

Taxonomic revision of *Garcinia* (Clusiaceae) in India

Mohan N. *, Shameer P.S. & T. Sabu

Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode,
Thiruvananthapuram, Kerala - 695 562, India

*E-mail: nmohan59@gmail.com

Abstract: A taxonomic revision of the genus *Garcinia* L. (Clusiaceae) in India is provided. Thirty three species and seven varieties are recognized, which include four recently described species, *G. assamica* Sarma *et al.*, *G. gamblei* Shameer *et al.*, *G. pushpangadaniana* Sabu *et al.* and *G. sibeswarii* Shameer *et al.* *Garcinia kydia* Roxb. is reduced to a variety of *G. cowa* Roxb. ex DC. Lectotypes are designated for six names (*G. acuminata* Planch. & Triana, *G. cadelliana* King, *G. cowa*, *G. cowa* var. *kydia* (Roxb.) Shameer & N.Mohan, *G. dulcis* (Roxb.) Kurz, and *G. nervosa* Miq.). In the absence of supporting literature and herbarium specimens, the distribution of *G. brevirostris* Scheff, *G. merguensis* Wight and *G. jelinekii* Kurz is doubtful in India. Detailed descriptions, distribution, notes, photos and taxonomic keys for identification of taxa are provided.

Keywords: Endemism, Guttiferae, Lectotypification, Mangosteen family.

Introduction

The genus *Garcinia* L., belonging to the family Clusiaceae Lindl. (*nom. alt.* Guttiferae), consisting mainly of trees, is a major component of the evergreen and semi-evergreen flora of India, with a high degree of endemism. Economically, it is also one of the earliest explored plant groups as a fruit crop. References of 'Coddam pulli' or 'Cambog' (Van Rheede, 1678) and 'Mangoustan' (Garcin, 1733) appeared in pre Linnaean literature were the source of naming *Garcinia mangostana* L. (Linnaeus, 1753) and *Garcinia gummi-gutta* (L.) N.Robson (*Cambogia gummi-gutta* L.) (Linnaeus, 1754). Further, all the workers who dealt with the floras of Indian regions (pre and post independent periods) considered the family with due importance in their floristic

treatments and included many additions from time to time. Except for the revision of *Garcinia* L. by Maheshwari (1964), there has been no serious effort to revise this genus in India in recent years. In this context, the present study on the taxonomic revision of *Garcinia* of India was undertaken.

Garcinia is the second-largest genus within the family Clusiaceae. Though POWO (2023) enlists 405 accepted names in the genus, all the recent revisions and other lists estimate only nearly 260 species world-wide (Rogers & Sweeney, 2007; Stevens, 2006; Sweeney, 2008; Nimanthika & Kaththriarchi, 2010; Mabberley, 2017). This is an indication for the need of a comprehensive study of the genus throughout the world. *Garcinia* species are generally small or medium sized evergreen trees distributed in tropical regions, with high species richness in Southeast Asia and Africa. The centre of diversity of the genus is considered the Malaysian region, with some species reaching into India and the Micronesian islands and also extending to Australia, tropical Africa and the Neotropics (Nazre, 2006; Rogers & Sweeney, 2007; Stevens, 2006; Sharma *et al.*, 2013).

Garcinia is represented by 33 species and seven varieties in India (Anderson, 1874; Maheshwari, 1964; Kostermans, 1977; Singh, 1993; Srivastava, 1994; Sabu *et al.*, 2013; Sarma *et al.*, 2016; Shameer *et al.*, 2017, 2021), mainly concentrated in three phyto-geographical zones, the Western Ghats, Northeast India and the Andaman and Nicobar Islands. The taxonomy of *Garcinia* in India is not well understood, especially due to the lack of detailed morphological studies based on fresh field collections. Other than the revision by Maheshwari (1964) and general floristic accounts on the genus in *Flora of British India* (Anderson, 1874) and *Flora*

Received: 15.12.2022; Revised & Accepted: 23.09.2023;

Published Online: 30.09.2023

of India (Singh, 1993), routine representation of hitherto known species of respective areas have appeared in all other recent floristic works of the country. Reassessment of the South Indian taxon, *Garcinia echinocarpa* Thwaites var. β . (*G. echinocarpa* var. *monticola* Maheshw.) as *Garcinia rubro-echinata* Kosterm. (Kostermans 1977) and the addition of one new species, *Garcinia dhanikhariensis* S.K.Srivast. (Srivastava 1994) from Andaman and Nicobar Islands, are the only notable contributions that appeared after Maheshwari (1964). Present study provides an updated, comprehensive account of *Garcinia* in India. The finding of four new species during the study (Sabu *et al.*, 2013; Sarma *et al.*, 2016; Shameer *et al.*, 2017, 2021) and typification of 11 names, including six designated in this paper, highlight the significance of the present revision.

History of *Garcinia*

The genus *Garcinia* has a long historical, taxonomic, and economic background. Since Linnaeus (1753), many species have been subsequently added to the genus. At the same time, several authors described plants belonging to the genus under different generic names, which subsequently became conspecific with the taxa (Sweeney, 2008). This caused chaos in the nomenclature of these species. Also, many times, the earlier workers described species based on incomplete specimens and even without designating a type. Consequently, modern taxonomic revisions and studies have been undertaken in majority of the centres of diversity of the genus such as Malaysia (Nazre, 2006), Madagascar (Sweeney & Rogers, 2008), Africa (Sosef & Dauby, 2012), and Australia (Cooper, 2013). These studies, however, lacked an Indian perspective.

Linnaeus (1753) named the genus *Garcinia* to honour Laurentius Garcin (1683–1752), a Dutch army doctor and naturalist in the Dutch Indies (Indonesia) during 1720–1729, who on his voyage to the Moluccas (Maluku Islands, Indonesia) made the first ever illustrated description of a fruit-bearing tree, which the locals called ‘mangoustan’ (Garcin, 1733). Linnaeus named the plant *Garcinia mangostana*, and the illustration by Garcin was later designated by Hammel (1993) as the lectotype of the species.

The common names used in the pre-Linnaean literature, such as *Carcapuli* (Acosta, 1585),

Coddam-pulli (Rheede, 1678) and *Mangoustan* (Garcin, 1733), were later diagnosed as members of the family and named as *Garcinia cambogioides*, *G. gummi-gutta* and *G. mangostana*, respectively.

Mangosteens (*G. mangostana*) may be one of the earliest plants to be recorded by Europeans. The name ‘Mangustoes’ had appeared in Garcia de Orta’s (1563) *Colóquios dos simples e drogas he cousas medicinais da Índia*, which indicates its usage by the Portuguese in India (Burkill, 1935). Mangosteens were thought to be native to the Moluccas (Garcin, 1733) or Indonesia and Peninsular Malaysia (Garcin, 1733; Rumphius, 1741). However, since it has never been found in wild (Whitmore, 1973; Richard, 1990), it was also suggested to represent a hybrid species (Nazre, 2006). The place of origin is thought to be Peninsular Malaysia because the closely allied species *G. malaccensis* Hook.f. and *G. celebica* L. are indigenous to this area (Richard, 1990). Mangosteen is believed to have been cultivated for hundreds of years in the Southeast Asian region (Ramage *et al.*, 2004).

Generic limits

In general, *Garcinia* exhibits some of the most extreme floral diversity in angiosperms, particularly in the androecium. While many *Garcinia* species have four free sepals and four free petals, others have two, three, or five or more perianth parts per whorl, and in some species, the sepals can be completely fused in the bud. The stamens in staminate flowers and staminodes in pistillate flowers vary in numbers (4–5 to indefinite), free or fused variously in fascicles (fasciculate) or in phalanges (phalangiata). The anthers vary in the shape of the thecae, and the number of loculi (thecae) per anther. Pistillodes may be present or absent. In pistillate flowers, style branches can be present or absent, and the surface ornamentation of the stigma is very diverse (Sweeney, 2008). Some species have additional disk lobe, or ring-shaped structures in the flowers called ‘fasciclododes’ (Sweeney, 2008). But the genus in general possesses several characters that unite them together *viz.* colleters, dioecy, capitate stigmas, eperulate buds, and introrse anthers (Sweeney, 2008; Ruhfel *et al.*, 2011).

Because of this extreme floral diversity, earlier authors described members under different generic

names. In addition to *Garcinia*, Linnaeus himself described two more genera, viz., *Rheedia* L. and *Cambogia* L., *Cambogia* differs from *Garcinia* in having very short filamented stamens and fewer stigma rays, whereas *Rheedia* was named based on a description by Plumier (1703) for a New World plant, which he described as having yellow fruits. Both genera were eventually got placed in *Garcinia*.

After *Garcinia* (Linnaeus 1753) many generic names, besides *Rheedia* and *Cambogia*, such as *Coddampuli* Adans., *Biwaldia* Scop., *Stalagmitis* Murray, *Mangostana* Rumph. ex Gaert., *Verticillaria* Ruiz & Pav., *Xanthochymus* Roxb., *Brindonia* Thouars, *Chloromyron* Pers., *Hebradendron* Graham, *Discostigma* Hassk., *Terpnophyllum* Thwaites, *Rhinostigma* Miq., *Clusianthemum* Vieill., *Tripetalum* K.Schum., *Pentaphalangium* Warb., *Tsimatimia* Jum. & H.Perrier and *Septogarcinia* Kosterm. were described to accommodate plants belonging to this group, but all of them, in the course of time, were placed in *Garcinia* (Jones, 1980).

Earlier workers separated the neotropical genus *Rheedia* from *Garcinia*, because the flowers of the former have free stamens and were purported to have two sepals instead of four (Planchon & Triana, 1860; Vesque, 1893; Engler, 1893, 1925). While arguing for the inclusion of *Rheedia* in *Garcinia*, Robson (1958) correctly pointed out that this distinction breaks down when one considers the entire variation within the two genera. This argument has been adopted in several recent treatments (Adams, 1970; Jones, 1980; Stevens, 2006). Phylogenetic studies also supported the unification of *Rheedia* with *Garcinia* (Sweeney, 2008).

Sweeney (2008) suggested that the African genus *Allanblackia* Oliv. have characters that reside inside *Garcinia* and if future data support this idea, the genus will have to be united with *Garcinia*, which would require the transfer of about 10 species. Through their phylogenetic studies, Ruhfel et al. (2011) corroborated the recommendation by Sweeney that *Allanblackia* be transferred to *Garcinia*.

Indian scenario

All Indian floristic works, earlier as well as recent, have given a general consideration for *Garcinia* species found in the respective area. But from these works it is difficult to come up with a clear picture on the total number of taxa represented within the

country. Anderson (1874) included 30 species and 8 varieties in the erstwhile British India, where as Maheshwari (1964) in his revision of the genus in India included 41 taxa (35 species and six varieties), where 31 species and five varieties are native and four species and one variety are exotic. Two species earlier reported within the country (*G. nervosa* (Miq.) Miq. and *G. keenania* Pierre) were not included in this work. Singh (1993) followed Maheshwari, in almost all aspects, for the treatment of *Garcinia* in the *Flora of India* and recognized 39 wild taxa (35 species and four varieties) including *G. keenania*, a first-time report to the country. Interestingly almost all these species except three, *Garcinia talbotii* Raizada ex Santapau, *Garcinia rubro-echinata* Kosterm. and *Garcinia dhanikhariensis* S.K.Srivast., were described during the post independent period. Present study recognizes 33 species and seven varieties indigenous for the country, including Andaman and Nicobar Islands.

Materials and Methods

The basic methodologies for taxonomic studies were followed. The protologues and relevant literature were collected from authentic databases such as *Botanicus* (<http://www.botanicus.org>), *Biodiversity Heritage Library* (<http://www.biodiversitylibrary.org>) and *Tropicos* (<http://www.tropicos.org>) and through personal communications. Herbarium specimens with respect to the country, deposited at all major herbaria in India and abroad, were examined. The specimens housed at all major Indian herbaria (ASSAM, BSI, CAL, CALI, DD, KFRI, FRC, MH, PBL and TBGT), and the digital images of the specimens at overseas herbaria (A, BR, BM, E, GDC, K, JE, L, LBD, LINN, MO, NY, P, MU, SING, TCD, W) were studied. Exploration trips were conducted throughout the centres of diversity of the genus within the country. The locations mentioned in earlier literature and herbarium specimens were selectively revisited. The collection of flowering and fruiting specimens was made as far as possible. A special effort was made to locate both staminate and pistillate plants in each locality. For collection and preservation, the procedures given by Jain and Rao (1977) and Balgooy and Van (1987) were followed. Field notes adding adequate information such as date of collection, locality, altitude, habit, habitat, height, colour of juvenile leaves, flowers and fruits: notes on species frequency and dominance and associations

were made during the exploration trips. Several accessions from different geographical regions were collected to study the variability within the species. Digital photographs were taken from the field using a 1100D DSLR camera (Cannon, Japan). The latitude, longitude, and altitude were accurately measured using handheld 64st GPS (Garmin, USA). For preservation in the field, 70% methyl alcohol was employed. Identification and description were made from dried and pickled specimens. Specimens were studied in detail with critical examination of relevant protologues, earlier revisions (Maheshwari, 1964) and floras. Type specimens deposited in various Indian herbaria or images of type specimens deposited outside the country were examined for confirmation. Specimens deposited in all relevant Indian herbaria were examined and recorded. Experts were consulted in the case of doubtful specimens. All the herbarium specimens prepared for this study are deposited at the Herbarium of the Jawaharlal Nehru Tropical Botanical Garden and Research Institute (TBGT).

Centres of diversity and distribution of *Garcinia* in India

The area of the present study is the country as a whole in its political perspective. During the present study, 33 species and seven varieties were recognized as native to the Indian region. As the genus occurs mainly in semi-evergreen to evergreen habitats, it reached the greatest diversity in three phytogeographical zones, *viz.*, the Western Ghats, Northeast India, and the Andaman and Nicobar Islands, where the above vegetation types form the major component. Among these, one species (*Garcinia cambogioides*) shares distribution in both the Western Ghats and Northeast India, whereas three species (*G. cowa*, *G. dulcis* and *G. xanthochyma*) share distribution in Northeast India and the Andaman and Nicobar Islands. Maximum diversity is found in Northeast India, where 15 species and three varieties are recorded, followed by the Western Ghats, housing 11 species and two varieties, and the Andaman and Nicobar Islands, with 10 species and two varieties. With respect to endemism, the Western Ghats ranks first with nine species and two varieties, followed by Northeast India with three species and two varieties, and Andaman and Nicobar Islands with three species and one (Table 1). The Agasthyamala Biosphere

Reserve (ABR), situated at the southernmost end of the Western Ghats has the highest representation of the genus in an area with respect to species diversity and endemism, where six species are found, out of which four are restricted to the biosphere reserve.

Taxonomic Treatment

Garcinia L., Sp. Pl. 443. 1753; Lour., Fl. Cochinch. 1: 14. 1790; Desr. in Lam., Ency. Meth. 3: 699. 1792; DC., Prod. 1: 560. 1824; Cambess., Mem. Mus. Hist. Nat. (Paris) 16: 425. 1828; G. Don, Gen. Syst. 1: 619. 1831; Wight & Arn., Prod. 1: 100. 1834; Miq., Fl. Ind. Bat. 1: 506. 1859; Benth. & Hook.f., Gen. Pl. 1: 174. 1862; Drury, Handbook Indian Fl. 1: 139. 1864; Oliv., Fl. Trop. Africa 1: 164. 1868; T. Anderson in Hook.f., Fl. Brit. India 1: 259. 1874; Vesque in A. DC., Monogr. Phan. 8: 251. 1893; Brühl & King, Ann. R. Bot. Gardn. Calc. 5 (2): 139. 1896; T. Cooke, Fl. Pres. Bombay 1: 76. 1901; Gamble, Man. Indian Timb. 49. 1902; Prain, Bengal Pl. 1: 246. 1903; Pit. in Lecomte, Fl. Gen. Indo-Chine 1: 295. 1907; Brandis, Indian Trees 49. 1907; Dunn in Gamble, Fl. Madras 1: 71. 1915; Maheshw., Bull. Bot. Surv. India 6: 108. 1964; N.P. Singh in B.D. Sharma & Sanjappa (eds.), Fl. India 3: 98. 1993. *Lectotype: Garcinia mangostana* L. (designated by Hammel, 1993).

Rheedia L., Sp. Pl. 2: 1193. 1753. *Type: Rheedia lateriflora* L.

Cambogia L., Gen. Pl. (ed. 5): 225. 1754. *Type: Cambogia gummi-gutta* L.

Coddampuli Adans., Fam. Pl. (Adanson) 2: 445. 1763, *nom. illeg.*

Biwaldia Scop., Intr. Hist. Nat. 232. 1777, *nom. illeg.*

Stalagmitis Murray, Commentat. Soc. Regiae Sci. Gott. 9: 173. 1789. *Type: Stalagmitis cambogioides* Murray

Oxycarpus Lour., Fl. Cochinch. 2: 647. 1790. *Type: Oxycarpus cochinchinensis* Lour.

Mangostana Gaertn., Fruct. Sem. Pl. 2: 105. t. 105. 1790. *Type: Mangostana cambogia* Gaertn.

Verticillaria Ruiz & Pav., Veg. Fl. Chil. 1: 140. 1798. *Type: Verticillaria acuminata* Ruiz & Pav.

Brindonia Thouars, Dict. Sci. Nat. (F. Cuvier) 5: 339 1806. *Type: Brindonia indica* Thouars

Xanthochymus Roxb., Pl. Coromandel 2(4): 51. t.

Table 1. *Garcinia* L. in India: Distribution and endemism

Sl. No.	Taxa	Geographic zone		
		Western Ghats	Northeast India	Andaman & Nicobar
1	<i>Garcinia acuminata</i> Planch. & Triana		+	
2	<i>Garcinia andamanica</i> King var. <i>andamanica</i>			+ Endemic
3	<i>Garcinia andamanica</i> King var. <i>pubescence</i> King			+
4	<i>Garcinia anomala</i> Planch. & Triana		+	
5	<i>Garcinia assamica</i> J.Sarma, Shameer & N.Mohanani		+ Endemic	
6	<i>Garcinia atroviridis</i> Griff. ex T.Anderson		+	
7	<i>Garcinia cadelliana</i> King			+ Endemic
8	<i>Garcinia calycina</i> Kurz			+ Endemic
9	<i>Garcinia cambogioides</i> (Murray) Headland var. <i>cambogioides</i>	+	+	
10	<i>Garcinia cambogioides</i> (Murray) Headland var. <i>cuspidata</i> (A.Beegum, Brothakur & J.Sarma) T.K.Paul		+ Endemic	
11	<i>Garcinia cambogioides</i> (Murray) Headland var. <i>mucronata</i> (A.Beegum, Brothakur & J.Sarma) T.K.Paul,		+ Endemic	
12	<i>Garcinia cambogioides</i> (Murray) Headland var. <i>pictoria</i> (Roxb. ex Buch.-Ham.) Shameer & N.Mohanani	+ Endemic		
13	<i>Garcinia celebica</i> L.			+
14	<i>Garcinia conicarpa</i> Wight	+ Endemic		
15	<i>Garcinia cowa</i> Roxb. ex DC var. <i>cowa</i>		+	+
16	<i>Garcinia cowa</i> Roxb. ex DC.var. <i>kydia</i> (Roxb.) Shameer & N.Mohanani			+
17	<i>Garcinia dhanikhariensis</i> S.K.Srivast.			+ Endemic
18	<i>Garcinia dulcis</i> (Roxb.) Kurz		+	+
19	<i>Garcinia gamblei</i> Shameer, T.Sabu & N.Mohanani	+ Endemic		
20	<i>Garcinia gummi-gutta</i> (L.) N.Robson var. <i>gummi-gutta</i>	+		
21	<i>Garcinia gummi-gutta</i> (L.) N.Robson var. <i>papilla</i> (Wight) N.P.Singh	+ Endemic		
22	<i>Garcinia imberti</i> Bourd.	+ Endemic		

23	<i>Garcinia indica</i> (Thouars) Choisy	+ Endemic		
24	<i>Garcinia keenania</i> Pierre		+ Endemic	
25	<i>Garcinia lanceifolia</i> Roxb. var. <i>lanceifolia</i>		+	
26	<i>Garcinia lanceifolia</i> Roxb. var. <i>oxyphylla</i> (Planch. & Trian.) Laness		+	
27	<i>Garcinia microstigma</i> Kurz			+
28	<i>Garcinia nervosa</i> Miq.			+
29	<i>Garcinia pedunculata</i> Roxb. ex Buch.-Ham.		+	
30	<i>Garcinia pushpangadaniana</i> T.Sabu, N.Mohanan, M.V.Krishnaraj & S.M.Shareef	+ Endemic		
31	<i>Garcinia rubro-echinata</i> Kosterm.	+ Endemic		
32	<i>Garcinia sibeswarii</i> Shameer, J.Sarma, N.Mohanan & A.Begum		+ Endemic	
33	<i>Garcinia sopsopia</i> (Buch.-Ham.) Mabb.		+	
34	<i>Garcinia spicata</i> (Wight & Arn.) Hook.f.	+		
35	<i>Garcinia stipulata</i> T.Anderson		+	
36	<i>Garcinia succifolia</i> Kurz		+	
37	<i>Garcinia talbotii</i> Raizada ex Santapau	+ Endemic		
38	<i>Garcinia travancorica</i> Bedd.	+ Endemic		
39	<i>Garcinia wightii</i> T.Anderson	+ Endemic		
40	<i>Garcinia xanthochyma</i> Hook.f.		+	+

196. 1805. Type: *Xanthochymus pictorius* Roxb.

Hebradendron Graham, Companion Bot. Mag. 2: 199. t. 27. 1837. Type: *Hebradendron cambogioides* (Murray) Graham.

Discostigma Hassk., Flora 25(2, Beibl.): 33. 1842. Type: *Discostigma rostratum* Hassk.

Terpnophyllum Thwaites, Hooker's J. Bot. Gard. Misc. 6: 70. t.2c. 1854. Type: *Terpnophyllum zeylanicum* Thwaites

Rhinostigma Miq., Fl. Ind. Bat. Suppl. 1: 495. 1860. Type: *Rhinostigma macrophyllum* Miq.,

Clusianthemum Vieill., Bull. Soc. Linn. Normand. 9: 338. 1865. Type: *Clusianthemum pedicellatum* Vieill.

Pentaphalangium Warb., Bot. Jahrb. Syst. 13(3-4):

382. 1891. Type: *Pentaphalangium crassinerve* Warb.

Septogarcinia Kosterm., Reinwardtia 6: 167. 1962. Type: *Septogarcinia sumbawaensis* Kosterm.

Polygamo-dioecious, semi-evergreen to evergreen, medium sized trees, up to 25 m tall or rarely shrubs; exudation white, yellow, pale green or deep brown; canopy usually spreading, pyramidal or oval crown. Terminal and axillary buds often enclosed in deep excavations of the petiole bases; colleters usually present; branches horizontal spreading or drooping; branchlets terete or 4/6-angled; stipuliform structures immediately below the leaf insertion. Leaves opposite, simple; petiole angular or rugose, longitudinally ridged,

adaxially ligulate at the base; lamina of varying shape, coriaceous to chartaceous, margins entire, repand or sub-repand; midrib usually prominent on both sides, rarely conspicuous only below; lateral veins conspicuous or inconspicuous; pedicels longitudinally striated; exudate canals parallel or perpendicular to the veins, prominent or obscure. Flowers dioecious, tetramerous or pentamerous. Staminate flowers axillary or terminal, solitary to few flowered, in simple cymes, short spikes or in fascicles, pedicelled or sessile; sepals free, imbricate, usually green or yellowish, rarely pinkish or red, orbicular to sub-orbicular, convex, carnose; margins membranaceous, rarely ciliate; petals free, yellow, white, cream, pink or red, rarely pale green, imbricate, ovate to oblong or orbicular; margins membranaceous, rarely ciliate; stamens numerous, free or united in a single bundle or on tetragonous torus mass or in phalanges; rudimentary pistil fungiform, margins crenate or lobed, rarely absent; nectary disc present or absent, when present spherical or lobate. Pistillate flowers usually terminal, rarely axillary, usually solitary, rarely in pairs or fascicled; pedicels stout, angular or terete, rarely sessile; ovary usually 4 or 5-loculed, sometimes many loculed or rarely 1-2-loculed, globose or ovoid; Style absent or very short; stigma yellow or cream turning blackish on maturity, lobes entire, convex or peltate disc or slightly to deeply rayed; staminodes free or united variously in bundles or in phalanges, surrounding the ovary; nectary disc present or absent, spherical or 4-5 lobed, forming a cushion below ovary. Berries globose or subglobose or compressed, greenish when young, turning yellow, red, dark purplish or orange on ripening, smooth, warty, variously ridged or echinate; apex mamillate, or shortly beaked, discoid or depressed; aril pulpy, crispy or fibrous. Seeds 1-12, oblong, plano-convex, often flattened or ovoid reniform; seed coat usually thin membranous, rarely fibrous.

Key to the species of *Garcinia* in India

- 1. Flowers pentamerous 2
- 1. Flowers tetramerous 9
- 2. Ovary 6-8-locular; berries top-shaped, >10 cm across, irregularly wrinkled ... *G. pushpangadaniana*
- 2. Ovary usually (3)-5-locular; berries globose, ovoid or discoid, <10 cm across, smooth or irregularly ridged3

- 3. Staminodes free or bundles of 2-3; berries discoid, irregularly ridged *G. gamblei*
- 3. Staminodes 5-phalangiata; berries globose, obliquely globose or ovoid, smooth 4
- 4. Pedicel of pistillate flowers c. 1 cm; berries obliquely globose, 2-3 cm across *G. dulcis*
- 4. Pedicel of pistillate flowers 1.5-5 cm long; berries globose or sub-globose, > 5 cm across 5
- 5. Midrib and lateral veins raised on both surfaces; berries ovoid or obovoid, with long eccentric mamilla *G. nervosa*
- 5. Midrib and lateral veins not raised on surfaces; berries globose or obliquely globose, without mamilla 6
- 6. Pistillate flowers solitary; berries with persistent discoid stigma *G. andamanica*
- 6. Pistillate flowers fascicled; berries with papillose stigma 7
- 7. Berries oblique-ovoid, pointed-beaked *G. xanthochymus*
- 7. Berries globose to depressed globose, not beaked 8
- 8. Staminate flowers always fascicled; stigma 3-lobed, berries globose, smooth *G. talbotii*
- 8. Staminate flowers spicate; stigma 5-lobed; berries depressed globose, slightly ridged *G. spicata*
- 9. Flowers sessile or subsessile, pedicels to 0.5 cm long 10
- 9. Flowers pedicellate, pedicels >0.5 cm long 25
- 10 Flowers always axillary 11
- 10 Flowers terminal or sub-terminal 18
- 11.Bracts foliaceous *G. anomala*
- 11.Bracts absent 12
- 12.Flowers 1-3 13
- 12.Flowers >3, fascicled 16
- 13.Exudate brownish-white; persistent stigma hemispheric, not lobed *G. calycina*
- 13.Exudate bright yellow; persistent stigma 4-lobed in berries 14
- 14.Leaves linear-lanceolate, attenuate towards tip *G. wightii*

108 Taxonomic revision of *Garcinia* in India

14. Leaves elliptic-ovate, acute at tip 15
15. Stamens ≥ 20 ; berries globose to sub-globose *G. cambogioides*
15. Stamens ≤ 18 ; berries sub-globose to ovoid-globose *G. acuminata*
16. Flowers on short axillary or terminal branched spikes *G. assamica*
16. Flowers fascicled on axils of fallen leaves 17
17. Branchlets terete; leaves ovate-lanceolate, cuspidate at apex *G. cadelliana*
17. Branchlets tetragonous; leaves elliptic-oblong, shortly acuminate at apex *G. keenania*
18. Ovary 2-loculed 19
18. Ovary many-loculed 20
19. Leaves oblanceolate, caudat-cuminate at apex; berries laterally compressed; stigma not persistent *G. imberti*
19. Leaves linear-oblong to obovate, berries ovoid-oblong with persistent discoid stigma *G. travancorica*
20. Berry surface rough 21
20. Berry surface smooth 22
21. Berries sub-globose or ellipsoid, echinate *G. rubro-echinata*
21. Berries ovoid-conical, 3–5 grooved ... *G. conicarpa*
22. Staminate flowers in terminal panicles; pistillate flowers in terminal Racemes *G. sopsopia*
22. Staminate and pistillate flowers either solitary or in fascicles 23
23. Branchlets quadrangular; berries with persistent very minute stigma *G. microstigma*
23. Branchlets terete or sub-terete; berries with persistent, prominent, lobed stigma 24
24. Pistillate flowers with staminodes 12 in 4 bundles of 3 each; stigma with fan-shaped radiate lobes *G. dhanikhariensis*
24. Pistillate flowers with staminodes 10–18 in 4 unequal bundles of 4–7 each; stigma very verrucose *G. indica*
25. Flowers terminal or sub-terminal 26
25. Flowers axillary 27
26. Stamens in a globose mass; pistillate flowers with staminodes; berries 9–13- Grooved *G. atroviridis*
26. Stamens inserted on fleshy white, 4-lobed torus; staminodes absent; berries smooth 28
27. Leaves with stipuliform structures *G. stipulata*
27. Leaves without stipuliform structures 29
28. Stigma and rudimentary pistil flat, 8–9-lobed; ovary 8–9-celled; arils pulpy *G. celebica*
28. Stigma and rudimentary pistil convex, entire, recurved at the edge; ovary 4-celled; arils fibrous *G. sibeswarii*
29. Staminate flowers in terminal, trichotomous panicles *G. pedunculata*
29. Staminate flowers solitary or in fascicles 30
30. Leaves lanceolate; berries smooth 31
30. Leaves elliptic; berries grooved 32
31. Staminate flowers usually 3; berries globose *G. succifolia*
31. Staminate flowers solitary or geminate; berries obovoid or turbinate *G. lanceifolia*
32. Stamens 12–20; berries oblong to ovoid *G. gummi-gutta*
32. Stamens 50 or more; berries globose to depressed globose *G. cowa*
- Garcinia acuminata*** Planch. & Triana, Ann. Sci. Nat., Bot. ser. 4, 14: 355. 1860; Pierre, Fl. Forest. Cochinch. 6: 34 1883; Maheshw., Bull. Bot. Surv. India 6: 133. 1964; Deb, Fl. Tripura 1: 363. 1981; Harid. & R.R.Rao, For. Fl. Meghalaya 1: 105. 1985; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 102. 1993; Hajra *et al.*, Mat. Fl. Arunachal Pradesh 1: 183. 1996; A.S.Chauhan *et al.*, Fl. Namdapha Arunachal Pradesh 113. 1996; Kam.P.Singh in N.P.Singh *et al.*, Fl. Mizoram 1: 209. 2002; G.D.Pal, Fl. Lower Subansiri Dist. Arunachal Pradesh 1: 117. 2013. *Garcinia elliptica* (Graham) Wall. ex Pierre, Fl. Forest. Cochinch. 6: 33. t. 86B. 1883; Vesque, in A.DC., Monogr. Phan. 8: 478. 1893; Brandis, Indian Trees 53. 1907; Engl., in Nat. Pflanzenfam. (ed. 2) 21: 226. 1925; Craib, Fl. Siam. Enum. 1: 114. 1931; Gagnep., Fl. Gen. Indo-Chine Suppl. 3: 265. 1943, non Choisy 1824. *Stalagmitis elliptica* (Graham) G.Don

in Gen. Hist. 1:621. 1831. *Hebradendron ellipticum* Wall. ex Graham., Compan. Bot. Mag. 2: 200. 1837. *Lectotype* (first-step designated by Maheshwari, 1964; second-step designated here): BANGLADESH, Sylhet, 1831, Wallich 4869 (K [K000677599 digital image!]); *isolecto* (K [K000677598, digital image!], BR [BR0000006913038, BR0000006916183] digital images!).

Garcinia wallichiana Klotzsch ex Planch. & Triana, Ann. Sci. Nat., Bot. sér. 4, 14: 356. 1860. Type: Not traced.

Garcinia morella sensu T. Anderson in Hook. f., Fl. Brit. India 1: 264. 1874, non Desr. 1792. **Fig. 1**

Dioecious evergreen trees, up to 20 m tall; exudation yellow, sticky; branchlets terete, glabrous. Petioles 0.6–1.5 cm long, slender, adaxially ligulate at base; lamina elliptic-ovate to ovate-lanceolate, 8–16 × 5–8 cm, acute-cuneate at base, entire on margin, acuminate to cuspidate at apex, coriaceous; midribs raised on both surfaces; lateral veins slender, 12–25 pairs per side, raised on both surfaces. Staminate flowers tetramerous, axillary, solitary, c. 1 cm across; pedicels 0.3–0.6 cm long; sepals orbicular, coriaceous, 0.15–0.2 cm long; petals orbicular to obovate, c. 0.4 × 0.4 cm, coriaceous, glabrous, yellow; stamens 16–18, on tetragonous torus; rudimentary pistil absent. Pistillate flowers tetramerous, axillary, solitary, c. 1.2 cm across, sub-sessile; sepals and petals same as staminate flowers; staminodes c. 12, connate at base into a ring around the ovary; ovary globose, 0.1–0.2 cm across, 4-locular; stigma 4-lobed, tubercled. Berries sub-globose or ovoid, 1.5–2 cm across, smooth, yellow on ripening, with persistent sepals and crowned by stigma. Seeds 4, 0.8–1 cm long, oblong, slightly compressed.

Vernacular names: *Kuji-thekera*, *Korbomba* (Assamese); *Thoikoy* (Garo)

Flowering & fruiting: Flowering from November to December; fruiting from March to May.

Habitat: Mostly near streams in evergreen forests, between 500–1200 m elevation.

Distribution: India, Bangladesh, Myanmar and Thailand.

Specimens examined: INDIA, **Arunachal Pradesh**, West Kameng district, Bhulakpong, 24.04.1914, U.N. Kanjilal 562 (ASSAM). **Assam**; Barpetta district, Baksa, 90 m alt., 03.08.2015, PS.



Fig. 1. Lectotype of *Garcinia acuminata* Planch. & Triana (Wallich 4869 [K000677599]). © The Board of Trustees of the Royal Botanic Gardens, Kew, reproduced with permission.

Shameer 79678 (TBGT); *Ibid.*, PS. *Shameer* 79682 (TBGT); Nanga ghat, 02.02.1915, U.N. Kanjilal 6975 (ASSAM); Cachar district, Barak Reserve, 24.11.1914, U.N. Kanjilal 4745 (ASSAM); *Ibid.*, Bhaban Hill, 760 m, 02.12.1914, U.N. Kanjilal 4797 (ASSAM, CAL); Dibrugarh district, 27.06.2014, PS. *Shameer* 79643 (TBGT; Garo Hill district, Tura Forest 26.03.1941, R.N. De 20505 (ASSAM); Lakimpur district, Jaypore Reserve, 28.01.1915, U.N. Kanjilal 6975 (ASSAM); Tipam, 14.02.1914, U.N. Kanjilal 3401 (ASSAM). **Meghalaya**, United Khasi & Jaintia Hills district, Khasi, 600–1200 m, s.d., J.D. Hooker & J.J. Thomson s.n. (CAL, MH); Khasi, 15.01.1931, S.R. Sharma 8961 (ASSAM). **Without precise locality**, s.d., s.coll. 117 (CAL); s.d., Wallich 4869 (CAL); s.d., Wallich 4871 (CAL, K [K0001104111 digital image!]).

Uses: The gum is medicinal and used as dye (Singh, 1993); the fatty oil extracted from the seeds is

edible and used as a substitute for ghee, also used for lighting lamps (Maheshwari, 1964).

Typification: Maheshwary (1964) cited 'type Wallich 4869, East Pakistan (K-W)'. On perusal of the Wallich herbarium at Kew (K-W), two specimens with the same collection number (K000677599, K000677598) were found, but could not determine which among the two was mentioned by Maheshwari as the type. As per Art. 9.17 of the code (Turland *et al.*, 2018), Maheshwari's typification could be considered a first-step lectotypification and needs narrowing down to a single one of these specimens by subsequent lectotypification. Further two more specimens of Wallich 4869 were also located at BR (BR0000006913038, BR0000006916183). Hence, we designate the specimen at K (K000677599) as lectotype (second step) here.

Garcinia andamanica King, J. Asiat. Soc. Bengal 59: 170. t. 160. 1890; Vesque in A.D.C., Mongr. Phan. 8: 328. 1893; Brühl & King, Ann. R. Bot. Gardn. Calc. 5 (2): 141. 1896; Brandis, Indian Trees 49. 1907; C.E.Parkinson, For. Fl. Andaman Islands 89. 1923; Maheshw., Bull. Bot. Surv. India 6: 112. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 104. 1993; Dagar & N.T.Singh, Pl. Res. Andaman & Nicobar Islands. Enum. 2: 416. 1999; Hajra *et al.*, Fl. Andaman & Nicobar Islands 1: 136. 1999. Shameer & N.Mohanan, Rheedea 29(2): 181. 2019. *Lectotype* (designated by Shameer & Mohanan, 2019): INDIA, **Andaman Islands**, 1884, *King's coll.* 224 (CAL [CAL46765!]).

