



## Addition of fourteen species of trees to the flora of Manipur, India

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### Abstract

A field survey conducted to explore floral wealth of Manipur, a North-eastern state of India. A total of fourteen tree species have been recorded as new plant records from Manipur viz. *Bridelia glauca* Blume, *Careya arborea* Roxb., *Celtis timorensis* Spanoghe, *Dalbergia cultrata* Grah. ex Benth., *Diplokenema butyracea* (Roxb.) H.J. Lam., *Glochidion ellipticum* Wight, *Heteropanax fragrans* (Roxb. ex DC.) Seem., *Hovenia dulcis* Thunb., *Lindera candata* (Nees) Hook.f., *Litsea chartacea* (Wall. ex Nees) Hook.f., *Phoebe attenuata* (Nees) Nees, *Premna barbata* Wall. ex Schaner, *Rhaphiolepis bengalensis* (Roxb.) B.B.Liu & J.Wen and *Syzygium syzygioides* (Miq.) Merr. & Perry.

**Key words:** New records, Flora, Manipur, North-eastern India

### INTRODUCTION

Manipur, one of the eight sister states of the North Eastern Region of India, is an isolated hill-girt State stretching between 93°03' to 94°78' E longitudes and 23°80' to 25°68' N latitudes (Figure 1). It has a geographical area of 22,327 sq km that constitutes 0.7 percent of the total land area of the country. Ninety percent of the total geographical area of the State i.e. 20,089 sq km is hill-covered, the remaining area is a valley covering 2,238 sq km and accounting for only one-tenth of the total area of the state. Forest cover includes 904.99 sq km Very Dense Forest, 6,228.49 sq km Moderately Dense Forest, and 9,464.79 sq km under Open Forest, that are adding to 16,598.27 sq km of tree cover, which comes to 74.34 % of state's geographical area (F.S.I. 2021). It is a charming place encircled by nine hill ranges on all sides with a small and beautiful oval-shaped valley at the center. The State has 353 km long international border with Myanmar to Southeast and 502 km long border with the adjacent States of Nagaland on the North, Cachar district of Assam on the West and Mizoram on the South and the South-west (Figure 1). The altitude of the State varies from 790 to 2,997 m AMSL. Manipur has also been described as “a flower on the lofty heights” and “a jewel of India” (Singh *et al.* 2000).

Manipur, though small in size, has a distinct history of its own. The recorded history of Manipur as obtained from the State Royal Chronicle called the ‘*Cheitharol Kumpaba*’ covers the period from 33 AD to 1890 AD. During this period, altogether 74 kings ruled the state, of them Nongda Lairen Pakhangba (33 AD to 121 AD) was the first and the last was Kulachandra. Manipur was then a tiny independent kingdom. The State lost its independence to the British India in the year 1891. From 1892 onwards it became a princely native State under the political control of Government of British India. The British Paramountcy continued till 1947 when India won its independence (Naithani *et al.* 2010).

The valley areas of Manipur have two constituent parts, one of which is the Imphal Valley in the heart of the State and other is Jiri Valley in the west beyond the pale of hill ranges bordering the Cachar district of Assam. The Imphal Valley, with an average altitude of 775 m is more or less a flat area of 2,238 sq km. It slopes gently from North to South, from an altitude of 798 m. Besides, a number of small hills dotting the valley, the major physiographic features of the valley are numerous rivers and streams originating from the hills on all sides,

