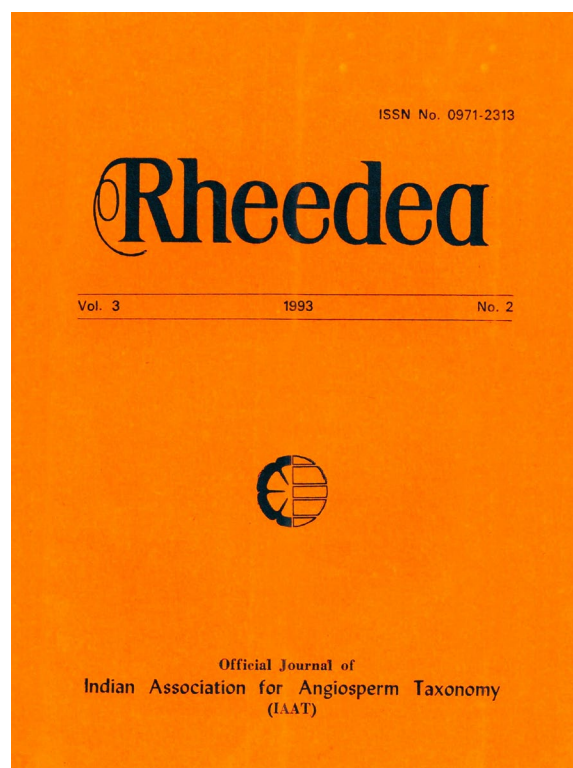




A taxonomic revision of the South Indian species of *Curcuma* Linn. (Zingiberaceae)

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A taxonomic revision of the South Indian species of *Curcuma* Linn. (Zingiberaceae)

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Abstract

The genus *Curcuma* Linn. in South India is revised. There are, in all, 17 species falling under two viz. subgenera, subgen. *Eucurcuma* Schum. and subgen. *Hitcheniopsis* (Baker) Schum. The latter, characterised by unspurred anther lobes, is represented by a single species, *C. ecalcarata*. Artificial keys for the identification of the taxa, their descriptions, illustrations and other relevant notes are provided here. A new species, *C. haritha* is also described.

INTRODUCTION

The genus *Curcuma* Linn., with around fifty species, distributed in tropical and subtropical Asia, belongs to the tribe *Hedychieae* (see, Smith 1981) and consists of a rather homogenous group of rhizomatous perennials. The name originates from the Arabic word 'kurcum', meaning yellow which probably refers to the colour of the rhizome or the flowers. The genus is easily recognised by its inflorescence, a spike with prominent spiral bracts which laterally fuse and form pouches, each subtending a cincinnus of flowers, and a cluster of, often coloured, sterile, terminal bracts forming what is called 'coma'.

The genus, however, is a taxonomically difficult one. It is a nightmare for plant hunters, herbarium technicians as well as taxonomists. Their occurrence as undergrowths in remote inaccessible forest areas and the extremely short period of flowering (mostly soon after the first rains) hinders collection of materials with adequate character details. With their large size, fleshiness, rhizomes, tubers etc., they are difficult materials for herbarium preparation. Consequently, most herbarium specimens are fragmentary and the treatment in most of the Floras, based as they are on these dried specimens, are truncated accounts. For field characters and diagnostic features of rhizomes, tubers etc. one has to depend upon the cursory notes prepared by earlier collectors, which

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 ctions, depending on lateral or central spikes while Horaninov (1862)
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 riably terminal) and *Amphiantha* (spikes both terminal and lateral).
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 enus in its spurless anthers. Schumann (1904) rejected the sectional
 based on spike position but recognised two subgenera [subgen.
 and subgen. *Hitcheniopsis* (Baker) Schum] based on the presence or
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 orted 8 species. But, that this is a gross underestimate has been
 the subsequent addition of nine more species, bringing the total
 S. W. Indian species to 17, of which 7 taxa (*C. coriacea*, *C. ecalcarata*,
C. kudagensis, *C. neilgherrensis*, *C. raktakanta*, *C. vamana* and
 a var. *lutea*) are endemic to this region. There is, still, a lot confusion
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 our collections besides those available in other herbaria of S. India.

would be wanting in many details. To make the matters worse, the flowers are evanescent and even flowering specimens in the herbaria cannot be of much help to a critical taxonomist.

Despite these, earlier taxonomists have made the best out of a bad case, even though some of their ideas cannot be upheld now. Many of them have attempted subgeneric classification of this genus. Roxburgh (1820) divided it into two sections, depending on lateral or central spikes while Horaninov (1862) distinguished 3 sections namely, *Exantha* (spikes always lateral), *Mesantha* (spikes invariably terminal) and *Amphiantha* (spikes both terminal and lateral). Baker (1890) accepted sects. *Exantha* and *Mesantha* while rejecting sect. *Amphiantha* and introduced a new section *Hitcheniopsis*, which differed from the rest of the genus in its spurless anthers. Schumann (1904) rejected the sectional classification based on spike position but recognised two subgenera [subgen. *Eucurcuma* and subgen. *Hitcheniopsis* (Baker) Schum.] based on the presence or absence of spur on anthers.