Key to the varieties

1. Leaves obtuse to rotund at base, glabrous on both surfaces var. *andamanica*
1. Leaves cuneate at base, pubescent abaxially var. *pubescens*

G. andamanica King var. **andamanica**

Dioecious semi-evergreen trees, up to 12 m tall; exudate white; branchlets 4–6-angular. Petioles 1–1.5 cm long, stout, adaxially ligulate at base; lamina ovate to rarely oblong, often in-equilateral, 15–25 × 9–15 cm, usually sub-cordate, rarely obtuse to rotund at base, irregularly repand at margins, acute-acuminate at apex, coriaceous; glabrous on both surfaces; midrib raised abaxially; lateral veins 14–20 pairs, obliquely parallel, prominent; exudate canals conspicuous on both

surfaces. Staminate flowers pentamerous, many, pedicellate, in axillary dense fascicles, raised from short wart like structures; sepals *c.* 0.5 × 0.7 cm, ovate, convex, margins membranous, pubescent; petals *c.* 1.2 × 0.7 cm, rotundate, clawed, white or pale yellow; stamens many, in 5 fleshy phalanges, anthers minute; disc glandular, 5, alternating with staminal bundles; rudimentary pistil fungiform or absent. Pistillate flowers pentamerous, axillary, solitary, pale yellow, pedicellate; sepals and petals same as in staminate flowers. Berries globular, 2.5–4 cm across, bright yellow or orange when ripe, fleshy, crowned by 5-lobed, discoid persistent stigma. Seeds 1–3, oblong, 2–2.5 cm long, oblong.

Vernacular name: *Madaw-mu* (Bengali).

Flowering & fruiting: Flowering from January to March; fruiting from April to May.

Habitat: Semi-evergreen forests, up to 20 m elevation and prefers damp places and proximity to streams.

Distribution: Endemic to Andaman Islands.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, South Andaman district, 1890, *King s.n.* (E [E00438019 digital image!]); Bamboodera, 09.04.1978, *N.G. Nair* 6939 (PBL); Havelock Island, 01.03.1916, *Parkinson* 1066 (CAL); Little Andaman, 4 km from Hut Bay, 27.01.1981, *R.K. Premnath* 8310 (PBL); Peel Island, 26.03.1980, *T.A. Rao* 7691 (PBL); Rutland Island, *s.d.*, *S. Kurz s.n.* (CAL [CAL46769]). North and Middle Andaman district, *s.d.*, *King's coll. s.n.* (CAL46770); *Ibid.*, 1884, *King's coll. s.n.* (K [K000677631 digital image!]); GDC [G00458474 digital image!]; Interview Island, Check Dam No. 3, 23.02.2011, *G.S. Lakra* 28820 (PBL); Deforestation site, Village no. 4, 10.01.1976, *N. Bharghavan* 3382 (PBL). Namuna Ghar-Hilly Jungle, 13.12.1890, *King s.n.* (CAL46958).

Garcinia andamanica King var. **pubescens** King, J. Asiat. Soc. Bengal 59: 170. 1890; Maheshw., Bull. Bot. Surv. India 6: 112. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 104. 1993; Hajra *et al.*, Fl. Andaman & Nicobar Islands 1: 137. 1999; Dagar & N.T.Singh, Pl. Res. Andaman & Nicobar Islands. Enum. 2: 416. 1999. *Lectotype* (designated by Maheshwary, 1964): INDIA, Andaman Islands, 1884, *King's coll.* 136 (CAL [CAL46758!]; *isolecto* K [K000677630 digital image!]).

Dioecious, evergreen trees, 6–9 m tall. Petioles

1.5–2.5 cm long, stout, adaxially ligulate at base; lamina broadly oblong to oblong-ovate, 15–25 × 8–10 cm, cuneate at base, margins repand; obtusely acuminate at apex, pubescent abaxially; midrib raised abaxially; lateral veins 12–20 pairs, obliquely parallel, prominent; exudate canals conspicuous on both surfaces. Flowers and fruits similar as in variety proper.

Flowering & fruiting: Flowering from February to March; fruiting from April to May.

Habitat: Semi-evergreen forests, up to 40 m elevation.

Distribution: India (Andaman Islands) and Myanmar.

Specimens examined: INDIA, **Andaman Islands**, South Andaman district, 1867, *S. Kurz s.n.* (GDC [G00458420 digital image!]); Hill Jungle, Port Monat, 18.04.1891, *King s.n.* (CAL [CAL46760]); Shoal Bay-19, 13.02.2016, *P.S. Shameer* 86617 (TBGT).

Garcinia anomala Planch. & Triana, Ann. Sci. Nat., Bot. sér. 4, 14: 329. 1860; Laness., Mem. Garcin. 30. 1872; T.Anderson in Hook.f., Fl. Brit. India 1: 266. 1874; Kurz, J. Asiat. Soc. Bengal, pt. 2, Nat. Hist. 43: 87. 1874 & Forest Fl. Burma 89. 1877; Pierre, Fl. Forest. Cochinch. 10: t. 79L. 1883; Vesque in A.DC., Monogr. Phan. 8: 369. 1893; Brandis, Indian Trees 50. 1906; Engl., Nat. Pflanzenfam. (ed. 2) 21: 223. 1925; Kanjilal *et al.*, Fl. Assam 1: 109. 1934; C.E.C.Fisch., Rec. Bot. Surv. India 12(2): 80. 1938; Maheshw., Bull. Bot. Surv. India 6: 117. 1964; N.P.Balacr., Fl. Jowai 2: 87. 1981; Hajra *et al.*, Mat. Fl. Arunachal Pradesh 1: 183. 1996; Kam.P.Singh in N.P.Singh *et al.*, Fl. Mizoram 1: 209. 2002. Shameer & N.Mohanan, Rheedeia 29 (2): 181. 2019. *Lectotype* (designated by Shameer & Mohanan, 2019): INDIA, East Bengal, Griffith 848 (G [G00458432 digital image!]; *isolecto*, (CAL [CAL46566!], W [W0073367 digital image!], K [K000677605 digital image!]). **Fig. 2**

Dioecious evergreen trees, 10–15 m tall; exudation yellow; branchlets robust, quadrangular. Petioles 1.8–2 cm long, transversely rugose, longitudinally ridged, adaxially ligulate at base; lamina elliptic or oblong-lanceolate, 10–20 × 3.5–8.5 cm, obtuse or rotundate at base, margins repand, shortly acute at apex; midribs raised on both surfaces; lateral veins conspicuous, 15–25 pairs per side, raised on both surfaces. Staminate flowers tetramerous in axillary cymes, *c.* 1.2 cm in diam., pedicels 0.3–0.4 cm long,

stout; bracts 2, foliaceous, 0.8–2 cm long; bracteoles 2, 0.2–0.3 cm long, almost concave, caduceous; sepals decussate, 0.5–0.6 cm long, orbicular, concave; petals yellowish white, 0.6–1.2 × 0.3–0.5 cm, obliquely-oblong, more or less concave, margins fimbriate; stamen numerous, in an annular mass, surrounding the pistillode; rudimentary pistil short, thick, columnar or slightly obconic, stigma conical, rugous, coronate. Pistillate flowers tetramerous, 3–5 in axillary cymes, smaller than staminate flowers; sepals persistent 0.2–0.3 cm long; petals whitish-green, 0.3–0.4 cm long, ovate, deciduous; staminodes numerous, filaments united into annular ring at the base of ovary; ovary oblong, 0.2–0.3 cm long, slightly attenuate at apex, 2-loculed, stigma disciform, irregularly lobulate. Berries ellipsoid, pruniform, 4–4.5 × 3–3.5 cm, smooth, dark olive green, turning orange-yellow on ripening, crowned by short, thick stigma and attached by recurved sepals. Seeds 1 or 2, *c.* 0.8 × *c.* 0.6 cm, oblong-ellipsoid.

Vernacular names: *Haibung* (Assamese); *Theechu* (Manipuri); *Dieng-Soh-kwanang*, *Soh-lain-khlaw* (Garo); *Dieng-Sa-Slung*, *Dieng-Soh-lang-sain* (Khasi); *Naufadawn tuai* (Lushai).

Flowering & fruiting: Flowering from November to December; fruiting from January to April.

Habitat: Evergreen forests, between 900–1800 m elevation.

Distribution: India, Bangladesh and Myanmar



Fig. 2. Fruit of *Garcinia anomala* Planch. & Triana (Photo by N. Mohanan & P.S. Shameer).

(Singh, 1993).

Specimens examined: INDIA, **Assam**, Cachar district, Loharband, 18.03.1938 R.N. De 16499 (ASSAM). **Mizoram**, Lushai Hills district, South Lushai, 26.04.1924, W.J.H. Wenger 4 (CAL). **Meghalaya**, East Khasi Hill district, Pynursla, 04.11.1938, K. Biswas 4051 (CAL); Pynursla Gorge forest, 04.11.1938, S.R. Sharma 18220 (ASSAM); Suranea, 1524 m, 06.10.1886, C.B. Clarke 45180D (CAL); Khasi and Jaintia Hill district, Jaraim, s.d., U.N. Kanjilal 2717 (CAL); Khasia, 915–1524 m, s.d., J.D. Hooker & T. Thomson 14 (MH, CAL, BR digital image!, K, digital image!); *Ibid.*, s.d., W. Griffith 654 (K, image!); Soharim, 16.09.1913, U.N. Kanjilal 2582 (CAL, DD); *Ibid.*, 20.04.1914, U.N. Kanjilal 415 (ASSAM); Ribhoi district, Mawsmai, 18.05.1932 P.C. Kanjilal 10111 (ASSAM); West Jaintia Hill district, Jowai, 1524 m, 14.12.1885, C.B. Clarke 42547D (CAL); *Ibid.*, 1524 m, September 1892, King's coll. s.n. (CAL [CAL47806]); *Ibid.*, September 1892, King's coll. s.n. (CAL [CAL47807]). **West Bengal**, Jalpaiguri district, Chamorchi, April 1905, G. Semghat 173 (CAL, DD). BANGLADESH, s.loc., 1861–62, W. Griffith 848 (CAL); s.loc., 915–1828 m, s.d., W. Griffith 848 (S). BHUTAN, Chumbi Valley Road, Jaldaha Valley, 915–1524 m, December 1904, G.L. Searight 185 (CAL); Chamorchi, Chumbi Valley, April 1905, G.L. Searight 173 (CAL). MYANMAR, Martaban, s.d., S. Kurz 539 (CAL); Pegu, Dookee lodge, 1524 m, s.d., S. Kurz 539 (CAL). **Without precise locality**, August, 1892, G. Mann s.n. (CAL); May 1893, Kings collector s.n. (CAL, DD).

Uses: The fruits are edible, consumed by the Assamese community (Baruah *et al.*, 2021).

Garcinia assamica J.Sarma, Shameer & N.Mohan, Phytotaxa 252 (1): 73. 2016. *Type:* INDIA, Assam, Barpetta district, Manas National Park, India–Bhutan border, N 26° 34' 22.2", E 091° 13' 03.5", 78 m, 22.04.2015, J. Sarma 79673 (holo, TBGT!; iso, CAL!, MH!). **Fig. 3a–c**

Dioecious evergreen to semi-evergreen trees, up to 15 m tall; exudate greenish–yellow; branches horizontally spreading; branchlets terete. Petioles 1–1.5 cm long, angular, adaxially ligulate at base; lamina elliptic–oblong, 7–11 × 2.5–5 cm, obtuse at base, entire on margins, acuminate at apex, coriaceous; midribs raised on both sides; lateral veins inconspicuous, 10–12 pairs per side. Staminate

flowers tetramerous, 4–6 grouped in on short axillary or terminal branched spikes; pedicels c. 0.5 cm long; sepals orbicular, c. 0.7 × 0.6 cm, convex, coriaceous, margin membranaceous, pale green; petals ovate–orbicular, 0.6–0.8 × 0.5–0.6 cm, membranaceous on margins, creamy white; stamen 25–30, on a convex receptacle; rudimentary pistil absent. Pistillate flowers tetramerous, sessile, on short axillary or terminal, unbranched or branched spikes, if unbranched, flowers 2–4 at tip, where as in branched spikes, flowers 2–5 at each node; sepals orbicular, c. 0.6 × 0.5 cm, convex, coriaceous, membranous at margins; petals orbicular, 0.8–1 cm long, membranaceous towards margins, pale yellow; staminodes 4 or 5, in a ring around ovary; ovary globose, c. 0.5 cm in diam., vertically grooved, 4 or 5-loculed; stigma 8–10-rayed, warty. Berries turbinate, 5–7 × 3–4 cm, smooth, fleshy, with distinct mamilla, greenish, turning orange–yellow when ripe. Seeds 2–5, oblong, c. 2 × 1 cm, compressed.

Flowering & fruiting: Flowering from February to May; fruiting from April to June.

Habitat: Semi-evergreen forests, near to rivulets, between 100–300 m elevation.

Distribution: Endemic to Assam.

Specimens examined: INDIA, **Assam**, Barpetta district, near Khaladia River, near Manas National Park, 100 m, 03.08.2015, P.S. Shameer 79679 (TBGT); Darrang district, Changoria, 22.04.1895, s.coll. 11174 (ASSAM); Kalahari, 76 m, 01.04.1914, U.N. Kanjilal 3726 (ASSAM).

Conservation status: Data Deficient (IUCN 2021).

Uses: The fruits are edible and used for making pickles by locals in Assam (Baruah *et al.*, 2021).

Notes: *Garcinia assamica* is morphologically allied to *G. nigrolineata* Planch. ex T.Anderson, an Indo–Malayan species found in almost the same ecological conditions, in the arrangement of flowers on axillary short spikes; arrangement of stamens on a convex disc and number and arrangement of staminodes in pistillate flowers. But it is distinct from the latter in having greenish–yellow (not yellowish) exudate; 2–5 pistillate flowers fascicled at nodes against solitary flowers; 4–5-loculed ovary against 5–7-loculed ovary; turbinate and smooth fruits against globose and vertically grooved surface, and fruit tip mamillate

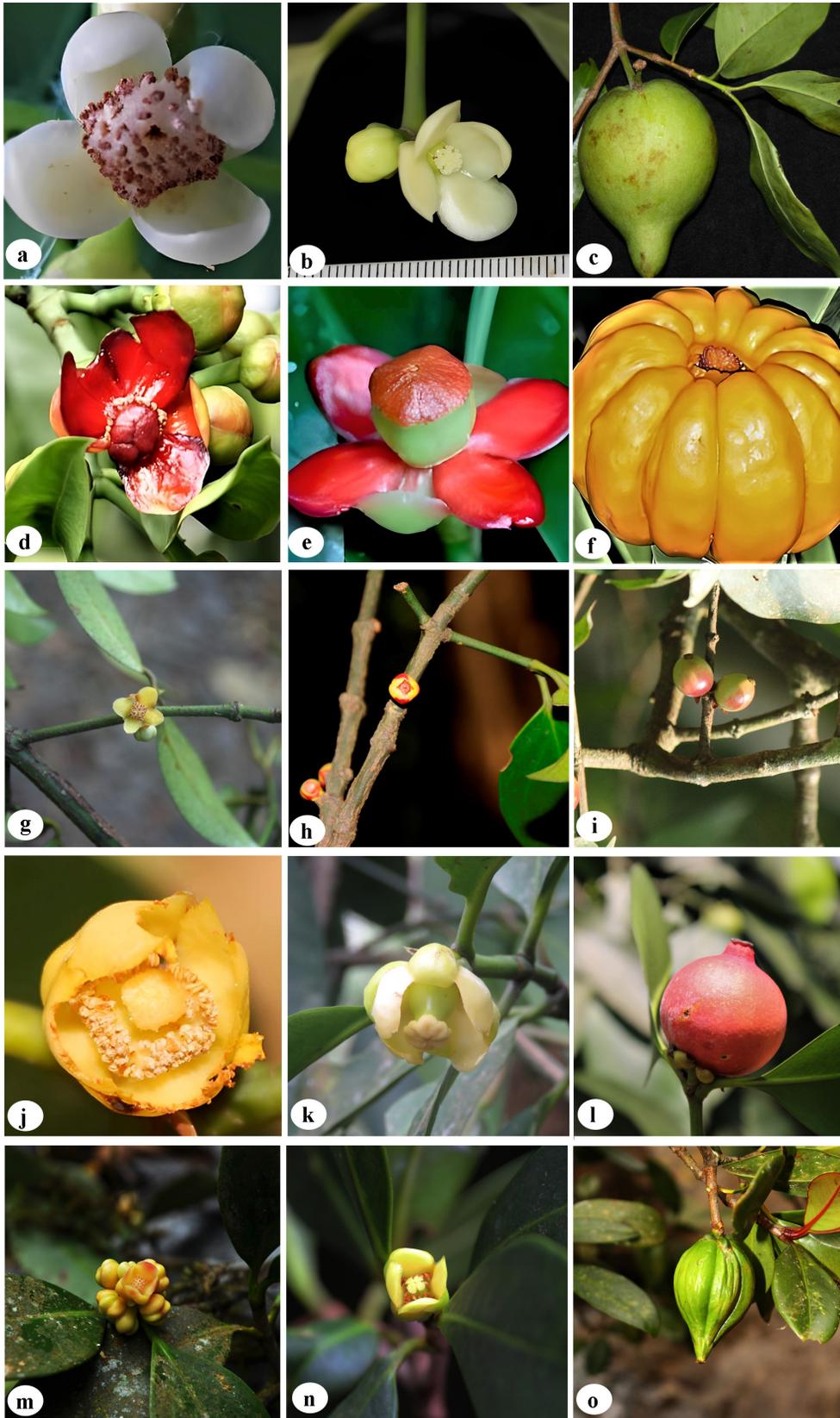


Fig. 3. Species of *Garcinia* L. in India: a–c. *Garcinia assamica* J.Sarma, Shameer & N.Mohanani; d–f. *G. atroviridis* Griff. ex T.Anderson; g–i. *G. cambogioides* (Murray) Headland var. *cambogioides*; j–l. *G. celebica* L.; m–o. *G. conicarpa* Wight (a, d, g, j, m. Staminate flowers; b, e, h, k, n. Pistillate flowers; c, f, i, l, o. Fruits; photos by N. Mohanani & P.S. Shameer).

against round tip.

Garcinia atroviridis Griff. ex T. Anderson in Hook.f., Fl. Brit. Ind. 1: 266. 1874; Pierre, Fl. Forest. Cochinch. 24: t. 80C. 1883; King, J. Asiat. Soc. Bengal 59: 159. 1890; Vesque in A.DC., Monogr. Phan. 8: 414. 1893; Brandis, Indian Trees 50. 1907; Ridl., Fl. Mal. Penins. 1: 173. 1922; Engl., in Nat. Pflanzenfam. (ed. 2) 21: 220. 1925; Craib, Fl. Siam. Enum. 1: 114. 1931; Kanjilal *et al.*, Fl. Assam 1; 109. 1934; Burkill, Dict. Econ. Prod. Mal. Penins. 1: 1047. 1935; Maheshw., Bull. Bot. Surv. India 6: 118. 1964; Whitmore, Tree Fl. Malaya 2: 206. 1973; N.P. Singh in B.D. Sharma & Sanjappa (eds.), Fl. India 3: 105. 1993; Hajra *et al.*, Mat. Fl. Arunachal Pradesh 1: 183. 1996; Ngerns., Diversity, 14(556): 2. 2022. *Lectotype* (designated by Maheshwari, 1964): INDIA, Upper Assam, Tabong, *Griffith* 862 (K [K000677601 digital image!]). **Fig. 3d–f**

Dioecious evergreen trees, to 20 m tall; exudation colourless; branchlets robust, terete. Petioles 1.5–2 cm long, slender, adaxially ligulate at base; lamina oblong-lanceolate, 12–20 × 5–8 cm, cuneate at base, margins entire, obtuse to shortly acuminate at apex; midribs raised on both sides; lateral veins numerous, c. 50 pairs per side, raised on both surfaces. Staminate flowers tetramerous, in few flowered, terminal racemes, 2–2.5 cm in diam., pedicels 0.75–2 cm long, slender; sepals pale yellow with red tinge inside, 0.8–1 cm long, orbicular, concave, membranous; petals deep red, 1–1.5 cm long, obovate, concave; stamens numerous, in a globose mass, inserted on a thin annular fleshy receptacle; rudimentary pistil broad cylindrical. Pistillate flowers tetramerous, terminal, solitary, rarely geminate, 2.5–3 cm in diam.; pedicels 1.5–2.5 cm long, slender; sepals orbicular, concave, similar to staminate flowers; petals deep red, concave, fleshy, 0.8–1.2 cm, smaller than staminate flowers; staminodes numerous, united in a thin fleshy wavy annulus round the ovary; ovary oblong or sub-globose, ribbed, 0.8–1 cm diam., 8–16-locular; stigma deep red, thick, fleshy, convex, 4-lobed. Berries depressed globose, 6–10 cm in diam., slightly 9–13-grooved, green, turning bright yellow on ripening, crowned by sessile, concave, ribbed stigma. Seeds 6–10 or more, enclosed in translucent bright orange pulpy aril.

Vernacular names: *Gelugor*, *Som-khaek* (Assamese).

Flowering & fruiting: Flowering from April to June; fruiting from July to September.

Habitat: In humid, lowland forests on the plains, up to 600 m elevation.

Distribution: India, Myanmar, Thailand, Malaysia, Singapore.

Specimens examined: MALAY PENINSULA, 153 m, April 1880, *H. Kunstler* 1452 (CAL); 153 m, April 1881, *King's coll.* 1652 (CAL); Perak, *s.d.*, *L. Wray* 2756 (CAL). SINGAPORE, 21.10.1929, *Nees s.n.* (MH [MH89869]). THAILAND, Siam, August 1923, *A.F.G. Kerr* 7477 (TCD 0010444 digital image!); Siam, March 1928, *A.F.G. Kerr* 14913 (TCD0010445 digital, image!); Siam, April 1931, *Lakshnakara, Mom Chao* 734 (TCD0010446 digital image!).

Uses: The exudate from fruit is used as a fixative in dyeing silk. Fruit rind is edible, used in curries (Maheshwari, 1964).

Notes: Maheshwari (1964) cited the 'Type: *Griffith*, Kew distrib. 862, Tabong, Upper Assam (K)'; whereas Kanjilal *et al.* (1934), Singh (1993) and Hajra *et al.* (1996) give locality as Assam and Arunachal Pradesh. But other than the type specimen, we could not find any specimens from Indian regions, deposited in any herbaria. Hence other than the literature evidence, the occurrence of the species in Indian region is yet to be confirmed.

Garcinia cadelliana King, J. Asiat. Soc. Bengal 59: 154. 1890; C.E. Parkinson, Forest. Fl. Andaman Islands 90. 1923; Maheshw., Bull. Bot. Surv. India 6: 135. 1964; N.P. Singh in B.D. Sharma & Sanjappa (eds.), Fl. India 3: 107. 1993; Hajra *et al.*, Fl. Andaman Islands 1: 137. 1999; Dagar & N.T. Singh, Pl. Resour. Andaman & Nicobar Isl. 2: 417. 1999. *G. lanessanii* Pierre var. β *cadelliana* (King) Vesque in A.DC., Monogr. Phan. 8: 359. 1893. *Lectotype* (designated here): INDIA, **Andaman Islands**, South Andaman district, near Port Blair, Hills rocky place, 30.07.1884, *King's coll.* 371 (CAL [CAL0000208116!]; isolecto CAL [CAL0000208117!], K [K000677632 digital image!], GDC [G00458416 digital image!]). **Fig. 4**

Dioecious semi-evergreen trees, 8–10 m tall; young branches slender, terete. Petioles 6–7 cm long, transversely rugose, with longitudinal ridges, adaxially ligulate at base; lamina elliptic to elliptic-oblong, 8.5–14 × 4–7 cm, cuneate at base, margins revolute, sub-acute at apex, coriaceous; midribs raised on both sides; lateral veins conspicuous, 10–

12 pairs per side, raised on both surfaces. Staminate flowers 3–8, in axillary fascicles, tetramerous, 0.5–0.6 cm in diam.; pedicels 0.2–0.25 cm long, stout; sepals almost orbicular, 0.15–0.2 cm in diam., margin membranaceous; petals obovate-orbicular, 0.2–0.3 cm long, concave; stamens 4-phalangiata, stamens indefinite in each phalange; rudimentary pistil slender, fungiform. Pistillate flowers and fruits not known.

Flowering & fruiting: Flowering from July to August; fruiting not seen.

Habitat: Evergreen forests, at 850 m elevation.

Distribution: Endemic to Andaman Islands.

Conservation status: Critically Endangered (IUCN 1998).

Typification: King (1890) cited the specimen Andamans, *King's coll.* 137 in the protologue,



Fig. 4. Lectotype of *Garcinia cadelliana* King (King's coll. 371 [CAL0000208116]) © The Director, Botanical Survey of India, Kolkata, reproduced with permission.

without mentioning where it is deposited. We could locate four specimens under this collection number, two housed at CAL (CAL0000208116, CAL0000208117), one deposited at K (K000677632) and one at GDC (G00458416). The sheet CAL0000208116 with a detailed description by the author is designated here as the lectotype.

Notes: Known only from the type collection, which is a male specimen. King noted in the protologue, 'pistillate flowers and fruits unknown'. Maheshwari (1964) treated it as a doubtful species. Singh (1993) included this species with the comment 'it is best kept as a distinct species until fresh collections are made'. Hajra *et al.* (1999) and Dagar and Singh (1999) also included the species in their floristic accounts.

Garcinia calycina Kurz, J. Bot. 13: 324. 1875; Pierre, Fl. Forest. Cochinch. 33: t. 87D. 1883; King, J. Asiat. Soc. Bengal 59: 160. 1890; Vesque in A.D.C., Monogr. Phan. 8: 478. 1893; Gamble, Man. Indian Timb 55. 1902; Engl., in Nat. Pflanzenfam. (ed. 2) 21: 226. 1925; Maheshw., Bull. Bot. Surv. India 6: 134. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 107. 1993; Hajra *et al.*, Fl. Andaman Islands 1: 138. 1999; Dagar & N.T.Singh, Pl. Resour. Andaman & Nicobar Isl. 2: 417. 1999; Shameer & N.Mohanani, Rheedea 29 (2): 182. 2019. *Lectotype* (designated by Shameer & Mohanani, 2019): INDIA, Nicobar Islands, Kamorta, February 1875, *S. Kurz s.n.* (CAL [CAL0000005868!]; *isolecto* K [K00067763, K000677634 digital image!], W [W0073376 digital image!]).

Diocious shrubs, 4–6 m tall; exudate brownish-white; branchlets tetragonous. Petioles 0.8–1 cm long, slender, adaxially ligulate at base; lamina elliptic to elliptic-oblong, 7.5–10 × 3.5–5 cm, cuneate at base, slightly revolute on margins, shortly caudate-acuminate or sub-acute at apex, coriaceous; midrib prominent on both sides; lateral veins 7–8 pairs, obliquely parallel. Staminate flowers tetramerous, axillary, solitary or paired, c. 0.4 cm in diam.; pedicels c. 0.4 cm long; sepals orbicular, concave, 0.15–0.2 cm in diam.; petals orbicular, concave, 0.2–0.3 cm in diam.; stamens to 20, on convex torus, rudimentary pistil absent. Pistillate flowers tetramerous, axillary, solitary, larger than staminate flowers, sub-sessile; sepals ovate, 0.15–0.2 cm long; petals orbicular, 0.3–0.5 cm in diam.; staminodes 10–12, distinct, around the ovary; ovary ovoid, 0.2–0.3 cm in diam.,

4-locular, entirely covered by the large hemispheric stigma. Berries ovoid-oblong, 1.5–2 × 0.5–1 cm, smooth, sepals persistent at base and crowned by sessile hemispheric stigma. Seeds 4, oblong, 0.8–1 × 0.5–0.6 cm, compressed.

Flowering & fruiting: Flowering from January to February; fruiting not seen.

Habitat: Sea shore vegetation of Kamorta Island of Nicobar.

Distribution: Endemic to Andaman and Nicobar Islands.

Notes: After the original collection made in 1875, no further collections were reported.

Garcinia cambogioides (Murray) Headland, Man. Mater. Med. Therap. [Royle] (ed. 3): 339, fig. 48. 1856. Shameer & N.Mohanan, Rheedea 30(4): 465. 2020. *Stalagmitis cambogioides* Murray, Commentat. Soc. Regiae Sci. Gott. 9: 173. 1789; G.Don, Gen. Syst. 1: 621. 1831; *Hebradendron cambogioides* (Murray) Graham, Compan. Bot. Mag. 2: 199. t. 27. 1836. *Lectotype* (first-step designated by Maheshwari, 1964; second-step by Shameer & Mohanan, 2020): SRI LANKA, *s.d.*, Hermann 195 (BM [BM000621661 digital image!]); *isolecto* (BM [BM00621719 digital image!]).

Garcinia morella (Gaertn.) Desr. in Lam *et al.*, Encycl. 3: 701. 1792; T.Anderson in Hook.f., Fl. Brit. India 1: 204. 1874; Bourd., Forest Trees Travancore 23. 1908; Ram Rao, Fl. Pl. Travancore 29. 1914; Dunn in Gamble, Fl. Madras 1: 74. 1915, excl. syn *G. elliptica* Wall. & *G. pictoria* Roxb.; Maheshw., Bull. Bot. Surv. India 6: 132. 1964; M.Mohanan, Fl. Quilon Dist. 80.1984; Manilal, Fl. Silent Valley 20. 1988; V.S.Ramach. & V.J.Nair, Fl. Cannanore Dist. 55. 1988; Vajr., Fl. Palghat Dist. 71. 1990; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. Ind. 3: 119. 1993; M.Mohanan & A.N.Henry, Fl. Thiruvananthapuram Dist. 71. 1994; K.N.Subram., Fl. Thenmala Division 23. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur For. 52. 1996; Sivar. & P.Mathew, Fl. Nilambur 69. 1997; Sasidh., Fl. Periyar Tiger Reserve 25. 1998 & Fl. Parambikulam Wildlife Sanctuary 22. 2002; N.Mohanan & Sivad. Fl. Agasthyamala 85. 2002. *Mangostana morella* Gaertn., Fruct. Sem. Pl. 2: 106, t. 101.1790.

Garcinia gutta Wight, Ic. Pl. Ind. Orient. 1: t. 44. 1840, *excl. syn.*

Key to the varieties

1. Branchlets 4-angular; stigma distinctly 4–5-lobed 2
1. Branchlets terete; stigma rounded or obscurely lobed 3
2. Stamens *c.* 25 in a tetragonous mass; staminodes 12–14; filaments connate into 3–5 bundles round the ovary; stigma serrately 5-lobed var. *cambogioides*
2. Stamens 35–40 in a sub-globose mass; staminodes *c.* 20; filaments connate at base into an entire sheath round the ovary; stigma 4-lobed var. *pictoria*
3. Berries oblong with 1–1.2 cm long curved tip var. *cuspidata*
3. Berries globose to sub-globose with 0.5–0.6 cm long mucronate tip var. *mucrona*

Garcinia cambogioides (Murray) Headland var. ***cambogioides*** Fig. 3g–i

Dioecious evergreen trees, up to 20 m tall; exudation deep yellow or orange-yellow, sticky; branches spreading, with pendulous tips; branchlets 4-angular. Petioles 0.8–1 cm long, with longitudinal ridges, adaxially ligulate at base; lamina elliptic-ovate or obovate, 10–15 × 4–8 cm, acute or cuneate at base, margins revolute and wavy, obtuse to shortly obtuse-acuminate at apex, coriaceous; midribs raised on both sides; lateral veins inconspicuous, 8–12 pairs per side; exudate canals inconspicuous on both surfaces. Staminate flowers tetramerous, axillary or on axils of fallen leaves, solitary or 2–3 fascicled, 0.5–1 cm in diam., sessile or 0.4–0.5 cm long pedicels; sepals orbicular or elliptic, convex, 0.4–0.6 × 0.2–0.4 cm; petals white to pink, rotundate or orbicular, 0.5–0.8 × 0.4–0.6 cm, membranaceous; stamens *c.* 25, in a central tetragonous mass, anthers red; rudimentary pistil absent. Pistillate flowers tetramerous, axillary, solitary, *c.* 0.3 × 0.6 cm, sessile; sepals orbicular, convex, *c.* 0.5 cm in diam., margins membranaceous; petals pink, ovate, 0.5–0.6 × 0.3–0.5 cm; staminodes 12–14, fascicled in groups of 3–4 and arranged in a ring around ovary; ovary sub-globose, *c.* 0.2 cm in diam., 4-locular; stigma 5-lobed, tubercled. Berries globose to sub-globose, 2.5–3 × 2–3 cm, smooth, greenish-yellow with reddish tinge, crowned by persistent papillate stigma. Seeds 4, ovoid-

reniform, c. 1.5 × 0.6 cm, laterally compressed.

Vernacular names: Mysore gamboges tree, Indian gamboges tree (English); Chikiri, Daramba, Iravi, Karukkampuli, Makki (Malayalam); Makki, Solaippuli (Tamil); Hardala, Devampuli, Jarize, Arsina gurgi (Kannada); Kuji-thejera (Assamese).

Flowering & fruiting: Flowering from November to January; fruiting from February to April.

Habitat: Common onstream sides in evergreen and semi-evergreen forests, up to 1100 m elevation.

Distribution: Indo-Malaya.

Specimens examined: INDIA, **Arunachal Pradesh**, East Siang district, Pasighat, 05.02.1912, I.H. Burkill 36754 (CAL). **Assam**, Cachar district, Bhuban hill, 02.12.1914, U.N. Kanjilal 4797 (CAL); South West Garo Hill district, Tura, 14.02.1886, C.B. Clarke 43109 (CAL); Rani Dawa bang, 16.01.1912, I.H. Burkill 37498 (CAL). **Karnataka**, Chikmagalur district, Horanadu R.F., near Jain temple area, 27.02.1984, E. Vajravelu 77872 (MH); Kemmengundi, 1425 m., 01.12.1983, K.V. Asha 1299 (CALI); Saingeri, 850 m., 09.11.1983, V.A. Vasantha 1040 (CALI). Shimoga district, Agumbe, 850 m., 28.11.1983, K. Shanthi 1041 (CALI); Uttara Kannada district, April, 1883, W.A. Talbot 376 (BSI, CAL); Garisoppah, 30.11.1884, W.A. Talbot s.n. (BSI); *Ibid.* 15.05.1896, W.A. Talbot 1896 (BSI); *Ibid.* November 1900, W.A. Talbot s.n. (BSI); *Ibid.* 01.02.1892, W.A. Talbot 2662 (BSI); North Canara, May 1929, T.R. Bell 5985 (BLAT); North Canara, 18.05.1954, H. Santapu 18567 (BLAT); *ibid.* 18.05.1954, R.P. Patil 627 (DD); Yellapur, North Canara, April, 1939, N.L. Bor 9555 (DD). **Kerala**, Kollam district, Colaturpolay (Kulathupuzha), 23.01.1896, T.F. Bourdillon 734 (FRC); *Ibid.*, 17.02.1904, s.coll. s.n. (TBGT [TBGT02248]); Naduvannorkadavu near Choodal bridge, 02.06.1964, K.N. Subramanian 1548 (FRC); Kulathupuzha, Arippa, 150 m, 03.08.1981, N. Sasidharan 1470 (KFRI); Malappuram district, Thalichola, 10.04.1982, Philip Mathew 28439 (CALI); Karuvarakundu, 16.06.1982, Philip Mathew 33368 (CALI); Nilambur, Nadukani, 525 m, 14.02.1985, N. Sasidharan 3342 (KFRI); Palakkad district, Attapadi hills, 28.10.1910, C.E.C. Fischer 2365 (CAL); Chenathnair Reserve, Palakkad, 11.12.1920, C.E.C. Fischer 4570 (CAL); Way to Silent valley Dam, 28.06.1976, P. Bharghavan 47238 (MH); Mukkali forest, 05.11.1976, E. Vajravelu 48852 (MH); R.F.

above Dam site, Silent Valley, 09.04.1978, N.C. Nair 56703 (MH); Way to Aruvampara Estate, 24.04.1980, V.J. Nair 67281 (MH); Dam site to Valiyapara thode, 05.12.1980, N.C. Nair 69118 (MH); Dam site to Veliyaparathode, 05.12.1980, N.C. Nair 69118 (MH); Bank of Kumattan thode, Silent Valley, 17.03.1984, N.C. Nair 81269 (MH); Attappady, Manthampotti, +500 m, 15.11.1985, N. Sasidharan 3615 (KFRI); Wallakkadavu, Silent Valley, 02.02.1994, Jomy Augustine 13193 (KFRI); Silent Valley National Park, MPCA, 08.03.2003, C. Kunhikannan & N. Venkatasubramanian 14833 (FRC); Palakkad, Silent Valley, Wallakkad, 18.11.2014, P.S. Shameer 79660 (TBGT); *Ibid.*, 16.12.2014, P.S. Shameer 79665 (TBGT); Thiruvananthapuram district, Bonacord, 29.05.1989, N. Mohanan 8416 (TBGT); Attayar, 02.03.1991, N. Mohanan 10564 (TBGT); Chemmunji Hills, 22.01.2014, P.S. Shameer 79610 (TBGT); Thrissur district, Kodakkalthodu, Thatchnaduvu area, Palapitty range, Chalakudy, 24.02.1982, K.N. Subramanian 7989 (FRC); Payampara area, Palapitty range, Chalakudy, 24.02.1982, K.N. Subramanian 7974 (FRC); Peechi, Vengappara, 425 m, 19.12.1988, N. Sasidharan 5045 (KFRI); Wayanad district, Kambamala, Begur Range, Wayanad forest Division, 06.05.1983, N. Venkatasubramanian 9370 (FRC). **Meghalaya**, United Khasi & Jaintia Hills district, s.d., G. Gallatly 252 (CAL); Khasia, J.D. Hooker & T. Thomson s.n., (CAL). **Tamil Nadu**, Coimbatore district, Anamalais, 28.10.1901, C.A. Barber 3874 (MH); Udumanparai, Anamalais, 03.05.1903, C.A. Barber 5750, 5760 (MH); Nilgiri district, Devala s.d., Weddermann s.n. (MH); Iyyerpadi, 20.02.1901, C.A. Barber 3831 (MH); Thirunelveli district, Kannikatty, 21.02.1913, D. Hooper & M.S. Ramaswami 39433 (CAL); Kannikatty, 19 Mach 1917, s.coll. 14653 (MH); SRI LANKA, March 1883, s.coll. s.n. (MH [MH60489]). **Without precise locality**, s.d., s.coll. s n., (MH [MH60488]); *Ibid.*, BM000946508 (BM, image!).

