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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

ADDITIONS OF WOODY CLIMBERS (LIANAS) TO THE FLORA OF MANIPUR, INDIA

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26 March 2020 | Vol. 12 | No. 4 | Pages: 15522–15529

DOI: [10.11609/jott.4802.12.4.15522-15529](https://doi.org/10.11609/jott.4802.12.4.15522-15529)



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Additions of woody climbers (Lianas) to the flora of Manipur, India

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Manipur, one of the northeastern states of India, is a predominantly hilly and forest dominated state with an area of 22,327km². Out of the total geographical area, 17,477km² is under forest cover which constitutes about 78% of the total area of the state. The state shares an international boundary with Myanmar (Anonymous 2009). Due to diverse phytogeography and varied climatic conditions, the state has provided suitable habitats for the growth of luxuriant floral elements. The total floral richness and abundance are also evidenced by the diversity of lianas in the state.

To explore the liana diversity of the state, a study has been carried out since 2013. During field explorations, the first author collected many woody climbers (lianas) from the study area of which five were found uncommon ones. After critical morpho-taxonomic examination of all the specimens, scrutiny of relevant literature (Hooker 1875–83; Kanjilal et al. 1934–39; Fang & Staples 1995; Chang et al. 1996; Chen & Turland 2007; Chen et al. 2007; Quang et al. 2013; eFlora 2017) and matching of specimens housed in herbaria of Botanical Survey of India (BSI), Eastern Regional Centre, Shillong (ASSAM) and Central National Herbarium (CNH), Howrah (CAL), the species were identified as *Ampelopsis rubifolia* (Wall.) Planch.

(Vitaceae), *Argyreia wallichii* Choisy (Convolvulaceae), *Combretum sundaicum* Miq. (Combretaceae), *Jasminum lanceolaria* Roxb. (Oleaceae), and *Tetrastigma obovatum* Gagnep. (Vitaceae). The identities of all the five species were further confirmed consulting the digitized images of type specimens at Royal Botanic Gardens, Kew, London (K) (www.apps.kew.org).

The perusal of relevant literature (Deb 1957, 1961; Chaudhuri & Naithani 1985; Singh et al. 2000) revealed that these species were not so far known from Manipur; hence, this report constitutes five new distribution records and additions of woody climbers to the state of Manipur.

The specimens were preserved following standard herbarium methods (Jain & Rao 1977) and deposited in ASSAM and the Herbarium of Department of Life Science & Bioinformatics, Assam University, Silchar. Detailed taxonomic description, illustration, and photographs are provided for easy identification of the species. In the treatment, families are arranged alphabetically and again species are arranged alphabetically within a family where the family contains more than one species.

Editor: K. Ravikumar, Foundation for Revitalisation of Local Health Traditions (FRLHT), Bengaluru, India.

Date of publication: 26 March 2020 (online & print)

Citation: Chanu, L.M. & D. Bhattacharyya (2020). Additions of woody climbers (Lianas) to the flora of Manipur, India. *Journal of Threatened Taxa* 12(4): 15522–15529. <https://doi.org/10.11609/jott.4802.12.4.15522-15529>

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Funding: None.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are thankful to the head, Department of Life Science and Bioinformatics, Assam University, Silchar for providing necessary facilities. The authors are also grateful to the head(s) of the herbaria ASSAM and CAL, Botanical Survey of India for giving permission to consult the herbarium and library. The first author is thankful to the principal chief conservator of forest, Forest Department, Government of Manipur for giving permission to explore the reserve forest areas of Manipur.



Family: Combretaceae

1. *Combretum sundaicum* Miq., Fl. Ned. Ind., Eerste Bijv. 2: 327. 1861; C.B. Clarke in Hook.f., Fl. Brit. India 2: 458–459. 1878; Kanjilal et al., Fl. Assam 2: 256. 1938; Jie & Turland in Wu et al., Fl. China 13: 316–320. 2007. (Fig. 1; Image 1).