However, authors of most Floras have continued to rely upon questionable characters like position of spikes, presence or absence of root-tubers and the colour of the coma for the identification of species in the genus and consequently the genus is badly in need of a revision (Larsen & Smith, 1978). But Roxburgh (1810) had already pointed out that the positional difference of spikes is a matter of flowering season, the early spikes being lateral and later ones terminal. Subsequently, this has been corroborated by Santapau (1945, 1952) in the case of *C. pseudomontana*, who also demonstrated that the colour of the coma is variable within the species, and hence unreliable for species delimitation. Protracted studies on wild and cultivated materials in South India corroborate this (see also, Mangaly & Sabu, 1987).

In India, except for a few ubiquitous species, the genus is mainly concentrated in the South West and North East India, and has not been revised since Baker (1890) who reported 29 species. From S. W. India, Fischer (1928) reported 8 species. But, that this is a gross underestimate has been proved by the subsequent addition of nine more species, bringing the total number of S. W. Indian species to 17, of which 7 taxa (*C. coriacea*, *C. ealcarata*, *C. haritha*, *C. kudagensis*, *C. neilgherrensis*, *C. raktakanta*, *C. vama* and *C. oligantha* var. *lutea*) are endemic to this region. There is, still, a lot of confusion prevailing in the species delimitation of South Indian materials and it is in this backdrop, that we chose to revise the genus in this area.

During this work, we have intensively explored the area of study for about a decade and detailed field notes were carefully made. The collected specimens were dissected, studied and illustrated in the laboratory. Simultaneously, planting materials were also collected for cultivation for further observation. The paper is based on our collections besides those available in other herbaria of S. India.

In the ensuing systematic treatment, we have not dealt with the sub-generic classification, primarily because, there is only one species for the subgen. *Hitcheniopsis*, in the area. Instead, we have given an artificial key for all the 17 species, their correct nomenclature, complete description along with illustrations and other notes which would be of interest to taxonomists.

SYSTEMATIC TREATMENT

Curcuma Linn.

Linn., Sp. Pl. 2. 1753 & Gen. Pl. ed. 5. 3: 1754; Roxb., Asiat. Res. 11: 338. 1810; & Fl. Indica 1: 20. 1820; Benth. in Benth. & Hook. f., Gen. Pl. 3: 643; 1883; Baker in Hook. f., Fl. Brit. India 6: 209. 1890; Trim., Handb. Fl. Ceylon 4: 240. 1898; Schum. in Engler, Pflanzenr. 4 (46): 99. 1904.

Rhizomatous herbs, with or without sessile tubers; roots many, often bearing root tubers. Leafy shoot 20–180 cm., leaf sheaths ligulate. Leaves 3–9, distichous, petiolate, lamina ovate elliptic to oblanceolate, tip acute to acuminate, base cuneate or cordate. Inflorescence lateral, central or both lateral and central on same plant, with or without a distinct coma. Coma bracts large spreading. Fertile bracts few to many, each jointed to the adjacent ones or to the main axis for about 1/3 or 1/2 of its length, the basal parts thus forming a pouch, the free ends more or less spreading, each bract subtending a cincinnus of 22–10 bracteolate flowers. Calyx short, truncate, tip shortly 3-lobed. Corolla tube funnel-shaped; lobes unequal; dorsal lobe hooded; lateral lobes linear-elliptic, tip rounded. Labellum shortly 3-lobed, middle lobe split shortly. Lateral staminodes linear, tip rounded. Filament of the fertile stamen constricted at the tip; anther versatile; thecae parallel, spurred or not. connective sometime produced into a crest. Ovary trilocular, ovules many on parietal placenta. Epigynous glands 2, sometimes absent. Fruit ellipsoid, thin walled, dehiscent and liberating the seeds into the mucilage in the bract pouch. Seeds many, arillate; aril white, lacerate.

Distribution: About 45–50 species; chiefly in S. E. Asia. In India about 25 species distributed in almost all states; many are cultivated and naturalized, but the main centre of distribution is South West and North East India.

Ecology: As undergrowth in tropical and sub-tropical forests margins of forests, open grass lands secondary forests and plantations. Several species are found growing in plains, in coconut and arecanut groves.

Flowering: April-May (lateral); July-September (central).

Fruiting: May-June; August-November.

Key to species

1. Anther lobes not spurred.....**C. ealcarata**
1. Anther lobes spurred.....2
2. Plants small; pseudostem 5—15 cm tall.....3
2. Plants large; pseudostem more than 30 cm tall.....9
3. Inflorescence without coma.....4
3. Inflorescence with coma.....5
4. Rhizome yellow; flowers longer than bracts, 5—6.3 cm long, calyx upto 1.75cm long, corolla tube 3—4 cm.....**C. oligantha**
4. Rhizome orange; flowers shorter than bracts, upto 2 cm long, calyx 4 mm long, corolla tube 8 mm.....**C. vamana**
5. Root tubers cylindrical, 10—18 cm long, leaves coriaceous, densely pubescent on both sides.....**C. coriacea**
5. Root tubers small, spherical, ovoid or oblong; leaves not coriaceous, glabrous or sparsely pubescent.....6
6. Flowers never exceeding bracts7
6. Flowers longer than bracts8
7. Leaves broadly ovate, subcordate at base, fertile bracts recurved, lip purple towards base.....**C. decipiens**
7. Leaves elliptic, base oblique, fertile bracts not recurved, lip deep purple with a bright yellow band**C. inodora**
8. Leaves c. 30 cm long; labellum bright yellow, anther 7 mm long**C. kudagensis**
8. Leaves 12—18 cm long; labellum yellow with a deep yellow median band anther 5 mm long.....**C. neilgherrensis**
9. Leaves with a purple patch along the midrib.....10
9. Leaves without a purple patch along the midrib.....11
10. Rhizome blue within; leaves with a purple patch on the distal half on the upper side only.....**C. caesia**
10. Rhizome yellow to deep yellow within; leaves with purple patch on both sides along the whole length of the midrib...**C. zedoaria**
11. Lateral staminodes with a patch of glandular hairs at centre.....12
11. Lateral staminodes without glandular hairs.....13
12. Pseudostem reddish purple; leaves spreading, oblong lanceolate, puberulent below.....**C. raktakanta**
12. Pseudostem green with a few light pink dots; leaves erect, semiplicate, ovate-elliptic; densely pubescent on the lower surface.....**C. haritha**
13. Rhizome with the smell of green mango.....**C. amada**
13. Rhizome without smell of green mango.....14