Uses: The butter extracted from seed is used in cooking, confectionary, substitute of ghee, candle making and medicine. Resin is a commercial source of yellow pigment for colouring varnishes and for dyeing silk fabrics (Maheshwari, 1964; Baruah et al., 2021).

Garcinia cambogioides (Murray) Headland var. *cuspidata* (A. Begum, Brothakur & J. Sarma) T.K. Paul, Pleione 15(3): 454. 2021; *G. morella* var. *cuspidata*

A.Begum, Brothakur & J.Sarma, *Pleione* 8 (2): 502. 2014. *Type*: INDIA, Assam, Tinsukia district, Borguri, Near Bherjan-Borjan, Padumoni Wildlife Sanctuary, 18.04.2012, 277 m asl., *Ajima Begum & Jatindra Sarma* 101 (holo, GUBH!; iso, ASSAM!).

Dioecious trees; exudate yellowish. Branches drooping; branchlets terete. Lamina lanceolate or elliptic-oblong or obovate, 7–13 × 2.7–4.1 cm, attenuate at base, margins entire, acuminate or cuspidate-bend at tip; midrib raised abaxially, impressed adaxially; secondary veins 8–12 pairs, slightly visible on upper surface only. Staminate flowers tetramerous, 0.8–1 cm diam.; stamens in a tetragonous mass. Pistillate flowers greenish white, solitary or in clusters of 2–4 terminal and axillary fascicles, 1–1.2 cm in diam., sessile. Sepals 4, almost equal, 0.25–0.3 × 0.2–0.35 cm; petals 4, ovate, imbricate, 0.8–0.9 × 0.4–0.45 cm, greenish white, margins fimbriate, 0.3–0.5 cm long; staminodes 0.2–0.25 cm long, united in lower half and enveloping ovary base; ovary obovate, quadrangular, 5–6-loculed, not grooved; style 0.1–0.2 cm long; stigma white, indistinctly 5–6-lobed. Berries oblong-ovoid, 5–6 × 4–5 cm, with 1–1.2 cm long curved tip. Seeds oblong, 2–4, compressed.

Flowering & fruiting: Flowering from March to April; fruiting from April to May.

Habitat: Evergreen forests, up to 200 m elevation.

Distribution: Endemic to Assam (India).

Garcinia cambogioides (Murray) Headland var. ***mucrona*** (A.Begum, Brothakur & J.Sarma) T. K.Paul, *Pleione* 15(3): 454. 2021; *G. morella* var. *mucrona* A.Begum, Brothakur & J.Sarma, *Pleione* 8 (2): 502. 2014. *Type*: INDIA, Assam, Tinsukia district, Digboi, Pangeri, 25.04.2013, 160 m asl., *Ajima Begum, Jatindra Sarma & S.K. Borthakur* 113 (holo, GUBH!; iso, ASSAM!).

Dioecious trees, 10–13 m tall; exudation yellow. Branches obliquely horizontal; branchlets terete. Lamina elliptic-obovate, 9–13.5 × 4.2–6.5 cm, attenuate at base, margins entire, mucronate at tip, midrib raised abaxially, impressed adaxially; secondary veins 8–12 pairs, prominent on both sides. Staminate flowers tetramerous, 0.8–1 cm in diam.; stamens in a central tetragonous mass. Pistillate flowers tetramerous, greenish white, 1–1.2 cm in diam., terminal, axillary, solitary or in cluster

of 2–4, sessile; staminodes 4–8 at the four corners, 0.2–0.25 cm long, very slender, united in lower half and enveloping the ovary base; stigma white, indistinctly lobed. Berries globose or sub-globose, 4–6 cm diam., 0.5–0.6 cm long mucronate tip.

Flowering & fruiting: Flowering from March to April; fruiting from May to June.

Habitat: Evergreen and semi-evergreen forests, up to 200 m elevation.

Distribution: Endemic to Assam (India).

Garcinia cambogioides (Murray) Headland var. ***pictoria*** (Roxb. ex Buch.-Ham.) Shameer & N.Mohanan, *Rheedea* 30(4): 468. 2020. *Garcinia pictoria* Roxb. ex Buch.-Ham. *Mem. Wern. Soc.* 5: 346. 1826; [Hort. Bengal. 42. 1814, *nom. nud.*]; Roxb., *Fl. Ind.* 2: 627.1832; Wight, *Ic. t.* 102. 1839; Choisy, *Mem. Soc. Phys. Geneve* 12: 417. 1851; Headland *Man. Mater. Med. Therap.* (ed. 3): 340. fig. 49. 1856; Planch. & Triana, *Ann. Sci. Nat. Bot. ser. 4.* 14: 355. 1860; Drury, *Indian Fl.* 1: 141.1864; Bedd., *Fl. Sylv. t.* 86–87; Pierre, *Fl. Forest. Cochinch.* 32: t. 85B. 1883; Vesque in A.D.C., *Monogr. Phan.* 8: 476. 1893; Gamble, *Man. Indian Timb.* 55. 1902; Sealy, *Kew Bull.* 11(2): 341. 1956; Maheshw., *Bull. Bot. Surv. India* 6: 133. 1964; Mabb., *Taxon* 26(5–6): 529. 1977. N.P.Singh in B.D.Sharma & Sanjappa (eds.), *Fl. India* 3: 122. 1993. *Hebradendron pictorium* (Roxb.) Royle, *Man. Mat. Med.* 305. 1847. Lectotype (designated by Shameer & Mohanan, 2020a): INDIA, Kerala, Wayanad, *s.d.*, *Samuel Dyer s.n.* (BM [BM000611609 digital image!]).

Dioecious evergreen trees, up to 20 m tall; exudation yellow; branches spreading; branchlets angular. Petioles 1–1.5 cm long, slender; lamina elliptic-ovate, 8–10 × 3–5 cm, acute or attenuate at base, margins entire, acute at apex; midribs prominent on both sides; lateral veins conspicuous, c. 20 pairs per side. Staminate flowers tetramerous, axillary, solitary; 0.8–2 cm in diam.; stamens 35–40, in a central sub-globose mass. Pistillate flowers tetramerous, axillary, solitary, 0.7–1 cm in diam.; staminodes c. 20, filaments connate at base in a sheath around ovary; ovary oblong, 0.2–0.4 cm in diam., 4-locular; stigma peltate, 4-lobed, tubercled. Berries globose or sub-globose, 3–5 × 1.5–2 cm, smooth, reddish when ripe, crowned by 4-lobed, persistent tubercled stigma. Seeds 1–3, oblong-reniform, 0.8–1 cm long.

Flowering & fruiting: Flowering from November to January; fruiting from February to May.

Habitat: Evergreen forests, above 900 m elevation, usually on stream sides.

Distribution: Endemic to the southern Western Ghats.

Specimens examined: INDIA, **Karnataka**, Uttara Kannada district, North Kanara, 02/01/1892, *s.coll.* 2662 (CAL). **Kerala**, Wayanad district, Puthoorvayal, Manikunu Mala, 25.07.2012, *P.S. Shameer* 86640 (TBGT); Kuruva Island, 20.11.2014, *P.S. Shameer* 79656, 79657 (TBGT).

Notes: The taxon is variously treated in Indian floras. Anderson (1874) and Dunn (1915) consider it as synonymous to *G. morella* (= *G. cambogioides*). Maheshwari (1964) treated it as a distinct species, with a note that “the species is closely allied to *G. morella* and scarcely distinguishable except by the female flowers”. Singh (1993) also considered it as distinct but commented that “this species is closely allied to *G. morella*, under which it is sometimes sunk”. Arisdason and Daniel (2005) followed Roxburgh and Maheshwari for inclusion of *G. pictoria* in their treatment. Headland (1856), though treated *G. cambogioides* and *G. pictoria* as distinct species, has given a note about their close relationship, with the aid of illustrations.

During the present study, we collected specimens of *G. pictoria* from the type locality in Wayanad and compared them with *G. cambogioides* (= *G. morella*). Except for the difference in number and structure of staminal mass, staminodes and stigmatic lobes, listed in the key to the varieties above, both taxa are similar in all other characters such as habit, texture of bark, colour of exudate, size and shape of leaves, flowers, fruits and seeds. Considering these, *G. pictoria* is reduced to a variety under *G. cambogioides*.

Garcinia celebica L., Herb. Amb. 7. 1754, Syst. Nat. ed. 12: 326. 1767 & in Murray, Syst. Veg. (ed. 13): 368. 1774; Miq., Fl. Ned. Ind. 1: 507. 1859; Planch. & Triana, Ann. Sci. Nat. Bot. sér. 4, 14: 173. 1860; Pierre, Fl. Forest. Cochinch. 1: 13. 1882; Vesque in A.D.C., Monogr. Phan. 8: 404. 1893; Boerl., Cat. Pl. Phan. 2: 69. 1901; Koord. & Valetton, Bijdr. Boomsoort. Java 9: 367. 1902; Merr., Interpr. Herb. Amb. 373. 1917; Backer & Bakh.f., Fl. Java (Spermatoph.) 387. 1963. “*Lectotype* (designated by

Merrill, 1917): “*Mangostana celebica*” in Rumphius, Herb. Amb. (Rumphius) 1. 134. pl. 44. 1741.

Garcinia affinis Wall. ex Pierre, Fl. Forest. Cochinch. 1. 15. 1882 & Fl. Forest Cochinch. 1. pl. 78C & 79G. 1883; Vesque, Monogr. Phan. 8: 410. 1893; Maheshw., Bull. Bot. Surv. India 6: 122. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 103.1993. *pro parte. nom. illeg.*

Garcinia cornea L. in Murray, Syst. Veg. ed. 13: 368. 1774; Blume, Bijdr. Fl. Ned. Ind. 214. 1825; Roxb., Fl. Ind. 2: 629. 1832; Miquel, Fl. Ned. Ind. 1: 506. 1859; Laness., Mem. Gen. Garcin. 21. 1872; T.Anderson in Hook.f., Fl. Brit. India 1: 260. 1874. *pro parte*; Pierre, Fl. Forest. Cochinch. 1: 12. 1882, Fl. Forest Cochinch. 1. pl. 78B. 1883; Vesque, Monogr. Phan. 8: 397. 1893; Merr., Interpr. Herb. Amb. 374. 1917. Maheshw., Bull. Bot. Surv. India 6: 122. 1964. *Lectotype* (designated by Merrill, 1917): “*Lignum corneum*” in Rumphius, Herb. Amb. (Rumphius) 3: 55. pl. 30. 1743.

Garcinia hombroniana Pierre, Fl. Forest. Cochinch. 1: 12. 1882, Fl. Forest Cochinch. 1 pl.79D, 79E & 79F. 1883; King, J. Asiat. Soc. Bengal 59: 155. 1890; Vesque in A.D.C., Monogr. Phan. 8: 395.1893; Ridl., Fl. Maly Penin. 1: 171. 1922; Engl., Nat. Pflanzenfam. (ed. 2) 21: 223. 1925; Craib, Fl. Siam. Enum.1: 115.1931; Maheshw., Bull. Bot. Surv. India 6: 121. 1964; Whitmore, Tr. Fl. Malaya 2: 212. 1973; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 111.1993; Hajra *et al.*, Fl. Andaman & Nicobar Islands 1: 139. 1999. *Lectotype* (designated by Nazre, 2010): Peninsular Malaysia, 1841, *J.B. Hombron s.n.* (P [P00329889 digital image!]).

Garcinia kingii Pierre ex Vesque in A.D.C., Monogr. Phan. 8: 407. 1893; Brandis, Indian Trees 50. 1907; Maheshw., Bull. Bot. Surv. India 6: 124. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 114. 1993; Hajra *et al.*, Fl. Andaman & Nicobar Islands 1: 139. 1999. *Lectotype* (designated by Nazre, 2010): INDIA, Andaman Island, 1884, *King's coll. s n.* (K [K000380453 digital image!]).

Garcinia kurzii Pierre, Fl. Forest Cochinch. 1. 14. 1882 & Fl. Forest Cochinch. 1. pl. 78C. 1883; King, J. Asiat. Soc. Bengal 59: 155. 1890; Vesque in A.D.C., Monogr. Phan. 8: 403. 1893; Brandis, Indian Trees 49. 1907; Engl., Nat. Pflanzenfam. (ed. 2) 21: 223. 1925; Maheshw., Bull. Bot. Surv. India 6: 123. 1964; N.P.Singh in B.D.Sharma &

Sanjappa (eds.), *Fl. India* 3: 115. 1993; Hajra *et al.*, *Fl. Andaman & Nicobar Islands* 1: 140. 1999; Dagar & N.T.Singh, *Pl. Res. Andaman & Nicobar Isl.* 2: 416. 1999. *Lectotype* (designated by Nazre, 2010): INDIA, South Andaman, 1867, *Kurz* 24 (P [P00329891 digital image!]).

Garcinia speciosa Wall., *Pl. Asiat. Rar.* 3(11): 37. t. 258. 1832; Planch. & Triana, *Ann. Sci. Nat. Bot. ser.* 4, 14: 326. 1860; Kurz, *Enum. Pl. Andaman Islands* 2. 1870, *J. Asiat. Soc. Bengal* 43: 86. 1874, *Forest Fl. Burma* 1: 88. 1877; T.Anderson in Hook.f., *Fl. Brit. India* 1: 260. 1874; Pierre, *Fl. Forest. Cochinch.* 1: 14 & pl. 79 H & 79 I. 1882; King, *J. Asiat. Soc. Bengal, Pt. 2 Nat. Hist.* 59: 154. 1890; Vesque in A.D.C., *Monogr. Phan.* 8: 402. 1893; Gamble, *Man. Indian Timb.* 53. 1902; C.E.Parkinson, *For. Fl. Andaman Islands* 90. 1923; Craib, *Fl. Siam. Enum.* 1: 117. 1931; Gagnep., *Fl. Gen. Indo-Chine Suppl.* 3: 267. 1943; J.Sinclair, *Bull. Bot. Soc. Bengal* 9: 87. 1955; Maheshw., *Bull. Bot. Surv. India* 6: 123. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), *Fl. India* 3: 125. 1993; Hajra *et al.*, *Fl. Andaman Islands* 1: 141. 1999; Dagar & N.T.Singh, *Pl. Resour. Andaman & Nicobar Isl.* 2: 420. 1999. *Lectotype* (designated by Maheshwari, 1964): BURMA, Mertaban & Amherst, *Wallich* 4855 (CAL [CAL46233!]). **Fig. 3j–l**

Dioecious semi-evergreen trees, up to 18 m tall; exudation pale yellow; branches horizontally spreading, branchlets slightly 4-angular. Petioles 1–2.5 cm long, stout, angular, rugous, adaxially ligulate at base; lamina elliptic to oblong-elliptic, sometimes oblanceolate, 11–20 × 5–10 cm, cuneate at base, margins sub-repand and entire, sub-acute or very shortly and abruptly acuminate at apex; midribs conspicuous on both sides; lateral veins conspicuous, 25–35 pairs per side; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, 3–6, in terminal fascicles, 2–2.5 cm diam., pedicels 0.5–1 cm long, stout; sepals imbricate, orbicular, concave, 0.6–0.8 × 0.3–0.4 cm, unequally fleshy, margins membranous petals pale yellow, ovate-orbicular, 0.8–1 × 0.6–1 cm, concave, membranous on margins; stamens numerous, inserted on a fleshy, slightly 4-lobed annulus, filaments united; rudimentary pistil flat, stigma 8-lobed. Pistillate flowers tetramerous, solitary, terminal, 2–3.5 × 2–2.5 cm; pedicels 1.5–2 cm long; sepals and petals similar to staminate flowers; staminodes absent; ovary globose, 0.5–1 cm in diam., 8–9-locular; style 0.2–0.3 cm long,

stigmatic rays spreading, convex, recurved at the edge when young, forming 8 shallow crenations on ageing. Berries sub-globose, 4–5 cm in diam., smooth, green turning pinkish-red or orange-red on ripening, crowned by disc-like remnant stigma and green leathery sepals at base. Seeds 4–6, oblong, 2.5–3 cm long, covered with soft, pulpy white aril.

Vernacular names: *Sea shore mangosteen* (English); *Parawa* (Andamanese).

Flowering & fruiting: Flowering from January to March; fruiting from February to April.

Habitat: In tropical evergreen, semi evergreen and inland forests, almost from sea level to mid lands.

Distribution: Native to India, Bangladesh, Malay Peninsula, Myanmar, Thailand and Singapore.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Nicobar district, Kamorta, February 1875, *S. Kurz s.n.* (CAL); *Ibid.*, 1884, *King's coll.* 483 (K [K000380452 digital image!]); Passa, Car Nicobar, 02.06.1975, *N.G. Nair* 2653 (PBL); *Ibid.*, Sawai, Car Nicobar, 24.02.1976, *N.G. Nair* 3526 (PBL); Car Nicobar, 10.06.1895, *King's coll.* 47817 (CAL); North and Middle Andaman district, Interview Island, 06.03.1990, *P. Lakshminarasimhan* 15148 (PBL); Interview Island, Watch Tower No. 2, 26.02.2011, *G.S. Lakhra* 28882 (PBL); North Nicobar, Katchal Island, near Police Station, 29.12.1974, *P. Chakraborty* 2239 (PBL); *Ibid.*, West Bay, 15.02.1977; *Ibid.*, Pondha, 02.04.1979, *M.K. Vasudeva Rao* 7509 (PBL); South Andaman district, East coast, 1899, *R.L. Heinig* (CAL [CAL46785]); *Ibid.*, *s.d.*, *S. Kurz s.n.* (CAL [CAL46779]); *Ibid.*, 13/01/1884, *King's coll.* 90 (CAL); *Ibid.*, 1884, *King s.n.* (K [K000380453, image!]); Chiriatapau, 19.01.1916, *C.E. Parkinson* 884 (CAL); *Ibid.*, 20.01.1916, *C.E. Parkinson* 888 (CAL); Boun-Boung-la, 04.02.1916, *C.E. Parkinson* 912 (CAL); *Ibid.*, 10.02.1916, *C.E. Parkinson* 934 (CAL); Rutland Island, Barakhari, 21.01.1982 *M.K. Vasudeva Rao* 8617 (PBL); Manjeri, 31.01.2004, *K. Karthigeyan* 19633 (PBL); Mount Harriet, 11.02.2016, *P.S. Shameer* 86610 (TBGT); Shoal Bay-17, 13.02.2016, *P.S. Shameer* 86615 (TBGT); Nayashahr, Dhanikari Reserve forest, 16.02.2016, *P.S. Shameer* 86618 (TBGT); *Ibid.*, 03.03.2017, *P.S. Shameer* 86645 (TBGT). **Kerala**, Thiruvananthapuram district, Cultivated in JNTBGRI orchard, 02.11.2013, *S.M. Shareef* 702016 (TBGT); *Ibid.*, 13.12.2014,

PS. Shameer 79668 (TBGT); *Ibid.*, 23.03.2016, PS. Shameer 86633 (TBGT). **West Bengal**, Cultivated Royal Botanic Garden, Howrah, *s.d.*, Wallich 4852 (CAL); *Ibid.*, *s.coll. s.n.*, (MH [MH63569]); *Ibid.*, *s.coll. s.n.* (CAL [CAL4619]); *Ibid.*, *s.coll. s.n.* (CALO [CAL46190]); *Ibid.*, *s.coll. s.n.* (CAL [CAL461191]); Cultivated in Botanic Garden, 07.12.1961, S.K. Mukerji *s.n.* [CAL [CAL297414]]; *Ibid.*, Joe W. Helfer 270 (CAL). **BANGLADESH, Chittagong**, 1886, King's coll. 274 (CAL); Sylhet, Wallich 4854 (K, image!); *Ibid.*, Wallich 4854 (BR [BR0000006912758, image!]); *Ibid.*, J.D. Hooker & T. Thomson *s.n.* (GDC [G00458944, image!]). **MALAY ARCHIPELAGO**, 1898, Teysman 79 (CAL [CAL471149]). **MALACA**, 1841, Cuming 2296 (K [K000380448 digital image!]); 1861, Griffith 857 (K [K000380447 digital image!]). **MANILA**, Amboina, *s.d.*, C.B. Robinson 323 (CAL). **MALAY PENINSULA, Malaca**, 1845, Griffith *s.n.* (CAL [CAL47015]); **Perak**, January 1884, King's coll. 5460 (CAL). **MYANMAR, Martaban**, *s.d.*, S. Kurz 538 (CAL). *s.loc., s.d.*, Wallich 4852 (CAL); *s.loc. s.d.*, J.E. Smith *s.n.* (K [K000380450, image!]). **Without precise locality**, December 1869, Pierre 3633 (K [K000380455 digital image!]).

Uses: Fruits are edible while roots and leaves are used as medicine. It yields an inferior gamboge. Timber is used for house building and also used for making bows in Andaman Islands. (Maheshwari 1964; Singh 1993).

Notes: *Garcinia affinis*, *G. cornea*, *G. celebica*, *G. hombroniana*, *G. kingii*, *G. kurzii* and *G. speciosa* are variously treated in earlier Indian floras and revisions. Wight (1840) treated *G. celebica*, *G. cornea* and *G. speciosa* as distinct species. Anderson (1874) considered *G. cornea* and *G. speciosa* as distinct whereas *G. affinis* was synonymized under *G. cornea*. Kurz (1874) considered *G. speciosa* and *G. cornea* as distinct species. Parkinson (1923) included both *G. kingii* and *G. kurzii* under *G. speciosa*, noting that they were "nearly allied". Maheshwari (1964) considered *G. affinis*, *G. cornea*, *G. hombroniana*, *G. kingii*, *G. kurzii*, and *G. speciosa* as distinct, and commented on the close similarity between *G. hombroniana* and *G. cornea*. Singh (1993) treated *G. affinis*, *G. hombroniana*, *G. kingii*, *G. kurzii*, and *G. speciosa* as distinct. He has excluded *G. cornea* and also commented that he has not seen specimens of *G. kingii*. Except for Wight (1840), *G. celebica* is not recorded in any earlier Indian works.

After a detailed study of all specimens kept under the aforementioned names, Nazre (2010) concluded that 'morphological evidences based on the literature and herbarium specimens suggested that there are no clear cut discontinuities in morphological characters or any characters exclusive to certain geographical areas between *G. hombroniana* with *G. celebica* and *G. cornea* and many other names including *G. affinis*, *G. kingii*, *G. kurzii* and *G. speciosa*. Because of that, the correct name that should be used is *G. celebica* as it was published much earlier and all other names should simply be synonyms of *G. celebica*. This treatment, accepted in International Plant Name Index (www.ipni.org) and World Flora Online (www.worldfloraonline.org) is followed here. In our expedition to Andaman & Nicobar Islands, we could collect specimens showing variations, but all were continuous and within the range.

Garcinia conicarpa Wight, Ic. Pl. Ind. Orient. t. 121. 1839, Ill. Ind. Bot. 1. 126. 1840; Planch. & Triana, Ann. Sic. Nat., Bot. sér. 4, 14: 347. 1860; Shameer & N.Mohanani, Phytotaxa 490(2): 191–196. 2021. *G. cambogia* (Gaertn.) Desr. var. *conicarpa* (Wight) T.Anderson in Hook.f., Fl. Brit. Ind. 1: 262. 1874; Vesque in A.DC., Monogr. Phan. 8: 428. 1893; Maheshw., Bull. Bot. Surv. India 6: 130. 1964. *G. gummi-gutta* var. *conicarpa* (Wight) N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 110. 1993; Nazarudeen, J. Econ. Tax. Bot. 25: 607. 2001; Sasidh., Biod. Doc. Kerala Fl. Pl. 6: 40. 2004; T.S.Nayar et al., Fl. Pl. Western Ghats 275. 2014; Arisdason & P.Daniel, Fl. Kerala 336. 2005. *Lectotype* (designated by Prasanth et al., 2019): **INDIA, Tamil Nadu**, Shevagherry hills, August 1836, R. Wight 141 (K [K000677578] digital image!); *isolecto*, (K [K000677579, K000677580] digital image!).

Garcinia darwiniana Kesha.Murthy, Yogan. & K.V.Nair, Curr. Sci. 56: 425. 1987. *Type*: **INDIA, Karnataka**, Coorg district, Mercara, 19.03.1984, K.R. Keshavmurthy et al. 4828A (RRCBI). **Fig. 3m–o** Dioecious evergreen trees, up to 15 m tall; exudation yellow, sticky; branches usually horizontal, branchlets terete. Petioles 0.7–0.9 cm long, stout; ligule absent; lamina obovate–ovate to rarely oblong, 6–10 × 4–8 cm, acute at base, margins entire, acute or obtuse at apex, coriaceous, reddish when young; midribs conspicuous on both

sides; lateral veins inconspicuous; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, axillary or terminal, solitary or 2–5 in fascicles, 1–1.5 × 1–1.2 cm; pedicels *c.* 0.5 cm long, stout; sepals ovate, convex, 0.5–0.6 × 0.5–0.6 cm, coriaceous, margins membranaceous with fimbrial like projections; petals, yellow, oblong-orbicular, coriaceous, 0.1–0.13 × 0.7–0.9 cm, concave with slightly membranaceous margins; stamens numerous in a convex torus; rudimentary pistil absent or present. Pistillate flowers tetramerous, 1–3, terminal or sub-terminal, 1–1.5 × 1–3 cm, sessile; sepals and petals similar to staminate flowers; staminodes *c.* 20, arranged in a ring around the ovary; ovary globose, 0.2–0.3 cm in diam., 3–5-locular, grooved; stigmatic rays 3–5, irregularly tuberculate. Berries ovoid-conical, 4–5 cm in diam., 3–5-grooved, mamillate at apex, yellowish green on ripening, pericarp very thick, fleshy. Seeds 2–4, ovate-oblong, 0.2–0.3 × 0.8–1 cm, enclosed in a thin, fibrous aril.

Vernacular names: Kattupuli (Malayalam).

Flowering & fruiting: Flowering from April to June; fruiting from June to October.

Habitat: Sholas and high altitude evergreen forests, between 1350–1950 m elevation.

Distribution: Endemic to southern Western Ghats, very rare.

Specimens examined: INDIA, **Karnataka**, Kodagu district, Bhagamandale, 22.07.1979, *Ramesh & Manohar* KFP8441 (MH). **Kerala**, Idukki district, Devicolam, December 1909, *Meebold* 13533 (CAL); Rajamalai, 03.09.1992, *Nazarudeen* 14810 (TBGT); *Ibid.*, 22.02.1995, *Kalesh* 21227 (TBGT); *Ibid.*, 18.11.2005, *Rama Subbu & Kulloli* 57832 (TBGT); *Ibid.*, 19.06.1998, *Biju* 37483 (TBGT); Bhadrakali shola, 01.10.2012, *Deepthy* 74641 (TBGT); Vellimala, 12.12.1993, *Jomy Augustine* 12902 (KFRI); Rajamalai, 22.02.1995, *Kalesh* 21227 (TBGT); Hut near Rajamalai, 19.06.1998, *Biju* 37483 (TBGT); Rajamalai, 18.11.2005, *Rama Subbu & Kulloli* 57832 (TBGT); Bhadrakali shola, 01.10.2012, *Deepthy* 74641 (TBGT); Kottamala, 25.05.1995, *Jomy Augustine* 15379 (KFRI); *Ibid.*, 1385 m, 25.09.2014, *P.S. Shameer* 79648 (TBGT); *Ibid.*, 1640 m, 25.09.2014, *P.S. Shameer* 79649 (TBGT); *Ibid.*, 1638 m, 25.09.2014, *P.S. Shameer* 79650 (TBGT); *Ibid.*, 1362 m, 26.09.2014, *P.S. Shameer* 79651 (TBGT); Perumudishola,

12.11.2014, *P.S. Shameer* 79654 (TBGT); *Ibid.*, 12.11.2014, *P.S. Shameer* 79655 (TBGT); *Ibid.*, 08.12.2016, *P.S. Shameer* 86637 (TBGT); Kozhikode district, Vellarimala, 24.03.2013, *P.S. Shameer* 86604 (TBGT); Wayanad district, Thollayiram forest, 20.02.2017, *P.S. Shameer* 86647 (TBGT). **Tamil Nadu**, Coimbatore district, between Olliar and Thorakadvar, 10.10.1901, *C.A. Barber* 3701 (MH); Annamalai, 18.02.1980, *Chandrabose* 65842 (MH);

Uses: Fruits are edible; dried fruit rinds are used in fish curries.

Notes: Though Wight (1840) described *G. conicarpa* as a distinct species, later authors considered it as a variety only under *G. gummi-gutta* (*G. cambogia*). Based on live specimens, the authors made a detailed study of all the three varieties of *G. gummi-gutta* (var. *gummi-gutta*, var. *conicarpa*, and var. *papilla*). It was found that in certain characters var. *conicarpa* differed from the other two varieties (ovate oblong leaves against elliptic leaves, absence of ligule against its presence, sessile pistillate flowers against pedicelled ones and ovoid conical, 3–5-grooved berries against globose, subglobose or oblong, 5–10-grooved berries), which supports Wight (1839, 1840), who treated the plant as distinct species. Hence *G. conicarpa* Wight was reinstated (*Shameer et al.*, 2021).

Garcinia cowa Roxb. ex DC., *Prod.* 1: 561. 1824; Roxb., *Fl. Ind.* 2: 622. 1832; Wight & Arn., *Prod.* 1: 101. 1834; Choisy, *Mem. Soc. Phys. Geneve*, 12. 414. 1851; Planch. & Triana, *Ann. Sic. Nat., Bot. ser.* 4, 14: 186. 1860; Laness., *Mem. Garcin.* 54. 1872; T. Anderson in *Hook. f., Fl. Brit. India* 1. 262. 1874; Kurz, *J. Asiat. Soc. Bengal. Pt. 2, Nat. Hist.* 43: 87. 1874 & *Forest Fl. Burma* 1: 90. 1877; Pierre, *Fl. Forest. Cochinch.* 28: t. 82D–H 1883; King, *J. Asiat. Soc. Bengal* 59: 163. 1890; Vesque in *A. DC., Monogr. Phan.* 8: 449. 1893; Dunn in *Gamble, Fl. Madras* 1: 74. 1915; Haines, *Bot. Bihar & Orissa* 2: 53. 1921; C.E. Parkinson, *For. Fl. Andaman Islands* 89. 1923; Engl., *Nat. Pflanzenfam.* (ed. 2) 21: 226; Craib, *Fl. Siam. Enum.* 1: 114. 1931; Kanjilal *et al.*, *Fl. Assam* 1: 105. 1934; Gagnep., *Fl. Gen. Indo-Chine Suppl.* 3: 261. 1943, excl. syn.; Sealy, *Kew Bull.* 11(2): 341. 1956; Maheshw., *Bull. Bot. Surv. India* 6: 131. 1964; Whitmore, *Tree Fl. Malaya* 2: 208. 1973; D.B. Deb, *Fl. Tripura, ser.* 9. 1: 363. 1981; N.P. Singh in *B.D. Sharma & Sanjappa (eds.), Fl. India* 3: 108.

1993; A.S.Chauhan *et al.*, Fl. Namdapha Arunachal Pradesh 113. 1996; Hajra *et al.*, Fl. Andaman Islands 1: 138. 1999; B.K.Sinha *et al.*, Fl. Great Nicobar Island 1: 152. 1999; N.P.Singh *et al.*, Fl. Manipur 1: 142. 2000; Kam.P.Singh in N.P.Singh *et al.*, Fl. Mizoram 1: 210. 2002. *Stalagmitis cowa* G.Don, Gen. Hist. 1: 621. 1831. *Lectotype* (first step designated by Maheshwari 1964; second step designated here): INDIA, without exact locality, *s.d.*, *W. Roxburgh s.n.* (BR [BR0000005108138 digital image!]); *isolecto* BR [BR0000006915667, BR0000006912420 digital images!]).

Oxycarpus gangetica Buch.-Ham., Mem. Wern. Soc. 5: 344. 1824, *nom. superfl.*

Garcinia lanceifolia Wall., Cat. 4861C. 1831, *non* Roxb. 1832.

G. roxburghii Wight, Ic. t. 104. 1840, Illustr.1: 125. 1840, *pro parte*.

Key to the varieties

1. Pistillate flowers fascicled; stigma sessile; fruit tip non-mamillate var. *cowa*
1. Pistillate flower solitary; stigma sub-sessile; fruit tip mamillate var. *kydia*

***Garcinia cowa* Roxb. ex DC. var. *cowa* Figs. 5 & 6a-c**

Dioecious evergreen trees, 9–18 m tall; exudation yellow; branches horizontally spreading; branchlets terete. Petioles 0.8–1.3 cm long, slender, adaxially ligulate at base; lamina broadly lanceolate, 8–13 × 2.5–7 cm, cuneate at base, entire on margins, acute at apex, sub-coriaceous; midrib flattened abaxially, prominent adaxially; lateral veins 12–16 pairs, obliquely parallel, not conspicuous; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, 3–8, fascicled, axillary or terminal, 1–1.3 × 1–1.5 cm; pedicels 0.5–0.7 cm long; sepals broadly ovate, 0.3–0.4 × 0.5–0.6 cm, margins membranous; petals yellow with a red tinge, imbricate, oblong, 0.7–0.8 × 0.8–1 cm; stamens 50 or more on tetragonous convex fleshy receptacle, anthers reddish; rudimentary pistil absent. Pistillate flowers tetramerous, 2–3, fascicled, terminal, 1.8–2 × 1.5–2 cm, pedicels 0.5–0.6 cm long; sepals and petals similar to staminate flowers; staminodes 3–8, in 4-phalanges around the ovary; ovary 0.3–0.5 cm in diam., sub-globose, 6–8-locular, stigma sessile, flat, deeply divided into 6–8 wedge-shaped rays, papillose. Berries globose, 2–4 × 2.5–4 cm,

depressed, dark yellow, vertically 4–6-grooved from base to apex, non-mamillate, pericarp thin. Seeds 4–8, oblong, 1–1.25 × 0.8–1 cm, in pulpy aril.

Vernacular names: *Kau-thekeera*, *Kaugach* (Assamese): *Kowa*, *Kau*, *Duffla*, *Blachung-Changne*; (Bengali): *Tekra*, *Rengram* (Garo); *Kattaphal* (Hindi); *Sarbana* (Orissa); *Kau* (Manipuri and Naga); *The Cowa fruit*, *The Cowa mangosteen* (English).

Flowering & fruiting: Flowering from February to March; fruiting from April to July.

Habitat: Fairly common in evergreen, semi-evergreen and tropical forests, up to 1200 m elevation.

Distribution: India, Bangladesh, Myanmar, China and Thailand.

Specimens examined: INDIA, **Andaman and Nicobar Islands**, South Andaman district, 1890,



Fig. 5. Lectotype of *Garcinia cowa* Roxb. ex DC. var. *cowa* (Roxburgh *s.n.*, BR0000005108138, digital image) ©“Agentschap Plantentuin Meise” (Botanic Garden Meise), reproduced with permission.