Large woody climber. Stems terete, glabrous; young branchlets short brown pubescent. Leaves simple, opposite; petioles 0.1–0.7 cm long, glabrous. Leaf blades broadly elliptic-ovate, 7–17 × 4–12 cm, obtuse-subacute at base, acute-acuminate at apex, entire at margins, thinly coriaceous, densely scaly at both surfaces; scales minute, yellow at abaxial surface, white at adaxial surface; lateral veins 7–8 pairs. Inflorescences apical to axillary, compound dichasium, c. 5–13 cm long, usually grouped at apex of branchlets forming a panicle, densely villous at axes, inconspicuously scaly; hemispheric capitula composed of apically condensed flower-bearing spikes, c. 0.8–1.3 cm long; bracts linear, caducous; buds ovate, acute at apex. Calyx tube infundibuliform, c. 0.7–1.2 cm long, glabrous at abaxial surface, yellow scaly, ring of densely coarse hairs at adaxial surface, 4-lobed; lobes broadly triangular-deltoid, c. 2 mm long, shortly acute-acuminate at apex. Petals 4, white, obovate-oblong, c. 0.2 × 0.1 cm, obtuse-rounded at apex. Stamens 8, exserted, c. 6 mm long; anthers ellipsoid, c. 1 mm long. Ovary superior, c. 3 mm long; styles terete, c. 8 mm long. Fruit not found.

Flowering: June–July.

Habitat: The species grows in shady areas along roadsides and hilly slopes between 1,000–1,126 m.

Specimen examined: #94641, 4.vii.2014, India, Manipur, Noney District, Charoi Chakotlong II, 24.752°N & 93.616°E, c. 1,126.90m, coll. L.M. Chanu 25359, ASSAM (Image 6).

Distribution: India (Assam, Manipur, Sikkim), Borneo, Java, peninsular Malaysia, Singapore, Sumatra, Thailand, Vietnam (<http://www.catalogueoflife.org>), (<https://www.indiabiodiversity.org>).

Family: Convolvulaceae

2. *Argyreia wallichii* Choisy, Mém. Soc. Phys. Genève 6: 422. 1833; C.B. Clarke in Hook.f., Fl. Brit. India 4: 187. 1883; Kanjilal et al., Fl. Assam 3: 342. 1939; Rhui-cheng & Staples in Wu et al., Fl. China 16: 316. 1995. (Fig. 2; Image 2).

Woody climber, extensively large. Stems terete, pale greenish; young branchlets short white tomentose. Leaves compound, opposite; petioles 5–13 cm long. Leaf blades broadly ovate-cordate, 11–24 × 8–19 cm, cordate at the base, acute at apex, entire at margins,



Image 1. *Combretum sundaicum* Miq.