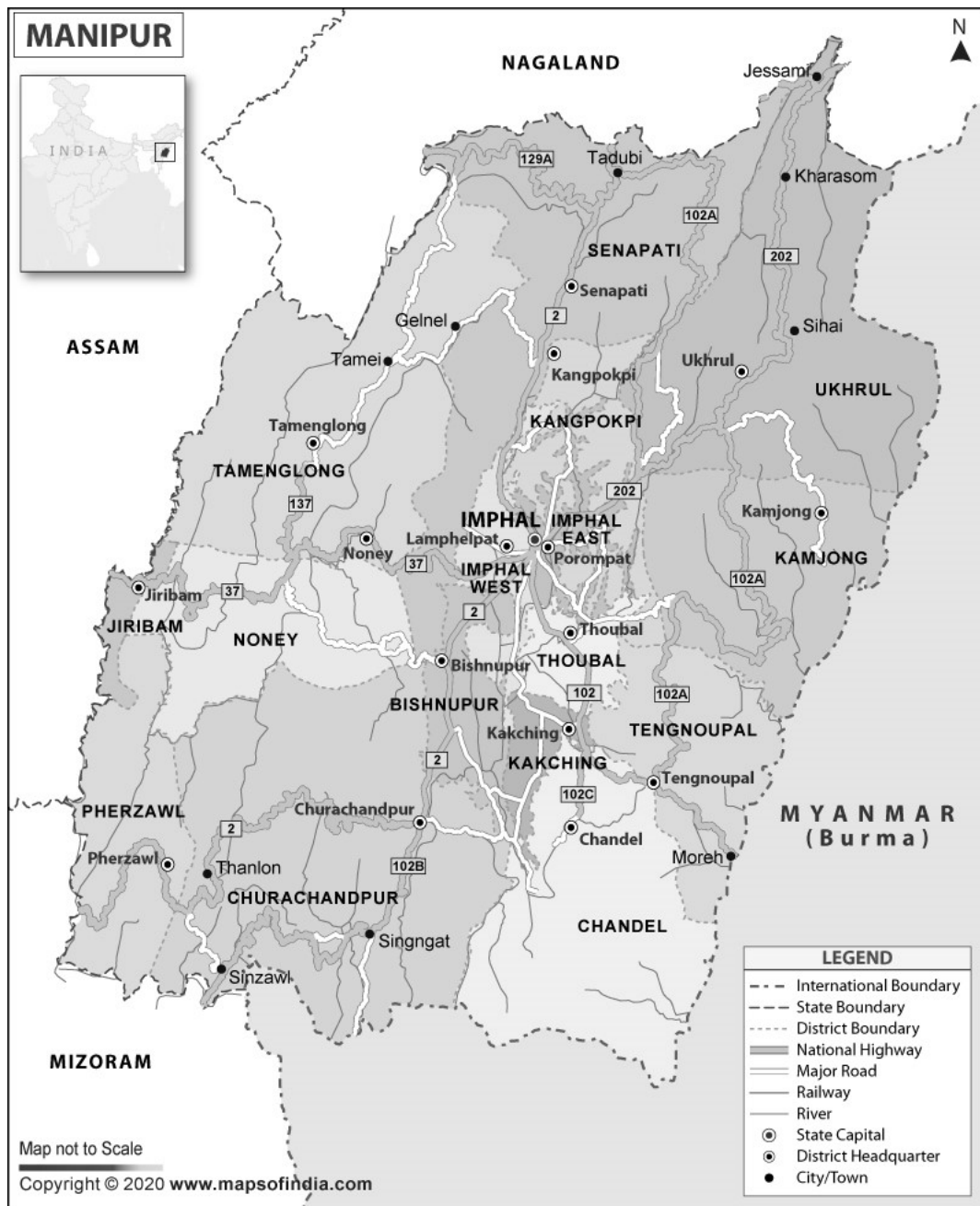


Figure 1. Political map of Manipur (study area)

many shallow lakes and marshes in the inter-fluvial areas. Its main physical feature is the Loktak Lake, a Ramsar Site, spreading over an area of 104 sq km, which is the source of Manipur River. The hill-ranges include the Naga hills to the North, the East Manipur hills along east Myanmar border, the Mizo and China hills to the South and the Western Manipur hills to the West. The mountain ranges have occasional connecting spurs and ridges of lower elevation between them. The highest point in this tract is Mount Iso (2,997 m). From this point Southwards, there is steady decrease in the height of the hill ranges.

Sir George Watt 1883 explored Manipur as a Surgeon to the boundary commission between Manipur and Burma (Burkill 1965). He Started his journey from Golaghat of Assam in spring and made a big collection of Plants. One set each of his collections was deposited in the herbaria Royal Botanical Gardens, Kew (K), Royal Botanical Garden Edinburgh (E) and Central National Herbarium (CAL), Howrah (India), and a few also in Forest Research Institute herbarium (DD), Dehra Dun. However, account of Watt's plant collections of Manipur was unpublished. After Watt, C.B. Clarke, a mathematician, made collections in 1885 from Manipur. He also followed the same route in which Watt has travelled. Later on, Clarke (1889) recorded 248 species representing 57 families of dicotyledonous plants. These plants shown great affinity to Khasi and Sikkim flora. A. Meebold in 1906-1907 made large collections from Manipur, which is now housed in CAL and few duplicates deposited in ASSAM Herbarium at Shillong (Singh *et al.* 2000). Sir Anandale in 1921 made collections of aquatic plants from Loktak-lake. K.P. Biswas in 1930 made collections from Manipur (Singh *et al.* 2000). D.C. Kaith (1932, 1936) published account of some important plants. U.N. Kanjilal, Extra Asstt. Conservator of Forests, made extensive collections from the whole of Assam and Manipur for publication of *Flora of Assam* (Kanjilal *et al.* 1934 – 1940). Kingdon-ward (1948, 1952) described the characteristics of the plants of Manipur. D.B. Deb (1956, 1957, 1958, 1961<sup>a,b</sup>) studied the flora of Manipur during 1951-1955. Later, Deb (1961<sup>a, b</sup>) published monocot and dicot floras of Manipur. Beside his personal collection of 1951-1955, he examined most of the collection made by G. Watt, C.B. Clarke, A. Meebold, D.C. Kaith and S.K. Mukerjee deposited in CAL. Deb (1961<sup>b</sup>) reported 1535 (+40 varieties) species of dicotyledonous plants representing 743 genera from 165 families. He (Deb 1961<sup>a</sup>) recorded 430 (+8 varieties) species representing 219 genera from 33 families of monocots. K.C. Malick in 1973 collected plants from Jirebam subdivision and Tauenglong district besides Nungbo, Kangpopi and adjacent forests of Imphal, enumerated 173 species and 3 varieties as addition to the flora of Manipur (Malick & Safui 1987). Besides, sporadic contributions have appeared on the floristic accounts of Manipur (Mukerjee, 1953; Jain & Shukla, 1979; Shukla & Baishya, 1979; Kataki *et al.*, 1984 a & b; Rao & Verma, 1982; Rao, 1974; Sastry & Hajra, 1983; Phukan, 1999). From Manipur University, Imphal a number of articles have also been published on various aspects (including Singh & Singh, 1983; Singh & Singh, 1985; Sinha, 1986, 1987; 1996, Sharma, 1987; Singh, 1999). However, none of these studies have provided detail account of flora of Manipur. Chauhan (1997) published floristic diversity of Manipur in the book edited by P.K. Hajra and V. Mudgal. Singh *et al.* (2000) have published first volume of flora of Manipur (Ranunculaceae to Asteraceae), which is based mostly on the basis of collections of Watt, Meebold, Kaith, Mukerjee, Deb and Malick except few sporadic collections made by Chauhan. Singh (2006) published account of the economic plants of Manipur.