King's coll. s.n. (CAL [CAL47066]); Dhanikhari-hill jungle, 22.04.1892, *King's coll.* (CAL); Rangat Bay, May 1915, *C.E. Parkinson* 580 (CAL); Mt. Harriet, 11.02.2016, *PS. Shameer* 86609 (TBGT); Shoal Bay-18, 13.02.2016, *PS. Shameer* 86613 (TBGT); Shoal Bay-16, 13.02.2016, *PS. Shameer* 86614 (TBGT); Nayashahr Reserve Forest, 16.02.2016, *PS. Shameer* 86619 & 86620 (TBGT); North and Middle Andaman district, Saddle Peak, 20.02.2016, *PS. Shameer* 86624 (TBGT). **Assam**, Cachar district, August 1903, *Shaik Mokim s.n.* (ASSAM); Tupidhar, 04.04.1940, *R.N. De* 19258 (ASSAM); Jorhat district, Seebesagar, 30.04.1885, *C.B. Clarke* 38037 (CAL); Kamrup district, Andherijuli, 13.04.1915, *U.N. Kanjilal* 5463 (ASSAM); Chhaygaon, 05. 04.1915 *U.N. Kanjilal* 5427 (ASSAM); Lukikhas forest about 2 miles south of Singra, 26.06.1964, *A.K. Rao* 39129 (ASSAM); Ranigodam, June 1898, *Prain's coll. s.n.* (CAL); Karimganj district, Longai Reseve forest, 28.03.1932, *P.C. Kanjilal* 10123 (ASSAM); *Ibid.*, 01.06.1932, *P.C. Kanjilal* 10245 (ASSAM); Kokrajhar District, Chakrasila, 11.07.2008, *Ranjit Dainmary* 117864 (ASSAM). Sivasagar district, Amgori, 22.04.1895, *s.coll.* 11174 (CAL); Jorhat, 30.04.1885, *C.B. Clarke* 38037 (CAL); Sivasagar, 1891, *S.E. Peal, s.n.* (CAL). **Bihar**, Madhubani district, *Majhaura*, 305-365 m, 07.05.1947, *H.F. Mooney* 2868 (DD). **Meghalaya**, Singbhum Garo Hill district, 35 km, Dalu Road, 22.03.1915, *U.N. Kanjilal* 5276 (CAL, DD); United Khasi & Jaintia Hills District, Khasi hills, 07.10.1886, *C.B. Clarke* 45150D (CAL); Khasi Hills, April 1877, *s.coll.* 248 (ASSAM); Tharia forest, 03.07.1940, *G.K. Deka* 19604 (ASSAM); Umteuswaqr Forest, 07.07. 1935. *S.R. Sharma* 12207 (ASSAM). **Mizoram**, Kolasib district, Kawnpai, 31.01.1962, *A.B. Arb*

2733 (ASSAM). **Nagaland**, Naga Hill district, May 1899, *Prain's coll.* 100010 (CAL). **Odisha**, Angul district, Athmallik, near river, 26.02.1917, *H.H. Haines* 4711 (CAL); Kendujhar district, Bangura 04.07.1957, *G. Panigrahi* 8651 (ASSAM). **West Bengal**, Alipurduar district, Rajbhatkawa, 24.03.1932, *A.H. Khan s.n.* (DD); Buxa Division, 152 m, 24.03.1931, *A.E. Osmaston s.n.* (DD); Jalpaiguri district Apalchand, Kathambari, 24.04.1962, *S.K. Mukerji* 5516 (CAL); Kalabari, Darrang, April 1914, *U.N. Kanjilal* 3726 (CAL, DD). **Uttarakhand**, Dehradun district, cultivated, *s.d.*, *M.B. Raizada s.n.* (DD). BANGLADESH, Chittagong Hill Track, 03.03.1876, *J.L. Lister* 331 (CAL); *s.loc.* 06.03.1876, *J.L. Lister* 150 (CAL); *s.loc.* April 1887, *King's coll.* 325 (CAL); *s.loc.* February 1886, *King's coll.* 572 (CAL); MYANMAR, Rangoon, March 1911, *A. Meebold* 14029 (CAL); *Ibid.*, *s.d.*, *A. Meebold* 14080 (CAL); Inoun district, 22.02.1915, *C.E. Parkinson* 81 (CAL); *s.loc.*, February 1991, *Shaik Mokim* 449 (CAL). SINGAPORE, Alor Star, Kedah, 1937, *Tungku Jacob* 32770 (CAL). THAILAND: Siam, 17.04.1910, *A.F.G. Kerr* 1124 (CAL).

Conservation status: Least Concern (IUCN 2020).

Uses: The species yield an inferior yellow dye. The ripe fruits are edible. The sliced fruits are sun dried and preserved in Assam and used against dysentery (Maheshwari, 1964).

Typification: *Garcinia cowa* was validly published by Candolle (1824), based on Roxb. Cat. p. 42, 1814. In the protologue, it is mentioned that 'India' is the 'type locality', but no specimens were cited. Subsequently, Roxburgh (1832) in *Flora India* indicated 'Chittagong' as the locality. Maheshwari (1964) designated 'Roxburgh, Chittagong, East Pakistan (Herb. Martius, BR)



Fig. 6. *Garcinia cowa* Roxb. ex DC var. *cowa*: a. Staminate flower; b. Pistillate flower; c. Fruit (Photos by N. Mohanan & P.S. Shameer).

as type. We could locate 3 herbarium specimens at BR, all collected by Roxburgh, but without any collection numbers (BR0000006915667, BR0000005108138, BR0000006912420) and labelled with country of origin as India. Since there are 3 specimens and Maheshwari did not specifically designate a single specimen as type, Maheshwari's typification is considered as the first step, and we select the best specimen among them, Roxburgh *s.n.* (BR0000005108138) as a second step lectotype here and other two specimens as isolectotypes.

***Garcinia cowa* Roxb. ex DC. var. *kydia* (Roxb.) Shameer & N.Mohanani, **comb. nov.** Fig. 7**

Garcinia kydia Roxb. Fl. Ind. 2: 623. 1832; Wight & Arn., Prod. 1: 101. 1834; Planch. & Triana, Ann. Sci. Nat., Bot. sér. 4, 14: 347. 1860; Laness., Mem. Garcin. 59. 1872; Kurz, J. Asiat. Soc. Bengal 59: 164. 1890; C.E.Parkinson, For. Fl. And. Isls. 90. 1923; Kanjilal, Fl. Assam 1: 105. 1934; Sealy, Kew Bull. 11(2): 341. 1956; Maheshw., Bull. Bot. Surv. India 6: 130. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 115. 1993. *Lectotype* (designated here): Roxb. Ic. t. 2282.

Garcinia kydiana Roxb., Hort. Bengal. 42. 1814, *nom. nud.*

Garcinia cowa T.Anderson in Hook.f., Fl. Brit. Ind. 1: 262. 1874, *pro parte.* non Roxb. ex DC., 1824.

Garcinia wallichii Choisy, Mem. Soc. Phys. Geneve 12: 417. 1851, *pro parte.*

Dioecious evergreen trees, up to 7–15 m tall; exudation yellow; branches horizontally spreading; branchlets terete. Petioles 0.6–1.2 cm long; lamina ovate-oblong to lanceolate, 6–15 × 2–4 cm, cuneate at base, acuminate at apex; nerves distinct when dry. Staminate flowers tetramerous, 3–5 in axillary and terminal umbels, rarely solitary, *c.* 2 cm in diam., peduncles 1–1.5 cm long; pedicels 4–6 cm long; sepals 0.4–0.5 cm long, ovate; petals 4, pale yellow, 0.6–0.8 cm long, broadly ovate; stamens numerous, on 4-angled torus; rudimentary pistil absent. Pistillate flowers tetramerous, solitary, axillary and terminal; sepals and petals same as in staminate flower; staminodes in 4 phalanges. Ovary globose, 3–4 cm in diam., 6–8-loculed; style short; stigma 6–8-rayed. Berries depressed globose, 2.5–4 cm in diam., 6–8 grooved towards apex with a short mammellate tip. Seeds oblong, 5–8, 1.5–2

cm long, pulpy aril.

Flowering & fruiting: Flowering from January to March; fruiting from April to July.

Habitat: Unusually found in evergreen and semi-evergreen forests up to 800 m elevation.

Distribution: India, Bangladesh, Myanmar and Malaysia.

Specimens examined: INDIA, **Andaman and Nicobar Islands**, North and Middle Andaman district, Saddle Peak, foot hill along Chota Thambu Nallah, 11.05.1982, *M.K. Vasudeva Rao* 8977 (PBL); *Ibid.*, 20.02.2016, *PS. Shameer* 86625 (TBGT); South Andaman district, North Corbyn's Cove, Hill Jungle *King's coll. s.n.* (CAL); Bamboa Filleet, Port Blair, 05.03.1884, *King's coll.* 150 (CAL); Andamans, 20.04.1901, *Prain's coll.* 28, (CAL); Mt. Harriet, 02.01.1916, *C.E. Parkinson* 837 (DD); Wilson Island, February–March 1934, *Kirat Ram* 3745 (DD); Shoal Bay, 03.03.2017, *PS. Shameer* 86646 (TBGT).

Uses: Ripe fruit pulps are eaten raw. Dried sliced



Fig. 7. Lectotype of *Garcinia cowa* Roxb. ex DC. var. *kydia* (Roxb.) Shameer & N.Mohanani (Roxb. Ic. t. 2282) © The Director, Botanical Survey of India, Kolkata.

pericarps of fruits were used as medicine for stomach disorders (Baruah *et al.*, 2021).

Typification: Roxburgh (1832) did not designate a type for *Garcinia kydia*. In the protologue he mentioned ‘a native of the Andaman Islands, where it was discovered by Col. Alexander Kyd and by him introduced into the Botanic Garden at Calcutta in 1794, where when about 10 years old, it began to blossom in February and the fruit to ripen in July’. But he has made a detailed illustration of the plant (Roxb. Ic. t. 2282, *Garcinia kydiana* in Roxb. Fl. India MS). Maheshwari (1964) in his revision, simply note under type as ‘ex Kyd (Andaman Islands); cult. in Indian Botanic Garden, Calcutta’ but no specimen is cited. Hence the typification by Maheshwari could not be considered legitimate. In this circumstance, as the best choice, we here designate Roxb. Ic. t. 2282 as the lectotype for *Garcinia cowa* var. *kydia*, as it is a detailed illustration of the plant, made by the original author himself.

Notes: *Garcinia kydia* Roxb. was variously treated by later scientists. Anderson (1874) considered *G. kydia* synonymous to *G. cowa* whereas Planchon and Triana (1860), King (1890), Parkinson (1923), Maheshwari (1964) and Sing (1993) treated both as separate species. Singh (1993) also remarked that “this species is clearly allied to *Garcinia cowa* Roxb. ex DC, under which it is sometimes merged”. On studying live specimens, herbarium and earlier descriptions we found that both taxa show almost similar characters, except for a few differences in certain characters, (pistillate flowers 2–3, fruits non-mamillate and grooved from base to apex in *G. cowa* against pistillate flowers solitary, fruit mamillate and grooved only towards the apex in *G. kydia*). In our observation, the differences are not distinct enough to treat both as separate species, but only as varieties of the same species. Hence, *G. kydia* is treated here as a variety of *G. cowa*.

Garcinia dhanikhariensis S.K.Srivast., Nord. J. Bot. 14: 51–53. 1994. *Type:* INDIA, Andaman & Nicobar Islands, South Andaman, Nayashahr forest, alt. ± 30 m, 18.01.1992, S. K. Srivastava 21068 (CAL!).

Fig. 8

Dioecious semi-evergreen trees, up to 10 m tall; exudation yellow; branchlets terete, ribbed. Petioles *c.* 0.5 cm long, stout, adaxially ligulate at

base; lamina elliptic or elliptic-lanceolate, 9–14 × 3–5 cm, cuneate at base, entire on margins, acuminate at apex; midrib flattened abaxially, prominent adaxially; lateral veins 9–12 pairs, obliquely parallel, not conspicuous; exudate canals conspicuous on both surfaces. Staminate flowers unknown. Pistillate flowers tetramerous, terminal, solitary or 2–3 fascicled, 1–1.2 cm in diam.; pedicels 0.5–0.6 cm long; bracteoles 2, 0.2–0.3 cm long, ovate, mucronate, attached at the base of sepals; sepals orbicular, *c.* 0.4 cm in diam., margin membranous; petals crimson-red, 0.5–0.7 × 0.4–0.5 cm, broadly ovate, convex; staminodes *c.* 12, in 4 bundles of 3 each, 3–4 cm long; ovary 0.3–0.4 cm long, ovoid, 3–4-locular, covered with numerous, imbricate, fleshy scales or warts; stigmas peltate, irregularly lobed. Berries sub-globose, 3–4 cm in diam., dark red on ripening, slightly projected at apex, with persistent sepals and stigma. Seeds 3–5, oblong, compressed, 1–1.5 cm long, in pulpy arils.

Flowering & fruiting: Flowering from January to February; fruiting March to April.

Habitat: Growing in semi-evergreen forests, up to 30 m elevation.

Distribution: India: Endemic to Andaman Islands, India.

Specimens examined: INDIA, **Andaman and Nicobar**, South Andaman district, Nayashahr forest, *Ibid.*, S. K. Srivastava 21068A, 21068B & 21068C (PBL); Nayashahr forest, Experimental Garden, 16.02.2016, P.S. Shameer 86621, 86622



Fig. 8. Fruit of *Garcinia dhanikhariensis* S.K.Srivast. (Photo by N. Mohanan & P.S. Shameer).

& 86623 (TBGT); *Ibid.*, 03.03.2017, *P.S. Shameer* 86643 & 86644 (TBGT).

Notes: Srivastava (1994) described *G. dhanikhariensis* based on a single specimen *viz.*, *S.K. Srivastava* 21068, from Nayashahr Reserve forest, in Dhanikari, South Andaman. Srivastava had included a description of staminate flowers in his protologue. The holotype (CAL) is a vegetative twig along with some detached flowers pasted separately. The isotype 21068 (A) is an imperfect specimen of detached twigs and leaves, with an illustration of a fruit; 21068B (PBL) a specimen with immature fruits and 21068C (PBL) is a vegetative twig. Hence, the genus being dioecious, the type specimen bearing fruits belonged to a female plant, the description of stamens by Srivastava may be a wrong interpretation of staminodes found in pistillate flowers. No male plants were found during this study, either. Though hitherto known only from female specimens, the characters are good enough to consider it a distinct species, allied to *G. indica*. Further, thorough exploration of nearby localities is suggested for locating male plants and thus confirming the distinctiveness of the species.

Garcinia dulcis (Roxb.) Kurz, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 43: 88. 1874, *Forest Fl. Burma* 1: 92. 1877; King, *J. Asiat. Soc. Bengal* 59: 169. 1890; Vesque in *A.D.C., Monogr. Phan.* 8: 312. 1893; Backer, *Fl. Bat.* 1: 85. 1907; Merr., *Philip. J. Sci. (Bot.)* 3: 362. 1908, *Enum. Philip. Pl.* 3: 84. 1923; Ridl., *Fl. Mal. Penins.* 1: 179. 1922; Engl., *Nat. Pflanzenfam.* (ed. 2) 21: 219. 1925; Burkill, *Dict. Econ. Prod. Mal. Penins.* 1: 1049. 1935. Maheshw., *Bull. Bot. Surv. India* 6: 115. 1964; N.P. Singh in B.D. Sharma & Sanjappa (eds.), *Fl. India* 3: 109. 1993. *Xanthochymus dulcis* Roxb., *Pl. Coromandel* 3: 66. 1819, *Fl. Ind.* 2: 631. 1832; Curtis's, *Bot. Mag.* t. 3088. 1831; Wight, *Ic.* 1. t. 192. 1840. *Lectotype* (designated here): India, 1814., *Wallich s.n.* (CAL [CAL0000065123!]).

Stalagmitis dulcis Cambess., *Mem. Mus. Hist. Nat. (Parris)* 16: 426. 1828, *nom. superfl.*

Stalagmitis cambogioides sensu Blanco, *Fl. Filip.* (ed. 2) 301. 1845, (ed. 3) 2: 195. 1878, *non* Murr. 1789.

Garcinia elliptica Choisy, *Mem. Nouv. Gen. Guttif.* 17. 1824. *nom. superfl.*

Garcinia nervosa sensu Dutta et al., *Indian J. Pl. Sci.* 3 (3): 34–36. 2014. *non* Miq. 1864.

Dioecious evergreen trees, 9–12 m tall; exudation milky; branches horizontal; branchlets tetra-angular. Petioles 1–1.5 cm long, stout, angular, rugous, adaxially ligulate at base, oblong to ovate-oblong, 12–30 × 5–15 cm, obtuse or rotundate at base, margins sub-repand and entire, shortly acuminate at apex; midribs conspicuous above and below; lateral veins conspicuous, *c.* 20 pairs per side, raised above and below; exudate canals conspicuous on both surfaces. Staminate flowers pentamerous, 5–12, axillary fascicled, 1.5 cm in diam., pedicels *c.* 1 cm long, stout; sepals 0.6–0.8 cm long, orbicular, concave, fleshy, margins membranaceous; petals orbicular, 0.8–1 cm across, concave; stamens 5-phalangiata, 6–8 per bundle, glands 5, alternating with staminal phalanges; rudimentary pistil absent. Pistillate flowers pentamerous, 2–8, fascicled axillary or on axils of fallen leaves, rarely solitary; pedicels 1–1.5 cm long; sepals and petals same as in staminate flowers; staminodes 5-phalangiata; glands 5, alternating with phalanges; ovary ovoid-sub-globose, 0.5–



Fig. 9. Lectotype of *Garcinia dulcis* (Roxb.) Kurz (Wallich s.n., [CAL0000065123]) © The Director, Botanical Survey of India, Kolkata, reproduced with permission.

0.6 cm in diam., 5-locular; style short, thick; stigmatic rays 5, spreading. Berries obliquely globose-ovoid, 2–3 cm in diam., smooth, with a curved acuminate tip of persistent stigma, green turning yellow on ripening. Seeds oblong, 1–5, 1–1.2 cm long, enclosed in a pulpy aril.

Flowering & fruiting: Flowering from March to May; fruiting from May to July.

Habitat: Common in moist deciduous to evergreen forests, below 500 m elevation.

Distribution: India, Malay Peninsula.

Specimens examined: INDIA: **Andaman and Nicobar Islands**, South Andaman district, Namunagar Hill jungle, 13.12.1890, *King s.n.* (CAL [CAL46959]). **Assam**, Dibrugarh district, Jakoi Reserve Forest, 27.06.2014, *P.S. Shameer* 79640 (TBGT). **West Bengal**. Indian Bot. Gard. Calcutta, *s.d., s.coll. s.n.* (LINN [LINN-HS1240-2]). **Without precise locality:** India 1832, *Wall. s.n.* (K [K000677636] digital image!); *Ibid.*, 1822, *E.I.C. (Wallich?) s.n.* (K [K000677635] digital image!); *Ibid. s.d., s.coll. s.n.* (CAL [CAL0000065128]). PHILLIPINES, Macaharing, Hontalban, Marila, 22.04.1891, *A. Loher* 74 (CAL); Island of Palwan, Brooks Island (Addison peak), March 1911, *A.D.E. Elmer* 12711 (CAL); *bid.*, Puerto Princesa (Mt. Pulgar), May 1911, *A.D.E. Elmer* 13154 (CAL); *bid.*, Lake Manguao, April 1913, *E.D. Merrill* 9448 (CAL); Jamindan, Capiz province, Panay, April–May 1918, *M. Ramos & G. Edano* 31319 (CAL); Blancoanae, *s.d., E.D. Merrill* 881 (CAL). MALAYSIA, Penang, 1822, *Wallich s.n.* (K [K001104038] digital image!); *s.loc. s.d., s.coll.* 4839b (CAL [CAL0000066396]); *s.loc.*, March 1884, *King's coll.* 5750 (CAL).

Conservation status: Least Concern (IUCN, 2018).

Uses: Fruits are edible and has a juicy pulp suitable for preparing jams and preservatives. Exudates from the bark are used as a dye (Maheshwari, 1964; Baruah *et al.*, 2021).

Typification: Roxburgh (1819, 1832) indicated that the species is described based on a plant grown in Calcutta Botanic Garden, brought from Molucca Islands. Maheshwari (1964) noted under Type: 'ex Molucca Islands: cult. in Indian Botanic Garden Calcutta', but did not cite a specific herbarium specimen deposited in any herbaria.

Since no specimen is designated, the typification of Maheshwari is invalid. On perusal of herbarium we could locate several specimens at CAL and K, collected by Wallich, with place of collection noted as India, possibly collected from the plant grown in Calcutta Botanic Garden. But except for one specimen bearing collection year 1814 (CAL0000065123), all others bare collection dates after the year of publication, 1820. It is possible that the specimen with collection year 1814 be an original collection seen by Roxburgh for describing this species. Hence specimen CAL0000065123 is designated here as the lectotype.

Garcinia gamblei Shameer, T.Sabu & N.Mohanan, *Phytotaxa* 297(1): 71. 2017. *Type:* INDIA, Kerala, Thiruvananthapuram district, Ponmudi, N 08° 46' 11.1" E 077° 06' 32.6", 1031 m, 18.05.2016, *P.S. Shameer* 86601 (TBGT!). **Fig. 10a–c**

Dioecious evergreen trees, 10–15 m tall; exudation milky; crown pyramidal with horizontal spreading branches; branchlets tetra-angular. Petioles 1–1.5 cm long, stout, transversely rugose with longitudinal ridges, adaxially ligulate at base; lamina comparatively ovate or broadly elliptic, 20–28 × 10–12 cm, obtuse-cuneate at base, margins sub-revolute, acute at apex, coriaceous; midribs prominent on both sides; lateral veins conspicuous, 25–40 pairs per side, raised on both surfaces. Staminate flowers pentamerous, 3–15 flowered, fascicled axillary or on axils of fallen leaves, sessile; sepals orbicular, convex, *c.* 0.5 × 0.3 cm, margin membranous, ciliate; petals obovate, *c.* 0.8 × 0.6 cm, green, membranous on margins; stamens 5-phalangiata, 8–17 in each phalange; disc 5-glandular, alternating with staminal bundles; rudimentary pistil absent. Pistillate flowers pentamerous, solitary, rarely 2–3, axillary or axils of fallen leaves, sub-sessile; sepals orbicular, *c.* 0.5–0.6 cm across; petals orbicular-obovate, 0.9–1 × 0.6–0.8 cm, membranaceous on margins; staminodes many in loose bundles of 2–3 united; ovary globose, *c.* 0.5 cm in diam., 5-locular; stigma peltate, 5-lobed. Berries discoid, 6–8 × 5–6 cm, irregularly ridged on surface, depressed on distal end. Seeds 1–3, rarely 5, oblong, *c.* 2.3 × 1.7 cm.

Flowering & fruiting: Flowering from March to May; fruiting from May to August.

Habitat: Shola forests, between 850–1150 m elevation.



Fig. 10. Species of *Garcinia* L. in India: a–c. *G. gamblei* Shameer, T.Sabu & N.Mohanan; d–f. *G. gummi-gutta* (L.) N.Robson var. *gummi-gutta*; g–i. *G. gummi-gutta* (L.) N.Robson var. *papilla* (Wight) N.P.Singh; j–l. *Garcinia imberti* Bourd. (a, d, g, j. Staminate flowers; b, e, h, k. Pistillate flowers; c, f, i, l. Fruits; photos by N. Mohanan & P.S. Shameer).

Distribution: Endemic to India.

Specimens examined: INDIA, Kerala, Thiruvananthapuram district, Ponmudi, 850 m, 07.3.1980, K. Vivekanandan 66141 (MH); *Ibid.*, 1100 m, 08.03.1980, M. Mohanan 66618 (MH); *Ibid.*, 1040 m, 05.11.2015, P.S. Shameer 86602 (TBGT); *Ibid.*, 1022 m, 14.03.2016, P.S. Shameer 86631 (TBGT); *Ibid.*, 1005 m, 26.05.2016, P.S. Shameer 86636 (TBGT).

Conservation status: Data Deficient (IUCN, 2018).

Notes: A new species described during the present study. Two specimens (K. Vivekanandan 66141 and M. Mohanan 66618) collected earlier from the type locality were found at Madras Herbarium, erroneously identified as *Garcinia xanthochyma*. Being doubtful, the locality was thoroughly explored and the plants were relocated. On detailed studies they were proved to be new. *Garcinia gamblei* is allied to *G. pushpangadaniana* in general habit; tetragonous branchlets; milky exudation; arrangement of staminate flowers in axillary fascicles; arrangement of stamens in 5-phalanges and shape of stigma lobes; but differs from the latter in having horizontal branches against drooping branches; sessile flowers against pedicellate flowers; arrangement of staminodes in loose bundles or sometimes even free against staminodes always in 5-phalanges; ovary locules and stigma lobes 5 against 6–8 and fruits vertically grooved with depressed apex against non-grooved and warty with mamillate apex.

***Garcinia gummi-gutta* (L.) N. Robson**, Brittonia 20: 103. 1968; N.C. Nair & A.N. Henry, Fl. Tamil Nadu 1: 27. 1983; Nicolson *et al.*, Regnum Veg. 119. 82. 1998; C.N. Mohanan, Fl. Quilon Dist. 80. 1984; C.J. Saldanha & Eswar Rao, Fl. Karnataka 1. 205. 1984; R. Ansari, Fl. Kasaragod Dist. 70. 1985; Manilal, Fl. Silent Valley 19. 1988; V.S. Ramach. & V.J. Nair, Fl. Cannanore Dist. 54. 1988; V.T. Antony, Fl. Kottayam Dist. 72. 1989; Vajr., Fl. Palghat Dist. 70. 1990; N.P. Singh in B.D. Sharma & Sanjappa (eds.), Fl. India 3: 110. 1993; M. Mohanan & A.N. Henry, Fl. Thiruvananthapuram Dist. 71. 1994; K.N. Subram., Fl. Thenmala Div. 24. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur For. 52. 1996; Sivar. & P. Mathew, Fl. Nilambur 68. 1997; Sasidh., Fl. Shenduruni Wildlife Sanctuary 30. 1997; Fl. Periyar Tiger Reserve 25. 1998; Fl. Chinnar Wildlife Sanctuary 30. 1999; Sunil & Sivad., Fl. Pl. Alappuzha Dist. 79. 2000; N. Mohanan & Sivad.,

Agasthyamala 84. 2002; Sasidh., Fl. Parambikulam Wildlife Sanctuary 22. 2002, Biodiv. Doc. Kerala Fl. Pl. 6: 40. 2004; Anil Kumar *et al.*, Fl. Pathanamthitta Dist. 70. 2005; Arisdason & P. Daniel in P. Daniel, Fl. Kerala 335. 2005; T.S. Nayar *et al.*, Fl. Pl. Western Ghats 1. 275. 2014. *Cambogia gummi-gutta* L., Gen. Pl. ed. 5, 522. 1754. *Lectotype:* 'Coddam pulli' in Rheede, Hort. Malab. Ind. 1: 41. t. 24. 1678.

Garcinia cambogia (Gaertn.) Desr. in Lamk., Encyc. 3: 701. 1792 *nom. illeg.*; Willd., Sp. Pl. 2: 848. 1800; Roxb., Pl. Corom. 3: 94. t. 298. 1820, Fl. Ind. 2: 621. 1832; Choisy in DC., Prod. 1: 561. 1824; G. Don, Gen. Syst. 1: 620. 1831; Wight & Arn., Prod. 1: 100. 1834; Thwaites, Enum. Pl. Zeyl. 1: 48. 1858; Miq., Fl. Ind. Bat. 1: 507. 1859; Planch. & Triana, Ann. Sic. Nat., Bot. ser. 4, 14: 332. 1860; Drury, Handbook Indian Fl. 1: 139. 1864; Bedd., Fl. Sylv. t. 85. 1869–1873; Laness., Mem. Garcin. 36. 1872; T. Anderson in Hook. f., Fl. Brit. India 1: 261. 1874, Trimen, Handb. Fl. Ceylon 1: 94. 1893; T. Cooke, Fl. Pres. Bombay 1: 77. 1901; Gamble, Man. Indian Timb. 54. 1902; Brandis, Ind. Trees 50. 1907; Talbot, For. Fl. Bombay Pres. 1: 91. 1909; Rama Rao, Fl. Pl. Travancore 29. 1914; Dunn in Gamble, Fl. Madras 1: 73. 1915; Engl., Nat. Pflanzenfam. (ed. 2) 21: 219. 1925; Sealy in Kew Bull. 11 (2): 341. 1956; Mac Millan, Trop. Pl. Gard. ed. 2, 257. 1956, Maheshw; Bull. Bot. Surv. India 6: 128. 1964, 880.

Cambogia gutta L., Sp. Pl. 728. 1753, *nom. illeg.*

Mangostana cambogia Gaertn., Fruct. 2: 106. 1790, *nom. illeg.*

Key to varieties

1. Stamens 12–20; berries globose-oblong, without a beak var. *gummi-gutta*
1. Stamens 25 or more; berries ovoid-oblong with a beaked apex var. *papilla*

Garcinia gummi-gutta* (L.) N. Robson var. *gummi-gutta Fig. 10d–f

Dioecious evergreen trees, up to 20 m tall; exudation pale yellow, sticky; branches horizontal with drooping tip; branchlets terete. Petioles 0.6–1.2 cm long, slender, adaxially ligulate at base; lamina elliptic to elliptic-ovate, 6–13 × 2.5–6 cm, acute or cuneate at base, margins revolute and entire, acute or rarely retuse at apex; midribs conspicuous above; lateral veins conspicuous above, 8–10 pairs per side, exudate canals inconspicuous on both surfaces.

Staminate flowers tetramerous, 3–8 in axillary fascicles, 1–1.7 × 1–1.2 cm; pedicels 0.7–1.2 cm long; sepals 0.4–0.5 cm across, orbicular, convex, margins membranous with fimbrial like projections; petals pale yellow or orange yellow, 0.7–0.9 × 0.3–0.4 cm, oblong, concave, margins membranous; stamens 12–20 arranged in a globose head, on a short receptacle or androphore; rudimentary pistil absent or if present stigma discoid and 4-cleft. Pistillate flowers tetramerous, terminal or axillary, solitary or up to 3 flowered, 1.5–2 cm in diam.; pedicels 0.4–0.6 cm long; sepals and petals similar to staminate flowers; staminodes 10–20, connate at base in a ring around the ovary or grouped in unequal bundles; ovary sub-globose or ovoid, 0.1–2 cm in diam., 6–10-locular and grooved; stigmatic rays 6–10, spreading. Berries globose or oblong, 6–8 cm in diam., 8–12-grooved, yellow or orange yellow when ripe, pericarp very thick, fleshy. Seeds 6–8, ovoid-oblong, compressed, 2–3 × 0.7–0.9 cm, enclosed in a pulpy aril.

Vernacular names: Kudampuli, Pinaru, Kodakapuli (Malayalam); Penampuli, Kodakapulai (Tamil); Upagimara, Seemaehunse (Kannada); Malabar tamarind, Malabar Gamboge (English).

Flowering: Flowering from January to April; fruiting from May to July.

Habitat: Evergreen to semi-evergreen forests, up to 900 m elevation and sides of streams and lakes in plains. Widely cultivated in homesteads.

Distribution: India and Sri Lanka.

Specimens examined: INDIA, **Karnataka**, Kodagu district, Coorg, 1869, *Beddome s.n.* (MH); Uttara Kannada district, Arbail, October 1888, *W.A. Talbot s.n.* (BSI); Dodmane, 05.03.1890, *W.A. Talbot* 3586 (BSI); Kumpta, 01.06.1901, *W. A. Talbot s.n.* (BSI); Nilkund Ghat, 02.03.1889, *W.A. Talbot s.n.* (BSI); Sonda, 09.05.1889, *W.A. Talbot* 3660 (PBSI). **Kerala**, Alapuzha district, Changanasery, Nalikodi, 16.04.1984, *Antany* 384 (MH); Ernakulam district, Cochin, 1884, *M.A. Lawson s.n.* (MH); *s.loc., s.d., Sarojini Menon* 12253 (TBGT); Idukki district, Chinnar, Coimbatore-travancore frontier, 14.05.1912, *C.E.C. Fischer* 3431 (CAL); Kannur district, Chanthanathode, 30.04.1979, *Ramachandran* 61659 (MH); Karimbam, 23.06.1980, *Ansari* 67819 (MH); Ponoth, 22.04.1980, *Ramachandran* 66929 (MH); Kollam district, Konni, 762 m, 12.01.1905, *TF*

Bourdillon 129 (TBGT); Konni, 762 m, 12.01.1905, *TF Bourdillon* 127 (TBGT); Thenmalai Estate, 19.04.1964, *Sebastine* 18324 (MH); Kulathupuzha, 13.02.1979, *C.N. Mohanan* 61169 (MH); Rosemala, 13.05.2014, *P.S. Shameer* 79626 (TBGT); Kozhikode district, Vellarimala, 24.03.2013, *P.S. Shameer* 86605 (TBGT); Palakkad district, Karivara forest, 12.03.1975, *E. Vajravelu* 46290 (MH); Shola above Varadimalai estate, 19.04.1978, *P. Bharghavan* 53908 (MH); Vallakadavu, 11.12.1992, *Jomy Augustine* 13431 (KFRI); Pathanamthitta district, Cherukol, Kozhancheri, 31.08.1977, *Nair* 50740 (MH); Thekkinthode, Kozhancheri, 11.04.2014, *P.S. Shameer* 79618 (TBGT); Thiruvananthapuram district, JNTBGRI Arboretum, 16.04.2014, *P.S. Shameer* 79621 (TBGT); Chullimanoor, 14.05.2014, *P.S. Shameer* 79625 (TBGT); College of Agriculture, Vellayani, 16.05.2014, *P.S. Shameer* 79627 (TBGT); Wayanad district, Kurichiarmala, ± 1350 m, 13.03.2000, *M.K. Ratheesh Narayanan* 3477 (CALI); Churam rock forest, 29.03.2002, *M.K. Ratheesh Narayanan* 3059 (CALI). **Tamil Nadu**, Coimbatore district, Anamallayis, 1871, *Beddome s.n.* (MH); Nilgiri district, Jhai shola, May 1889, *J.S. Gamble* 20711 (BSI, CAL); Tinnevely district, Sengatheri, 26.09.1916, *s.coll.* 13683 (MH). **Without precise locality, s.d., W. Roxburgh s.n.** (CAL [CAL572728]); *s.d., s.coll. s.n.* (MH [MH63574]).

Conservation status: Least Concern (IUCN, 2020).

Uses: Dried fruit rind is used as condiments as substitute for tamarind for preparing fish curries. A source of valuable chemical components like hydroxy citric acid (HCA) which act as an antiobesity agent (Maheshwari, 1964, Singh 1993).

Garcinia gummi-gutta (L.) N.Robson var. **papilla** (Wight) N.P.Singh in B.D.Sharma & Sanjappa, *Fl. India* 3: 110. 1993; Sasidh., *Biodiv. Doc. Kerala Fl. Pl.* 6: 40. 2004; Arisdason & P.Daniel in P.Daniel *Fl. Kerala* 337. 2005; T.S.Nayar et al., *Fl. Pl. Western Ghats* 275. 2014. *G. papilla* Wight, *Ic. Pl. Ind. Orient.* t. 96. 1839; Drury, *Handb. Indian Fl.* 1: 141. 1864; N.C.Nair & A.N.Henry, *Fl. Tamil Nadu* 1: 28. 1983. *Lectotype* (designated by Prasanth et al., 2019): Wight *Ic. t.* 960/2, 1845 (female). *Epitepe* (designated by Prasanth et al., 2019): INDIA, Kerala, Cochin, 04.1848, *R. Wight* 143 (K [K001273085 digital image!]).

Garcinia cambogia Desr. var. *papilla* (Wight)

T.Anderson in Hook.f., Fl. Brit. India 1: 262. 1874 *nom. illeg.*; Vesque in A.DC., Monogr. Phan. 8: 428. 1893; Trimen, Handb. Fl. Ceylon 1: 94. 1893; Maheshw., Bull. Bot. Surv. India 6: 130. 1964. Fig. 10g-i

Dioecious evergreen trees, up to 15 m tall; exudation yellow, sticky; branches usually horizontal; branchlets terete. Petioles 0.4–0.5 cm long, slender, adaxially ligulate at base; lamina elliptic, 6–9 × 1.5–3 cm, attenuate at base, margin revolute and entire, acute at apex; midribs conspicuous above and below; lateral veins inconspicuous, 8–12 pairs per side; exudate canals inconspicuous on both surfaces. Staminate flowers tetramerous, 3–5 in axillary fascicles, 1–1.5 × 1–1.2 cm; pedicels 0.5–0.7 cm long, stout; sepals ovate to oblong, 0.25–0.3 × 0.2–0.3 cm, convex, membranaceous on margins; petals oblong, concave, 0.8–1 × 0.6–0.8 cm, margins membranaceous, brick red; stamens 25 or more, on a globose androphore; rudimentary pistil absent or rarely present. Pistillate flowers tetramerous, terminal or axillary, solitary or 1–3 in fascicles, 0.1–0.12 × 0.7–1 cm; pedicels 0.4–0.5 cm long; sepals and petals same as staminate flowers; staminodes 9–12, in a ring around the ovary, filaments unequal; ovary sub-globose, 3–8-locular and grooved, stigmatic rays 3–8. Berries sub-globose, 4–6 cm in diam., 3–8-grooved, with a terminal mamilla; pericarp thick, fleshy. Seeds 3–5, sub-triangular, 0.2–0.3 × 0.8–1 cm, enclosed in a thick fibrous aril.