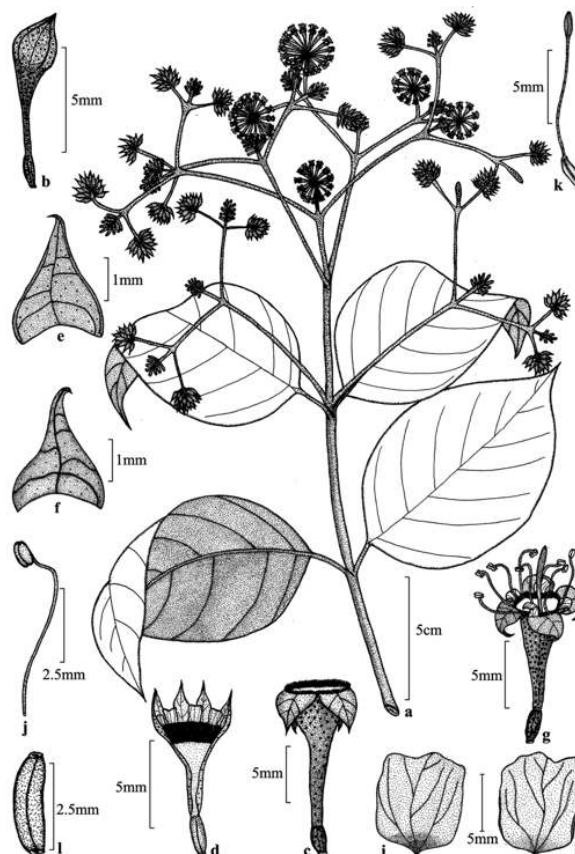


Figure 1. *Combretum sundaicum* Miq.: a—flowering twig | b— bud | c—calyx | d—calyx throat with rims of hairs | e—calyx lobe (adaxial view) | f—calyx lobe (abaxial view) | g—floret | h—petal (adaxial view) | i—petal (abaxial view) | j—androecium | k—gynoecium | l—ovary.

pale greenish, densely white tomentose at abaxial surface, glabrous at adaxial surface with sparsely strigose hairs along midrib; lateral veins 10–17 pairs, prominent at base adaxially. Inflorescences terminal-

axillary, capitate cymes, many flowered; peduncles up to 2cm long, pubescent. Outer bracts persistent, ovate-elliptic, 3–3.5 × 2–2.5 cm, greyish pubescent at abaxial surface, glabrous and nerved at adaxial surface, entire at margins. Inner bracts persistent, ovate-elliptic, 2–2.5 × 1–1.5 cm, pubescent at abaxial surface, glabrous at adaxial surface and nerved. Corolla and androecium not seen. Ovary globose to ovate-elliptic, glabrous, obtuse at apex; styles c. 1 cm long. Fruits not seen.

Flowering: October–November.

Habitat: The species was found in a deforested area at an elevation of c. 1,000m and climbing on *Pinus* sp.

Specimen examined: #94637, 3.xi.2013, India, Manipur, Chandel District, Chakpi karong Sub-division, Gohok Village, 24.207°N & 93.900°E, coll. L.M. Chanu 25324, ASSAM (Image 7).

Distribution: India (Sikkim, Manipur, West Bengal (Darjeeling)), Bhutan, China, Myanmar, northern Thailand (<http://www.catalogueoflife.org>).

Family: Oleaceae

3. *Jasminum lanceolaria* Roxb., Fl. Ind. 1: 98. 1820; C.B. Clarke in Hook.f., Fl. Brit. India 3: 601. 1882. Mei-Chen et al. in Wu et al., Fl. China 15: 314. 1996. Quang et al., *J. Biol.* 35(4): 431. 2013; Kanjilal et al., Fl. Assam 3: 232. 1939. *Jasminum lanceolaria* var. *puberulum* Hemsl., *J. Linn. Soc., Bot.* 26: 78. 1889. (Fig. 3; Image 3).

Woody climber. Stems terete; young branchlets smooth, greenish. Leaves opposite, 3-foliolate, sometimes reduced to single at the base of inflorescences; petioles 1–3 cm long, glabrous; petiolules 2–4.5 cm long, glabrous. Leaflets elliptic-ovate, coriaceous, cuneate-rounded at base, acute-acuminate at apex, entire at margins; nerve obscure, 5–8 pairs of lateral nerves; terminal leaflets larger than lateral leaflets, 6–12 × 3–4 cm; lateral leaflets 6–10 × 2.5–3.5 cm. Inflorescences compound, terminal-axillary, pedunculate trichotomous cymes, many flowered, 7–12 cm long. Bracts linear, 1–5 × 1–2 mm; bracteoles linear, c. 1 × 0.5 mm long, serrate at margins. Flowers fragrant, white, pentamerous; pedicels 0–1.2 cm long, glabrous. Calyx tubular, glabrous, 2–5 × 2 mm wide; lobes minutely dentate, c. 0.5 mm long. Corolla white, hypocrateriform; tubes 2–3 × 0.2–0.3 cm wide; 5-lobed, lobes oblong-lanceolate, 1–1.3 × 0.4–0.5 cm. Stamens 2; filament short, attached to throat; anthers c. 0.6 cm. Ovary c. 0.1 cm long, styles terete, c. 0.5 cm long; stigma c. 0.3 cm long. Fruits not seen.