14. Rhizome with sessile tubers.....15
 14. Rhizome without sessile tubers.....**C. pseudomontana**
 15. Rhizome deep orange-yellow within; lip light yellow
 with a median dark yellow band.....**C. longa**
 15. Rhizome yellow or light orange yellow within; lip deep
 yellow.....16
 16. Rhizome light orange yellow within; corolla white; calyx
 8 mm long.....**C. montana**
 16. Rhizome yellow within; corolla pinkish white; calyx 2 cm
 long.....**C. aromatica**

Curcuma amada Roxb., *Asiat. Res.* 11: 341. 1810 & *Fl. Ind.* 1: 33. 1820; Grah., *Cat. Pl. Bombay* 209. 1839; Dalz. & Gibs., *Bombay Fl.* 275. 1861; Baker in Hook. f., *Fl. Brit. India* 6: 213. 1890; Schum. in Engler, *Pflanzenr.* 4 (46): 108. 1904; Cooke, *Fl. Pres. Bombay* 2: 731. 1907; Fischer in Gamble, *Fl. Pres. Madras* 8: 1483. 1928; Ramach. & Nair, *Fl. Cannanore* 467. 1988.

Iconotype: Roxburgh, *lc. t.* 1760 (CAL).

Etymology: The specific epithet *amada* is derived from Bengali, meaning "mango ginger" referring to the characteristic taste of the rhizome, resembling that of unripe mango.

Vernacular names: Kan. *Mavenkai Shunti*; Mal. *Manga inchi*; Tel. *Mamidiallam*.
 (Fig. 1k)

Rhizome large, 4–53 × 4 cm, light yellow inside, white towards the periphery, with the smell of green mango; sessile tubers thick, 5–10 × 2–3 cm, cylindrical or ellipsoid, branched, horizontal. Roots fleshy, root tubers absent. Pseudostem 30–35 cm tall. Leaves 4–6; petiole 5–10 cm long; lamina of lower-leaves much smaller, c. 18 × 8 cm, upper larger, 45–60 × 14–15 cm, oblong-lanceolate, acuminate, base equal, closely pinnately veined, lower surface puberulous, upper glabrous, tip hairy. Inflorescence lateral or central; peduncle 20–22 cm long, covered by 5–6 sheaths; spike 12–18 cm long. Coma bracts 5–8, c. 6 × 2.5 cm, fused only at the base, spreading, light violet. Fertile bracts 15–18, c. 4 × 3.5 cm, orbicular-obtuse, slightly recurved, lower 2/3 fused to form a pouch, green. Bracteoles small. Flowers large, c. 5 cm long, 4–5 in each bract, longer than the bracts. Calyx truncate, 1 cm long, deeply cleft on one side, 3-lobed at the tip, minutely pubescent. Corolla tube funnel-shaped, 3 cm long, pale yellow, minutely pubescent; lobes unequal, white; dorsal lobe larger, 1.5 × 1.2 cm, hooded at the apex; laterals c. 1.4 × 1 cm long, tip rounded, glabrous. Labellum somewhat elliptic, c. 1.8 × 1.5 cm, 3-lobed, midlobe emarginate, recurved, pale yellow with a median dark yellow band, glabrous. Lateral staminodes c. 1.5 × 0.9 cm, apex slightly incurved, glabrous, pale yellow. Stamen white, thecae parallel, 4 mm long, basal spur 1 mm long, slightly