Vernacular names: *Kattupuli* (Malayalam).

Flowering & fruiting: Flowering from November to January; fruiting from February to June.

Habitat: Evergreen forests and shola vegetation between 800–1850 m elevation.

Distribution: Endemic to Southern Western Ghats.

Specimens examined: INDIA, **Kerala**, Idduki district, Devikulam, December 1909, *A. Meebold* 13533 (CAL); Palakkad district, Mukkali forest, 05.11.1976, *E. Vajravelu* 48852 (MH); Silent Valley, Wallakkad, 1867 m, 01.04.2013, *PS. Shameer* 79614 (TBGT); *Ibid.*, 16.12.2014, *PS. Shameer* 79666 (TBGT). **Tamil Nadu**, Coimbatore district, Anamallay Hills, 08.04.1912, *C.E.C. Fischer* 3350 (CAL); Kanyakumari district, Nagariyar Estate, Serhur Hills, 23.10.1988, *Srinivasan* 89492 (MH); Nilgiri district, Carrington, 18.06.1970, *Shetty* 34299 (MH); Near Gundvada river, Kodanad R.F., 10.10.1970,

E. Vajravelu 36813 (MH); Hill Grove Estate, 1525 m, January 1883, *J.S. Gamble* 11906 (DD); Kaikatty to Vannathi, 05.05.1971, *E. Vajravelu* 38870 (MH); Lambourk shola, 1525 m, April 1883, *J.S. Gamble* 11339 (DD); Nilgiris, *Wight* 143 (CAL).

Uses: Fruits are edible. The dried fruit rinds used as a substitute of tamarind in preparing fish curries.

Garcinia imberti Bourd., J. Bombay Nat. Hist. Soc. 12: 349. t. 1. 1899, Forest Trees. Travancore 24. 1908; Gamble, Man. Indian Timb. 57. 1902; Rama Rao, Fl. Pl. Travancore 31. 1914; Dunn in Gamble, Fl. Madras 1: 74. 1915; Maheshw., Bull. Bot. Surv. India 6: 117. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 112. 1993; N.Mohanani *et al.*, Indian J. For. 20: 383. 1997; Sasidh., Fl. Shenduruy Wildlife Sanctuary 31. 1997, Biodiv. Doc. Kerala Fl. Pl. 6: 40. 2000; R.Gopalan & A.N.Henry, End. Pl. India southern Western Ghats 206. 2000; N.Mohanani & Sivada., Fl. Agasthyamala 85. 2002; Arisdason & P.Daniel in P.Daniel, Fl. Kerala 337. 2005; T.S.Nayar *et al.*, Fl. Pl. Western Ghats 1: 275. 2014; Shareef & Krishnaraj, *Taiwania* 60(3): 148–149. 2015. *Lectotype* (designated by Shareef & Krishnaraj, 2015): INDIA, **Kerala**, Travancore, Strathmore estate, 1065 m, 17.04.1895, *TF. Bourdillon* 603, (TBGT [TBGRI02242!]). Fig. 10j-l

Dioecious evergreen trees, up to 20 m tall; exudation white, sweet-scented; branches horizontal spreading; branchlets 4-angled. Petioles 0.3–0.6 cm long, slender, adaxially ligulate at base; lamina oblanceolate, 6–12 × 2–6 cm, attenuate or cuneate at base, margins entire, shortly caudate acuminate at apex, acumen up to 0.8 cm long; midribs raised above and below; lateral veins not conspicuous; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, 3–6 or 9 in terminal fascicles, 0.5–0.6 cm in diam.; sepals sub-orbicular, concave, *c.* 0.3 × 0.3 cm, membranous; petals pale yellow, orbicular, 0.3–0.4 × 0.2–0.3 cm, membranaceous; stamens *c.* 16 in a central globose mass; rudimentary pistil absent. Pistillate flowers tetramerous, terminal, solitary, rarely up to 3, 0.6–0.8 × 0.5–0.6 cm; sepals orbicular, concave, 0.15–0.2 cm in diam., margins membranous; petals yellow, broadly ovate, 0.35–0.4 × 0.3–0.4 cm; ovary globose, 0.15–0.2 cm in diam., 2-loculed; stigma sessile, convex, capitate; staminodes *c.* 16, united in a ring around the ovary. Berries ovoid-

compressed, 2–2.5 × 1–1.2 cm, smooth, slightly beaked at apex. Seeds 1 or 2, oblong, 1–1.5 × 0.5–0.8 cm, compressed, enclosed in a pulpy aril.

Vernacular names: *Manja-kanji*, *Attupuli* (Malayalam); *Manja-kanji* (Tamil).

Flowering & fruiting: Flowering from June to August; fruiting August to January.

Habitat: Evergreen forests, between 900–1200 m elevation.

Distribution: Endemic to southern Western Ghats.

Specimens examined: INDIA, Kerala, Thiruvananthapuram district, Bonaccord, 22.06.1992, N. Mohanani 11912 (TBGT); *Ibid.*, 924 m, 18.05.2016, Anto Mathew 88404 (TBGT); Cheenikkala, 1124 m, 19.03.2016, Anto Mathew 88416 (TBGT); Chemmunji, 16.05.1896, TF Bourdillon s.n. (TBGT [TBGT02243]); *Ibid.*, 24.12.2014, Shareef 79267 (TBGT); *Ibid.*, 1140 m, 24.04.2016, Anto Mathew 88401, 88402 (TBGT); *Ibid.*, 14.03.2014, P.S. Shameer 79619 (TBGT); Meenmuttii, 06.11.1990, N. Mohanani 10158 (TBGT); *Ibid.*, 07.11.1990, N. Mohanani 10231 (TBGT); Pandimotta, s.d., G. Rajkumar & M. Alister 77333 (TBGT); Ponmudi, 1003 m, 19.04.2016, Anto Mathew 88408 (TBGT; Sankili, 1185 m, s.d., Anto Mathew 88414 (TBGT); Strathmore, 1894, TF Bourdillon 867, 871 (K [K000677617, K000677616, digital image!]); *Ibid.*, 17.04.1895, TF Bourdillon s.n. (FRC [FRC02242]). **Tamil Nadu**, Tirunelveli district, Kannikatty, 12.02.1989, R. Gopalan 90135 (MH).

Conservation status: Critically Endangered (IUCN, 2020).

Garcinia indica (Thouars) Choisy, Mem. Nouv. Gen. Guttif. 17. 1823; A.DC. Prodr. 1: 561.1824; Planch. & Triana, Ann. Sic. Nat., Bot. ser. 4, 14: 338. 1860; Laness., Mem. Gen. Garcin. 45. 1872; T.Anderson in Hook.f., Fl. Brit. India 1: 261. 1874; Hook.f., J. Linn. Soc. (Bot.) 14. 484. 1875; Pierre, Fl. Forest. Cochinch. 18: t. 80 (1). 1883; Vesque in A.DC., Monogr. Phan. 8: 423.1893; T.Cooke, Fl. Pres. Bombay 1: 76. 1901; Gamble, Man. Indian Timb. 54. 1902; Dunn in Gamble, Fl. Madras 1: 73. 1915; Brandis, Indian Trees 52. 1907; Talbot, For. Fl. Bombay Pres. 1: 90. 1909; Rama Rao, Fl. Pl. Travancore 28. 1914; Engl., Nat. Pflanzenfam. (ed. 2) 21: 219 & t. 87 H–J. 1925; Santapau, Rec. Bot. Surv. India (ed. 2) 16: 14. 1960; Maheshw.,

Bull. Bot. Surv. India 6: 127. 1964; Saldanha & M.S.Eswar Rao, Fl. Karnataka 1. 206. 1984; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 113. 1993; M.R.Almeida, Fl. Maharashtra 1: 87. 1996; Sasidh., Biodiv. Doc. Kerala Fl. Pl. 6: 41. 2004; S.R.Yadav & Sardesai, Fl. Kolhapur Dist. 63. 2002; K.G.Bhat, Fl. Udupi. 47. 2003; Arisdason & P.Daniel in P.Daniel, Fl. Kerala 337. 2005; J.Sarma et al., J. Econ. Taxon. Bot. 38: 1211–24. 2014; T.S.Nayar et al., Fl. Pl. Western Ghats 1: 275. 2014. *Brindonia indica* Thouars, Dict. Sci. Nat. 5: 340. 1804. *Oxycarpus indica* Poir., Encyc. Suppl. 4: 257. 1816. *Stalagmitis indica* G.Don, Gen. Hist.1: 621.1831. *Lectotype* (first-step designated by Maheshwari, 1964; second-step by Prasanth et al., 2019) INDIA, s.loc., Du-petit Thouars s.n. (P [P030773, digital image!]). *Epitepe* (Prasanth et al., 2019): INDIA, Goa, 22.5.2018, Arun Prasanth R. & V.Sundaresan 103 (MH!).

Garcinia celebica sensu Desr. in Lamk., Encyc. 3: 700. 1789, non L. 1754. *nom. illeg.*

Garcinia purpurea (G.Don) Roxb., Fl. Ind. 624. 1832. *Type:* (HBC, Calcutta Herbarium, s.d., s.coll. 4862 CAL (CAL00065141!))

Stalagmitis purpurea G.Don, Gen. Syst. 1: 621. 1831. *nom. superfl.*

Fig. 11

Dioecious evergreen to semi-evergreen trees, up to 15 m tall; exudation milky; branches horizontal, ending with pendulous tips; branchlets subterete. Petioles 0.5–1.2 cm long, slender, reddish, adaxially ligulate at base; lamina lanceolate or obovate-oblong, 6–12 × 1.5–5 cm, narrowed at base, margins entire, acute to acuminate at apex; midribs raised above and below; lateral veins 7–18 pairs per side, raised on both surfaces. Staminate flowers tetramerous, 4–8, in axillary or terminal fascicles, 0.5–0.9 cm in diam.; pedicel c. 0.4 cm long; sepals, yellowish to pinkish, ovate-rotundate, convex, 0.3–0.45 × 0.3–0.4 cm; petals creamy white, ovate-oblong, convex, 0.5–0.6 × 0.4–0.5 cm, membranous; stamens many, inserted on hemispheric sub-quadrate torus; rudimentary pistil absent or if present as long as stamens. Pistillate flowers tetramerous, solitary or 2–3, in terminal cymes, pedicel c. 0.3 cm long; sepals and petals same as staminate flowers; staminodes in 4 phalanges, 0.1–0.3 cm long; ovary sub-globose, 0.2–0.3 cm in diam.; stigmas 4–8-rayed, convex, sessile. Berries globose, 3–4 cm in diam., orange-

pink or deep purple when ripe; sepals persistent in fruit. Seeds 5–8, 2.5–3 cm long, oblong, compressed, in pulpy aril.

Vernacular names: *Kokum* (English); *Murgali* (Tamil); *Murgahuli* (Kannada); *Punerpuli Katamb* (Malayalam); *Prangso-arong* (Assamese).

Flowering & fruiting: Flowering from November to January; fruiting from December to March.

Habitat: In evergreen forests and midlands.

Distribution: Endemic to the Western Ghats.

Specimens examined: INDIA, **Karnataka**, Uttara Kannada district, Tinai Ghat, 10.03.1917, *L.J. Sedgwick* 3352 (CAL, BLAT); Karvar in coastal forest, December 1917, *L.J. Sedgwick* 5062 (BLAT); *Ibid.*, December 1918, *L.J. Sedgwick* 5043 (BLAT); Arabil Ghat, December 1918, *L.J. Sedgwick* 5127, 5131 (BLAT); North Kanara, Ambi, January 1888, *W.A. Talbot s.n.* (BSI); Anmodi, 10.02.1889, *W.A. Talbot s.n.* (BSI); 15.11.1882, *W.A. Talbot* 276 (CAL); Yellapur, March 1883, *W.A. Talbot s.n.* (BSI); *Ibid.*, April 1919, *L.J. Sedgwick* 5855 (BLAT); Yellapur, Teligeri, 12.03.1957, *S.K. Jain* 16504 (BSI); Devimani Ghat, 20.11.1908, *B. Kulkarni s.n.* (BSI). **Kerala**, Kannur district, Thaliparampa, cultivated in District Agricultural Farm, 08.04.2014, *P.S. Shameer* 79617 (TBGT); Wayanad district, Chandanathode, December 1937, *N.L. Bor* 9426 (DD). **Maharashtra**, Pune district, Lonavala, Picchi Hills, 06.05.1956, *S.K. Jain* 918 (BSI); Khandala, 21.03.1903, *G.A. Gammie* 16162 (BSI); *Ibid.*, 23.01.1943, *H. Santapau* 1526 (BLAT); *Ibid.*, Echo. Point. Ravine, 24.01.1943, *H. Santapau* 1554 (BLAT); *Ibid.*, 08.11.1943, *H. Santapau* 3122 (BLAT); *Ibid.*, 25.02.1956, *N.A. Irani* 1733 (BLAT); *Ibid.*, 07.07.1959, *Y.A. Merchant* 1116 (BLAT);

Raigad district, Mt. Berry, 21.12.1959, *N.A. Irani* 4816, 4817 (BLAT); Sindhudurg district, Mobar near Malvan, 01.03.1941, *H. Santapau* 62 (BLAT); Thane district, Ghodbunder, Bombay, 23.01.1954, *H. Santapau* 17921, 17922 (BLAT); Tungar hill, Mandri Range, 19.01.1968, *Billok* 113659 (CAL); Tungar, 19.04.1983, *K.C. Koshy* 1881 (TBGT); Victoria Gardens, Bombay, 17.01.1957, *R.R. Fernandze* 3550 (BLAT). **West Bengal**, Indian Botanic Garden cult. 16.12.1912, *S.C. Banerji* 11353 (CAL); *Ibid.*, 31.01.1912, *A.T. Gage s.n.* (CAL). **Without precise locality**, *s.d.*, *s.coll.* 95 (CAL [CAL48274]).

Conservation status: Vulnerable (IUCN, 2015).

Uses: Fruit is used for medicine, food, dyes, oil and soft wood. The seeds yield valuable fat known as 'Kokum butter'. It is used as an edible fat, good as an anti-obesity agent. (Maheshwari, 1964; Baruah *et al.*, 2021). Traditionally, Kokum has been used for treatment against diarrhea, skin infections and wounds. Life enhancing antioxidant xanthone is found in *Kokum* pericarp. Potential benefits of *Kokum* are anti-viral, anti-bacterial, cardio support, immune system enhancer, anti-inflammatory, vasorelaxant (Lim *et al.*, 2021).

Garcinia keenania Pierre, Fl. Forest. Cochinch. Fasc. 5: 8. 1883; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 114. 1993. *Type:* INDIA, Assam, Cachar, June 1874, *R.L. Keenan* 2672 (K [K000677639 digital image!]).

Dioecious, evergreen shrubs or small trees; branchlets tetragonous. Petioles 0.5–1 cm long, adaxially ligulate at base; lamina elliptic-oblong, 7–11 × 2.8–5 cm, attenuate at base, margin entire, shortly acuminate at apex, acumen 0.5–1 cm long; midribs raised above and below; lateral veins more



Fig. 11. *Garcinia Indica* (Thouars) Choisy: a. Staminate flower; b. Pistillate flower; c. Fruit (Photos by N. Mohanan & P.S. Shameer).

than 30 pairs per side, raised on both surfaces. Staminate flowers not known. Pistillate flowers tetramerous, 5–6, axillary fascicled, 0.5–0.7 cm in diam., pedicel *c.* 0.5 cm long; sepals orbicular, concave, 0.15–0.3 cm in diam.; petals orbicular or slightly oblong, white, 0.4–0.45 cm, concave; staminodes absent or sometimes minute; ovary globose, 0.4–0.5 cm in diam., 2-locular; stigma fleshy, convex, undulate on margin. Fruits not known.

Flowering & fruiting: Flowering from April to September; fruiting not known.

Habitat: No data available, hitherto known only from the type specimen.

Distribution: Endemic to India.

Notes: Pierre described the species based on a single specimen (Keenan 2672), which is a female flowering specimen and still remains not recollected. Maheshwari (1964) did not include this species in his revision on Indian *Garcinia*. Singh (1993) included it in the *Flora of India*. Though described from a single female specimen, it possesses characters to be treated as a distinct species, but could be confirmed only after collecting male and fruiting specimens. A thorough exploration of Cachar district in Assam is needed to find the species in the wild.

Garcinia lanceifolia Roxb., Fl. Ind. 2: 623. 1832; Wight, Ic. t. 103. 1839; F.Voigt, Hort. Suburb. Calc. 87. 1845; Planch. & Triana, Ann. Sci. Nat., Bot. ser. 4., 14: 341. 1860; Drury, Indian Fl. 1: 140. 1864; Laness., Mem. Garcin. 48. 1872; T.Anderson in Hook.f., Fl. Brit. India 1. 263. 1874; Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 87. 1874, Forest Fl. Burma 1: 91. 1877; Pierre, Fl. Forest. Cochinch. 19: t. 80D–E & t. 81A. 1883; Vesque in A.DC., Monogr. Phan. 8: 429. 1893; Gamble, Man. Indian Timb. 53. 1902; Brandis, Indian Trees 50. 1907; Engl., Nat. Pflanzenfam. (ed. 2) 21: 219. 1925; Kanjilal et al., Fl. Assam 1: 196. 1934; C.E.C.Fisch, Rec. Bot. Surv. India 12 (2): 81. 1938; Sealy, Kew Bull. 11 (2): 342. 1956; Maheshw., Bull. Bot. Surv. India 6: 125. 1964; N.P.Balacr., Fl. Jowai 1: 88. 1981; Malick & Safui, J. Econ. Tax. Bot. 10: 2. 1987; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 116. 1993; A.S.Chauhan in N.P.Singh et al., Fl. Manipur 1: 143. 2000; N.P.Singh et al., Fl. Mizoram 1: 210. 2002. *Stalagmitis lanceifolia* G.Don, Gen. Hist. 1: 621. 1831; Ngerms., Diversity, 14(556): 8. 2022.

Lectotype (designated by Ngermsaengsarua, 2022): INDIA, cultivated in H.B.C. (Calcutta Botanic Garden), *s.d.*, *s.coll.* East India Company Herbarium 4861B (K [K000639523 digital image!]); *isolecto* CAL!; P [P04700745!, P04700755 digital images!].

Garcinia purpurea Wall. ex Choisy, Mem. Soc. Phys. Geneve 12. 416. 1851, *non* Roxb. 1832.

Stalagmitis lanceifolia G.Don, Gen. Hist. 1: 621. 1831, *nom. superfl.*

Key to the varieties

1. Leaves linear-lanceolate; berries turbinate, not grooved, orange to yellow on ripening var. *lanceifolia*

1. Leaves linear-oblong; berries ovoid, grooved, red on ripening var. *oxyphylla*

Garcinia lanceifolia Roxb. var. *lanceifolia*

Dioecious evergreen shrubs or small trees, 4–12 m tall; exudation yellow; branches profusely spreading; branchlets terete. Petioles 0.8–1 cm long, adaxially ligulate at base; lamina linear-lanceolate, 6–10 × 2.5–3.5 cm, attenuate or cuneate at base, margins entire, cuspidate-acuminate at apex; midribs raised above and below, glabrous; lateral veins 8–10 pairs per side, raised on both surfaces. Staminate flowers tetramerous, solitary or in pairs, terminal or axillary; pedicel 0.8–1.2 cm long; sepals oblong, *c.* 0.2 × 0.4 cm, yellowish green; petals red, 0.3–0.4 cm long, somewhat smaller than sepals, slightly oblique; stamens 18–40, on a globose receptacle; rudimentary pistil absent. Pistillate flowers tetramerous, solitary, terminal or axillary, sessile; sepals and petals almost similar to staminate flowers; staminodes 4–8 each, in four bundles, connate at base of ovary in an irregular ring; ovary globose-obovoid or somewhat turbinate, 0.3–0.4 cm long, 6–8-loculed; stigma 6–8-rayed, sessile, tubercled. Berries obovoid or turbinate, 2.5–3 cm in diam., smooth, orange-yellow on ripening, with persistent sepals. Seeds oblong, 6–8, 1–1.5 cm long, compressed.

Vernacular names: *Bapohi-thekera*, *Kan tekera*, *Prangsu*, *Prango-arong* (Assamese); *Thisuru* (Garo); *Dieng-soh-jadu* (Khasi); *Dieng-sohsint* (Jain); *Pelte* (Lushai).

Flowering & fruiting: Flowering from February to March; fruiting from April to July.

Habitat: Commonly found in evergreen forests, between 200–1400 m elevation.

Distribution: India, Bangladesh, Myanmar and Pakistan.

Specimens examined: INDIA, **Assam**, Chirang district, Thorasim hills, Schlich s.n. (DD); Cachar district, Bomail WLS, 04.06.2012, *A.A. Barphuiya* 928 (ASSAM); Dibrugarh district, Jakoi Reserve forest, 27.06.2014, *P.S. Shameer* 7964 (TBGT); Sivasagar district, *s.d.*, *S.C. Peal* 297 (CAL); Amgori, January 1888, *G. Mann s.n.* (CAL); Gaurisagar, 06.03.1914, *U.N. Kanjilal* 3556 (ASSAM); Sibsagar, Chrigori, 22.04.1895, *R.E.P. India (Annon.)* 11166 (MH). **Manipur**, Tamenglong district, 26.05.1986, *C.B. Clarke* 44024 (CAL). **Meghalaya**, Khasi & Jaintia Hills, Khasi, *s.d.*, *Wallich s.n.* (CAL [CAL46421]); Nartining, 27.11.1907, *s.coll.* 16055 (ASSAM). **Without precise locality**, February 1848, *s.coll. s.n.* (CAL [CAL46436]); *s.d.*, *Jenkins s.n.* (MH [MH68587]). **BNGLADESH**, Rajabari, 18.04.1895, *R.E.P. India (Annon.)* 11152 (CAL); **MYANMAR**, Tainjuup, 365 m, December 1911, *S.M. Toppin R.A.* 4169 (CAL).

Uses: The fruit pericarp is eaten raw. Dry sliced pericarps are used in fish curry; also used for treating dysentery. Gamboge, the gum resin is used as medicine and as yellow dye. (Maheshwari, 1964; Baruah *et al.*, 2021).

Garcinia lanceifolia* Roxb. var. *oxyphylla (Planch. & Trian.) Laness., Mem. Garcin. 48. 1872; Maheshw., Bull. Bot. Surv. India 6: 126. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 117. 1993. *Garcinia oxyphylla* Planch. & Trian., Ann. Sci. Nat., Bot. ser. 4., 14: 342. 1860. *Lectotype* (designated by Maheshwari, 1964): Assam, 1845, *W. Hooker & Jenkins s.n.* (K [K001273091 digital image!]). **Fig. 12**

Dioecious evergreen large shrubs or small trees, 4–10 m tall; branches horizontally spreading; exudation yellow; branchlets terete. Lamina linear-oblong, 5–8 × 2.5–3.5 cm, attenuate at base, margins entire, acute at tip. Flowers almost similar to var. *lanceifolia*; staminodes 8–13, in 2–4 bundles; ovary globose, 0.3–0.4 cm in diam., 7–10-locular. Berries ovoid-disciform, 3.5–4 cm in diam., obscurely grooved, red on ripening.

Vernacular names: *Rupohi-thekeera* (Assamese).

Flowering & fruiting: Flowering from November to January; fruiting from February to June.

Habitat: Commonly found in evergreen forests;

between 75–1250 m elevation.

Distribution: India.

Specimens examined: INDIA, **Assam**, Jorhat district, Sibpur, 11.08.2015, *P.S. Shameer* 79697 (TBGT); Karbi Anglong district, Bokajan, 21.06.1963, *D.B. Desh* 35243 (ASSAM); Mikir Hills, Kalioyi Reserve, 04.02.1977, *S.K. Borthakur* 69152 (ASSAM); Kokrajhar district, Chakrasila WLS, 11.06.2008, *Ranjit Daimary* 111425 (ASSAM); Chakrasila WLS, 11.07.2008, *Ranjit Daimary* 117863 (ASSAM); Lakhimpur district, Jokai Reserve, 18.03.1914, *U.N. Kanjilal* 4085 (ASSAM); Sivasagar district, Bokajau Reserve, 85 m, 15.12.1913, *U.N. Kanjilal* 121M (ASSAM); Dimapur, 24.03.1913, *U.N. Kanjilal* 2166 (ASSAM); Sibsagar, July 1882, *G. Mann s.n.* (CAL); Sivasagar, *s.d.*, *S. Peal* 83 (CAL). **Meghalaya**, Khasi & Jaintia Hill district, Jarain, 1250 m, 22.05.1965, *A.S. Rao* 42512 (ASSAM); Khonshnong, 05.02.1915, *U.N. Kanjilal* 713P (ASSAM); Nartiang, 27.11.1937, *S.R. Sharma* 16055 (ASSAM). **Mizoram**, Mamit district, Saitahl, 04.09.1990, *D.K. Singh* 98940 (ASSAM); Dampatlaung, 1100 m, 03.09.1990, *D.K. Singh* 99161 (ASSAM); Dampa Tiger Reserve, Saithal Hill, 450 m, 25.09.2006, *B.K. Singha & N. Odyuo* 112963 (ASSAM). **Nagaland**, Dimapur district, Balijan, Rangapahar, 02.05.1946, *G.K. Deka* 22091 (ASSAM); *Ibid.*, 02.05.1946, *G.K. Deka* 22091 (ASSAM). **Tripura**, Tripura district, Deoracherra, 30 m, 19.01.1962, *D.B. Deb.* 26877 (ASSAM). **Without precise locality**, *s.d.*, *Wallich* 4862 (CAL); *s.d.*, *Wallich s.n.* (CAL [CAL46423]).

Uses: The fruits are acidic and eaten raw (Baruah *et al.*, 2021).



Fig. 12. Fruit of *Garcinia lanceifolia* var. *oxyphylla* (Planch. & Trian.) Laness. (Photo by N. Mohanan & P.S. Shameer).

Notes: *Garcinia lanceifolia* var. *lanceifolia* and var. *oxyphylla* looks similar in vegetative stages and can be distinguished only in the fruiting stage. *G. lanceifolia* only is recorded in most of the recent floras (Kanjilal et al., 1934; Balakrishnan, 1981; Chauhan, 2000; Singh, 2002).

Garcinia microstigma Kurz, Jour. Bot. 13: 324. 1875, Forest Fl. Burma 1: 91. 1877; Pierre, Fl. Forest. Cochinch. 4: t. 19. 1883; King, J. Asiat. Soc. Bengal 59: 157.1890; Vesque in A.D.C., Monogr. Phan. 8: 434. 1893; Gamble, Man. Indian Timb. 53. 1902; Brandis, Indian Trees 52; C.E.Parkinson, For. Fl. Andaman Islands 90. 1923; Maheshw., Bull. Bot. Surv. India 6: 125. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 119. 1993; Hajra et al., Fl. Andaman Islands 1: 140. 1999; Dagar & N.T.Singh, Pl. Resour. Andaman & Nicobar Isl. 2: 419. 1999. *Lectotype* (designated by Maheshwari, 1964): INDIA, South Andaman, Mount Harriot, 02.02.1875, *S. Kurz s.n.* (CAL [CAL0000208110!]); *isolecto* (K [K000677640 digital image!]).

Dioecious semi-evergreen shrubs, 2–3 m tall; exudate yellow; branchlets tetra-angular, glabrous. Petioles 1.2–2 cm long, slender, adaxially ligulate at base; lamina elliptic to elliptic-oblong or lanceolate, 10–13 × 3.5–6 cm, cuneate at base, margins entire, obtuse or acuminate at apex; midrib prominent above; lateral veins 7–8 pairs, parallel, inconspicuous. Staminate flowers tetramerous, axillary or terminal, solitary or 2–3, fascicled, 0.8–1 cm in diam., pedicel 0.5–0.6 cm long; sepal orbicular, 0.5–0.6 cm long, outer pair keeled, larger than inner, margins membranous; petals red, obovate-orbicular, 0.5 cm in diam., concave; stamens 20–35, on a tetragonous torus, filaments c. 0.1 cm long; rudimentary pistil absent. Pistillate flowers tetramerous, terminal, solitary; sepals and petals same as staminate flowers; ovary globose, 0.5–0.8 cm in diam. Berries globose, 3.5–5 cm in diam., smooth, slightly depressed, with persistent sepals and very minute discoid, persistent stigma. Seeds 2 or more, oblong, 3–4 cm long, with scanty aril.

Flowering & fruiting: Flowering from September to November; fruiting from December to February.

Habitat: Semi-evergreen forests, very rare.

Distribution: India and Myanmar.

Specimens examined: INDIA, **Andaman and Nicobar Islands**, South Andaman district, *s.d.*, *S.*

Kurz s.n. (CAL [CAL0000208111]); Bommungla, 16.09.1916, *C.E. Parkinson* 1000 (CAL); North and Middle Andaman district, Baratang Island, December 1913, *C.E. Parkinson* 165 (DD); Betapav, 28.03.1916, *C.E. Parkinson* 1140 (CAL, DD); Rangat, May 1915, *C.E. Parkinson* 580 (DD).

Conservation status: Data Deficient (IUCN, 2020).

Notes: Kurz (1875), in the protologue noted that the species is similar to *Garcinia kydia* in leaf characters. Only very few old specimens are represented in herbaria, and there were no recent collections made. In our observation both species show some distinct differences, *viz.* smooth, slightly depressed fruits with a persistent discoid stigma in *G. microstigma* against globose-ovoid fruits 6–8 grooved towards apex and with a short mamillate tip in *G. kydia* (= *G. cowa* var. *kydia*).

Garcinia nervosa (Miq.) Miq., Ann. Mus. Bot. Ludge.-Bat. 1: 208. 1864; King, J. Asiat. Soc. Bengal 59: 169. 1890; Merr., Philip. J. Sci. 10: 325. 1915; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 121.1993; Hajra et al., Fl. Andaman & Nicobar Isl. 1: 141. 1999. *Stalagmitis nervosa* Miq., Fl. Ned. Ind. Eerste Bijv. 3: 496. 1861. *Neotype* (designated here): Malaysia, Perak, 07.1886, *King's Coll.*10491 (CAL [CAL0000005829!]).

G. andersonii Hook.f., Fl. Brit. India 1: 270. 1874; N.G.Nair in Geobios 4: 221.1977. *Type:* Malaysia, *s.d.* *A.C. Maingay* 157. (K [K000677676 digital image!])

Garcinia macrophylla T.Anderson ex Hook.f., Fl. Brit. India 1: 270. 1874, *nom. inval.* **Fig. 13**

Dioecious semi evergreen trees, 10–12 m tall; exudate yellowish; branchlets tetra-angular. Petioles 1–3 cm long, stout, rugous, adaxially ligulate at base; lamina comparatively large, oblong-oblongate or oblong-ovate, 20–60 × 8–22 cm, rounded or minutely cordate base, margins revolute, sub-acute or obtuse at apex; midrib and lateral veins bold, raised on both surfaces; lateral veins 17–25 pairs, parallel; exudate canals conspicuous on both surfaces. Staminate flowers pentamerous; 5–8, fascicled on axils of fallen leaf; stamens many in groups of 1–5, around the rudimentary pistil. Pistillate flowers pentamerous, solitary or a few fascicled on axils of fallen leaves, 1.7–2 cm in diam., pedicel 2.5–3.5 cm long, slender; sepals 0.3–0.5 cm long, orbicular, concave, pubescent; petals pale green, 0.8–1.2 cm

long, orbicular, concave; staminodes 5-phalagiate, 0.3–0.4 cm, alternating with glandular disc; ovary ovoid, 0.5–1 × 0.4–0.6 cm, 5-locular; stigmas 5-lobed. Berries ovoid or obovoid, 4.5–6 × 3.5–4 cm, yellow with red blotches, with large eccentric mamilla, crowned by persistent 5-lobed stigma. Seeds 2 or 3, ovoid, 1.5–2 × 0.5–0.8 cm, elongated.

Flowering & fruiting: Flowering from October to December; fruiting from December to March.

Habitat: Occur in undisturbed mixed forests, usually on hill slopes, and on alluvial rivers bank; up to 175 m elevation.

Distribution: India, Malaysia to Philippines.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Nicobar district, South Nicobar,



Fig. 13. Neotype of *Garcinia nervosa* Miq. (Malaysia, Perak, 07.1886, King's Coll.10491 (CAL [CAL0000005829!])). © The Director, Botanical Survey of India, Kolkata, reproduced with permission.

Arong, Car Nicobar, 31.05.1975, N.G. Nair 2644, 3571, 3572 (PBL); Campell ferry, 02.03.1966, K. Thothathri 11336 (PBL); *Ibid.*, East-West road, 18 km from C Bay, 23.08.1975, N.P. Balakrishnan 3049 (PBL); *Ibid.*, South Nicobar, 35 km on East-West road, 20.07.1976, N.P. Balakrishnan 3884 (PBL); North Nicobar, Mildera, Katchal Islands, 03.05.1977, P. Chakraborty 5595 (PBL); *Ibid.*, School point, 12.04.2010, C. Murugan 28130 (PBL); South Nicobar, GT. Nicobar, 38 km on North-South road from Campbell Bay, 27.11.1978, N.G. Nair 7110 (PBL); *Ibid.*, GT. Nicobar, 27 km on East-West road, 20.10.1979, D.K. Hore 7231 (PBL); *Ibid.*, GT. Nicobar 40 km East-West road, 10.02.1980, R.P. Dwivedi 7859 (PBL); *Ibid.*, GT. 16 km from East-West road, 15.11.1993, B.K. Sinha 16351 (PBL); Little Nicobar 17.04.2011, C. Murugan 28493 (PBL). SINGAPORE: 1894, H.N. Ridley 5966 (CAL); Bidadari, April 1897, H.N. Ridley 8454 (CAL). MALAYSIA. Malaya, *s.d.*, A.C. Maingay 157 (K [K000677676 digital image!]; Perak, July 1886, King's coll. 10491 (CAL); Perak, *s.d.*, Revd. Father Scortechini *s.n.* (CAL [CAL46722]); 1882, King's coll. 3197 (CAL). PHILIPPINES: Tayyay, Palawan, May 1913, E.D. Merrill 9387 (CAL).

Uses: Fruit pulp is edible and sour in taste. Ripe fruits cure dysentery (Baruah *et al.*, 2021).

Typification: Miquel (1864) described *Garcinia nervosa* without assigning a type. We could not locate any original specimens in any herbaria. Hence, a neotype is selected from the later collections available at CAL. Among the various specimens examined, we could locate the specimen 'King's collector 10491' cited by King (1890) at CAL [CAL0000005829!]. This specimen authenticated by King, in the detailed description of the species, is designated here as the neotype of *G. nervosa*.

Notes: Anderson (1874) in Hooker's *Flora of British India* erected *G. andersonii* Hook.f., with its distribution in eastern Peninsula. King (1890) treated it as a synonym under *G. nervosa*. Maheshwari (1964) did not include *G. nervosa* or *G. andersonii* in his revision; whereas Nair (1977) included *G. andersonii* in his report for Car Nicobar Island. Singh (1993) included *G. nervosa*, with its distribution as Andaman and Nicobar Islands. Dutta *et al.* (2014) reported *G. nervosa* as new distributional record for the mainland, but on closer observation of literature and specimens, we

found that it was an erroneous identification for *G. dulcis* (Roxb.) Kurz.