In recent past some additions to the flora of Manipur was published by Singh *et al.* (2004), Khumbongmayum *et al.* (2005), Supriya Devi & Yadav (2006), Mao *et al.* (2009), Singh & De (2009). Bala Chandran & Ravikumar (2014), Dhatchanamoorthy *et al.* (2018) and Naithani *et al.* (2022). After Deb (1961b). However, there is no detailed information on the flora of Manipur as on date is available except two books for Bamboos (Naithani *et al.* 2010) and Orchids (Mao & Deori, 2018) were published.

## MATERIALS AND METHOD

A short field survey was conducted in different forest areas of Manipur during 30<sup>th</sup> November to 9<sup>th</sup> December 2015, and more than 100 Angiospermic tree species and aquatic plants were collected. Mounted Herbarium specimens prepared following the standard method of Jain & Rao (1977), have been deposited in the herbarium of Forest Research Institute, Dehra Dun (DD). Identification of tree specimens was confirmed by consulting various literature *viz.*,

Hooker (1872-1897); Clarke (1889); Brandis (1906); Kanjilal *et al.* (1934-1940); Deb (1961<sup>b</sup>); Balakrishnan (1981-1983); Haridasan & Rao (1985-1987); Thothathri (1987) and Singh *et al.* (2000). Names and family delimitation of the collected plants were updated from [www.plantsoftheworldonline.org](http://www.plantsoftheworldonline.org).

## RESULT AND DISCUSSION

During the survey authors came across fourteen interesting tree species from Manipur, one of them *viz.*, *Dalbergia cultrata*, recorded new to India, thirteen species *viz.*, *Bridelia glauca*, *Careya arborea*, *Celtis timorensis*, *Diploknema butyracea*, *Glochidion ellipticum*, *Heteropanax fragrans*, *Hovenia dulcis*, *Lindera caudata*, *Litsea chartacea*, *Phoebe attenuata*, *Premna barbata*, *Rhaphiolepis bengalensis* and *Syzygium syzygioides* are now addition to the state flora of Manipur. In earlier publications on additions to the flora of Manipur were mostly herbaceous plants. Probably, this the first-time present authors have collected and reported fourteen tree species from Manipur, that too on a short visit of ten days. Nomenclature, brief description, distribution, coloured photographs of fourteen species are provided for their easy identification.

### Enumeration

***Bridelia glauca*** Blume, Bijdr. Fl. Ned. Ind. 597. 1826; Dressler in Blumea 41(2): 311, f.4. 1996; Balak. & Chakrob., Fam. Euphorbiaceae India 318. 2007. *B. pubesens* Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 241. 1874; Hook.f., Fl. Brit. India 5: 270. 1887; Saxena & Brahman, Fl. Orissa 3: 1614. 1995; Kanjilal *et al.*, Fl. Assam 4: 145. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 778. 1987; Hajra *et al.*, Mat. Fl. Arunachal. Prad. 1: 366. 1996. [**Phyllanthaceae**]

Small trees with pubescent or tomentose branches. *Leaves* 10 – 25 cm long, elliptic, acuminate, pilose or hairy beneath. *Flowers* white, 5 – 6 mm across. *Drupes* ellipsoid or oblong, 12 × 6 mm, red when ripe.

**Specimen examined:** Sendra Park area, Bishnupur District, 1<sup>st</sup> December, 2015, H.B. Naithani & Ranjana Negi 5419. Acc. No. 173839 (DD).

**Distribution:** India [Andhra Pradesh, Arunachal Pradesh, Assam, Jharkhand, Meghalaya, Mizoram, Sikkim, Tripura, West Bengal, Bihar, Odisha and now in Manipur], Nepal, Myanmar, Bhutan, S. China, Malaysia to Bismarck Archipelago.