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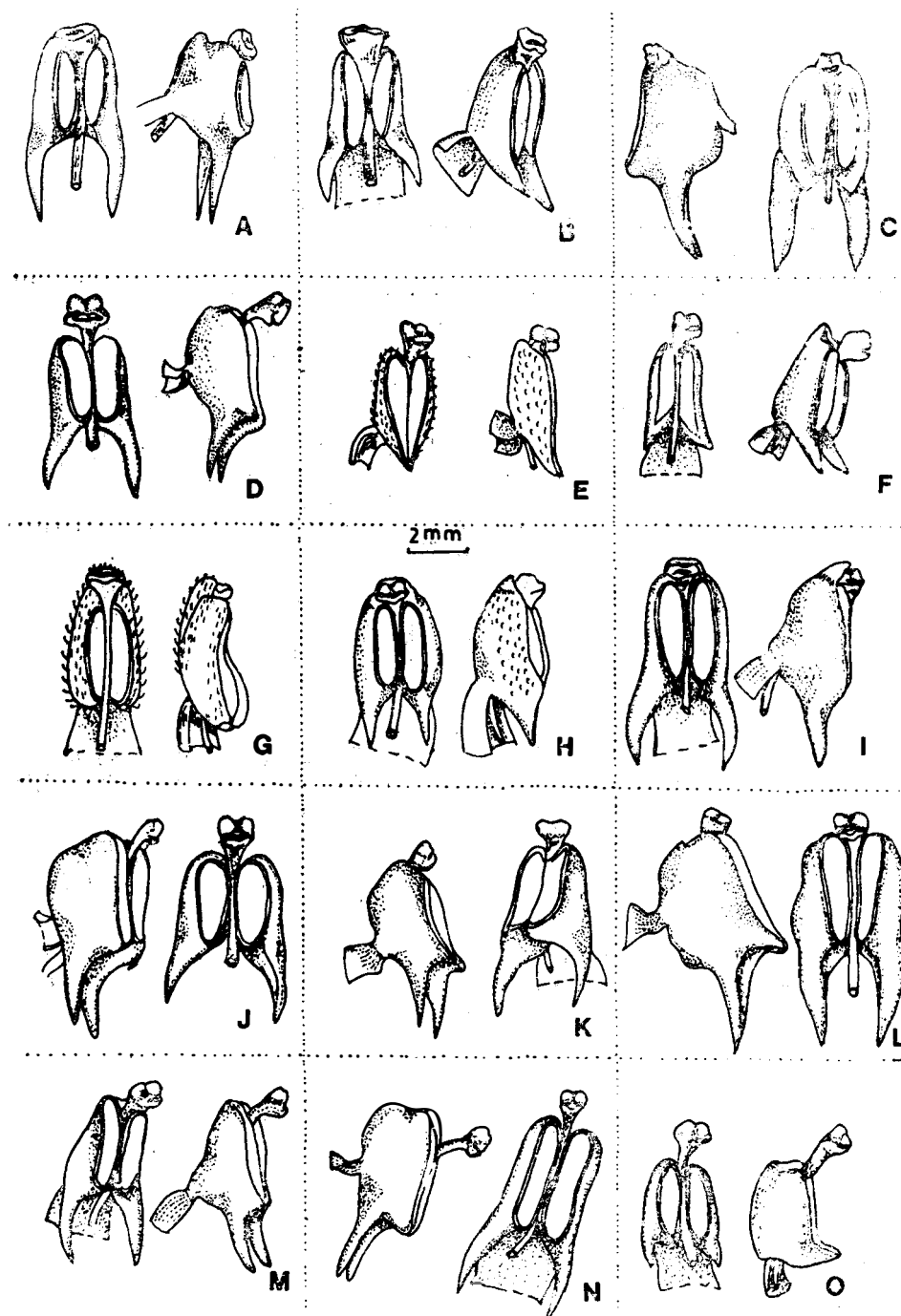


Fig. 1. Anthers in *Curcuma* spp. - Lateral and front views: A, *C. zedoaria*; B, *C. coriacea*; C, *C. montana*; D, *C. caesia*; E, *C. vama*; F, *C. pseudomontana*; G, *C. ecalcarata*; H, *C. neilgherrensis*; I, *C. oligantha* var. *lutea*; J, *C. raktakanta*; K, *C. amada*; L, *C. longa*; M, *C. inodora*; N, *C. haritha*; O, *C. decipiens*.

convergent, glabrous. Epigynous glands two, linear, 6 mm long, tip acute. Ovary trigonous, 3 mm long, tricarpeal, syncarpous with many ovules, densely hairy. Style long, filiform; stigma closely appressed within the anther lobes. Fruit setting not seen.

Cytology: $2n=42$ (Raghavan & Venkatasubban, 1943; Chakravorti, 1948; Sharma & Bhattacharyya, 1959; Ramachandran, 1969).

Distribution: Native of Begnal. It is now widely cultivated throughout India.

Flowering: June-August.

Note: Closely related to *C. longa*, this can easily be distinguished by the characteristic smell and pale yellow colour of the rhizome, pale yellow flowers and light violet coma. This species displays some degree of variability in leaf pubescence. Unlike the type specimen from Bengal, the South Indian materials have lateral spikes.

Uses: The tubers are regarded as cooling and as useful in prurigo. Tubers, made into a paste with spirit and egg-white is applied for chronic rheumatism and bruises. Roots are expectorant and astringent, useful in diarrhoea and gleet. Tubers are also used as condiment and vegetable (Watt, 1972).

Specimens examined: ANDHRA PRADESH: Visakapatnam Dt.: Anakapalli, *Anonymous* 14157 (MA); Arakuvally, *Balakrishnan* 627 (CAL). KARNATAKA: S. Kanara Dt.: Udupi, *Bhat* 1943 (PPCH). KERALA: Kozhikode Dt.: Olavanna, *Sabu* 39105 (CALI). Kannur Dt.: Thottada, *Sabu* 37311 (CALI); Aralam, *Ramachandran* 61523 (MH); Kannothe, *Ramachandran* 57530 (MH). Kottayam Dt.: Palai, *Mangaly* 10264 (CALI). Malappuram Dt.: Calicut Univ. Bot. Gard, *Sabu* 37313 (CALI); C. U. Campus, *Mangaly* 17567 (CALI); Manjeri, *Ellis* 35371 (MH). Wynad Dt.: Mananthavady, *Sabu* 39154 (CALI), TAMIL NADU: Madurai Dt.: Kumili, *Shetty* 13293 (MH).