Garcinia pedunculata Roxb. ex Buch.-Ham., Edinburgh J. Sci. 7: 45, t. 1. 1827; Roxb., [Hort. Bengal. 42. 1814, *nom. nud.*] & Fl. Ind. 2: 625. 1832; G. Don, Gen. Hist. 1: 620. 1831; Wight, Ic. t. 114–115. 1839, Illustr. 1: 125. 1840; F. Voigt, Hort. Suburb. Calc. 86. 1845; Choisy, Mem. Soc. Phys. Geneve 12: 415. 1851; Drury, Useful Pl. India 228. 1858 & Handb. Indian Fl. 1: 140. 1864; Planch. & Triana, Ann. Sic. Nat., Bot. ser. 4. 14: 347. 1860; Laness., Mem. Garcin. 42. 1872; T. Anderson in Hook. f., Brit. India 1: 264. 1874; Prain, Bengal Pl. 1: 247. 1903; Brandis, Indian Trees 49. 1907; Engl., Nat. Pflanzenfam. (ed. 2) 21: 220. 1925; Kanjilal et al., Fl. Assam 1: 107. 1934; Sealy, Kew Bull. 11 (2): 342. 1956; Maheshw., Bull. Bot. Surv. India 6: 119. 1964; Mabb., Taxon 26(5–6): 535. 1977; N. P. Singh, Fl. Jowai 1: 89. 1981; Harid. & R. R. Rao, For. Fl. Meghalaya 1: 108. 1985; A. S. Chauhan in N. P. Singh et al., Fl. Manipur 1: 143. 2000; N. P. Singh in B. D. Sharma & Sanjappa (eds.), Fl. India 3: 121. 1993; Hajra et al., Mat. Fl. Arunachal Pradesh 1: 185. 1996; Kam. P. Singh in Singh et al., Fl. Mizoram 1. 211. 2002; Ngerns., Diversity 14(556): 16. 2022. *Lectotype* (designated by Maheshwari 1964); India, Goalpara, 10.10.1808. *Wallich* 4860 (CAL [CAL0000065121!]); *isolecto*, (K [K001104082 digital image!]). **Fig. 14a–c**

Dioecious trees, up to 20 m tall; exudate yellow; branches short, spreading with oval crown; branchlets terete, apically quadrangular. Petioles 2–4 cm long, stout, adaxially ligulate at base; lamina obovate, oblong or oblanceolate, 9–30 × 5–15 cm, cuneate at base, margins undulate, acute or obtuse at apex; midrib stout, prominent on both sides; lateral veins 10–30 pairs, obliquely parallel; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, 8–12 in terminal, trichotomous panicles, c. 1.5 cm across; pedicel 5–6 cm long, slender; sepals pale green, orbicular, 1–1.2 cm across; petals pale yellow, oblong-obovate, 0.9–1.1 × 0.6–0.8 cm; stamens more than 75, in a tetragonous torus, filaments very short; rudimentary pistil broad disciform. Pistillate flowers tetramerous, solitary, terminal, yellow green to pale green, 1.8–2 cm across; pedicel 2.5–3 cm long, very stout, 4-angled; sepals and petals same as in staminate flowers; staminodes in 4 phalanges; ovary globose, 0.6–0.8 cm in diam., 8–12-locular; stigmas peltate,

rays spreading. Berries globose, 7–11 cm in diam., smooth, orange yellow on ripening. Seeds 8–10, ovoid-reniform, 2–3 cm long, in fleshy aril.

Vernacular names: *Bor-thejera* (Assamese); *Tikur*, *Tikur* (Bengali & Hindi); *Soh-iyntraw*, *Dieng-sohdanei* (Khasi); *Thaipomlein*, *Vaum-va* (Lushai); *Ampri-arong* (Mikiri); *Tabing-asing* (Miri & Abor); *Heibung* (Manipuri).

Flowering & fruiting: Flowering from September to November; fruiting from November to June.

Habitat: Found in tropical mixed forests, up to 915 m elevation.

Distribution: India, Bangladesh and Myanmar.

Specimens examined: INDIA, **Arunachal Pradesh**, Papum Pare district, Harjuli, Duphla hills, 23.12.1874, *J.L. Lister* 112 (CAL); Lohit district, Parasuram Road, Tezu, NEFA, 03.02.1939, *R. N. De* (ASSAM). **Assam**, Cachar district, Barak Reserve Forest, Bhuban Hill, 22.12.2012, *Hussain Ahmed Barbhuiya* 987 (ASSAM); Barpetta district, Nityananda, near Khaladia river, 03.08.2015, *PS. Shameer* 79677 (TBGT); Darrang district, Panbari camp, November 1952, *G. M. Nath s.n.* (DD); *Ibid.*, May 1952, *G.M. Nath s.n.* (DD); Dibrugarh district, Jakoi Reserve Forest, 27.06.2014, *PS. Shameer* 79642 (TBGT); Golapara district, Golapara, 10.10.1808, *Buchanan-Hamilton Francis* 1123 (E [E00438017]) digital image!; Sibsagar district, March 1879, *s.coll. s.n.* (CAL [CAL46451]); Lakhimpur district, Jokai Reserve, 100 m, 01.04.1914, *U.N. Kanjilal* 4083 (ASSAM); Upper Assam, *s.d.*, *G. Mann* 41 (CAL). **Bihar**, Sarai Korang, 28.03.1895, *s.coll.* 11103 (CAL). **Meghalaya**, East Khasi hill district, Near Sohrha, 03.06.1965, *Krishnan* 42694 (ASSAM). **Nagaland**, Naga Hills district, 1882, *H. Collett* 192 (CAL). **West Bengal**, H. B. Calcutta, *s.d.*, *R. Wight s.n.* (K [K000677592 digital image!]). **Without precise locality**, *s.d.*, *s.coll. s.n.* (MH [MH63598]); *Wallich* 4860 (CAL, K [K000742485, K000677593 digital image!]); *s.d.*, *s.coll.* 41 (ASSAM). **BENGLADESH**, Rajbare, November 1873, *J.S. Gamble* 1645A (MH); Sylhet district, Karimganj, 08.03.1947, *Dinanath Paul* 22090 (ASSAM); Sylhet, *s.d.*, *s.coll.* 4860C (CAL). **MYANMAR**, Thapanhun, 120 m, November 1909, *G.E.S. Cubitt* 326A (CAL); Mergui, March 1911, *Meebold* 16555 (CAL).

Uses: The fruits are edible; fleshy pericarp is used

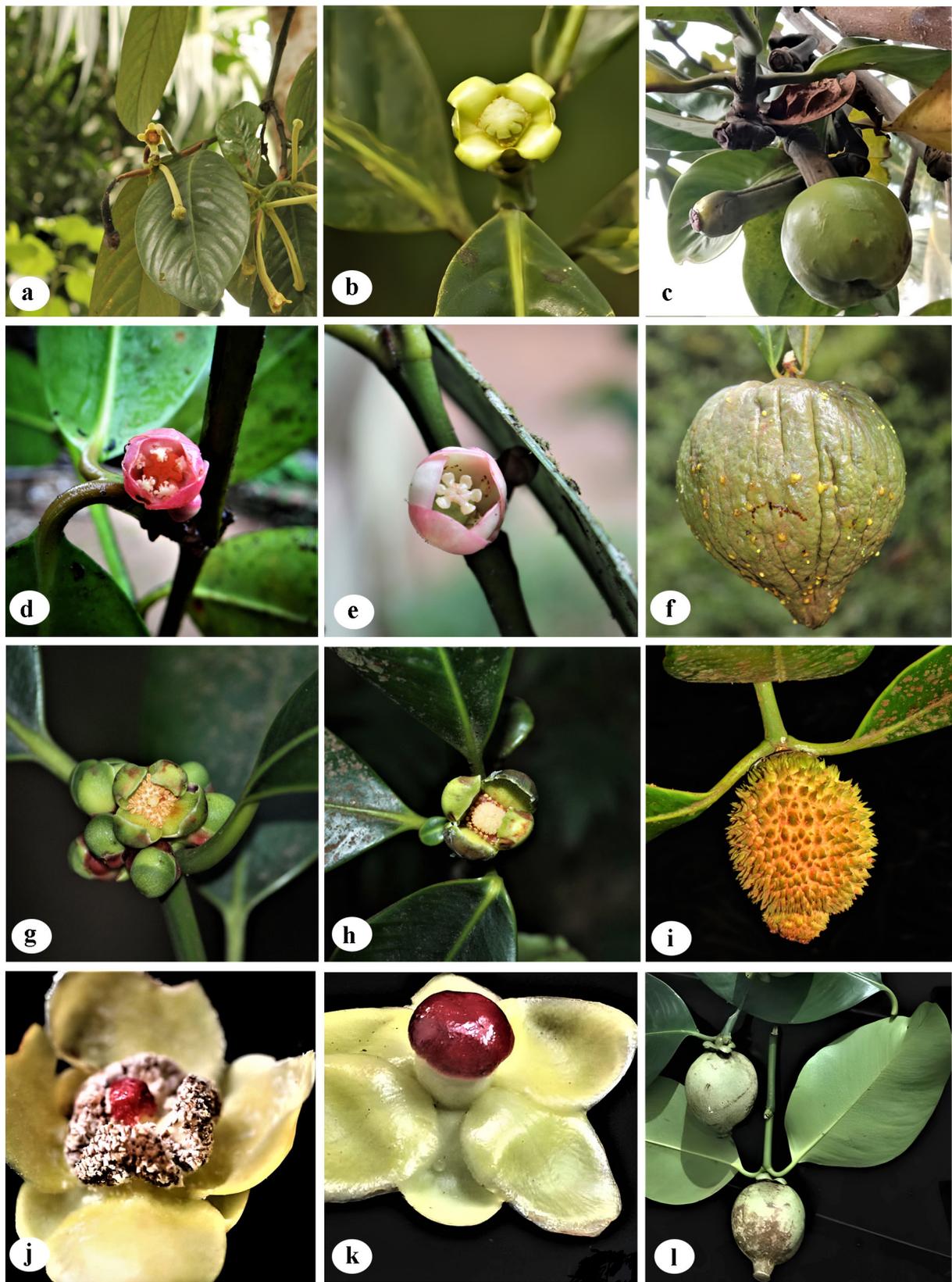


Fig. 14. Species of *Garcinia* L. in India: a–c. *G. pedunculata* Roxb. ex Buch.-Ham; d–f. *G. pushpangadaniana* T.Sabu, N.Mohan, M.V.Krishnaraj & S.M.Shareef; g–i. *G. rubro-echinata* Kosterm.; j–l. *G. sibeswarii* Shameer, J.Sarma, N.Mohan & A.Begum (a, d, g, j. Staminate flowers; b, e, h, k. Pistillate flowers; c, f, i, l. Fruits; photos by N. Mohan & P.S. Shameer).

instead of lime or lemon. Dried pericarps of fruits are used to treat dysentery. It is used as root stock for grafting mangosteen. Gum is used as a fixative or as a mordant in saffron dye (Maheshwari, 1964; Baruah et al., 2021).

Garcinia pushpangadaniana T.Sabu, N.Mohanani, Krishnaraj & Shareef, Phytotaxa 116(2): 52. 2013; T.S.Nayar et al., Fl. Pl. Western Ghats 2: 1237. 2014. *G. xanthochymus sensu* Sasidh., Biodiv. Doc. Kerala Fl. Pl. 6: 40. 2000. *Type*: INDIA, Kerala, Idukki district, Kadar, N 10° 7'46.1" E 077° 01'18.7", 1379 m, 15.05.2012, Sabu, Shareef & Krishnaraj 72601 (holo TBGT!; iso CAL!, CALI!, MH!).

Fig. 14d-f

Dioecious, evergreen to semi-evergreen trees, 15–20 m tall; exudation milky; crown pyramidal with horizontally spreading branches, ending with drooping branchlets; branchlets 4-angled, Petiole 1.5–2 cm, transversely rugose and with longitudinal ridges, adaxially ligulate at the base; lamina elliptic-oblong, 14–20 × 6–8 cm, obtuse at base, margins sub-repand or revolute, acute to obtuse at apex, midribs prominent on both sides, glabrous; lateral veins 28–34 pairs per side, raised on both surfaces. Staminate flowers pentamerous, 2–10, fascicled axillary or on axils of fallen leaves, 1–1.5 × 0.8–1 cm; pedicels 0.7–1 cm long, stout; sepals orbicular to sub-orbicular, c. 0.5 cm across, convex, coriaceous, margins membranous, ciliate; petals pink or pale green, 0.8–1 cm across, orbicular, shortly clawed at base, membranous on margins, stamens 12–15 each, 5-phalangiata; disc 5, glandular, alternating with staminal bundles; filaments c. 0.1 cm long; rudimentary pistil absent. Pistillate flowers pentamerous, 2–8, fascicled axillary or on axils of fallen leaves, 1–1.5 × 1–1.3 cm; pedicel 1–1.5 cm long, stout; sepals imbricate, orbicular to sub-orbicular, c. 0.6 cm wide, convex; petals pink or white with reddish tinge, orbicular, 1–1.2 cm wide, membranaceous and ciliate at margin; staminodes 3–5 each, in 5 phalanges; ovary globose, c. 0.6 cm in diam., 6–8-loculed, stigma 6–8-lobed, stellate, Berries top shaped, 10–12 × 8–11 cm, shortly mamellate at tip, fleshy, irregularly wrinkled on surface. Aril inconspicuous. Seeds 1–4, plano-convex, 1.5–2 × 0.8–1 cm, with rugous testa.

Vernacular names: *Manthipuli* (Malayalam).

Flowering & fruiting: Flowering from March to

May; fruiting from May to August.

Habitat: Evergreen and shola forests, between 850–1450 m elevation.

Distribution: Endemic to the Western Ghats.

Specimens examined: INDIA, Kerala, Idukki district, Mankulam, 10.05.1915, R. Venkata Rao 3433 (TBGT); Irumbuthara, 1300 m, 29.03.2012, Shareef & Roy 72414 (TBGT); Kadar, 14.05.2015, P.S. Shameer 86607 (TBGT); Wallakkad, 01.04.2014, P.S. Shameer 86606 (TBGT). Palakkad district, Walakkad, Silent Valley, 1700 m, 24.03.1982, Prasannakumar 10320 (CALI); *Ibid.*, 15.11.1983, Prasannakumar 11430 (CALI); *Ibid.*, 30.05.1984, T. Sabu 11448 (CALI); *Ibid.*, 28.02.1988, T. Sabu 11334 (CALI). Tamil Nadu, Coimbatore district, Ayerpady, 20.04.1903, Barber 2841 (MH); *Ibid.*, 20.04.1903, Barber 5420 (MH); *Ibid.*, 06.11.1901, Barber 3963 (MH); *Ibid.*, s.d., Barber 3841 (CAL); *Ibid.*, 4100', 25.04.1912, Fisher 3387 (FRC); Coimbatore, 1250 m, 22.10.1961, Joseph 13093 (MH); *Ibid.*, 1400 m, 22.07.1978, Chandrabose 57234 (MH); *Ibid.*, Lower Nirar to Italiar Forest, 1250 m, 06.09.1983, Ramamurthy 78412 (MH).

Notes: The authors could find a few specimens of this taxon in different herbaria (CAL, CALI, FRC, and MH), collected from different localities in the Western Ghats. Because of the resemblance in vegetative characters, they were previously identified erroneously as *G. xanthochymus* Hook.f. ex T.Anderson and are correctly identified here as *G. pushpangadaniana*. This species has the largest fruit (10–12 × 8–11 cm) among Indian *Garcinia* and weighs 500–600 gm.

Uses: Rind is used as a substitute to camboge in curries by tribal people.

Garcinia rubro-echinata Kosterm., Ceylon J. Sci. (Biol. Sci.) 12(2): 128. 1977; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. Ind. 3: 123. 1993; Sasidh., Biodiv. doc. Kerala Fl. Pl. 6: 41. 2004; Arisdason & P.Daniel in P.Daniel, Fl. Kerala 341. 2005; T.S.Nayar et al., Fl. Pl. Western Ghats 1: 276. 2014. *Lectotype* (designated by Kostermans, 1977): INDIA, Kerala, Strathomore, 17.04.1895, TF Bourdillon 611 (K [K000677641 digital image!]).

Garcinia echinocarpa sensu Hook.f., Fl. Brit. Ind. 1: 264. 1874; Gamble, Man. Indian Timb. 53. 1902; Brandis, Indian Trees 50. 1907; Bourd., For. Trees.

Travancore 23. 1908; Rama Rao, Fl. Pl. Travancore 29. 1914; Dunn in Gamble, Fl. Madras 1: 73. 1915; N.C.Nair & A.N.Henry, Fl. Tamil Nadu 1: 27. 1983; M.Mohanani & A.N.Henry, Fl. Thiruvananthapuram 71. 1994; N.Mohanani & Sivad., Fl. Agasthyamala 83. 2002, non Thwaites, 1854.

Garcinia echinocarpa var. *monticola* sensu Maheshw., Bull. Bot. Surv. India 6: 126. 1964. **Fig. 14g-i**

Dioecious evergreen trees, up to 20 m tall; exudate brownish-white; branchlets terete, apically quadrangular. Petioles 1–2.5 cm long, stout, adaxially ligulate at base; lamina sub-obovate to broadly elliptic, 8–15 × 3–8 cm, shortly acute at base, slightly revolute at margins, obtuse or sub-retuse at apex, coriaceous; midrib prominent above, flattened below, lateral veins 30–40 pairs, obliquely parallel, prominent; exudate canals conspicuous on both surfaces. Staminate flowers tetramerous, 5–8 in axillary or terminal fascicles, pale green, 1.6–2 × 1.2–1.5 cm; sepal orbicular-obtuse, convex, 0.5–0.7 cm wide, shortly clawed at base, margins membranous; petals pale green, sub-orbicular to oblong, *c.* 1.3 × 0.7 cm; stamens 30–70 on tetragonous torus; rudimentary pistil present. Pistillate flowers tetramerous, solitary, terminal, pale green, 1.8–2.5 × 1.5–1.8 cm; sepals obtuse, convex, 0.6–0.8 × 0.8–1 cm, coriaceous; petals pale green, orbicular, convex, 1.5–1.9 cm wide; staminodes *c.* 22, free, around the ovary; ovary 0.2–0.3 cm, 3–4-locular, covered with numerous, fleshy scales or warts; stigma peltate, irregularly 4-lobed. Berries sub-globose or ellipsoid, 4–6 × 2.5–4 cm, covered with spines or tubercles. Seeds 1–3, oblong, 3–4 cm long; aril scanty.

Vernacular names: Malayalam: *Para* or *pura*, *Malamkongu*; Tamil: *Madul*.

Flowering & fruiting: Flowering from December to March; fruiting from March to May.

Habitat: Moist evergreen forests, between 950–1100 m elevation.

Distribution: Endemic to the southern Western Ghats.

Specimens examined: INDIA, Kerala, Thiruvananthapuram district, Agasthyamala, 05.10.1989, N. Mohanani 7949 (TBGT); Athirumala, 1300 m, 07.01.2013, S.M. Shareef 792257 (TBGT); Chemmunji, 17.11.2009, G. Rajkumar 44747 (TBGT); *Ibid.*, 22.01.2014, P.S. Shameer 79604 (TBGT);

Travancore, 08.04.1898, *TF Bourdillon* 953 (FRC); *Ibid.*, 05.04.1895, *TF Bourdillon s.n.* (MH); *Ibid.*, *s.d.*, *R.H. Beddome s.n.* (MH); **Tamil Nadu**, Tirunelveli district, Tinneveli hills, 1879, *R.H. Beddome s.n.* (MH); Kannikatti, 21.02.1913, *Hooper & Ramaswami* 39428 (CAL); *Ibid.*, 19.03.1917, *s.coll.* 14650 (MH); *Ibid.*, 05.06.1964, *K.N. Subramanian* 1606 (MH); *Ibid.*, 30.07.1989, *Shanavas Khan* 5866 (TBGT); *Ibid.*, 30.07.1989, *Shanavas Khan* 5325 (TBGT). **Without precise locality**, 1873, *R.H. Beddome s.n.* (MH [MH2939]).

Uses: Oil from the seed is used for lighting lamp (Maheshwari, 1964).

Conservation status: Endangered (IUCN, 2020).

Notes: *Garcinia echinocarpa* Thwaites was earlier considered as a species distributed in South India and Sri Lanka. Thwaites (1858) identified two varieties under this taxon, var. α and var. β . Maheshwari (1964) in his revision named the var. β as *G. echinocarpa* var. *monticola* and treated the south Indian and high-altitude specimens of Sri Lanka under this taxon. Kostermans (1977) separated the South Indian taxon from Sri Lanka, as a distinct species *viz.*, *G. rubro-echinata* Kosterm., endemic to South India.

Garcinia sibeswarii Shameer, J.Sarma, N.Mohanani & A.Begum. *Phytotaxa* 507(2): 191–197. 2021. *Type:* INDIA, Assam, Lakhimpur district, Dulang Reserve Forest, N 270 25' 17.80", E 940 10' 59.40", 110 m, 24.02.2021. *J. Sarma* 1656(1) (CAL!). **Fig. 14j-l**

Dioecious evergreen trees, 10–12 m tall; exudation milky; branches horizontally spreading; branchlets terete to slightly angled. Petioles 2–2.5 cm long, slender, adaxially ligulate at base; lamina ovate-oblong, 17–20 × 10–12 cm, coriaceous, acute or acuminate at base, margins entire, acute or very shortly and abruptly acuminate at apex; midribs conspicuous on both sides; lateral veins 40 or more pairs; exudates canals conspicuous on both surfaces. Staminate flowers tetramerous, 5–10, in terminal fascicles, 2–3 cm diam.; pedicel 0.8–1.2 cm long, stout; sepals orbicular, concave, 0.6–0.8 × 0.3–0.4 cm, margin membranaceous; petals pale yellow, ovate-orbicular, 0.8–1.2 × 0.6–1 cm, concave, membranaceous on margins; stamens numerous, inserted on fleshy white, 4-lobed torus, wavy on margins; anthers brownish-white, rudimentary pistil columnar, with a convex, peltate, reddish stigma. Pistillate flowers tetramerous, solitary,

terminal, 1.5–3 cm across; pedicel 1–1.5 cm long; sepals orbicular, concave 0.6–0.8 × 0.4–0.5 cm, margin membranaceous; petals greenish-yellow, ovate, 0.8–1 × 0.6–0.8 cm, concave, membranaceous on margins; staminodes absent; ovary sub-globose, 0.2–0.4 cm in diam., 4-locular; style very short; stigma red, sticky, peltate, convex. Berries sub-globose to globose, 8–10 cm in diam., smooth, green, turning yellow on ripening, crowned by disc-like remnant stigma and green leathery sepals at base. Seeds 3 or 4, oblong, *c.* 3 × 6 cm, reticulate-noduled on surface, covered with brownish-white, fibrous aril.

Flowering & fruiting: Flowering from February to May; fruiting from May to June.

Habitat: Semi evergreen forests, between 100–300 m elevation.

Distribution: Endemic to Assam.

Specimens examined: INDIA, Assam, Lakhimpur district, Dulang Reserve Forest, March 1962, G. Panigrahi 27621 (ASSAM); Diya, 04.04.1914, U. Kanjilal 444M (ASSAM).

Common name: 'Gela thekera' (Assamese), meaning rotten camboge.

Uses: As the common name indicates, the fruit is not generally preferred for human consumption. But they are highly relished by the primates such as the Rhesus macaque (*Macaca mulatta*) and the rare Assamese macaque (*Macaca assamensis*), very common in the area.

Garcinia sopsopia (Buch.-Ham.) Mabb., Taxon 26: 529. 1977; Grierson & D.G.Long, Fl. Bhutan 1(2): 57. 1984; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 124. 1993; Hajra *et al.*, Mat. Fl. Arunachal Pradesh 1:186. 1996; A.S.Chauhan in N.P.Singh *et al.*, Fl. Manipur 1: 143. 2000; Kam.P.Singh in Singh *et al.*, Fl. Mizoram 1. 212. 2002. *Oxycarpus sopsopia* Buch.-Ham., Mem. Wern. Nat. Hist. Soc. 5: 345. 1824. *Lectotype* (designated by Mabberley, 1977): Golpara, 01.06.1808, Buchman 1120 (E, [E00438015 digital image!]).

Garcinia paniculata Roxb., Fl. Ind. 2: 626. 1832; Wight, Ic. t. 112. 1839, Illustr. 1: 125. 1840; Voigt, Hort. Suburb. Calc. 87. 1845; Choisy, Mem. Soc. Phys. Geneve 12: 415. 1851; Planch. & Triana, Ann. Sci. Nat., Bot. ser. 4, 14: 349. 1860; Drury,

Indian Fl. 1: 140. 1864; Laness., Mem. Garcin. 60. 1872; T.Anderson in Hook.f., Fl. Brit. India 1: 266. 1874; Kurz, Forest Fl. Burma 92. 1877; Pierre, Fl. Forest. Cochinch. 25: t. 83J. 1883; Vesque in A.DC., Monogr. Phan. 8: 415. 1893; Gamble, Man. Indian Timb. 53. 1902; Brandis, Indian Trees 50. 1907; Engl., Nat. Pflanzenfam. (ed. 2) 21: 224. 1925; Kanjilal *et al.*, Fl. Assam 1: 108. 1934; Sinclair. Bull. Bot. Soc. Bengal 9 (2): 87. 1955; Sealy, Kew Bull. 11 (2): 342.1956; Maheshw., Bull. Bot. Surv. India 6: 124. 1964; N.P.Singh, Fl. Jowai 1: 89. 1981; Deb, Fl. Tripura 1: 364. 1981. *Lectotype* (first step designated by Maheshwari 1964, second step designated here): HBC (Calcutta Herbarium), 31.12.1814, Wallich 4857 (CAL [CAL0000065167!]); *isolecto*, (K [K001104077 digital image!]).

Garcinia bobeeecowa Roxb., Hort. Bengal. 42. 1814, *nom. nud.*

Stalagmitis paniculata G.Don, Gen. Hist. 1: 621. 1831, *nom. superfl.*

Dioecious evergreen trees, 15–18 m tall; exudation yellow, sticky; branches horizontally spreading; branchlets terete. Petioles 1.5–2.5 cm long, adaxially ligulate at base; lamina obovate to oblanceolate 15–25 × 5–9 cm, cuneate at base, margins repand, acuminate at apex; midribs raised above and below, more conspicuous below; lateral veins, 1–12, raised on both surfaces; exudate canals inconspicuous on both surfaces. Staminate flowers tetramerous, many, in terminal brachiate panicles, sweet scented; pedicel *c.* 0.4 cm long; sepals sub-orbicular, 0.2–0.3 cm wide, convex; petals white, ovate, concave, 0.6–0.8 × 0.3–0.4 cm; stamens numerous, in a central sub-globose mass; rudimentary pistil absent. Pistillate flowers tetramerous, fewer than staminate flowers, in 5–8 cm long terminal racemes; sepals and petals same as staminate flowers; staminodes absent; ovary sub-globose, 0.2–0.3 cm in diam., tubercled, 5-locular; stigma sessile, convex, tubercled. Berries globose or sometimes ellipsoid, 3–3.5 cm in diam., smooth, yellow on ripening. Seeds 3–5, 1–1.5 cm diam., reniform, embedded in pulpy aril.

Vernacular names: *Sochopa-tenga* (Assamese); *Dieng-soh-jadu*, *Dieng-soh-longkor*, *Dieng-soh-longky-daw* (Khasi); *Bombhathei*, *Vawmva* (Lushai); *Thirsu* (Garo).

Flowering & fruiting: Flowering from November to February; fruiting March to May.

Habitat: Evergreen forests of foot hills, between 100–900 m elevation.

Distribution: India, Bangladesh, Nepal and Myanmar.

Specimens examined: INDIA, **Assam**, Kamrup district, Burni Forest, 13.02.1932, *Sri Ram* 9897 (ASSAM); Burdwan Reserve, 08.04.1915, *U.N. Kanjilal* 5439(DD); Sibsagar district, Nayajanka, 90 m, 23.04.1911, *U.N. Kanjilal* 1656 (ASSAM); Garampani, 20.11.1913, *U.N. Kanjilal* 3007 (ASSAM); Holongapal Reserve, 20.12.1910, *U.N. Kanjilal* 7074 (ASSAM). Nagajanka, 23.04.1911, *U.N. Kanjilal* 1656 (ASSAM). **Bihar**, Buxar district, Sarai Korang, 28.03.1895, *Herb. G. Watt* 11103 (CAL). **Manipur**, Tamenglong district, Phalong, *A. Meebold* 6471 (CAL). **Meghalaya**, West Garo Hills district, Rangnlachakgiri to Samphaligiri road, 01.03.1915, *U.N. Kanjilal* 5195 (ASSAM, CAL); West Jaintia Hills district, Dawki, 01.11.1935, *G.K. Deka* 12875 (ASSAM); Khasi & Jaintia Hills district, 21.11.1872, *C.B. Clarke* 17905B. (CAL); Syndai, 19.10.1913, *U.N. Kanjilal* 2771 (ASSAM); Dombu Reserve, 26.03.1915, *U.N. Kanjilal* 5373 (ASSAM, DD); Dawgiri Reserve Forest, 14.03.1975, *M.K.V. Rao* 61422 (ASSAM); Near 62 km on Baghanara-Maha deo road, 15.09.1990, *M.K.V. Rao* 64128 (ASSAM); Ri-Bhoi district, Nongpoh, 30.05.1914, *U.N. Kanjilal* 3981 (ASSAM); Barpani, 05.12.1916, *U.N. Kanjilal* 7106 (ASSAM, DD); near soil conservation Umling, *s.d., J. Joseph* 43780 (ASSAM); Umsaw forest, 30.11.1934, *C.S. Purkayastha* 10938 (ASSAM); *Ibid.*, 26.10.1938, *S.R. Sharma* 17926 (ASSAM); *Ibid.*, 26.10.1938, *K. Biswas* 3767 (CAL). **Mizoram**, Mamit district, Saitah, 03.09.1990, *D.K. Singh & K.P. Singh* 98852 (ASSAM). **Without precise locality**, 12.06.1814, *Wallich s.n.* (CAL [CAL46524]); East India, *Roxburgh s.n.* (K [K000677602 digital image!]); BANGLADESH: Sylhet, *s.d., Wallich* 4858 (CAL, K[K000677604 digital image!]); Rajbari Talpigre, November 1873, *J.S. Gamble* 1645A (MH); *W. Roxburgh s.n.* (BM [BM000611602 digital image!]); Chittagong Hill Track, 31.03.1876, *J.L. Lister* 330 (CAL); *Ibid.*, Burkhal, March 1880, *J.S. Gamble* 7800 (CAL). Chittagong, *s.d., F. Fihlish s.n.* (CAL [CAL46507]). NEPAL, without locality, *s.d. Wallich s.n.* (CAL).

Typification: Under *G. paniculata* Roxb., Maheshwari 1964 cited 'Type: ex Sylhet, E. Pakistan; cult in Indian Botanic Garden, Calcutta',

without citing a specimen or herbarium. We could locate two specimens of Wallich 4857, noted locality as 'HBC (Calcutta Herbarium)' one each at CAL and K. Maheshwari's typification could be considered as first-step lectotypification and need narrowing down to a single one of these specimens by subsequent lectotypification. Hence we designate the CAL specimen [CAL0000065167!] as lectotype (second step) and the K specimen [K001104077] as isolectotype.]

Use: The pulpy aril of the highly flavored fruit is edible (Maheshwari, 1964).

Garcinia spicata (Wight & Arn.) Hook.f., *J. Linn. Soc., Bot.* 14: 486. 1875; Brandis, *Indian Trees*: 49. 1906; Gamble, *Fl. Madras* 1: 53. 1915; Maheshw., *Bull. Bot. Surv. India* 6: 112. 1965; N.C.Nair & A.N.Henry *Fl. Tamil Nadu* 1: 28. 1983; N.P.Singh in B.D.Sharma & Sanjappa, *Fl. India* 3: 125. 1993; Anil Kumar *et al.*, *Fl. Pathanamthitta* 72. 2005; Palkar *et al.*, *Rheedea* 27(2): 143. 2017. *Xanthochymus spicatus* Wight & Arn., *Prodr. Fl. Ind. Orient.* 1: 102. 1834. *Type: s.loc., s.d., R. Wight* 346a (E [00179065 digital image!]).

Garcinia ovalifolia Hook.f., ('*ovalifolius*'), *Fl. Brit. Ind.* 1: 269. 1874, *non* Oliver 1868, var. *spicata* (Wight & Arn.) Hook.f.

Dioecious evergreen trees, 10–20 m tall; exudate white; branchlets 4-angled. Petioles 1–2 cm long, ligulate at base; lamina broadly elliptic-oblong or ovate, 10–20 × 4–8 cm, rounded or obtuse at base, margins entire, obtuse to retuse at apex, thick-coriaceous; midrib raised on both surface; lateral veins 15–18 pairs, prominent on both surfaces. Staminate flowers pentamerous, many, spicate or sometimes fascicled; pedicel 0.1–0.5 cm long; sepals sub-orbicular, 0.25–0.3 cm wide; petals obovate, 0.5–0.7 cm, concave, pale green or greenish yellow, ciliate on margins; stamens in 5 phalanges, each with 8–10 stamens; rudimentary pistil absent. Pistillate flowers solitary or in pairs, axillary or on leafless stem; pedicel 0.1–0.35 cm long; sepals and petals similar to staminate flowers; staminodes 5; ovary oblong, 0.1–0.2 cm across, 2–4-loculed; style *c.* 0.1 cm long; stigma 3–5-lobed, peltate, spreading, persistent in fruit as thick black spot. Berries broadly to depressed globose, 3–4 cm in diam., pale green turning yellow on ripening; young fruit with shallow ridges and furrows; aril pulpy. Seeds 1–3, broadly oblong, 1.5–2.5 × 1–1.3

cm, slightly compressed.

Flowering & fruiting: Flowering from February to March; fruiting from April to June.

Habitat: Evergreen to semi-evergreen forests.

Distribution: India and Sri Lanka.

Specimens examined: INDIA, Andhra Pradesh, Nellore district, Nellore, July 1883, *Gamble* 12819 (MH); Tirupati district, Sriharikota forest, May 1904, *s.coll.* 3034, 3035, 3036 (MH). **Karnataka**, Agumbe district, Barakana, Balehalli, 19.05.1960, *R. Sundara Raghavan* 62720 (BSI). **Kerala**, Kasargod district, Cherpady, Uduma, 12.03.1993, *A. Nazarudeen* 16408 (TBGT); Uduma, Kavu, 09.06.1990, *Sarojini Menon* 17054 (TBGT); Kollam district, Kolaturpolay (Kulathoorpuzha) 27.04.1904, *Bordillon* 1524 (MH); Karingalodathodu area, Tenmalai range, 07.12.1961, *K.N. Subramanian* 77529 (BSI); Kottayam district, Koruthode, 200 m, 12.11.1995, *Jomy Augustine* 16906 (CALI, KFRI); Puthupalli, *s.d.*, *G.S. Puri* 36572 (BSI); Palakkad district, Mukkali forest, 07.03.1975, *E. Vajravelu* 46240 (MH); Pathanamthitta district, Pamba, 200 m, 12.02.1994, *Jomy Augustine* 13370 (CALI); Pamba, 18.03.1994, *A. Nazarudeen* 19587 (TBGT); Muzhiyar, 07.02.1994, *Nazarudheen* 19082 (TBGT); Triveni, 25.03.1995, *Pandurangan & Raveendran* 12747 (TBGT); Thiruvananthapuram district, Rockwood estate 21.04.1904, *T.F. Bordillon* 742 (TBGT). **Tamil Nadu**, Pudukkottai district, Pudukkottai, November 1909, *C.A. Barber* 8498 (MH); Villupuram district, Marakkanam, 03.06.1907, *C.A. Barber* 8321 (MH); Coimbatore district, Annamalais, Karian shola, 19.03.1939, *V. Narayanaswamy* 5444 (MH); SRI LANKA, Ceylon Southern Province, Hambantota district, Yala, Talgasmankade, 26.04.1973, *L.H. Cramer* 4124 (MH).

Garcinia stipulata T. Anderson in Hook.f., Fl. Brit. India 1: 267. 1874; Pierre, Fl. Forest. Cochinch. 9: t. 79K. 1883; Vesque in A.D.C., Monogr. Phan. 8: 365. 1893; Gamble, Man. Indian Timb. 52. 1902; Brandis, Indian Trees 50. 1907; Engl. in Nat. Pflanzenfam. (ed. 2) 21: 225. 1925; Maheshw., Bull. Bot. Surv. India 6: 116. 1964; Grierson & D.G. Long, Fl. Bhutan 1(2): 57. 1984; N.P. Singh in B.D. Sharma & Sanjappa (eds.), Fl. India 3: 126. 1993; Hajra et al., Mat. Fl. Arunachal Pradesh 1: 186. 1996; G.D. Pal, Fl. Lower Subansiri Dist. Arunachal Pradesh 1: 119. 2013. *Lectotype* (first step designated by Maheshwari,

1964; second step designated by Ranjan et al., 2022): INDIA, Sikkim, *s.d.*, J.D. Hooker & T. Thomson 17 (CAL [CAL0000005830!]); *isolecto* CAL [CAL0000005831!]).