***Careya arborea*** Roxb., Pl. Coromandel. 3: 14t. 218. 1819; Clarke in Hook. f., Fl. Brit. India 2: 511. 1879; Kanjilal *et al.*, Fl. Assam 2: 288. 1938; Balak., Fl. Jowai 1: 201. 1981; Haridasan & Rao, For. Fl. Meghalaya 1: 403. 1985; Long & Rae in Grierson & Long, Fl. Bhutan 2(1): 290. 1991; Hajra *et al.*, Mat. Fl. Arunachal. Prad. 1: 479. 1996. *Barringtonia arborea* (Roxb.) F. Muell., Fragm. 5: 184. 1866. *Careya orbiculata* Miers. in Trans. Linn. Soc. London Bot. 1: 98. 1875 [**Lecythidaceae**]

Small or medium trees. *Leaves* 15 – 40 × 7 – 18 cm, obovate or obovate-oblong, crenate-serrate, rounded or shortly acuminate, narrowed at base. *Flowers* white and pink, 5 – 8 cm across. *Berries* 5 – 7 cm in diam., globose, fleshy, crowned with the persistent calyx.

**Specimen examined:** Before Tengnoupal, Tengnoupal district, Moreh Road, 4<sup>th</sup> December 2015, H.B. Naithani & Ranjana Negi 5461. Acc. No. 173852 (DD).

**Distribution:** Throughout India. Afghanistan.

**Note:** Singh *et al.* (2000) mentioned *C. arborea* in a chapter on page number 16 & 17 pertain to forest types. However, in the text the family Lecythidaceae has not been included.

***Celtis timorensis*** Span. in Linnaea 15: 343. 1841; Grierson & Long, Fl. Bhutan 1(1): 84. 1983; Giri *et al.*, Mat. Fl. Arunachal Prad. 2: 387. 2008; *C. cinnamomea* Lindl. ex Planch. in An. Sci. Nat.

Ser. 3,10: 303.1848; Hook. f., Fl. Brit. India 5:488. 1888; Kanjilal *et al.*, Fl. Assam 4: 228. 1940; Haridasan & Rao, For. Fl. Meghalaya 2: 805. 1987 [**Cannabaceae**]

Lofty trees with dense crown. *Leaves* 5 - 10 × 3 - 4 cm, ovate, ovate-lanceolate, caudate acuminate, base rounded to truncate, often oblique. *Cymes* 2 - 3 cm long. *Flowers* greenish-red, 0.4- 0.6 cm across. *Drupes* ovoid- ellipsoid, 1.2 - 2 cm long, white, rugose.

**Specimen examined:** On way to Koubru, Kangpokti district, Manipur, 2<sup>nd</sup> December 2015, H.B. Naithani & Ranjana Negi 5427. Acc. No. 173873 (DD).

**Distribution:** India [Goa, Karnataka, Kerela, Madhya Pradesh, Meghalaya, Mizoram, Sikkim, West Bengal and now in Manipur]. Malaysia.

*Dalbergia cultrata* T.S. Ralph in Icon. Carpolog.: 22. 1849; Baker in Hook.f., Fl. Brit. India 2: 233. 1876; Thothathri, Taxon. Rev. Dalberg. Indian Subcont. 91.f. b. 1987. *Dalbergia cultrata* Grah. ex Benth. in Miq. Pl. Jungh. 1: 254. 1851. *Amerimnon cultratum* (Grah.) O. Kuntze, Rev. Gen. Pl. 1: 159. 1891 [**Fabaceae: Faboideae**]

A deciduous tree. *Leaves* alternate, 12.3 - 25.5 cm long; leaflets 7 - 10, alternate, lamina obovate, at times widely elliptic, terminal one largest, entire, retuse to emarginated. *Inflorescence* axillary, fasciculate panicles. *Flowers* white or pale-rose, 4 - 6 mm long. *Pods* flat, oblong, 3.5 - 8 × 1 - 2 cm, glabrous, obtuse to acute at apex; *seeds* 1 - 2, uniform.

**Specimen examined:** Palel, Kakching district, 4<sup>th</sup> December 2015, H.B. Naithani & Ranjana Negi 5450. Acc. No. 173848 (DD).

**Distribution:** Native of Myanmar (Thothathri 1987). Cultivated at Forest Research Institute, Dehra Dun, Uttarakhand. Bangladesh, Cambodia, China, Laos, Thailand, Vietnam

**Note:** The present collection from Manipur from the wild, is its first record from India.

*Diploknema butyracea* (Roxb.) H.J.Lam. in Bull. Jard. Bot. Buitenzorg ser. 3, 7:186. 1925; van Royen in Blumea 9 (1): 82. 1958; Long & Rae in Grierson & Long, Fl. Bhutan 2(2): 573. 1999; Majumdar *et al.*, in J. Res. Biol. 2(7): 660. 2012. *Bassia butyracea* Roxb., Asiat. Res. 8: t. 477. 1805; Clarke in Hook.f., Fl. Brit. India 3: 546. 1882. *Illipe butyracea* (Roxb.) Engl., Bot. Jahrb. Syst. 12:509. 1890. *Mixandra butyracea* (Roxb.) Pierre ex Dubard in Revis. Gen. Bot. 20:196.1908. *Madhuca butyracea* (Roxb.) Macbr., Contr. Gray. Herb.53: 18. 1918. *Aesandra butyracea* (Roxb.) Bachni in Boissiera 11: 29. 1965. [**Sapotaceae**]