Habitat: Grows in moist forests at an altitude of c. 782m.

Flowering: April–May.



Image 2. *Argyreia wallichii* Choisy. Inset: persistent bracts.



Figure 2. *Argyreia wallichii* Choisy: a—flowering twig | b—outer bract (adaxial view) | c—outer bract (abaxial view) | d—inner bract | e—outer and inner bracts arrangement | f—gynoecium.

Specimen examined: #94638, 7.iv.2014, India, Manipur, Chandel District, Chakpi karong Sub-division, Khubung Khunou, 24.198°N & 93.908°E, coll. L.M. Chanu 25337, ASSAM (Image 8).

Distribution: India (Andaman Island, Assam, eastern



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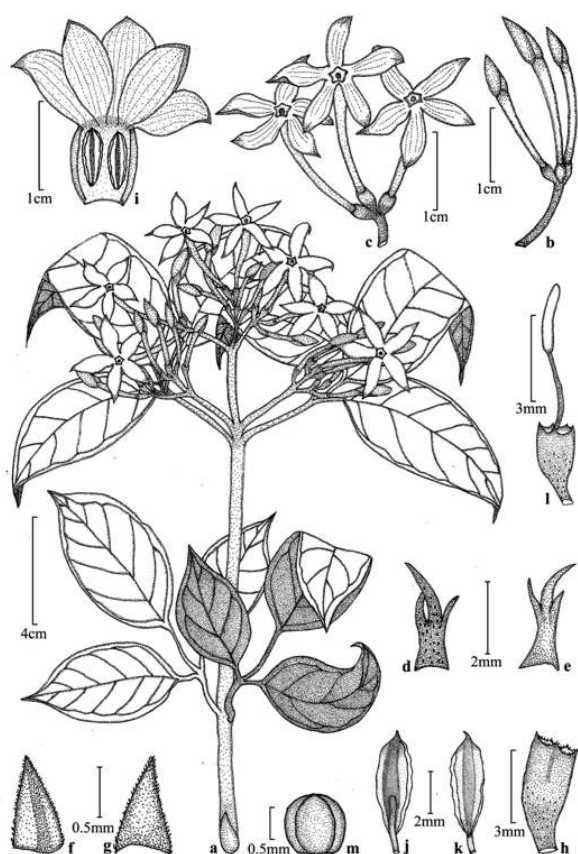
Image 3. *Jasminum lanceolaria* Roxb.

Figure 3. *Jasminum lanceolaria* Roxb.: a—flowering twig | b—bud | c—floret | d—bract (abaxial view) | e—bract (adaxial view) | f—bracteole (abaxial view) | g—bracteole (adaxial view) | h—calyx | i—corolla showing epipetalous stamens | j—stamen (abaxial view) | k—stamen (adaxial view) | l—gynoecium | m—ovary.

Himalaya, Manipur), Bangladesh, China, Japan, Malaya, Myanmar, Taiwan, Thailand, Vietnam (<http://www.catalogueoflife.org>).

Family: Vitaceae

4. *Ampelopsis rubifolia* (Wall.) Planch., Monogr. Phan. 5: 463. 1887; Chen in Wu et al., Fl. China 12: 183. 2007. *Vitis rubifolia* Wall., Fl. Ind., ed. 1820 2: 480 1824. M.A. Lawson in Hook.f., Fl. Brit. India 1: 663. 1875; Kanjilal et al., Fl. Assam 1(1): 302. 1934. (Fig. 4; Image 4).