Curcuma aromatica Salisb., *Parad.* London t 96. 1805; Wight, *Icon. Pl. Ind. Or.* 6: t. 2005. 1853; Baker in Hook. f., *Fl. Brit. India* 6: 210. 1890; Trimen, *Handb. Fl. Ceylon* 4: 241. 1898; Schum. in Engler, *Pflanzenr.* 4(46): 111. 1904; Cooke, *Fl. Pres. Bombay* 2: 730. 1907; Fischer, *Rec. Bot. Surv. India* 9: 177. 1921 & in Gamble, *Fl. Pres. Madras* 8: 1483. 1928; Rao & Verma, *Bull. Bot. Surv. India* 14: 122. 1972; Mani. & Sivar., *Fl. Calicut* 286. 1982, Burt & Smith in Dassan., *Rev. Handb. Fl. Ceylon* 4: 503. 1983; Mani., *Fl. Silent Valley* 311. 1988.

Curcuma zedoaria auct. non (Christm) Rosc.; Roxb., *Asiat. Res.* 11: 333. 1810 & *Fl. Indi.* 1: 23. 1820; Dalz. & Gibs., *Bombay Fl.* 274. 1861.

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Iconotype: Roxburgh, Ic. t. 1010 (CAL).

Vernacular name: Kan. *Kasturi arishina*; Mal. *Kattu-manjal*.

Rhizome large, 3—5 × 3—4 cm, yellow within, aromatic; sessile tubers many, yellow. Leafy shoot 1 m or more. Leaves distichous, 5—7; petiole often as long as the lamina; lamina 40—70 × 10—14 cm, broadly lanceolate, acuminate, densely pubescent below. Inflorescence 15—30 × 9 cm lateral; peduncle 5—8 cm long covered by sheaths. Coma bracts large, spreading, pink. Fertile bracts upto 6 cm long, tips recurved, pale greenish-white, slightly hairy on upper surface. Bracteoles c. 2 cm long, white, sparsely pubescent. Calyx 2 cm long, tip 3-lobed, sparsely pubescent. Corolla tube just exceeding the calyx, funnel-shaped, lobes unequal, pinkish-white; dorsal lobe broadly ovate; arching over the anther, hooded; lateral lobes narrower, oblong. Labellum orbicular, obscurely 3-lobed, deep yellow. Lateral staminodes oblong, obtuse, as long as the corolla lobes. Anther thecae parallel, each ending in a long, sharp spur at base. Style long, filiform; stigma 2-lobed with a perforation in the centre.

Cytology: $2n = 42, 63$ (Raghavan & Vengatasubban, 1943; Chakravorti, 1948; Ramachandran, 1969).

Distribution: Occurs in India, China and Sri Lanka. It is widely cultivated in South India for its rhizome.

Flowering: May-June.

Uses: The rhizomes are used medicinally, being regarded as tonic and carminative. It is used externally for scabies and the eruption of small pox. It is made into a paste with benzoin and is applied to the forehead for headache. When applied externally to the skin, it gives a peculiar lively tinge to the naturally dark complexion and a delicious fragrance (Watt, 1972).

Specimens examined: ANDHRA PRADESH: Godavari Dt.: Choodavaram, *Ramaswami* 1475 (CAL). KARNATAKA: N. Kanara Dt.: Karwar, *Bhatt* 1916 (PPCH); without loc., *Sedgwick* 2490 (BLAT); S. Kanara Dt.: Sampagi, *Barber* 2237 (MH). KERALA: Kasarakode Dt.: Nileswar, *Nair* 73856 (MH); Kollam Dt.: Pathanapuram, *Bourdillon* 1243 (UCH). Palakkad Dt.: Parambikulam *Sebastine* 14501 (CAL); Karanir, *Fischer* 3355 (CAL); Anamalais, *Barber* 5784 (MH). Aruvampara, *Nair* 67290 (MH). Pathanamthitta Dt.: Ranni, *Mohanan* 61212 (MH). Thrissur Dt.: NBPGR Campus, *Velayudhan* TCR 227 (NBPGR). Wynad Dt.: Chandandanathode, *Ellis* 27113 (MH). Travancore, *Calder & Ramaswami* 1495 (CAL). TAMIL NADU: Coimbatore Dt.: Kurudimalai, *Viswanathan* 742 (MH); Unithikulam pass, *Fischer* 1928 (CAL & FRC). Ramanad Dt.: Sethur forest, *Vajrvelu* 38579 (MH); Tirunelveli Dt.: Mudaliarattu, *Anonymous* 15011 (MH); Naterickal, *Hooper & Ramaswami* 38561 (CAL).

Curcuma caesia Roxb., Asiat. Res. 11: 334. 1810 & Fl. Indica 1: 26. 1820; Rosc., Monandr. Pl. t. 106. 1828; Salisb., Trans. Hort. Soc. 1: 285. 1812; Horan., Monogr. 22. 1862; Baker in Hook. f., Fl. Brit. India 6: 212. 1890; Schum. In Engler, Pflanzenr. 4 (46): 112. 1904; Prain, Bengal Pl. 2: 1042. 1908; Sabu & Mangaly, Indian J. For. Addl. Ser. 1: 15. 1990.

Iconotype: Roxburgh Ic. t. 1923 (CAL).

Curcuma malabarica Velay., Amal. & Murali., J. Econ. Tax. Bot. 14: 189. 1990.

Type: Kerala, Pavaratty, Velayudhan AV158 (MH).