Trees upto 25 m tall. *Leaves* 17 - 35 × 8.7 cm, lamina elliptic oblong, obovate, crenate, obtusely acuminate, yellowish, cinnamomous or brownish tomentose or woolly on one or either side. *Flowers* pale-yellowish, solitary in upto 6- flowered axillary clusters. *Fruits* ovoid or oblong, 2 - 2.5 × 1 - 1.5 cm.

**Specimen examined:** After Palel, Kakching district, Moreh Road, 4<sup>th</sup> December 2015. H.B. Naithani & Ranjana Negi 5458. Acc. No. 173850 (DD).

**Distribution:** India [Assam, Arunachal Pradesh, Sikkim, West Bengal, Tripura and now in Manipur], Nepal, Tibet, Bhutan.

**Note:** Majumdar *et al.* (2012) quoted one herbarium specimen collected from Nizamghat, Assam on 5<sup>th</sup> December 1913, No. 3137, collector's name not known. Probably they have overlooked the publication by van Royen (1958), in which the above-mentioned collection was made by U.N. Kanjilal, designated as a type of another species i.e. *Diploknema butyraecoides* (Schott) H.J. Lam.

**Uses:** Seeds yield fat called *Phulwa* or *Phulwara Butter*, used as a cooking medium, also employed in the manufacture of margarine and as an adulterant of ghee. It makes excellent soap and may be mixed with sweet scented oils for use as hair pomade. Butter is substitute for cocoa butter in chocolate manufacture (Anonymous 1986).

***Rhaphiolepis bengalensis*** (Roxb.) B.B.Liu & J.Wen in Front. Plant Sci. 10:1731: 10. 2020. *Mespilus bengalensis* Roxb., Fl. Ind. 2: 510. 1832. *Eriobotrya bengalensis* (Roxb.) Kurz in Prelim. Rep. Forest Pegu, App. A: lvii. 1875; Hook.f., Fl. Brit. India 2: 371. 1878; Kanjilal *et al.*, Fl. Assam 2: 213. 1938; Haridasan & Rao, For. Fl. Meghalaya 1: 347. 1985. Grierson in Grierson & Long, Fl. Bhutan 1(3): 602. 1987; Hajra *et al.*, Mat. Fl. Arunachal. Prad. 1: 419. 1996; Mao *et al.*, Checklist Fl. Nagaland 59. 2017. [**Rosaceae**].

Medium to large trees. *Lamina* much variable, 8 - 2 x 3 - 7 cm, elliptic- oblong, lanceolate or obovate, coarsely serrate, short acuminate, thickly coriaceous. *Flowers* 1 cm across, white, fragrant in terminal panicles. *Berries* obovoid, ellipsoid, 1- celled, glabrous, upto 2 cm long.

**Specimen examined:** After Palel, Kakching district, Moreh Road, 4<sup>th</sup> December 2015, H.B. Naithani & Ranjana Negi 5460. Acc. No. 173851 (DD).

**Distribution:** India [Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Uttarakhand, West Bengal and now in Manipur], Bangladesh, Borneo, Cambodia, China, Laos, Malaysia, Myanmar, Sumatera, Thailand, Vietnam.

**Note:** Wood reddish brown, good for furniture and allied purposes (Haridasan & Rao 1985).

***Glochidion ellipticum*** Wight, Icon. Pl. Ind. Orient. 5: t. 1906. 1852; Hook.f., Fl. Brit. India 5: 321.1887; Chakrab. in J.Econ. Taxon. Bot. 26:726. 2002; Balak. & Chakrob., Fam. Euphorbiaceae India 348. 2007. *G. assamicum* (Muell.-Arg.) Hook.f., Fl. Brit. India 5: 319. 1887; Kanjilal *et al.* Fl. Assam 4: 187.1940; Long in Grierson & Long, Fl. Bhutan 1(3); 780. 1987; Haridasan & Rao, For. Fl. Meghalaya 2: 790.1987. Giri *et al.*, Mat. Fl. Arunachal Prad. 2: 372. 2008; *Phyllanthus assamicus* Muell. Arg., Fl. 48: 378. 1865. *G. balakrishanii* Jothi, Manickam, Sundraisan & Joseph. in J. Econ. Taxon. Bot. 26:114.2002. *G. mandakamdevi* Borthakur & Kalita in J. Econ. Taxon. Bot. 30: 490. f. 2. 2006. [**Phyllanthaceae**]

Large shrubs to medium trees. *Lamina* glabrous, 5 - 18 x 2 - 8 cm, elliptic, elliptic-oblong or lanceolate, acuminate, base narrowed, cuneate. *Male flowers* with long slender panicles. *Females* subsessile. *Capsules* 5 - 8 mm across, obscurely 4-lobed.