Large woody climber. Stems angular, glabrous; young branchlets slender, surface covered with densely rusty ferruginous pilose hairs; tendrils anti-folius, bifurcate. Leaves compound, bipinnate, rarely 3-foliolate, c. 22 cm long; petioles 5–11 cm long, densely curly pilose; terminal leaflets petiolules c. 2–3 cm long; lateral leaflets petiolules c. 0.2–0.5 cm long, densely curly pilose. Leaflets ovate-elliptic, 4–11 × 2.5–6.5 cm, sub-truncate at base, acute-acuminate at apex, serrate at margins, pubescent at abaxial surface, glabrous at adaxial surface; 5–7 pairs of lateral nerves. Inflorescences leaf-opposed, umbellate cymes, c. 11cm long, pseudo-terminal, densely curly ferruginous pilose; peduncles 5–8 cm long, densely rusty ferruginous pilose. Flowers pale greenish, c. 0.3cm long; pedicels 1–0.2 cm long, densely rusty ferruginous pilose; buds ovoid, c. 0.3 cm long, rounded at apex, rusty ferruginous pilose abaxially. Calyx cupular, 0.2–0.3 × 0.1–0.2 cm, rusty pilose at abaxial surface; 5-lobed, lobes apex slightly sub-truncate, densely rusty ferruginous pilose abaxially. Petals c. 0.2cm long, 5-lobed, elliptic-ovate, pubescent at abaxial surface. Stamens 5, c. 1.5mm long; anthers ovate, c. 0.5mm long, dorsifixed. Disc cupular. Ovary adnate to disc; styles short, conical; stigmas capitate. Fruits not seen.

Habitat: The species grows along roadsides and hill slopes at an elevation of c. 880m. It forms a large canopy on tree species viz. *Acacia* sp. and *Pinus* sp. Associated other species recorded was *Millettia pachycarpa* Benth. (Leguminosae: Papilionoideae).

Flowering: Mid April–June.

Specimen examined: #94639, 29.vi.2016, India, Manipur, Chandel District, Beru Anthi, 24.331°N & 94.975°E, coll. L.M. Chanu 25441, ASSAM (Image 9).

Distribution: India (Assam, Manipur, Meghalaya, Mizoram), Bangladesh, China (<http://efloraindia.nic.in>, <http://www.catalogueoflife.org>).

5. *Tetragastium obovatum* (M.A. Lawson) Gagnep., Notul. Syst. (Paris) 1(9): 266–267. 1910; Teng in Wu et al., Fl. China 12: 202. 2007; *Vitis obovata* M.A. Lawson in



Image 4. *Ampelopsis rubifolia* (Wall.) Planch.