Dioecious evergreen trees, up to 20 m tall; exudation yellow; branches spreading; branchlets angular. Petioles 1–1.5 cm long, adaxially ligulate at base; lamina elliptic-oblong or lanceolate, 12–23 × 4–9 cm, cuneate or obtuse at base, margin entire, shortly acuminate at apex; midribs raised above and below, more conspicuous below; lateral veins 10–15 pairs per side, raised on both surfaces; stipules subulate, 0.5–0.7 cm long, deciduous. Staminate flowers tetramerous, axillary, 4–6-flowered cymes, 0.4 cm across, pedicel 2–2.5 cm long; 2-bracteolate near base; bracts scale like; sepals sub-orbicular, concave, 0.9–1.2 × 1.0–1.2 cm; petals yellow, obliquely ovate, 2.0–2.5 × 1.2–1.5 cm, membranous; stamens numerous, in a ring around rudimentary pistil; rudimentary pistil fungiform; stigma peltate, convex. Pistillate flowers tetramerous, axillary, solitary or paired; pedicel 1–1.5 cm long; sepals and petals similar to staminate flowers; ovary 0.5–0.8 cm in diam., 2-locular; stigma orbicular, tubercled. Berries oblong, smooth, 2.5–3 × 2–2.5 cm, pointed at apex. Seeds 2, *c.* 2 × 0.8 cm, oblong, flattened embedded in pulpy aril.

Flowering & fruiting: Flowering from October to December; fruiting from December to March.

Habitat: In moist subtropical forests, in valleys of rivers and streams, between 800–1500 m elevation.

Distribution: Bhutan and India.

Specimens examined: INDIA, **Arunachal Pradesh**, Abor Hill district, Upper Rotung, 03.03.1912, *I.H. Burkill* 38198 (CAL); South slope Bapu, 7.03.1912, *I.H. Burkill* 36917 (CAL); Near the Dihong, 250 m, 19.01.1912, *I.H. Burkill* 36124 (CAL); Piri Mountain, 2360 m, November 1934, *N.L. Bor* 2461A (DD); Kameng district, Kameng Forest Division, 13.11.1951, *G.K. Deka* 27 (ASSAM); Bora hills, 10.05.1958, *G. Panigrahi* 15350 (ASSAM); Papum Pare district, Daffa Hills, 19.01.1876, *J.L. Lister* 187 (CAL). **Meghalaya**, East Khasi Hill district, Mowpoot, 762 m, 14.11.1871, *C.B. Clarke* 14609 (CAL). **Sikkim**, South Sikkim district, Rayong, 20.10.1879, *G. King s.n.* (DD); Sikkim, August 1881, *J.S. Gamble* 9670 (K [K000677613 digital image!]); Sikkim, *s.d.*, *J.D. Hooker* 105 (K [K000677611 digital image!]); **West Bengal**, Darjeeling district,

Darjeeling, 1525 m, August 1881, *J.S. Gamble* 9760 (CAL, MH); Lebong, *T. Anderson* 789 (CAL); Pomong, 23.08.1869, *C.B. Clarke* 8803 (CAL); Kalimpong district, 1420 m, 09.12.1879, *J.S. Gamble* 7500 (CAL); Mungpoo, 1066 m, 24.08.1884, *G.A. Gammie s.n.* (BSI). **Without precise locality**, 915 m, 04.09.1876, *J. Sykes* 1648A (MH); *s.d., s.coll. s.n.* (MH [MH63589]); *s.d., s.coll. s.n.* (MH [MH63584]); *s.d., s.coll.* 1246 (CAL); *s.d., S. Kurz s.n.* (CAL [CAL46590]). BHUTAN: *S. loc., s.d., Griffith* 860 (CAL).

Uses: The fruits are eaten by Lepchas in Sikkim and the tree produces an inferior gum (Maheshwari, 1964).

Garcinia succifolia Kurz, *J. Asiat. Soc. Bengal*, Pt. 2, Nat. Hist. 41(2): 293. 1872, Forest Fl. Burma 91. 1877. *Garcinia loniceroides* T.Anderson in Hook.f., *Fl. Brit. Ind.* 1: 264. 1874; Maheshw., *Bull. Bot. Surv. India* 6: 126. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), *Fl. India* 3: 118. 1993; A.S.Chauhan in N.P.Singh *et al.*, *Fl. Manipur* 1. 143. 2000. *Lectotype* (designated by Maheshwari, 1964): Myanmar, *Griffith* 870 (K [K000677591 digital image!]).

Dioecious evergreen shrubs or small trees; exudation yellow, sticky; branchlets terete. Petioles 0.6–0.8 cm long, slender, adaxially ligulate at base, 5–10 × 1.5–2.5 cm, oblong-lanceolate, acute at base, margins entire, acute-acuminate at apex; midrib raised above and below; lateral veins conspicuous, 8–12 pairs per side, raised on both surfaces. Staminate flowers tetramerous, 3 or rarely more in terminal or axillary fascicles, 0.4–0.5 cm across; sepals broadly ovate, concave, 0.2–0.3 cm long; petals pale green, ovate, 0.3–0.4 cm long; stamens numerous, in a central sub-tetragonal mass; rudimentary pistil absent. Pistillate flowers tetramerous, solitary, axillary, yellowish green; sepals and petals similar to staminate flowers; staminodes in 4-bundles. Berries globose, smooth, 6–10 cm in diam., yellow; aril pulpy.

Flowering & fruiting: Flowering from September to November; fruiting from November to January.

Habitat: Evergreen and semi-evergreen forests, up to 1100 m elevation. It is fairly found in the river banks.

Distribution: India and Myanmar.

Specimens examined: INDIA, Manipur, Tamenglong

district, Nungba, 1525 m, November 1907, *A. Mebbold* 6326 (CAL). Nagaland, Naga Hill district, Kungba, 1525 m, December 1907, *A. Mebbold* 7399 (CAL). MALAYAN PENINSULA, Perak, 60–90 m, September 1881, *King's coll.* 2718 (CAL); Perak, 150–150 m, January 1885, *King's coll.* 7077 (CAL); Perak, 150–150 m, September 1885, *King's coll.* 8196 (CAL). MYANMAR, Joukyaghat, *s.d., S. Kurz* 535; Martaban, *s.d., S. Kurz* 536 (CAL)).

Notes: Kurz (1872) described *Garcinia succifolia* from Myanmar, without mentioning any specimens. Anderson (1874) described *Garcinia loniceroides* based on the specimen 'Myanmar, Griffith 870'. But Kurz (1877) synonymized *G. loniceroides* under *G. succifolia*. However, the subsequent Indian authors Maheshwari (1964), Singh (1993) and Chauhan (2000), followed Anderson (*l.c.*) in their treatments, whereas IPNI (<https://www.ipni.org>) and WFO (<http://www.worldfloraonline.org>) accept priority of *G. succifolia* over *G. loniceroides*.

Garcinia talbotii Raizada ex Santapau, *Rec. Bot. Surv. India* (ed. 2) 16: 14. 1960; Maheshw., *Bull. Bot. Surv. India* 6: 113. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), *Fl. Ind.* 3: 127. 1993; M.R.Almeida, *Fl. Maharashtra* 1: 88. 1996; Arisdason & P.Daniel in P.Daniel, *Fl. Kerala* 343. 2005; T.S.Nayar *et al.*, *Fl. Pl. Western Ghats* 276. 2014; Palkar *et al.*, *Rheedea* 27(2): 146. 2017. *Type:* INDIA, Karnataka, Uttara Kannada district, Gairosoppah Ghat, 20.01.1896, *W.A. Talbot* 3713 (holo, BSI [BSI0000000003!]; iso, CAL!).

Garcinia ovalifolia sensu Hook.f., ('*ovalifolius*'), *Fl. Brit. Ind.* 1: 269. 1874, *non* Oliver, 1868, *macrantha* Hook.f. ex T.Anderson.

Garcinia malabarica Talbot, *J. Bombay Nat. Hist. Soc.* 11: 234. t. 1. 1897, *For. Fl. Bombay Pres.* 1: 96. 1909, *nom. illeg., non* Desr., 1792.

Xanthochymus ovalifolius sensu J.Graham, *Cat. Pl. Bombay.* 26. 1839, *non* Roxb., 1832.

Garcinia spicata var. *macrantha* sensu Vesque in A.DC., *Monogr. Phan.* 8: 311. 1893; T.Cooke, *Fl. Pres. Bombay* 1: 79. 1901. **Fig. 15a–c**

Dioecious evergreen trees, up to 20 m tall; branches horizontal spreading; exudate white, turning brownish on exposure; branchlets apically quadrangular. Petioles 0.8–1.7 cm long, rugose, greenish, adaxially ligulate at base; lamina elliptic-ovate, or ovate-oblong, 7.5–18 × 3–10 cm, acute

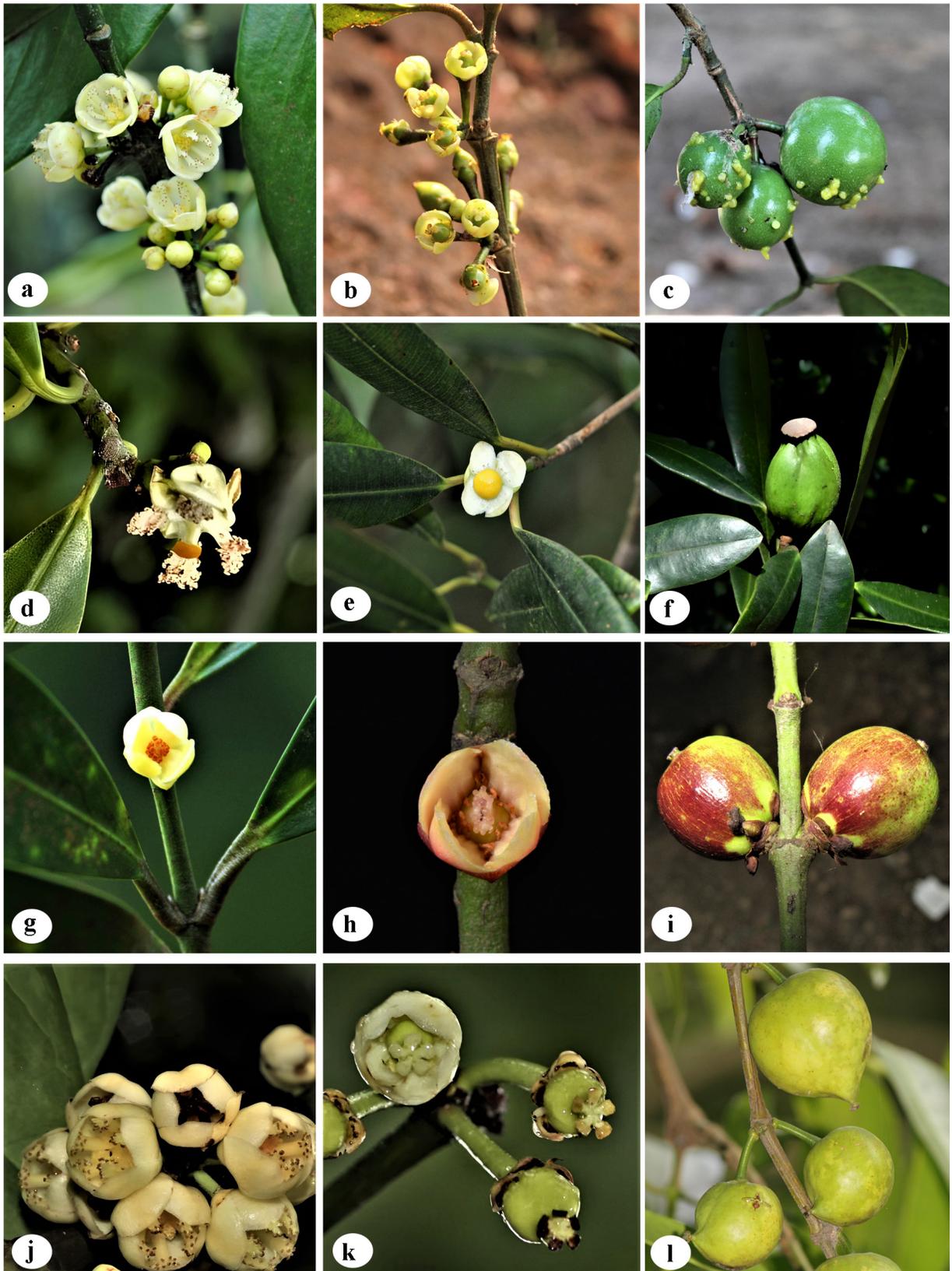


Fig. 15. Species of *Garcinia* L. in India: a–c. *G. talbotii* Raizada ex Santapau; d–f. *G. travancorica* Bedd.; g–i. *G. wightii* T.Anderson; j–l. *G. xanthochyma* Hook.f. (a, d, g, j. Staminate flowers; b, e, h, k. Pistillate flowers; c, f, i, l. Fruits; photos by N. Mohanan & P.S. Shameer).

or rarely attenuate at base, retuse or acute at apex; midrib conspicuous on both sides; lateral veins 16–32 pairs, not raised on the surface; exudate canals conspicuous on both surfaces. Staminate flowers pentamerous, many, fascicled axillary or terminal, 1.8–2.3 cm in diam.; pedicel *c.* 1 cm long, slender; sepal orbicular, concave, 0.4–0.5 cm wide; petals, creamy-white or greenish-white, orbicular-ovate, 0.6–1 × 0.5–0.8 cm, margins membranous; stamens 4–18 each, in 5-phalanges, antipetalous, disc 5, alternating with staminal bundles; rudimentary pistil absent. Pistillate flowers pentamerous, many, axillary fascicled, often on old branchlets, 1.8–2.7 cm across; pedicel 1–1.5 cm long; sepals free, orbicular, concave, 0.5–0.6 cm wide, rarely ciliate on margins; petals creamy white or pale green, orbicular-ovate, concave, 1.3–1.8 × 1.5–1.9 cm, membranous; staminodes 3–5 each, in 5 phalanges, disc 5; ovary globose, 0.3–0.4 cm long, 3-locular, very rarely 4; stigmas peltate, 3-lobed, thick. Berries globose, 4–6 × 3.8–5 cm, smooth, yellow at maturity; aril pulpy. Seeds 1–3, oblong, up to 3 cm long.

Vernacular names: *Haldi*, *Ont* (Kannada); *Limboti*, *Pansara*, *Tavir* (Marathi).

Flowering & fruiting: Flowering from January to March; fruiting from March to June.

Habitat: Evergreen to semi-evergreen forests, up to 350 m elevation.

Distribution: Endemic to the Western Ghats.

Specimens examined: INDIA, **Karnataka**, Uttara Kannada district, *Gerusoppa Ghat*, *s.d.*, *W.A. Talbot* 2693 (BSI, CAL); *Diggi*, 09.05.1988, *W.A. Talbot s.n.* (BSI); *Devimane*, October 1919, *Hallberg & McCann* 34583 (BLAT); *Guddhehalli*, *Karvar*, *s.d.*, *T.R. Bell* 7811, 7844 (BLAT); *Castle Rock*, 16.04.1909, *R.K. Bhide* (BSI); North Kanara, 03.01.1902, *s.coll.* 2693 (MH); Shimoga district, Barakan, Agumbe, 28.03.1964, *Sundhara Raghavan* 97275 (BSI); Shimoga, Hulikal Ghat, 04.05.1978, *Saldanha* 7629 (MH); Hassan district, Bisle Ghat 08.01.1970, *Saldanha* 13013 (MH). **Kerala**, Malappuram district, Cherupadi Kavu, 29.01.2014, *P.S. Shameer* 79607 (TBGT); *Ibid.*, 28.04.2014, *P.S. Shameer* 79609 (TBGT); Palakkad district, Nelliampathy ghat, 29.06.1914, *S.T. Dunn s.n.* (MH [MH3018]); Palakkad district, Mandampatty, 12.04.1978, *Nair* 56755 (MH); Thiruvananthapuram district, JNTBGRI, Arboretum cult. *s.d.*, *P.S. Shameer* 72615

(TBGT). **Maharashtra**, Nashik district, Nandgaon forest, Pune, 01.02.1964, *Venkata Reddi* 95862 (BSI); Palghar district, Shirgaon, 21.04.1957, *J.A. Vasudeva* 17031 (BSI); Pune district, Bhimashankar, *s.d.*, *W.A. Talbot* 5024 (BSI); Auhpe forest, 23.03.1907, *G.M. Ryan* 1751 (BSI); Ambavne, Kakepano forest 25.03.1964, *Venkata Reddi* 96030 (BSI); Bhimashankar, 25.10.1956, *L.A. Vasavade* 8575 (BSI); *Ibid.*, 13.06.1961, *K.P. Janardhanan* 72256 (BSI); *Ibid.*, 07.06.1962, *K.P. Janardhanan* 76642 (BSI); *Ibid.*, *s.d.*, *J.A.V.* 9314 (BSI); *Ibid.*, 24.02.1961, *K.P. Janardhanan* 69201 (BSI); *Ibid.*, 22.04.1961, *K.P. Janardhanan* 72108 (BSI); Choura hill, 04.04.1962, *K.P. Janardhanan* 76581 (BSI); Raigad district, Lakeview, Matheran, 29.01.1957, *Puri* 9895 (BSI); Picnic spot, Matheran, 26.02.1959, *N.A. Irani* 2994 (BLAT); *Ibid.*, 02.11.1907, *H.P. Paranjpe s.n.* (BSI Acc. No. 6751); *Ibid.*, 09.11.2006, *S.C. Majumdar & S.K. Das* 192443 (BSI); Sudagarh Fort, Pali, 09.03.1979, *M.J. Kothari* 156423 (BSI); Satara district, Khandala, 21.03.1903, *G.A. Gammie* 16163 (BSI); Koyna, 23.11.1978, *R.K. Kochhar* 157811 (BSI); Jaigad, Koyna, 11.02.1979, *R.K. Kochhar* 158332 (BSI); Sindhudurg district, Amboli, 28.04.1902, *G.A. Gammie* 15025 (BSI); Amboli, 09.11.1965, *B.G. Kulkarni* 107936 (BSI); Meroli Plateau, Khandala *H. Santapau* 3566, 4210 (BLAT); *Ibid.*, 21.03.1903, *G.A. Gammie* 16163 (BSI); *Ibid.*, Elphinstone slopes, 20.12.1949, *H. Santapau* 10585 (BLAT); *Ibid.*, 26.01.1959, *H. Santapau* 866, 23053 (BLAT); *Ibid.*, Coona River, October 1918, *H. Santapau* 28438 (BLAT); St. Xavier's Rivine, *s.d.*, *H. Santapau* 1747, 3251, 3252, 15422, 15423 (BLAT).

Conservation status: Least Concern (IUCN, 2020).

Uses: The fruits yield an inferior quality of yellow gum. Its dried fruits are used like tamarind in curries (Singh, 1993).

Notes: *Garcinia talbotii* and *G. spicata* are two closely resembling species, but distinct. *Garcinia talbotii* is endemic to the Western Ghats whereas *G. spicata* is distributed in peninsular India and Sri Lanka. In almost all herbaria, both species are found erroneously identified both ways. *Palkar et al.* (2017) confirmed the identity of both species and demarcated their distribution as *G. talbotii* endemic to central and northern Western Ghats, whereas *G. spicata*, besides Sri Lanka, has scattered distribution in southern Western Ghats in Kerala and Tamil Nadu and Eastern Ghats in Andhra

Pradesh. *Garcinia malabarica* Desr. (in Lam. Encycl. 3: 701, 1792) was an erroneous identification and naming for the Rheede's '*Panitsjika-maram*' (Rheede, Hort. Malab. 3: 45-47, t. 41. 1682). This was later correctly identified and named as *Diospyros malabarica* (Desr.) Kostel. (Kosteletzky, 1834; Nicolson *et al.*, 1988).

Garcinia travancorica Bedd., Fl. Sylv. t. 173. 1872; T.Anderson in Hook.f., Fl. Brit. India 1: 268. 1874; Gamble, Man. Indian Timb, 52. 1902; Bourd., Forest Trees Travancore 25. 1908; Brandis, Indian Trees 49; Rama Rao, Fl. Pl. Travancore 30.1914; Dunn in Gamble, Fl. Madras 1: 74. 1915; Engl., Nat. Pflanzenfam. (ed. 2) 21: 224. 1925; Maheshw., Bull. Bot. Surv. India 6: 120. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 128. 1993; M.Mohanani & A.N.Henry Fl. Thiruvananthapuram 72. 1994; Sasidh., Fl. Shenduruy WLS 32. 1997; Gopalan & A.N.Henry, Endemic Pl. India Southern Western Ghats 206. 2000; K.Ravik. & D.K.Ved, Illustr. Field Guide 100 Red Listed Med. Pl. 157. 2000; N.Mohanani & Sivad., Fl. Agasthyamala 87. 2002; Arisdason & P.Daniel in P.Daniel, Fl. Kerala 343. 2005; T.S.Nayar *et al.*, Fl. Pl. Western Ghats 1: 276. 2014. *Lectotype* (designated by Maheshwari, 1964): INDIA, Travancore & Tinnevelly Ghats, 01.12.1871, *Beddome s.n.* (GDC [G00458915 digital image!]).

Fig. 15d-f

Dioecious evergreen trees, up to 15 m tall; exudate yellow; branches horizontal; branchlets terete. Petioles 1-1.5 cm long, adaxially ligulate at base; lamina linear-oblong to sub-spathulate, 5.5-10 × 1.5-3 cm, acute at base, margins repand, acute or obtuse at apex; midribs raised above and below, conspicuous on both sides; lateral veins more than 50 pairs per side, raised on both surfaces, closely parallel, exudate canals inconspicuous on both surfaces. Staminate flowers tetramerous, usually 3 in terminal or sub-terminal, trichotomous short cymes, 1.2-1.5 × 0.8-1 cm; pedicel 0.2-0.3 cm long, stout; sepals orbicular, concave, 0.2-0.3 cm wide, margins membranous; petals creamy white, orbicular, concave, 0.5-0.7 cm wide; stamens numerous, arranged on 4 polyandrous bundles; rudimentary pistil columnar, with a circular peltate stigma. Pistillate flowers tetramerous, terminal or sub-terminal, solitary or rarely paired, 1.3-1.5 × 8-1.2 cm; sepals orbicular, convex, 0.4-0.5 cm wide; margins membranous; petals milky white,

orbicular to sub-orbicular, 0.6-0.8 cm wide; staminodes many, free or 2-3-united, arranged in a circle around ovary; ovary sub-globose or pyriform, 0.2-0.3 cm in diam., 1-2-locular; stigma sessile, peltate-discoid, convex, yellow, waxy shining. Berries ovoid-oblong, 2-3 × 1-2.5 cm, smooth, with persistent discoid stigma. Seeds 1 or 2, ovoid, 2-2.5 × 0.7-1 cm.

Vernacular names: *Malampongu* (Malayalam).

Flowering & fruiting: Flowering from January to May; fruiting from April to August.

Habitat: In evergreen forests, between 950-1250 m elevation.

Distribution: Endemic to southern Western Ghats.

Specimens examined: INDIA, Kerala, Thiruvananthapuram district, Travancore, *Beddome s.n.* (MH); Travancore, 02.10.1894, *TF Bourdillon* 327, 328 (CAL, MH); Chemmunji, 22.01.1992, *N. Mohanani* 11037 (TBGT); Agasthyamalai, 20.06.1999, *William Decruse & Gangaprasad* 15168 (TBGT); Chemmunji, 19.01.2000, *Rajkumar* 41848 (TBGT); *Ibid.*, 29.02.2000, *Rajkumar* 38787 (TBGT); *Ibid.*, 30.09.2013, *Rajkumar & Alister* 77159 (TBGT). **Tamil Nadu**, Tirunelveli district, Travancore and Tinnevelly, *s.d.*, *s.coll.* 2997 (MH); Tinnevelly hills, 1200 m, *s.d.*, *s.coll. s.n.* (MH [MH2992]); Kalivayalpil, Tinnevelly, 01.06.1901, *Barber* 3051 (MH); Kalivayalpil to Hamington Bungalow, Travancore, 02.06.1901, *Barber* 3071 (MH); Agasthyamalai, 20.08.1963, *Henry* 17337 (MH); Kanyakumari district, Upper Kodayar, 23.03.1984, *Gopalan* 81418 (MH); Muthukulyvagal, Travancore, 03.10.1904, *TF Bourdillon* 328 (MH). **Without precise locality**, *s.d.*, *s.coll.* 411 (BM [BM000946509, digital image!]); December 1871, *Beddome* 211 (K [K000677615, digital image!]); *Ibid.*, 212 ([K000677614 digital image!]).

Conservation status: Critically Endangered (IUCN, 2020).

Uses: It yield a soluble yellow pigment used as a water colour.

Garcinia wightii T.Anderson in Hook.f., Fl. Brit. India 1: 265.1874; Pierre, Fl. Forest. Chochinch. 33: t. 86A. 1883; Vesque in A.DC., Monogr. Phan. 8: 427. 1893; Gamble, Man. Indian Timb. 55. 1902; Dunn in Gamble, Fl. Madras 1: 74. 1915; Brandis, Indian Trees 53. 1907; Rama Rao, Fl. Pl. Travancore

30. 1914; Engl., Nat. Pflanzenfam. (ed. 2) 21: 226. 1925; Maheshw., Bull. Bot. Surv. India 6: 134. 1964; N.C.Nair & A.N.Henry, Fl. Tamil Nadu, ser. 1, 1: 28. 1983; M.Mohanan, Fl. Quilon Dist. 80. 1984; N.P.Singh in B.D.Sharma & Sanjappa (edn.), Fl. Ind. 3: 129. 1993; Anil Kumar *et al.*, Fl. Pathanamthitta Dist. 62. 1994; Sasidh. & Sivar., Fl. Pl. Thrissur For. 53. 1996; Sasidh., Fl. Periyar Tiger Reserve 26. 1998; Sasidh., Fl. Parambikulam Wildlife Sanctuary 22. 2002; Sasidh., Biodiv. Doc. Kerala Fl. Pl. 6: 42. 2004; Arisdason & P.Daniel in P.Daniel Fl. Kerala 344. 2005; T.S.Nayar *et al.*, Fl. Pl. Western Ghats 1: 277. 2014. *Lectotype* (designated by Maheshwari, 1964): Southern India, without precise locality, 1866, R. Wight 145 (K [K000677600 digital image!]).

Fig. 15g-i

Diocious evergreen trees, up to 15 m tall; exudation deep yellow; branches horizontally spreading; branchlets tetra-angular. Petioles 0.6–0.8 cm long, slender, adaxially ligulate at base; lamina linear-lanceolate, 6–14 × 1.5–3 cm, acute at base, margins entire, attenuated towards tip.; midribs raised above and below, conspicuous on both sides; lateral veins 12–18 pairs per side; exudate canals inconspicuous on both surfaces. Staminate flowers tetramerous, axillary, solitary or 2–3 together, 1–1.2 × 0.8–1 cm, sessile; sepals orbicular, concave, 0.4–0.5 cm wide, margins membranaceous; petals creamy white, obovate, concave, 0.4–0.6 × 0.2–0.35 cm, membranaceous; stamens 12–15, arranged in a tetragonus mass; rudimentary pistil absent. Pistillate flowers tetramerous, axillary, solitary, 0.5–0.7 × 1–1.5 cm, sessile; sepals orbicular, convex, 0.3–0.4 cm wide, margins membranous; petals pinkish white, obovate, 0.4–0.45 × 0.35–0.4 cm; staminodes 12–16, free or 2–3 united, arranged in a ring round the ovary; ovary globose, 0.2–0.3 cm in diam., 4-locular; stigma sessile, large, 4-lobed. Berries sub-globose, 1.2–1.5 × 0.9–1 cm, smooth; stigma and sepals persistent. Seeds 4, oblong-ovoid, 0.7–0.9 × 0.4–0.45 cm.

Vernacular names: *Attukaruka*, *Pulimaranga*, *Kolivala* (Malayalam).

Flowering & fruiting: Flowering from November to February; fruiting from January to February.

Habitat: Usually on stream sides in evergreen forests, up to 700 m elevation.

Distribution: Endemic to Southern Western Ghats of Kerala.

Specimens examined: INDIA, Kerala, Idukki district, Udumanparai, Annamalai hills, 22.11.1901, Barber 4085 (MH); Eranakulam district, Malayatur river bank, Travancore, March 1889, T.F. Bourdillon 58b (MH); Banks of Periyar river, Travancore, 10.12.1895, T.F. Bourdillon 1575 (MH); *Ibid.*, 06.12.1904, *s.coll. s.n.* (TBGT [TBGT02250]); Kottayam district, Mundakayam, December, 1910, A. Meebold 12839 (MH, DD); Pathanamthitta district, Panamkuttu, 22.01.1983, C.N. Mohanan 77940 (MH); Attathode, 20.03.1994, Nazarudeen 19596 (TBGT); Perumthenaruvi, 12.03.2011, S.M. Shareef 70653 (TBGT); Thiruvananthapuram district, JNTBGRI Arboretum cult., P.S. Shameer 79601 (TBGT); *Ibid.*, 18.12.2013, P.S. Shameer 79602 (TBGT).

Conservation status: Endangered (IUCN, 2020).

Garcinia xanthochymus Hook.f., Fl. Brit. Ind. 1. 269. 1874; Kurz, J. Asiat. Soc. Bengal 43: 88. 1874, Forest Fl. Burma 1: 93. 1877; Pierre, Fl. Forest. Cochinch. 3: t. 71A. 1883; King, J. Asiat. Soc. Bengal 59: 168. 1890; Vesque in A.DC., Monogr. Phan. 8: 315. 1893; Woodrow, J. Bombay. Nat. Hist. Soc. 11: 125. 1897; T.Cooke, Fl. Pres. Bomb. 1: 78. 1901; Brandis, Indian Trees 49. 1907; Haines, Bot. Bihar & Orissa 2: 53. 1921; C.E.Parkinson, For. Fl. Andaman Islands 89. 1923; Craib, Fl. Siam. Enum. 1: 118. 1931; Kanjilal *et al.*, Fl. Assam 1: 104. 1934; Burkill, Dict. Econ. Prod. Mal. Penins. 1: 1056. 1935; Gagnep., Fl. Gen. Indo-Chine suppl. 3: 257. 1943; J.Sinclair, Bull. Bot. Soc. Bengal 9: 87. 1955; Mac Millan, Trop. Pl. & Gard (ed. 5) 258. 1956; Maheshw. Bull. Bot. Surv. India 6: 114. 1964; Kosterm., Ceylon J. Sci., Biol. Sci. 12(1): 67. 1976, in Dassan., Hand. Fl. Ceylon 1: 87. 1980; N.R.Ugemuge, Fl. Nagpur Dist. 63. 1986; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. Ind. 3: 129. 1993; M.Mohanan & A.N.Henry, Fl. Thiruvananthapuram Dist. 72. 1994; N.P.Singh *et al.*, Fl. Manipur 1: 144. 2000; Sasidh., Biodiv. Doc. Kerala Fl. Pl. 6: 42. 2004; Li Xiwen & *al.*, Fl. China 13: 41. 2007; T.S.Nayar *et al.*, Fl. Pl. Western Ghats. 1: 277. 2014. *Lectotype* (designated by Maheshwari, 1964): Herb. Martius, Brussels, Circars, W. Roxburgh *s.n.* (BR [BR6102010489135 digital image!]).

Xanthochymus pictorius Roxb., Pl. Cor. 2: 51. t. 196. 1805, Fl. Ind. 2: 633. 1832.

Stalagmitis pictoria G.Don, Gen. Syst. 1: 620. 1831.

Garcinia pictoria (Roxb.) D'Arcy, Ann. Missouri Bot. Gard. 67: 998. 1980, 'pictorius', (*non Garcinia pictoria* Roxb. 1832.), *isonym*.

Xanthochymus tinctorius DC., Prod. 1: 562. 1824; A.C.White & Arn., Prod. 102. 1834; Choisy, Mem. Sos. Phys. Hist. Nat. Geneve 12: 43. 1851; Planch. & Triana, Ann. Sci. Nat., Bot. ser. 4., 14: 304. 1860, *orth. var.*

Garcinia tinctoria W.Wight, Bull. Bur. Pl. Industr. U.S.D.A. 137: 50 1909; Dunn in Gamble, Fl. Madras 1: 741915; Gamble in Kew Bull. 64.1916, *orth. var.* Fig. 15j-l

Dioecious evergreen trees, up to 15 m tall; exudation milky or pale green turning yellow on exposure; branches usually drooping; branchlets tetra-angular. Petioles 1–2.5 cm long, stout, angular, adaxially ligulate at base; lamina linear-oblong or oblong-lanceolate, 12–45 × 4–13 cm, cuneate at base, margins sub-repand and entire, acute-acuminate at apex, coriaceous; midribs conspicuous above and below; lateral veins conspicuous 15–20 pairs per side, raised above and below; exudate canals conspicuous on both surfaces. Staminate flowers pentamerous, 4–10, fascicled axillary or axils of fallen leaves, 2–3 cm across; pedicel *c.* 2.5 cm long, stout; sepals orbicular, concave, 0.8–1 cm wide, fleshy, ciliate on margins; petals pale greenish, orbicular, concave, 0.8–1 cm wide, slightly membranaceous on margins; stamens 3–5 each, in 5 phalanges, glands 5, alternating stamina phalanges; rudimentary pistil absent. Pistillate flowers pentamerous, axillary, 1–10 in axillary fascicles, 2.5–3 cm in diam.; pedicel 2–4 cm long; bracts minute, sub-orbicular, red; bracteoles 2, minute, *c.* 1 cm long; sepals pale greenish, orbicular, concave, 0.4–0.6 × 0.4–0.5 cm, shortly clawed, ciliate on margins; petals pale greenish, orbicular, concave, 0.7–1 cm wide, margins membranaceous; staminodes 5-phalangiata bundles, alternating with 5 fleshy glandular disc; ovary ovoid, 0.2–0.3 cm in diam., 5-locular; style very short; stigma 5-rayed, spreading, entire, peltate. Berries sub-globose, 5–6 cm in diam curved-mamellate, bright yellow on ripening; remnants of stigma persistent. Seeds 1–4, oblong-compressed, 2–3 × 1.2–1.5 cm, embedded in pulpy aril.

Vernacular names: *Raja puli*, *Thamalam* (Malayalam); *Tepol-tenga* (Assamese).

Flowering & fruiting: Flowering and fruiting throughout the year.

Habitat: In moist deciduous to evergreen forests, between 100–1000 m elevation.

Distribution: India, Myanmar to Malaysia and China.

Specimens examined: INDIA, **Andaman and Nicobar Islands**, South Andaman district, Near Mt. Harriet, 05.04.1884, *King* 242 (CAL); South Andaman, *s.d.* *Kurz s.n.* (MH [MH46697]); Near port Blair, 24.07.1884, *King's coll.* 205 (CAL); *s.loc.* 29.06.1914, *s.coll.*, 6224 (MH); Manjerry, 23.08.2003, *K. Karthigeyan* 19576 (PBL); Mt. Harriet, 11.02.2016, *P.S. Shameer* 86612 (TBGT); Rutland, Bada khadi, 20.02.2004, *K. Karthigeyan* 21309 (PBL); North and Middle Andaman district, East Island Wildlife Sanctuary, 10 m, 27.12.2011, *M.Y. Kamble* 30509 (PBL); Entrance Island, 08.11.1990, *P. Lakshminarasimhan* 15206 (PBL); Jharnanala Tikri, Baratang Island, 27 October 1979, *Basu* 7373 (CAL); Interview Island, ± 5 m, 25.04.1964, *K. Ramamurthy* 18946 (PBL); Lamia Bay to Kalipur, 01.04.1977, *N.P. Balakrishnan* 5436, 5444 (PBL); Long Island, 19.10.1990, *G.S. Lakhra* 15524 (PBL); Saddle Peak Range, 28.03.1977, *Balakrishnan* 5198 (PBL); Saddle peak on the way to hill top, 07.09.2002, *R. Sumathi* 18583 (PBL); Interview Island way to west coast, 23.09.2010, *G.S. Lakhra & V.M. Radhakrishnan* 28730 (PBL); Kalpong dam site, 21.02.2016, *P.S. Shameer* 86626 (TBGT). Paget Island Wildlife Sanctuary, 15 m, 14.03.2012, *M.Y. Kamble* 30622 (PBL); Saddle peak foot hills, 20.02.2016, *P.S. Shameer* 86627 (TBGT). **Andhra Pradesh**, Godavari district, Vathangi, 05.02.1916, *s.coll.* 12677 (MH). **Assam**, Kamarup rural district, 31.10.1954, *Deka* 23361 (ASSAM); Upper Assam, *G. Mann* 589 (DD); Lakhimpur district, Digboi, 15.06.1938, *Deka* 17012 (ASSAM);. **Karnataka**, Udipi district, Karkala, South Kanara, 06.04.1970, *Rajagopal Shetty* 3999 (MH); Uttara Kannada district, Karvar, April 1928, *TR. Bell* 3969 (BLAT); Sirsi, 01.04.1886, *W.A. Talbot s.n.* (BSI); Sirsi-Siddhipur, October 1919, *Hallberg & McCann* 34784 (BLAT); Sonda, 06.05.1896, *W.A. Talbot* 3656 (BSI); Yellapur, Saharahalli, 26.05.1954, *H. Santapau* 18741 (BLAT); *Ibid.*, 17.11.1950, *A.R. Baraganza s.n.* (DD). **Kerala**, Thiruvananthapuram district,

Thumpa, VSSC campus (cult.) 07.01.2016, *Teema Joseph* 87099 (TBGT); JNTBGRI orchard (cult.), 21.04.2018, *S.M. Shreef* 79297 (TBGT). **Maharashtra**, Mumbai city district, Victoria Garden, Bombay, January, 1917, *s.coll.* 13815 (BLAT); Malabar Hill, Bombay, April 1917, *s.coll.* 13817 (BLAT). Pune district, College Garden, Pune, 09.06.1902, *L.D. Garade* 377 (BLAT, BSI); Meroli Plateau, Khandala, 10.04.1943, *H. Santapau & MCMcnnan* 1892 (BLAT); **Meghalaya**, East Khasi Hill district, Shillong, 915 m, 20.08.1886, *C.B. Clarke* 44626 (GDC, image!); Khasi, *J.D. Hooker & T. Thomson s.n.* (CAL). **Mizoram**, Mizo district, South Lushai, between Luichong and Demagiri, *A.T. Gage* 205 (CAL). **West Bengal**, Dargling district, Mungpoo, *s.d., Prain's coll. s.n.* (CAL); Kurseong, 31.03.1911, *Rihu & Rhomboo* 4984 (CAL). **Without precise locality**, 1901, *s.coll.* 131 (CAL). BANGLADESH, Chittagong hill tracks, 1875, *J.L. Lister* 238 (CAL); Chittagong Hill Track, 1876, *Lister s.n.* (MH [MH63602]); *J.D. Hooker & Thomson s.n.* (CAL); Kodala hills Chittagong, February 1886, *Badul Khan* 421 (CAL); Barkul, Chittagong, 30.03.1876, *J.L. Lister s.n.* (CAL). MYANMAR: Martaban, *s.coll.* 542 (CAL). SRI LANKA: *s.d., Walther* 128 (CAL).