**Specimen examined:** On the way to Khoubru, Kangpokpi district, 2<sup>nd</sup> December 2015, H.B. Naithani & Ranjana Negi 5431. Acc. No. 173844 (DD).

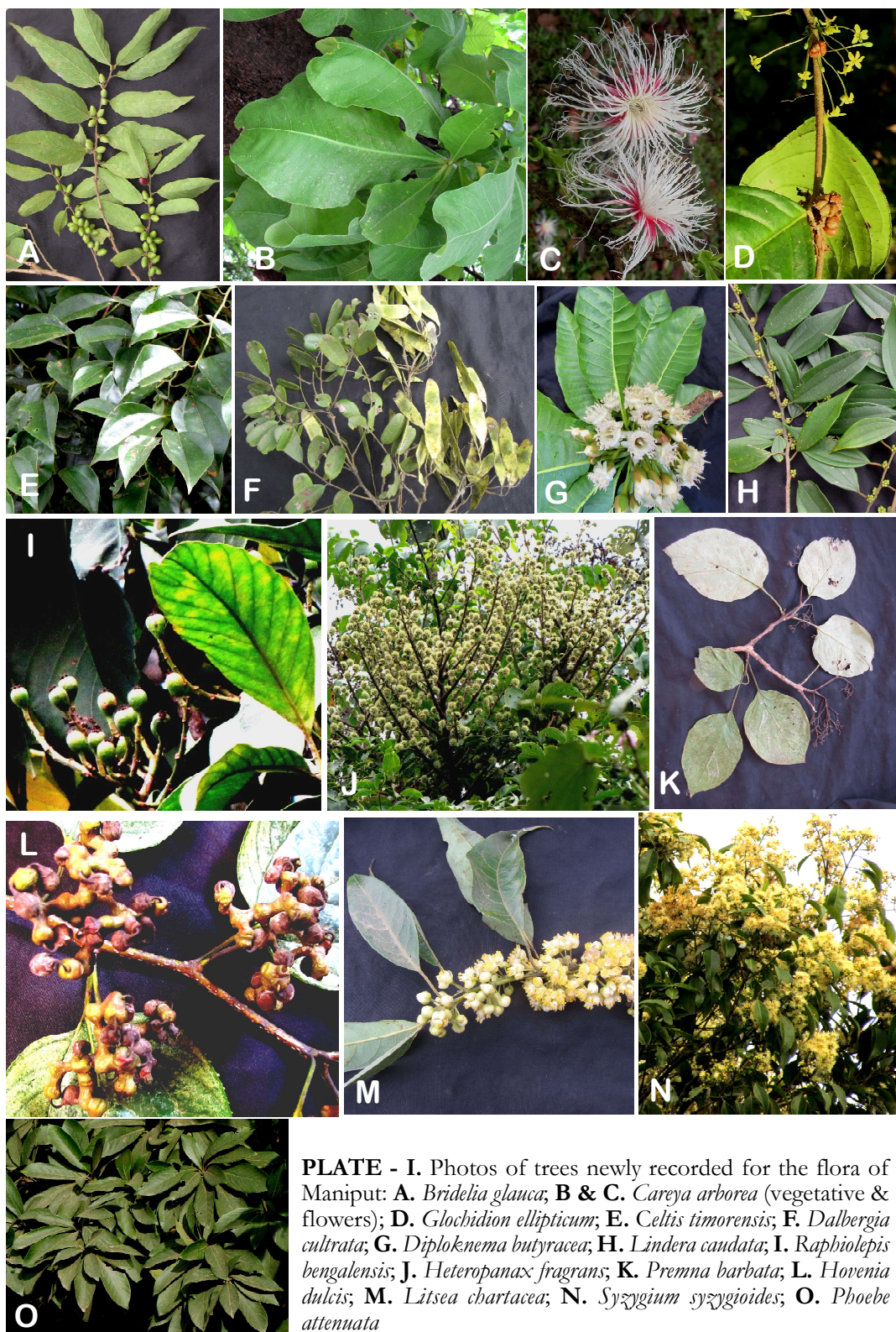
**Distribution:** India [Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Sikkim, Tamil Nadu, Tripura, Uttarakhand, West Bengal and now in Manipur], Bangladesh, China, Myanmar, Nepal, Taiwan, Thailand, Vietnam.