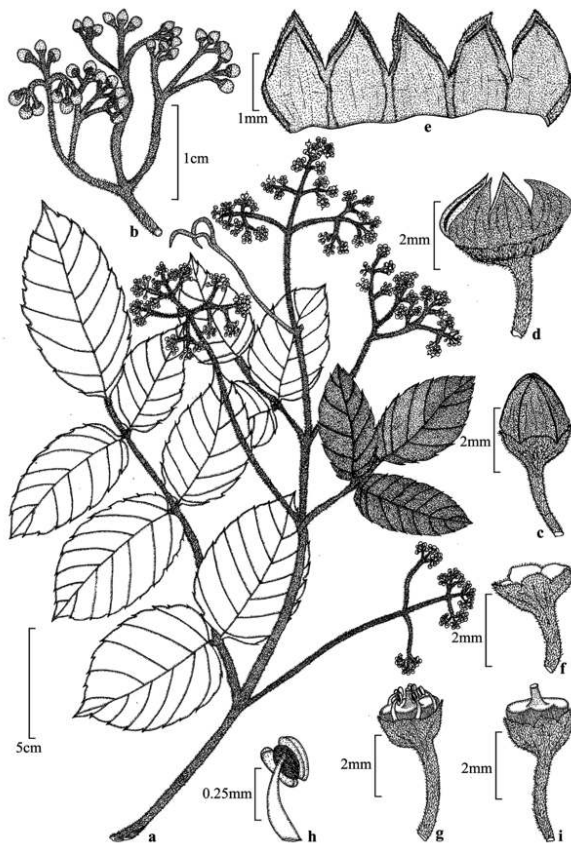


Figure 4. *Ampelopsis rubifolia* (Wall.) Planch.: a—flowering twig | b—inflorescence | c—bud | d—floret | e—corolla (adaxial view) | f—calyx | g—androecium | h—stamen | i—gynoecium.

Hook.f. Fl. Brit. India 1(3): 658–659. 1875; Kanjilal et al., Fl. Assam 1(1): 298. 1934; Deb, Fl. Tripura 1: 415. 1981. (Fig. 5; Image 5).

Large woody climber. Stems flattened; young branchlets terete, densely hirsute; tendrils anti-folius, unbranched. Leaves palmately 5-foliolate; petioles 10–15 cm long, densely hirsute; petiolules 1–2 cm long, densely hirsute. Leaflets ovate, obovate-elliptic, hirsute at abaxial surface, adaxially glabrous with sparsely pilose hairs at veins, membranous, serrate at margins; lateral nerves 6–8 pairs, distinct; terminal leaflets obovate-elliptic, 15–20 × 7–9 cm, cuneate at base, acuminate at apex, serrate at margins; lateral leaflets elliptic-ovate, 11–18 × 4.5–8.5 cm, asymmetric at base, acuminate at apex, serrate at margins. Flowers not seen. Infructescences axillary, umbelliform, dichasium. Fruits berry, globose, smooth, 1.8–2 cm, 2–4 seeded. Seeds ellipsoid, c. 1 cm long, plano-convex, rostrate at base, retuse at apex with transverse line on both surfaces, ventrally furrowed, up to apex.

Habitat: Grows in moist and shady areas at an elevation of 790–1,340 m.

Fruiting: June–July.

Specimens examined: #94640, 15.vi.2014, India, Manipur, Imphal West District, Orchid Preservation Centre, Khonghampat, 24.892°N & 93.898°E, c. 793 m, coll. L.M. Chanu 25348, ASSAM; #94642, 04.vii.2014, India, Manipur, Churachandpur District, Ngariyan Hill, 24.611°N & 93.688°E, c. 1,340m, coll. L.M. Chanu 25363, ASSAM (Image 10).

Distribution: India (Assam, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim), Bangladesh, China, Myanmar, Thailand, Vietnam (<http://www.catalogueoflife.org>).

Notes: As per IUCN (2019), threat status of these five species has not been assessed. No ecological studies were also conducted for enumeration of their abundance in the study area in this present study, however, field observations made in the entire state during the last six years showed that *Ampelopsis rubifolia*, *Argyreia wallichii*, *Combretum sundaicum*, and *Jasminum lanceolaria* were rare in the state and were recorded only from hill regions of Manipur. The first author could recognize only one population of each of these four species in the field. In contrast, *Tetrastigma obovatum* was found common throughout and seen growing abundantly in different localities in the state, both in hilly and valley districts. Deforestation of timber-yielding plants might have had a devastating impact on the overall population status of lianas in the state as this curious growth form is fully



Image 5. *Tetrastigma obovatum* (M.A. Lawson) Gagnep.

