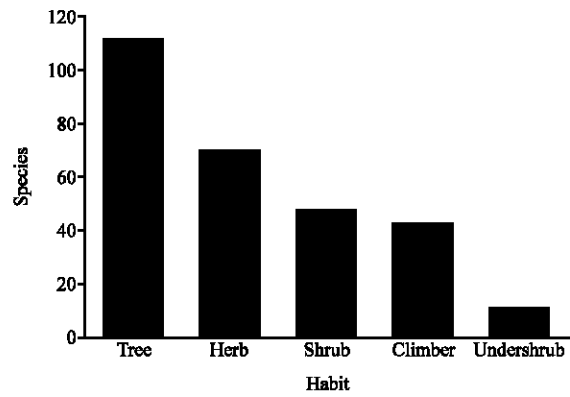


Fig. 3: Habit characteristic of the wild edible plants of Assam

(Table 2) found at different forest types of Assam which has been already included in the list of Red Data Book, CITES, IUCN Red List threat categories due to over exploitations and these plants need a strong conservation and protection management. In the present estimates we only focus those wild plants that are used as wild vegetables, fruits and in ethnomedicines by the ethnic tribes of Assam specially Bodo, Mishing, Karbi, Dimasha, Rabha, Garo, Santhals, Rajbongshi, Deuri, Tiwa, Sonowal, Manipuri, Kuki, Hmar etc. The present finding is confirmatory with the findings of Khan *et al.* (2007) that

communities of the valley get significant benefits from forests, in the form of forest products most of which are non-timber forest products especially medicinal plants.

An important element in the relationship between ethnobotany and conservation is detailed knowledge of the component of biodiversity possessed by the natives over the year and dynamics of the ecosystem (Ubom, 2010). Many researches reports on the rich bio-resources of the state since last few decades and emphasizing the importance of conservation (Kumar, 2011). However, bio-resources of the Assam are depleting so far due to

various anthropogenic activities and lack of good harvest practices (Kumar, 2011). The region also has a unique problem of enforcing conservation law. It appears from the present study that in Assam, wild vegetables, edible fruits and medicinal plants occupied a unique position; therefore the need of the hour for the region is to exploit this herbal wealth like other neighbouring South East Asian countries.

### CONCLUSION

Forests have commercially vulnerable medicinal species, which if managed appropriately can serve a sustainable income source for local peoples. An urgent need, therefore for conservation of medicinal wild plant species and their habitats and indigenous knowledge, is required. The results also revealed that many wild edible species are under growing pressures from various anthropogenic factors viz. deforestation, timber collection, logging, fire, livestock grazing etc.

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