(Fig. 1D)

Rhizome large, 5–6 × 9–10 cm, blue in the centre, verging towards grey, the blue colour is highly variable, depending on the nature of the soil and age of the rhizome, strongly aromatic; sessile tubers branched, condensed; roots fleshy; root tubers many, ovate-oblong, pale, watery-pearl colour. Plants large, 70–100 cm tall, pseudostem 30–35 cm tall, sheaths green. Leaves distichous, 79–100 cm; petiole as long as lamina; lamina 30–40 × 10–12 cm, oblong-lanceolate, tip acute, base acuminate, glabrous purple or reddish-brown patch along the sides on the distal half of the mid rib on upper side only, fading at maturity, groove of the midrib green. Inflorescence lateral, 25–30 cm peduncle 12–18 cm; spike 12–15 × 5 cm; coma bracts large, pink to violet, lower ones streaked green. Fertile bracts 18–20, 4.5–5 × 4.4–5 cm lower half fused, tip rounded, green with a pink tip. Each bract subtends a cincinnus of 8–10 flowers. Bracteoles large, 3.5 × 2.5 cm, white with a median light green patch. Flowers 4.5–5 cm equal to or slightly shorter than the bracts. Calyx 1 cm, truncate, 3-lobed at apex, split on one side. Corolla tube 3–3.3 cm long, pink, lobes unequal; dorsal lobes 1.5 × 1.2 cm, concave, hooded; lateral lobes 1.5 × 1. cm, tip rounded, pink. Labelium 1.5–1.7 × 1.8 cm tip emarginate, yellow with a deep yellow median band. Lateral staminodes 1.5 × 1 cm, yellow. Anther 7 mm, without crest, spurred at base, spurs 3 mm long, divergent. Epigynous glands two, 5 mm long, linear, yellowish green. Ovary 5 mm, trilobular, with many ovules. Style long, filiform; stigma bilipped, slightly exerted above the anther lobes. Fruiting not common.

Distribution: So far known only from the Coromandel coast of India in W. Bengal and Bihar (Chotanagpur) only, the present collection forms the first record of its occurrence in South India (Sabu & Mangaly, 1989).

Ecology: It is very common throughout the coastal areas and riverine alluvial soils extending upto midlands in Kerala and S. Karnataka. During monsoon it is a common undergrowth in coconut and arecanut groves and also as a weed in waste lands in association with *C. raktakanta* and *C. haritha*.

Flowering: April - May (Just after first pre-monsoon showers).

Specimens examined; KARNATAKA: S. Kanara Dt.: Mangalore, *Sabu* 39131 (CALI); Uduppi, *Sabu* 39130 (CALI). KERALA: Calicut Dt.: Nallalam, *Sabu* 10360 (CALI); Ernakulam Dt.: *Mangaly* 6668, 10352 (CALI); Thrissur Dt.: Chalakkudy, *Indira & Mangaly*, 17540 (CALI); Kannur Dt.: Kizhuthalli, *Sabu* 37383 (CALI); Malappuram Dt.: Parappanangadi, *Mangaly* 17541 (CALI); Wynad Dt.: Mananthody, *Sabu* 39153 (CALI).

Curcuma coriacea Mangaly & Sabu, Notes Roy. Bot. Gard. Edinburgh 45: 429. 1989.

Type: Kerala, Idukki Dt., Painavu, 700 m, *Mangaly & Sabu* 10337 (MH).

(Fig. 1C)

Rhizome small, 2–4 × 1–2 cm, cylindrical to conical, non-aromatic, white inside; sessile tubers absent; roots many, fleshy; root tubers long, 10–18 cm, cylindrical, fleshy, white inside. Leafy shoot 30–45 cm, tall; pseudostem 10–15 cm tall, green or with violet tinge. Leaves distichous, straight; petiolate, petiole 10–20 cm long; lamina 27–35 × 10–15 cm, elliptic, coriaceous, partially folded along the midrib (plicate), margin hyaline base acute, tip acute to acuminate, alternate veins prominent, densely pubescent on both surfaces; ligule not prominent. Inflorescence lateral; peduncle 5–10 cm long; spike 5–10 cm with a distinct coma. Coma bracts deep pink to violet. Fertile bracts 5–6 × 2.5–3 cm, ovate-acute, slightly recurved, fused about half way from the base, light green with light pink in the middle extending towards the tip. Bracteoles 1.2–1.5 cm long. Flowers 6 cm long, as long as or slightly longer than the bracts, yellow, 3–5 in each bract. Calyx tubular, 1.3 cm long, tip 3-lobed, deeply split on one side, pubescent. Corolla tube funnel-shaped, lobes unequal; dorsal lobe broader, concave, hooded at tip, bright yellow; lateral lobes linear. Labellum 2 × 2 cm, tip deeply split, lobes rounded, deep yellow. Lateral staminodes ovate-oblong, tip rounded, bright yellow. Anther thecae 4 mm long, with a small crest, spurred at base, spurs divergent, pointing forward. Epigynous glands two, 3 mm long. Ovary 2.5–3 × 2.5 mm, trilobular with many ovules, pubescent. Style long, filiform; stigma faintly 4-lobed, bilipped. Fruit 1.2 × 0.7 cm, ovoid, slightly trigonal, pubescent. Seeds 3 × 2.5 mm, ovoid or ellipsoid with a basal constriction, smooth; aril lacerate, white.

Distribution: Endemic to Kerala. Known only from Idukki, Palakkad and Pathanamthitta Districts (Mangaly & Sabu, 1989).

Ecology: It grows in open grass lands at higher elevations, and also along the margins of secondary forests.