***Heteropanax fragrans*** (Roxb. ex DC.) Seem., Fl. Vit.: 114. 1866; Clarke in Hook. f., Fl. Brit. India 2: 734. 1879; Haridasan & Rao, For. Fl. Meghalaya 1:432. 1985; Grierson in Grierson & Long, Fl. Bhutan 2(1): 337. 1991; Hajra *et al.*, Mat. Fl. Arunachal. Prad. 1: 548. 1996; *Panax fragrans* Roxb. ex DC., Prodr.4: 254. 1830. *Heteropanax fragrans* var. *attenuatum* Clarke in Hook.f., Fl. Brit. India 2: 735. 1879. *H. fragrans* var. *subcordatus* Clarke in Hook.f., Fl. Brit. India 2: 735. 1879. *Aralia fragrans* (Roxb.) Jebb & J. Wen in Adansonia 23: 311. 2001, non G. Don ex Roudon, 1830 [**Araliaceae**]

Small trees with very few branches. *Leaves* tripinnate, 90 - 120 x 60 - 90 cm, lamina of leaflets 1 - 7, elliptical to elliptical- ovate, 7.5 - 18 cm, or the terminal attaining 23 x 12 cm, base oblique. *Umbels* racemed on the branches of an erect panicle. *Flowers* small, yellowish. *Fruits* compressed, 1 cm diam; seeds 2, flat, orbicular.

**Specimen examined:** Between Tupul and Noney, Noney District, 6<sup>th</sup> December, 2015, H.B. Naithani & Ranjana Negi 5474. Acc. No. 173855 (DD).

**Distribution:** India [Andaman Island, Assam, Arunachal Pradesh, Bihar, Odisha, Tripura, Uttarakhand, West Bengal and now in Manipur], China, Malaysia.



**PLATE - I.** Photos of trees newly recorded for the flora of Manipur: **A.** *Bridelia glauca*; **B & C.** *Careya arborea* (vegetative & flowers); **D.** *Glochidion ellipticum*; **E.** *Celtis timorensis*; **F.** *Dalbergia cultrata*; **G.** *Diploknema butyracea*; **H.** *Lindera candata*; **I.** *Raphiolepis bengalensis*; **J.** *Heteropanax fragrans*; **K.** *Premna barbata*; **L.** *Hovenia dulcis*; **M.** *Litsea chartacea*; **N.** *Syzygium syzygioides*; **O.** *Phoebe attenuata*

**Note:** When the tree is without flowers or fruits. It looks quite similar to *Oroxylum indicum*.

***Hovenia dulcis*** Thunb., Nov. Gen. Pl. 1: 8. 1781; Lawson in Hook.f., Fl. Brit. India 1: 641. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 282. 1936. [**Rhamnaceae**]

A medium sized deciduous tree with straight trunk. *Lamina* 10 - 25 x 5 - 8 cm, ovate, long acuminate, serrate, membranous, 3-nerved at the base. *Flowers* white in axillary and terminal dichotomous cymes. *Fruits* 3 celled, indehiscent drupe, about 8 mm diam., peduncles and part of the inflorescence thicken into a fleshy mass when the fruit ripens.

**Specimen examined:** On way to Koubra, Kangpojkpi district, 2<sup>nd</sup> December 2015, H.B. Naithani & Ranjana Negi 5426. Acc. No. 173842 (DD).

**Distribution:** India [Arunachal Pradesh, Assam, Meghalaya, Himachal Pradesh, Jammu Kashmir, Tamil Nadu, Uttarakhand, West Bengal and now in Manipur].

***Lindera caudata*** (Nees) Hook.f., Fl. Brit. India 5: 184. 1886; Kanjilal *et al.*, Fl. Assam 4: 97. 1940; Balak., Fl. Jowai 2: 401. 1983; Haridasan & Rao, For. Fl. Meghalaya 2: 726. 1987; Giri *et al.*, Mat. Fl. Arunachal Prad. 2: 335. 2008; Chakrab. in Ind. J. Forestry 39 (2): 185. 2016. *Daphnidium caudatum* Nees in Wallich, Pl. Asiat. Rar. 2: 63. 1831. *Lindera wardii* Allin in Brittonia 4: 63. 1941. *Itea daphnecaudata* (Nees) H.W. Li in Acta Bot. Yunnan 7: 132. 1985. [**Lauraceae**]

Medium or small trees. *Lamina* 5-14 x 2- 4.5 cm, ovate or elliptical, lanceolate, caudate acuminate, base rounded to obtuse. *Umbels* axillary, spicate, 1.5- 2 cm across. *Fruits* globose, 5 – 7mm across, yellow dotted.

**Specimen examined:** Ukhrul, Ukhrul district, 3<sup>rd</sup> December 2015, H.B. Naithani & Ranjana Negi 5444. Acc. No. 173846 (DD).

**Distribution:** India [Arunachal Pradesh, Meghalaya, Nagaland and now in Manipur], Bangladesh, Thailand, China Laos and Myanmar.

***Litsea chartacea*** (Wall. ex Nees) Hook.f., Fl. Brit. India 5: 170. 1886; Grierson & Long, Fl. Bhutan 1(2): 275. 1984; Gangop. *et al.*, Lauraceae In. Fl. Pl India Annot. Checklist Vol. II. 439. 2020 (Eds. S.S. Dash & A.A. Mao). *Tetranthaera chartacea* Wall. ex Nees in Wallich, Pl. Asiat. Rar.2: 66. 1831. [**Lauraceae**]

Shrubs or small trees. *Leaves* 10 - 20 x 3 - 5 cm, elliptic- oblong, glabrous, green above, whitish beneath, shortly acuminate, lateral veins 7 - 9 pairs; petiole slender. *Umbel* buds 4-6 mm, flowers on short pedicles, 1 - 2 mm. *Fruits* ellipsoid, 17 x 10 mm, obtuse.