Uses: Fruit is edible and has a juicy pulp with a pleasant acidic flavor, used for preserving jams and cool drinks. Exudates from the plant parts are used in dyeing. Bark of the tree and latex of unripe fruits are used to make yellow dye. (Maheshwari, 1964; Baruah *et al.*, 2021).

Note: The authority of the species is differently given in floras and databases, either as *G. xanthochymus* Hook.f. or *G. xanthochymus* Hook.f. ex T. Anderson. In the treatment of Guttiferae in *Fl. Brit. Ind.*, J.D. Hooker has given a preface note (Vol. 1. Page 259) that the account of the British India Guttiferae was drawn up by T. Anderson shortly before his death in 1870. But for the reduction of *Xanthochymus* to *Garcinia*, Hooker himself is answerable. In this context, the authors treat *G. xanthochymus* Hook.f. as the correct authority for the species.

Anderson (1874), Dunn (1915), Maheshwari (1964), and Singh (1993) reported *G. xanthochymus* as distributed throughout India. Floristic accounts pertaining to the Western Ghats (Cook, 1901; Nair & Henry, 1983; Saldanha & Ramesh, 1984; Sasidharan, 2004; Nayar *et al.*, 2006, 2014), also

considered it native to their respective areas. But on perusal of specimens in herbaria and through field studies, we found that the species occurring wild only in Northeast India and Andaman and Nicobar Islands. Whatever specimens are confirmed as *G. xanthochymus* from other parts of India are all from cultivated sources, as it is widely grown as a fruit plant throughout the country.

Doubtful species

After perusal of relevant literature and specimens deposited in various herbaria, the authors conclude that some of the species included in earlier Indian floras were based on speculation about geographic distributions or erroneous identification. Such species are treated here as doubtful species in Indian context.

Doubtful species based on geographical distribution

Garcinia merguensis Wight, *lc. t.* 116. 1839, *Illustr.* 1: 124. 1840; Kurz, *J. Asiat. Soc. Bengal* 43: 87. 1874; T. Anderson in *Hook.f., Fl. Brit. Ind.* 1: 267. 1874; *Hook.f., J. Linn. Soc., Bot.* 14: 485. 1875; Pierre, *Fl. Forest. Cochinch.* 6: t. 68, 69, 91D. 1883; King, *J. Asiat. Soc. Bengal* 59: 150. 1890; Vesque in *A.D.C., Monogr. Phan.* 8: 341. 1893; Brandis, *Indian Trees* 50. 1907; Pit. in *Lecomte, Fl. Gen. Indo-Chine* 1: 299. 1907; *Ridl., Fl. Mal. Penins.* 1: 169. 1922; Engl., *Nat. Pflanzenfam.* (ed. 2) 21: 223. 1925; Craib, *Fl. Siam. Enum.* 1: 116. 1931; Burkill, *Dict. Econ. Prod. Mal. Penins.* 1: 1055. 1935; Gagnep., *Fl. Gen. Indo-Chine Suppl.* 3: 258. 1943; Maheshw., *Bull. Bot. Surv. India* 6: 118. 1964; N.P. Singh in *B.D. Sharma & Sanjappa (eds.), Fl. India* 3: 118. 1993. *Discostigma merguense* Planch. & Triana, *Ann. Sci. Nat., Bot. ser. 4.*, 14: 363. 1860. *Lectotype* (designated by Maheshwari, 1964): **Myanmar**, Mergui, 1860, *Griffith* 97 (K [K000677610 digital image!]).

Specimens examined: MALAYAN PENINSULA, Perak, *s.d., Scrotechini* 244 (CAL); *Scrotechinia* 244 (CAL); *Ibid., s.d., L. Wray Jr.* 1075 (CAL); *Ibid., s.d., L. Wray Jr.* 2943 (CAL); Alaxwelli hill, April 1884, *Scrotechini* 494 (CAL); *s.d., Scrotechini* 812 (CAL). CAMBODI, Kamchai, *s.d., Pierre* 19260 (CAL).

Notes: Wight (1839, 1940) described *G. merguensis* without mentioning any specimen, locality or distribution. Anderson (1874) included it in *Flora*

of *British India* with statement 'Eastern Peninsula from Mergui to Malacca', which presently form parts of Myanmar. Maheshwari (1964) gave the locality as Andaman Islands, Sylhet, Burma, Penang, Cambodia, Cochinchina, Thailand, Malacca and Malayan Peninsula, which is again followed by Singh (1993). However, no Floristic accounts of the Andaman and Nicobar Islands contain this species (Parkinson, 1923; Dagar & Singh, 1999; Hajra et al. 1999). We could not find any specimens from the Indian territory, including Andaman and Nicobar Islands in any of the Herbaria, especially PBL. Whatever specimens found at CAL are all from other countries. The authors therefore consider *G. merguensis* to be a species of uncertain occurrence in India until further definite proof of its presence is obtained.

Garcinia brevirostris Scheff. in Tijdschr., Nederl. Ind. 31: 353. 1870, Flora 53: 241. 1870; Pierre, Fl. Forest. Cochinch. 5: t. 91 C. 1883; Vesque in A.D.C., Mon. Phan. 8: 362. 1893; Merr., Enum. Philipp. Pl. 3: 83. 1923; Burkill, Dict. Econ. Prod. Mal. Penins. 1: 1048. 1935; Maheshw., Bull. Bot. Surv. India 6: 120. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 106. 1993. *Garcinia eugeniifolia* Wall. ex T.Anderson in Hook.f., Fl. Brit. Ind. 1: 268. 1874; Pierre, Fl. Forest. Cochinch. 6: t. 91 E, F. 1883; King, J. Asiat. Soc. Bengal 59: 150. 1890; Vesque in A.D.C., Mon. Phan. 8: 343. 1893; Ridl., Fl. Malayan Peninsula. 1: 169. 1922; Whitmore, Tree Fl. Malaya 2: 210. 1973. *Garcinia gitingensis* Elmer, Leaf. Philip. Bot. 3: 1053. 1911. *Lectotype* (designated by Maheshwari 1964): Penang, *s.d.*, Wallich 4873 (CAL).

Hebradendron eugeniifolium Choisy, Mém. Soc. Phys. Genève 12: 419. 1851, *nom. illeg.*

Specimens examined: MALACCA, without exact locality, *s.d.*, Griffith 856 (CAL). MALAY PENINSULA, March 1886, H. Kunster 604 (CAL); Perak, March 1886, King's coll. 8604 (CAL); Perak, Taiping Hill, 17.02.1917, King's coll. 2375 (CAL); Perak, *s.d.*, L. Wray Jr. 461 (CAL); Pulau Penang, 21.03.1923, R.S. Hruthukar 10285 (CAL); Perak, April 1884, King's coll. 5954 (CAL); Perak, *s.d.*, L. Wray Jr. 461 (CAL); Perak, Decruse Huped Jungle, September, 1886, King's coll. 10865 (CAL). MYANMAR, Vectors court District, 19.10.1924, C.B. Smatis 133 (CAL). PHILIPPINES, Jamindan Capiz Province Panay, April–May 1918, M. Ramos

& G. Edano 31099 (CAL); Mt. Salinbong Bong Capiz Province Panay, June 1919, A. Martelino & G. Edano 35618 (CAL); Bucas Grande Island, June 1919, M. Ramos & J. Pascasio 35083 (CAL); Mt. Bulilao Capiz Province Panay, June 1919, A. Martelino & G. Edano 35684 (CAL); Lake Manguao, Palawan, April 1913, E.D. Merrill 9454 (CAL); Magallanes Province of Capiz, Island of Sibuyan, April 1910, Distr. A.D.E. Elmer 12213 (CAL); Island of Luzon, November, 1915, Distr. A.D.E. Elmer 15604 (CAL); SINGAPORE: Chaachu Kang, 1896, H.N. Ridley 6195 (CAL); Chaugi, 1892, H.N. Ridley 4638 (CAL). **Without precise locality**, *s.d.*, J.W. Helfer 202, 279 (CAL).

Notes: Scheffer (1870) described *G. brevirostris* without citing any specimen or locality. Anderson (1874) described *G. eugeniifolia* (= *G. brevirostris*), in *Flora of British India* as distributed in Eastern Peninsula, Malacca and Singapore, all presently not in Indian territory. Maheshwari (1964) indicated Andaman Islands as a home for this species. Further, he also cited two specimens as being from Bengal, 'without exact locality, Helfer 202 (CAL)' and 'Calcutta, Helfer 279 (CAL)'. We examined both the cited specimens, but there is no indication of any locality. Rao (1986) and Singh (1993) followed Maheshwari, and included this species in the Indian flora. Hajra (1999) included it in the *Flora of Andaman and Nicobar Islands*, with a statement that 'inclusion is based only on the basis of Singh and Rao'. But Parkinson (1923) and Dagar and Singh (1999) did not consider this species in their respective floras. The type specimen, as well as all other specimens deposited at CAL, are from the Malayan Peninsula. We could not find any specimens from the Indian territory, including Andaman and Nicobar Islands, in any of the Herbaria, especially PBL. Hence, we consider *G. brevirostris* a doubtful species in the Indian context until further definite proof of its occurrence is obtained.

Doubtful species based on single imperfect specimen

Garcinia jelinckii Kurz ex King, J. Asiat. Soc. Bengal 59: 172. 1890; Vesque in A.D.C., Monogr. Phan. 8: 487. 1893; Maheshw., Bull. Bot. Surv. India 6: 135. 1964; N.P.Singh in B.D.Sharma & Sanjappa (eds.), Fl. India 3: 131. 1993; Dagar & N.T.Singh, Pl. Res. Andaman and Nicobar Isl. Enum. 2: 418. 1999. *Lectotype* (designated by Marinho, 2017): INDIA, **Nicobar Island**, Tillangchong, *s.d.*,

Novara 169 / L. Jelinek 106 (W [W0073376]; *isolecto* CAL [CAL47010!]).

Notes: King (1890) treated this taxon based on a single collection (L. Jelinek 106). Maheshwari commented “a specimen with leaves like a *Garcinia* and detached fruit of a true *Garcinia* (Jelinek 106 Exped. Novara No. 169, Nicobar Island), collected by Dr. Jelinck, has been thus named in Calcutta Herbarium. The material is too imperfect to be dealt with”. Maheshwari (1964) and Singh (1993) included as a doubtful species. Though Parkinson (1923) did not include the species, Dagar and Singh (1999) included it in Andaman Flora. Though a duplicate of the specimen designated as type (Marinho 2017) is located at W (W 0073376 image!), with few leaves and a dried fruit, it is difficult to come to an otherwise conclusion. Hence it is treated here as doubtful species.

Cultivated species

Many *Garcinia* species, being cherished fruit plants, are introduced to countries outside their homeland. Such three species, listed below, are also found cultivated in India.

Garcinia intermedia (Pittier) Hammel, Ann. Missouri Bot. Gard. 76: 927. 1989. *Rheedia intermedia* Pittier, Contr. U.S. Natl. Herb. 13: 454. 1912.

Dioecious, evergreen small trees, up to 5–6 m tall, native to southern Mexico and Central America. Fruits globose, smooth, c. 4 cm in diam., orange to red on ripening, with pulpy aril, is edible. The fruit commonly known as ‘Lemon drop mangosteen’ is primarily consumed fresh, but can also be used to make juices, jams and jellies. Introduced and widely grown throughout tropics.

Specimen examined: Thiruvananthapuram, Jawaharlal Nehru Tropical Botanic Garden, cultivated in the garden, 100 m, 23.01.2015, S.M. Shareef 70677 (TBGT).

Garcinia livingstonei T. Anderson, J. Linn. Soc., Bot 9: 263. 1867; Oliv., Fl. Trop. Africa 1: 165. 1868.

Dioecious evergreen shrubs or bush-like trees, 4–15 m tall, native to a wide range in Tropical Africa from Ivory coast to Somalia and South Africa. Commonly known as African mangosteen, it is a traditional fruit plant throughout its range of distribution. Maheshwari included the plant

based on cultivation in Indian Botanic Gardens. We found a plant growing in the Goa University Garden. Cultivated rarely in some parts of India.

Specimens examined: INDIA, Royal Botanic Garden, Kolkata, Cultivated, 17.04.1902, *s.coll. s.n.* (CAL [CAL46877]); *Ibid.*, *s.d.*, *s.coll. s.n.* (CAL [CAL47266]).

Garcinia mangostana L., Sp. Pl. 443. 1753.

Garcinia mangostana is a dioecious, evergreen tree, that grows up to 20–25 m tall, known only in cultivation and is not found in wild (Richard, 1990). The fruit commonly known as ‘mangosteen’ considered as the most delicious among tropical fruits and is popularly known as the ‘Queen of fruits’ widely cultivated throughout wet tropical areas of Southeast Asian regions.

Specimens examined: Cultivated in INDIA, **Andaman and Nicobar Islands**, South Andaman district, Chiriatapau, Inland forests, 30.05.1974, K. Thothathri & N.G. Nair 1093 (PBL). **Tamil Nadu**, Thenkasi district, Courtallam, November 1901, M. Rama Rao 126 (TBGT). **Kerala**, Kollam district, Rosemala, 16.02.1997, A. Nazarudeen 34103 (TBGT); Pathanamthitta district, Muzhiar, 07.02.1994, A. Nazarudeen 19076 (TBGT); Thiruvananthapuram district, Orchard, JNTBGRI, 10.03.2014, S.M. Shareef 79247 (TBGT); *Ibid.*, 23.03.2016, P.S. Shameer 86632 (TBGT). **MYANMAR**, Mergui, March 1911, A. Meebold 14099 (CAL). **Without precise locality**, *s.d.*, *s.coll.* 5744 (CAL); *Ibid.*, 1822, Wallich 4872 (CAL).

Acknowledgements

The authors are thankful to the Director, JNTBGRI for the support given throughout the study. We wish to thank the Directors and Curators of the Herbaria (ASSAM, BKF, BMC, BSI, BLAT, CAL, CALI, FRC, G, GDC, GUBH, K, KFRI, LBG, MH, MPU, PBL, TBGT and TCD), for permission to consult the herbarium and library and giving consent for using the images for the work. The support given by all the State Forest Departments in India, for conducting field studies in the Forest Reserves and Protected Areas, is thankfully acknowledged. We thank the Kerala State Forest Department and University of Kerala for financial support.

Literature Cited

- ACOSTA C. 1585. *Trattato di Christoforo Acosta Africano medico & chirurgo della historia, natura et virtve delle droghe medicinali., altri semplici rariffimi, che vengono portati dalle Indie Orientali in Europa.* Presso à Francesco Ziletti, Venetia.
- ADAMS C.D. 1970. Miscellaneous additions and revisions to the flowering plants of Jamaica. *Phytologia* 20: 309–314.
- ANDERSON T. 1874. Guttiferae. In: HOOKER J.D. (ed.), *Flora of British India*. Volume 1. L. Reeve & Co., London. pp. 258–278.
- ARISDASON W. & P. DANIEL 2005. Ranunculaceae–Connaraceae. In: DANIEL P. (ed.), *The flora of Kerala*. Volume 1. Botanical Survey of India, Kolkata. pp. 334–347.
- BALGOOY M. & M.J. VAN 1987. Collecting. In: DEVOGEL E.F. (ed.), *Manual of herbarium taxonomy: theory and practice*. Rijksherbarium, Leiden.
- BARUAH S., BARMAN P., BASUMATARY S. & B. BHUYAN 2021. Diversity and ethnobotany of genus *Garcinia* L. (Clusiaceae) in Assam, Eastern Himalaya. *Ethnobotany Research & Applications* 21(33): 1–14. <https://ethnobotanyjournal.org/index.php/era/article/view/2571>
- BURKILL I.H. 1935. *A dictionary of economic products of the Malay Peninsula*. Volume 1. Crown Agents for the Colonies, London.
- CANDOLLE A.P. DE 1824. *Garcinia cowa*. In: CANDOLLE A.P. DE & A. DE CANDOLLE (eds.), *Prodromus systematis naturalis regni vegetabilis*. Volume 1. Sumptibus Sociorum Treuttel et Würtz, Paris. p. 561.
- CHAUHAN A.S. 2000. In: SINGH N.P., CHAUHAN A.S. & A.S. MONDAL (eds.), *Flora of Manipur*. Volume 1. Botanical Survey of India, Kolkata. pp. 141–144.
- COOK T. 1901. *The flora of the Presidency of Bombay*. Taylor & Francis, London.
- COOPER W.E. 2013. A taxonomic revision of *Garcinia* L. (Clusiaceae) in Australia, including four new species from tropical Queensland. *Austrobaileya* 9(1): 1–29.
- DAGAR J.C. & N.T. SINGH 1999. *Plant resources of the Andaman and Nicobar Islands (Enumeration and utilization of vascular plants)*. Volume 2. Bishen Singh Mahendra Pal Singh, Dehradun.
- DUNN S.T. 1915. Guttiferae. In: GAMBLE J.S. (ed.), *Flora of the Presidency of Madras*. Volume 1. Adlard & Sons Ltd., London. pp. 71–75.
- DUTTA B., BORBORAH K., SARMA J. & S.K. BORTHAKUR 2014. *Garcinia nervosa* Miq. a new record from mainland India. *Indian Journal of Plant Sciences* 3(3): 34–36.
- ENGLER A. 1925. Guttiferae. In: A. ENGLER & K.A.E. PRANTL, (eds.), *Die natürlichen Pflanzenfamilien*. Volume 21. Engelmann, Leipzig, pp. 154–237.
- ENGLER A. 1893. Guttiferae. In: ENGLER A. & K.A.E. PRANTL (eds.), *Natürlichen Pflanzenfamilien*. Volume 3. Engelmann, Leipzig. pp. 194–242.
- GARCIA DE ORTA 1563. *Coloquios dos simples, e drogas he cousas medicinais da India*. Por Ioannes de Endem, Goa.
- GARCIN L. 1733. The settling of a new genus of plants, called after the Malayans, Mangostans; By Laurentius Garcin, M.D. and F.R.S. Translated from the French by Mr. Zollman, F.R.S. *Philosophical Transactions* 38: 232–242.
- GRAHAM R. 1836. Remarks on the gamboge tree of Ceylon, and the character of *Hebradendron*, a new genus of Guttiferae, and that to which the tree belongs. *Companion to the Botanical Magazine* 2(19): 193–200.
- HAJRA P.K., VERMA D.M. & G.S. GIRI 1996. *Materials for the flora of Arunachal Pradesh*. Volume 1. Botanical Survey of India, Kolkata.
- HAJRA P.K., RAO P.S.N. & V. MUDGAL 1999. *Flora of Andaman and Nicobar Islands*. Volume 1. Botanical Survey of India, Kolkata.
- HAMMEL B. 1993. In: JARVIS C.E., BARRIE F.R., ALLAN D.M. & J.L. REVEAL (eds.), *A list of Linnaean generic names and their types*. *Regnum Vegetabile*. Volume 127. Koeltz Scientific Books, Germany.
- HEADLAND F.W. 1856. Medicinal plants, from Ranunculaceae to fungi. In: ROYLE J.F. (ed.), *A manual of materia medica and therapeutics*. John Churchill, London. pp. 339–340.
- IUCN 1998. *IUCN Red List Categories and Criteria*. Version 2.3. IUCN, Species Survival Commission, Gland & Cambridge.
- IUCN 2015. *IUCN Red List Categories and Criteria*. Version 3.1. IUCN, Species Survival Commission, Gland & Cambridge.
- IUCN 2018. *IUCN Red List Categories and Criteria*. Version 3.1. IUCN, Species Survival Commission, Gland & Cambridge.

- IUCN 2020. *IUCN Red List Categories and Criteria*. Version 3.1. IUCN, Species Survival Commission, Gland & Cambridge.
- IUCN 2021. *IUCN Red List Categories and Criteria*. Version 3.1. IUCN, Species Survival Commission, Gland & Cambridge.
- JAIN S.K. & R.R. RAO 1977. *A Handbook of Field and Herbarium Methods*. Today and Tomorrow's Printers & Publishers, New Delhi.
- JONES S.W. 1980. *Morphology and major taxonomy of Garcinia (Guttiferae)*. Ph.D. Thesis (Unpublished), University of Leicester, London.
- KANJILAL U.N., KANJILAL P.C. & A. DAS 1934. *Flora of Assam*. Volume 1. Prabasi Press, Calcutta
- KING G. 1890. Materials for a flora of the Malay Peninsula. *Journal of the Asiatic Society of Bengal, Natural Science* 59(2): 113–172.
- KOSTELETSKY V.F. 1834. *Allgemeine Medizinisch-pharmazeutische Flora*. Volume 3. Bei Borrosch und Andre, Prag.
- KOSTERMANS A.J.G.H. 1977. Miscellaneous botanical notes. *Ceylon Journal of Science (Biological Science)* 12(2): 125–138.
- KURZ W.S., 1872. New Burmese plants. *Journal of the Asiatic Society of Bengal* 41: 293–294.
- KURZ W.S., 1874. Contributions towards a knowledge of the Burmese flora. *Journal of the Asiatic Society of Bengal* 43: 39–141.
- KURZ W.S., 1875. Description of new plants from the Nicobar Islands (including a few from the Andaman Islands). *Journal of Botany, British and Foreign* 13: 124.
- KURZ W.S., 1877. Forest Flora of British Burma, Volume 1. Office of the Superintendent of Government Printing. Calcutta. p.91.
- LIM S.H, LEE H.S., LEE C.H. & C.I. CHOI 2021. Pharmacological activity of *Garcinia indica* (Kokum): an updated review. *Pharmaceuticals* 14(12): 1338. <https://doi.org/10.3390/ph14121338>
- LINNAEUS C. 1753. *Species Plantarum*. Volume 1. Laurentius Salvius, Stockholm.
- LINNAEUS C. 1754. *Genera Plantarum*. Edition 5. Laurentius Salvius, Stockholm
- MABBERLEY D.J. 1977. Francis Hamilton's commentaries with particular references to Meliaceae. *Taxon* 26(5/6): 523–540.
- MABBERLEY D.J. 2017. *Mabberley's plant-book: a portable dictionary of plants, their classification and uses*. Cambridge University Press, Cambridge.
- MAHESHWARI J.K. 1964. Taxonomic study of Indian Guttiferae III. The genus *Garcinia* L. *s.l.* *Bulletin of the Botanical Survey of India* 6: 107–135.
- MARINHO L.C. 2017. Types of *Garcinia* L. (Clusiaceae) in the herbarium W (Naturhistorisches Museum Wien). *Annalen des Naturhistorischen Museums in Wien. Serie B, Botanik und Zoologie, Vienna* 119: 173–181.
- MERRILL E.D. 1917. *An interpretation of Rumphius's herbarium Amboinense*. Manila Bureau of Printing, Manila.
- MIQUEL F.A.G. 1864. Observaciones de Clusiaceis. *Annales Musei Botanici Lugduno-Batavi* 1: 208. 157.
- NAIR N.C. & A.N. HENRY 1983. *Flora of Tamil Nadu, India. Series 1. Analysis 1*. Botanical Survey of India. Kolkata.
- NAIR N.G. 1977. Two new records of plants from Car Nicobar Island, India. *Geobios* 4: 211.
- NAYAR T.S., BEEGAM A.R., & M. SIBI 2014. *Flowering plants of the Western Ghats, India*. Volume 1. Tropical Botanic Garden and Research Institute, Thiruvananthapuram.
- NAYAR T.S., BEEGAM A.R., MOHANAN N. & G. RAJKUMAR 2006. *Flowering plants of Kerala - a handbook*. Tropical Botanic Garden and Research Institute, Thiruvananthapuram.
- NAZRE M. 2006. *Taxonomic revision and molecular studies of Garcinia section Garcinia (Guttiferae)*. Ph.D. Thesis (Unpublished). University of Edinburgh.
- NAZRE M. 2010. Historical review and notes on the correct scientific name for Seashore Mangosteen. *Genetic Resources and Crop Evolution* 57: 1249–1259. <https://doi.org/10.1007/s10722-010-9588-y>
- NICOLSON D.H., SURESH C.R. & K.S. MANILAL 1988. *An interpretation of van Rheedee's Hortus Malabaricus*. Koeltz Scientific Books, Germany.
- NGERNSAENG SARUAY C. 2022. Lectotypifications of Three Names in *Garcinia*, Synonymy of *Garcinia pedunculata* and Detailed Descriptions of Three Species in *Garcinia* Section *Brindonia* (Clusiaceae). *Diversity* 14(556): 1–29. <https://doi.org/10.3390/d14070556>
- NIMANTHIKA W.J. & H.S. KATHTHRIARACHCHI 2010. Systematics of genus *Garcinia* L. (Clusiaceae) in Sri Lanka. New insights from vegetative morphology. *Journal of National Science Foundation* 38: 29–44. <https://doi.org/10.4038/JNSFSR.V38I1.1723>
- PALKAR R.S., JANARTHANAM M.K. & S. KRISHNAN 2017. Taxonomic identity and occurrence of *Garcinia*

- spicata* and *G. talbotii* (Clusiaceae) in peninsular India. *Rheedea* 27(2): 143–151. <https://dx.doi.org/10.22244/rheedea.2017.27.2.28>
- PARKINSON C.E. 1923. *A forest flora of Andaman Islands*. Bishen Singh Mahendra Pal Sigh, Dehradun.
- PLANCHON J.E. & J. TRIANA 1860. Mémoires sur la famille des Guttifères. *Annales des Science Naturelles* (Bot.), Series. 14: 226–367.
- PLUMIER C. 1703. *Nova plantarum Americanarum genera. Catalogus Plantarum Americanum*. Joannem Boudot, Paris.
- POWO (2023). *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available at: <http://www.plantsoftheworldonline.org/> (Accessed on 28.09.2023).
- PRASANTH A.R., WILSON K. & V. SUNDARESAN 2019. Typification of three names in *Garcinia* (Clusiaceae). *Rheedea* 29(4): 328–330 <https://dx.doi.org/10.22244/rheedea.2019.29.4.07>.
- RAMAGE C.M., SANDO L., PEACE C.P., CARROLL B.J. & R.A. DREW 2004. Genetic diversity revealed in the apomictic fruit species *Garcinia mangostana* L. (mangosteen). *Euphytica* 136: 1–10. <https://doi.org/10.1023/B:EUPH.0000019456.06040.eb>
- RANJAN V., KUMAR A. & G. KRISHNA 2022. Second-step lectotypification of *Garcinia stipulata* (Clusiaceae) and its recollection from Darjeeling–Sikkim Himalaya, India. *Phytotaxa* 577(1): 118–124. <https://doi.org/10.11646/phytotaxa.577.1.5>
- RAO M.K.V. 1986. A preliminary report on the angiosperms of Andaman and Nicobar Islands. *Journal of Economic and Taxonomic Botany* 8: 107–184.
- RICHARD A.J. 1990. Studies in *Garcinia*, dioecious tropical forest trees: the origin of mangosteen. *Botanical Journal of the Linnean Society* 103: 301–308. <https://doi.org/10.1111/j.1095-8339.1990.tb00191.x>
- ROBSON N.K.B. 1958. New and little known species from the Flora Zambesiaca area. VI. *Boletim da Sociedade Broteriana* 32: 151–173.
- ROGERS S.Z. & P.W. SWEENEY 2007. Two distinctive new species of Malagasy *Garcinia* (Clusiaceae). *Systematic Botany* 32: 772–779. <https://doi.org/10.1600/036364407783390683>
- ROXBURGH W. 1819. *Plants of the Coast of Coromandel*. Volume. 3. W. Bulmer & Co., London.
- ROXBURGH W. 1832. *Polyandria monogynia in Flora Indica, or descriptions of India plants*. W. Thacker & Co., Calcutta.
- RUHFEL B.R., BITTRICH V., BOVE C.P., MATS H.G., GUSTAFSSON M.H.G., PHILBRICK C.T., RUTISHAUSER R., XI Z. & C.C. DAVIS 2011. Phylogeny of the Clusoid clade (Malpighiales): evidence from the plastid and mitochondrial genomes. *American Journal of Botany* 98(2): 306–325. <https://doi.org/10.3732/ajb.1000354>
- RUMPHIUS G.E. 1741. *Herbarium Amboinense, plurimas complectens arbores, frutices, herbas, plantas terrestres & aquaticas, quae in Amboina, et adjacentibus reperuntur insulis, accuratissime descriptas juxta earum formas, cum diversis denominationibus, cultura, usu, ac virtutibus*. Apud Franciscum Changuion, Joannem Catuffe, Hermannum Uytwerf, Amsterdam.
- SABU T., MOHANAN N., KRISHNARAJ M.V., SHAREEF S.M., SHAMEER P.S. & P.E. ROY 2013. *Garcinia pushpangadaniana*, (Clusiaceae) a new species from southern Western Ghats, India. *Phytotaxa* 116(2): 51–56. <http://dx.doi.org/10.11646/phytotaxa.116.2.2>
- SALDANHA C.J. & S.R. RAMESH 1984. *Flora of Karnataka*. Oxford & IBH Publishing Co., New Delhi.
- SARMA J., SHAMEER P.S. & N. MOHANAN 2016. A new species of *Garcinia* (Clusiaceae) from Assam, North East India. *Phytotaxa* 252(1): 73–76. <http://dx.doi.org/10.11646/phytotaxa.252.1.8>
- SASIDHARAN N. 2004. *Biodiversity documentation for Kerala, Part 6: flowering plants*. Kerala Forest Research Institute, Peechi.
- SCHEFFER R.H.C.C. 1870. Observaciones phytogrsphicae. *Natuurkundig tijdschrift voor Nederlandsch Indië* 31: 353.
- SHAMEER P.S. & N. MOHANAN 2019. Lectotypification of three names in *Garcinia* (Garciniaceae). *Rheedea* 29(2): 181–183. <https://dx.doi.org/10.22244/rheedea.2019.29.2.04>
- SHAMEER P.S. & N. MOHANAN 2020. *Garcinia cambogioides*, the correct name for *G. morella* (Clusiaceae), its taxonomy, typification and notes on the status of *G. pictoria*. *Rheedea* 30(4): 463–469. <https://dx.doi.org/10.22244/rheedea.2020.30.4.06>
- SHAMEER P.S., SABU T. & N. MOHANAN 2017. *Garcinia gamblei*, a new species from the southern Western Ghats, India. *Phytotaxa* 297(1): 71–76. <https://doi.org/10.11646/phytotaxa.297.1.7>
- SHAMEER P.S., SABU T. & N. MOHANAN 2021. Taxonomic reinstatement of *Garcinia conicarpa* Wight (Clusiaceae). *Phytotaxa* 490(2): 191–196. <https://doi.org/10.11646/phytotaxa.490.2.5>

- SHAMEER P.S., SARMA J., MOHANAN N. & A. BEEGUM 2021. *Garcinia sibeswarii* (Clusiaceae), a new species from Assam, India. *Phytotaxa* 50 (2): 191–197. <https://doi.org/10.11646/phytotaxa.507.2.7>
- SHAREEF M. & M.V. KRISHNARAJ 2015. Lectotypification of *Garcinia imberti* Bourd. (Clusiaceae). *Taiwania* 60(3): 148–149. <https://doi.org/10.6165/tai.2015.60.148>
- SHARMA B.P.H., HANDIQUE P.J. & H.S. DEVI 2013. A historical and taxonomic overview of *Garcinia* L. and its reproductive ecology. *Folia Malaysiana* 14(1): 63–76.
- SINGH K.P. 2002. Clusiaceae In: SINGH N. P., SINGH K.P & D. K. SINGH (eds.), *Flora of Mizoram*, Volume 1. Botanical Survey of India, Kolkatta.. 208–214.
- SINGH N.P. 1993. Clusiaceae (Guttiferae *nom. alt.*). In: SHARMA B.D. & M. SANJAPPA (eds.), *Flora of India*. Volume 3. Botanical Survey of India, Kolkatta. pp. 86–151.
- SOSEF S.M. & G. DAUBY 2012. Contribution to the taxonomy of *Garcinia* (Clusiaceae) in Africa, including two new species from Gabon and a key to the Lower Guinean species. *PhytoKeys* 17: 41–62. [10.3897/phytokeys.17.3114](https://doi.org/10.3897/phytokeys.17.3114)
- SRIVASTAVA S.K. 1994. *Garcinia dhanikhariensis* (Clusiaceae), a new species from Andaman Islands, India. *Nordic Journal of Botany* 14: 51–53. <https://doi.org/10.1111/j.1756-1051.1994.tb00570.x>
- STEVENS P. 2006. Clusiaceae - Guttiferae. In: KUBITZKI K. (ed.), *The families & genera of vascular plants IX, flowering plants eudicots*. Springer Verlag, Berlin. pp. 48–66.
- SWEENEY P.W. 2008. Phylogeny and floral diversity in the genus *Garcinia* (Clusiaceae) and relatives. *International Journal of Plant Science* 169: 1288–1303. [1058-5893/2008/16909-0014\\$15.00](https://doi.org/10.1058-5893/2008/16909-0014$15.00)
- SWEENEY P.W. & Z.S. ROGERS 2008. Nomenclatural notes on *Garcinia* (Clusiaceae) from Madagascar and the Comoros. *Novon* 18: 524–537.
- THWAITES G.H.K. 1858. *Enumeratio plantarum Zeylaniae: An enumeration of Ceylon plants, with descriptions of the new and little known genera and species, observations on their habitats, uses, native names*. Dulau & Co., London.
- TURLAND N.J., WIERSEMA J.H., BARRIE F.R., GREUTER W., HAWKSWORTH D.L., HERENDEEN P.S., KNAPP S., KUSBER W.H., LI D.Z., MARHOLD K., MAY T.W., MCNEILL J., MONRO A.M., PRADO J., PRICE M.J. & G.F. SMITH (eds.) 2018. *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. *Regnum Vegetabile* 159. Koeltz Botanical Books, Glashütten. <https://doi.org/10.12705/Code.2018>
- RHEEDE VAN H.A. 1678. *Hortus Indicus Malabaricus*. Volume 1. Sumptibus Johannis van Someren, et Joannis van Dyck, Amsterdam.
- VESQUE J. 1893. Guttiferae. In: CANDOLLE C. DE (ed.), *Monographiae Phanerogamarum: Prodromi nunc continuato nunc revisio auctoribus Alphonso et Casimir de Candolle Aliisque Botanicis ultra memoratis*. Volume 8. Masson S.G., Paris. pp. 1–669.
- WHITMORE T.C. 1973. Guttiferae. In: WHITMORE T.C. (ed.), *Tree flora of Malaya, a manual for foresters*. Volume 2. Longman, London. pp. 196–225.
- WIGHT R. 1839. *Icones Plantarum Indiae Orientalis*. Part (6). J.B. Pharoah, Madras.
- WIGHT R. 1840. *Illustrations of Indian Botany*. Volume 1, J.B. Pharoah, Madras. pp. 124–126.