Flowering: April - June. *Fruiting*: May - August.

Notes: This species is similar to *C. plicata* Wall., but is distinct in having coriaceous, dense pubescent leaves, lateral inflorescence and bright yellow corolla.

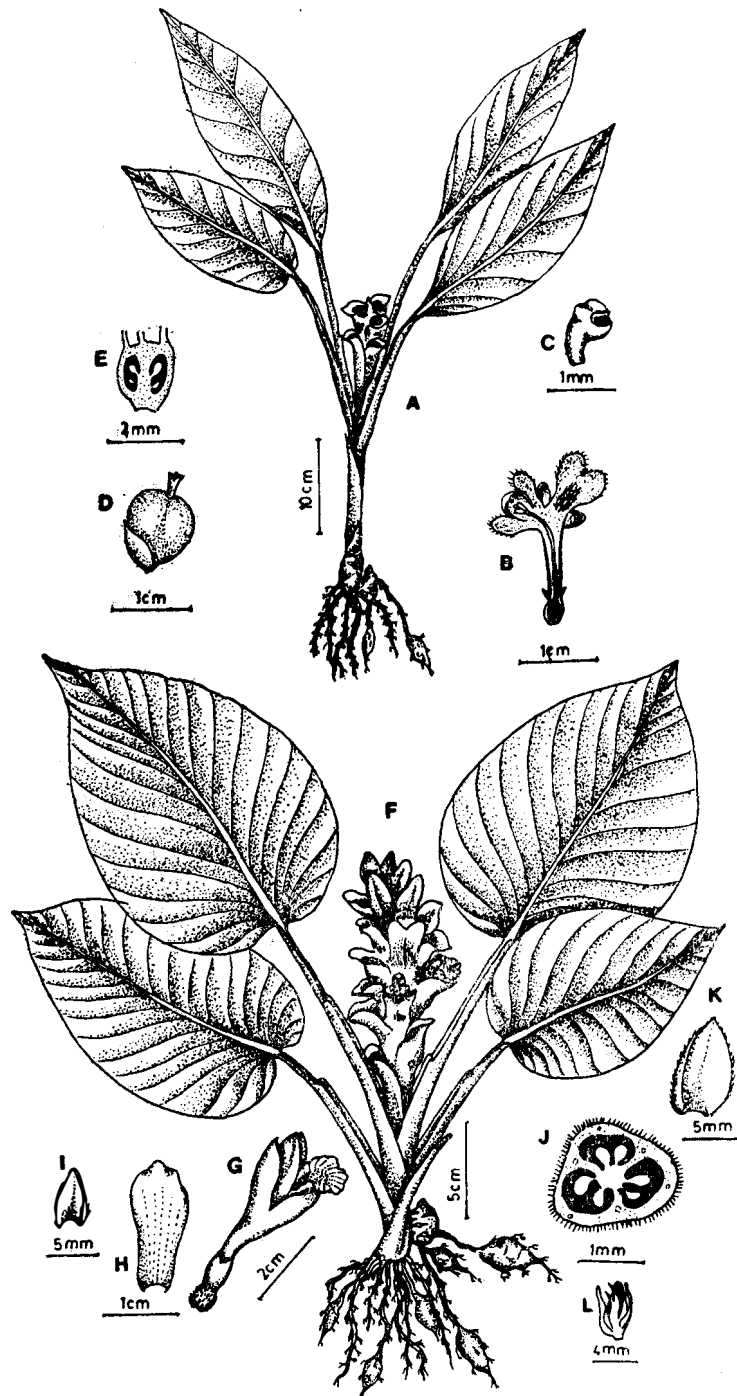


Fig. 2 A-E, *Curcuma vamana*; A, habit; B, flower split open; C, stigma; D, fruit; E, L. S. of ovary; F-L, *C. decipiens*; F, habit; G, flower; H, lateral staminode; I, inner bracteole; J, C. S. of ovary; K, outer bracteole; L, seed with aril.

Specimens examined: KERALA: Idukki Dt.: Painavu, *Mangaly & Sabu* 10336 (CALI), 10338 (E); Kulamavu, *Mohanan & Ramanujan* 71932 (MH); *Ramachandran* 71138 (MH); *Mangaly* 6739 (CALI); Thenkachi, *Sharma* 40870 (MA); Vellimalai, *Mangaly & Sabu* 10344 (CALI).

Curcuma decipiens Dalz., Kew J. Bot. 2: 144. 1850; Dalz. & Gibs., Bombay Fl. 274. 1861; Baker in Hook. f., Fl. Brit. India 6: 215. 1890; Schum. in Engler, Pflanzenr. 4 (46): 105. 1904; Cooke, Fl. Pres. Bombay 2: 731. 1907; Fischer, Rec. Bot. Surv. India 9: 173. 1921 & in Gamble, Fl. Pres. Madras 8: 1483. 1928.

Type: Not Known.