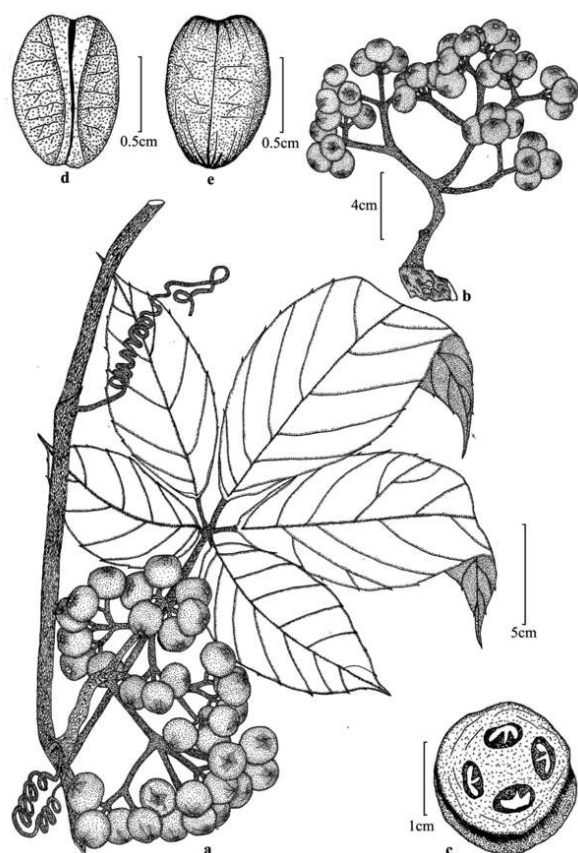


Figure 5. *Tetrastigma obovatum* (M.A. Lawson) Gagnep.: a—fruiting twig | b—fruit | c—transverse section of fruit | d—seed (adaxial view) | e—seed (abaxial view).

dependent upon their supporting trees for their climbing mechanisms. Therefore, to preserve these lianas, in situ conservation of overall habitat should be prioritized.

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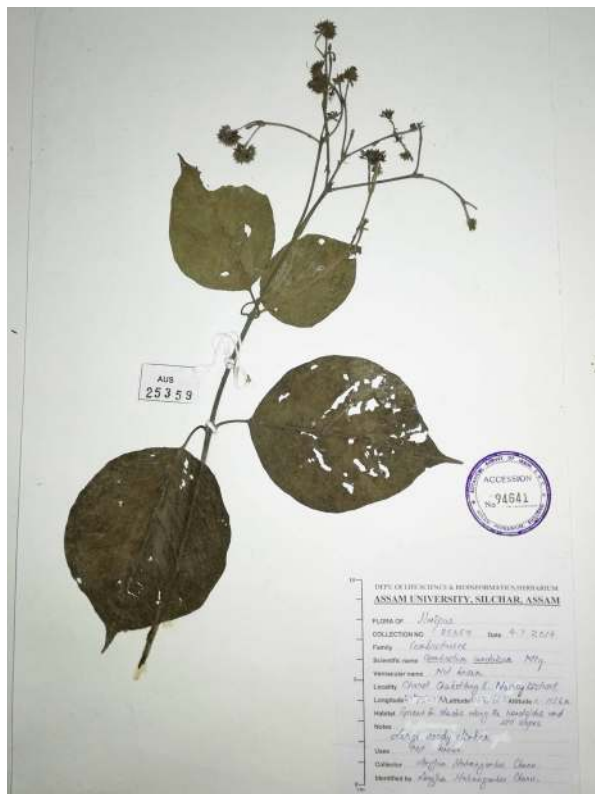
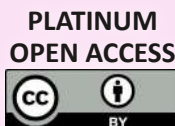
Image 6. *Combretum sondaicum* Miq. [#94641]Image 7. *Argyreia wallichii* Choisy. [#94637]Image 8. *Jasminum lanceolaria* Roxb. [#94638]Image 9. *Ampelopsis rubifolia* (Wall.) Planch. [#94639]



Image 10. *Tetrastigma obovatum* (M.A. Lawson) Gagnep. [#94640] & [#94642]





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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

March 2020 | Vol. 12 | No. 4 | Pages: 15407–15534

Date of Publication: 26 March 2020 (Online & Print)

DOI: 10.11609/jott.2020.12.4.15407-15534

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