**Specimen examined:** Between Litan and Ukhrul, Ukhrul district, 3<sup>rd</sup> December 2015, H.B. Naithani & Ranjana Negi 5443. Acc. No. 173845 (DD).

**Distribution:** India [Arunachal Pradesh, Assam, Mizoram, Sikkim, West Bengal and now in Manipur]

***Phoebe attenuata*** (Nees) Nees, Syst. Laur. 104. 1836; Hook.f., Fl. Brit. India 5: 143. 1886; Kanjilal *et al.*, Fl. Assam 4: 73. 1940; Haridarsan & Rao, For. Fl. Meghalaya 2: 74. 1987; Giri *et al.*, Mat. Fl. Arunachal Prad. 2: 344. 2008. *Ocotea attenuata* Nees in Wall., Pl. Asiat. Rar. 2 :71. 1831. [**Lauraceae**]

Large trees, branches horizontal. *Lamina* 10 - 18 x 3 - 8 cm, oblanceolate, ovate- lanceolate, obtuse or subacute, base narrow, attenuate. *Flowers* 6 - 7 mm across, yellowish- white. *Fruits* ellipsoid, 7 - 15 mm long.

**Specimen examined:** Before Tengnoupal, Tengnoupal District, Moreh Road, 4<sup>th</sup> December 2015, H.B. Naithani & Ranjana Negi 5462. Acc. No. 173853 (DD).

**Distribution:** India [Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, West Bengal and now in Manipur].



**Note:** The straight bole produces good quality timber, which can be a substitute for teak (Haridasan & Rao 1987).

***Premna barbata*** Wall. ex Schauer in DC., Prodr. 11: 636. 1847; Clarke in Hook.f., Fl. Brit. India 4: 579. 1885; Kanjilal *et al.*, Fl. Assam 3:476.1939; Balak., Fl. Jowai 2: 386. 1983. Haridasan & Rao, For. Fl. Meghalaya 2: 682. 1987; Long in Grierson & Long, Fl. Bhutan 2(2): 924. 1999; Rajendran & Daniel, Ind. Verbenaceae (Taxon. Rev.) 217. 2002; Giri *et al.*, Mat. Fl. Arunachal Prad. 2: 268. 2008. *P. calycina* Haines in Bull. Misc. Inform. Kew 1922: 122. 1922; Saxena & Brahmam, Fl. Orissa 3: 1417. 1995. [**Lamiaceae**]

Small laxly spreading tree. *Lamina* 4 - 5 × 2 - 8 cm, ovate, ovate-oblong, ± serrate or dentate, caudate-acuminate, 2 - 5 nerved. *Corymbs* 3-6 cm across. *Flowers* small, white or greenish-white. *Fruits* 4 - 5 mm across, globose, blackish- purple when ripe, 1 - 2 seeded.

**Specimen examined:** Sendra Park, Bishnupur district, 1<sup>st</sup> December 2015, H.B. Naithani & Ranjana Negi 5423. Acc. No. 173841 (DD).

**Distribution:** India [Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim, West Bengal, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Odisha, Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Uttarakhand and now in Manipur].

***Syzygium syzygioides*** (Miq.) Merr. & L.M.Perry in J. Arnold Arbor. 19: 109. 1938; Balak., Fl. Jowai 1:200.1981; Haridasan & Rao, For. Fl. Meghalaya 1:402.1985; Hajra *et al.*, Mat. Fl. Arunachal. Prad. 1: 479. 1996; Mao *et al.*, Checklist Fl. Nagaland 64. 2017. *Jambos syzygioides* Miq., Fl. Ind. Bat. Ser. 1, 1:341.1855. *Eugenia cymosa* Wight, All. Ind. Bot. 2:17. 1841, *non* Lam., 1789; Kanjilal *et al.*, Fl. Assam 2:273.1938 [**Myrtaceae**]

Large trees with dense crown. *Lamina* 4 - 10 x 2 - 5 cm, elliptic- lanceolate, oblong-elliptic, caudate or long acuminate, base narrow, cuneate. *Cymes* in densely panicles, dense flowered. *Flowers* white, 1 - 1.3 cm across. *Berries* globose, blackish-purple when ripe, 8 - 10 mm long, crowned by the calyx limb.

**Specimen examined:** Before Tangnoupal, Tengnoupal District, Moreh Road, 4<sup>th</sup> December 2015, H.B. Naithani & Ranjana Negi 5463. Acc. No. 173854 (DD).

**Distribution:** India [Andaman & Nicobar Islands, Assam, Meghalaya, Nagaland, Tripura and now in Manipur]. Bangladesh, China, Myanmar, Malaysia, Singapore and Indonesia.

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