Vernacular name: Mal. *Kuzhi kua*

(Fig. 1. O., 2. F-L)

Rhizome small, 3–5 × 2 cm, ovoid-conical, pale yellow-white; roots fleshy, short, root-tubers 2.5–3 × 2 cm, ovoid, white inside. Leafy shoots 30–60 cm long. Leaves distichous, 2–4, petiolate; petiole equal to the lamina; lamina 10–30 × 5–15 cm broadly ovate, base slightly cordate, tip deltoid with a small cusp, glabrous; ligule short, 1–2 mm long. Inflorescence both lateral and central; peduncle 6–10 cm long; spike 4–6 × 2–3 cm, with a distinct coma. Coma bracts many, c. 5 × 1 cm, lower green with purple tip, upper deep purple-pink. Fertile bracts upto 4 × 3 cm, tip broad, rounded, recurved, green with purple-pink tips, minutely pubescent on the outer surface, lower half fused. Bracteoles small, outer 8 × 4 mm, inner 4 × 3 mm, triangular, light pink or white with pink spots, pubescent. Flowers 4.5 cm long, longer than the bracts, 1 or 2 in each bract. Calyx 1–1.2 cm long, truncate, tip shortly 3-lobed, white with pink spots, minutely pubescent. Corolla tube 2 cm long, funnel-shaped, deep purple; lobes unequal, deep purple; dorsal lobe 1.5 × 1.3–1.5 cm, apiculate; lateral lobes 1.3 × 0.7 cm, ovate-oblong; Labellum 1.5 × 1.5 cm, tip slightly 3-lobed, midlobe emarginate, yellow, purple towards the base, glandular hairs on inner side; lateral staminodes 1.5 × 0.8 cm, oblong, yellow, purple towards the base. Anther-thecae parallel, 4 mm long, yellow, spurred; spurs small, parallel, with purple spots. Epigynous glands 2, 4 mm long, linear. Ovary 3–4 mm long, trilobular, densely pubescent. Style long, filiform; stigma bilipped, slightly exerted from the anther. Fruit 1 × 0.5 cm, ovoid, hairy. Seeds many, 5 × 2 mm, oblong, brown with a white spot at the tip, aril white, lacerate. *Cytology:* 2n = 42 (Ramachandran, 1969).

Distribution: Endemic to Peninsular India (North Kerala and Karnataka). Rama Rao (1914) reported this species from Konni (Travancore) but we could not collect it from any part of S. Kerala.

Ecology: Common in exposed laterite soil and on rocky hill slopes.

Flowering: April - September. **Fruiting:** May - October.

Notes: This can be distinguished from other species of *Curcuma* by the deep purple coma, 2-flowered cincinni and purple corolla. From its close ally, *C. inodora*, it differs in the flowers being longer than the bracts, 2-flowered cincinni, dark yellow labellum and staminodes.

Specimens examined: GOA: Ambachangal, *Singh* 124503 (CAL); Sanguem forest, *Cheriyam* 106253 (CAL); Polleni, *Cheriyam* 106015 (CAL). KARNATAKA: N. Kanara Dt.: Kumta, *Sabu* 37365 (CALI); Castle Rock, *Meebold* 9905 (CAL). KERALA: Palakkad Dt.: Anamalais, *Fischer* 3456 (CAL); Alathur, *Sabu* 37391 (CALI); Walayar, *Sabu* 37395 (CALI); Thenkurissy, *Sabu* 39142 (CALI). Without locality: *Bourdillon* 649 (CAL).

Curcuma ecalcarata Sivar. & Indu, Notes Roy. Bot. Gard. Edinburgh 41: 321. 1983.

Type: Kerala, Palakkad Dt., Kanjirapuzha, *Sivarajan & Indu* AVS 1497 (E; CALI),

Etymology: The specific epithet refers to its lack of Spur on anthers.

(Fig. 1. G)

Rhizome small, 3–5 × 2–2.5 cm, conical, yellow inside; sessile tubers absent; roots many, fleshy; root tubers fusiform, white inside. Leafy shoot 30–45 cm tall. Leaves bifarious. 6–8; petiole 20–25 cm, minutely pubescent; lamina 20–30 × 10–15 cm, broadly ovate, acuminate, slightly and often unequally cordate at base; pubescent below near the midrib towards the base; profusely lepidote on the lower surface, sparsely lepidote on the upper surface. Inflorescence central; peduncle 12–15 cm long, pubescent; spike 10–15 cm long, pubescent, 10–15 × 5 cm, with a distinct coma. Coma bracts longer than the fertile ones, 4 × 3.5 cm, free or slightly adnate at base, bright rose in those with rose fertile bracts and greenish-white in those with green fertile bracts. Fertile bracts c. 3 × 2.5 cm, broadly rounded, tip recurved, green or rose. Bracteoles c. 7 mm long, triangular with a longitudinal ridge at the back, ridge and margins pubescent. Flowers 5–6 cm long, longer than the bracts, yellow or orange-yellow. Calyx 1–1.3 cm long, truncate, 3-lobed at apex, deeply split on one side, pubescent. Corolla tube 2.5–3 cm long, lobes unequal; dorsal lobe 1.5 × 1 cm, oblong, concave, hooded and apiculate at tip; laterals 1.5 × 0.7 cm, oblong-obtuse, light yellow-orange. Labellum 2–2.2 × 2–2.2 cm, 3-lobed, lateral lobes rounded, middle lobe triangular, much exceeding the laterals, yellow or orange-yellow; lateral staminodes 1.8–2 × 0.8 cm, oblong-obtuse. Stamens yellow; filament broad; anther 4–5 mm long, thecae parallel, ecalcarate, connective broad, hooded at apex, glandular hairs on the back. Epigynous glands two, 4 mm long, cylindrical. Ovary 1.2 × 1 mm, trilocular many, ovules, pubescent, style long,

filiform; stigma cup-like, between the thecae and hood, mouth hairy. Fruit 1.5×1 cm, obovoid, slightly trigonal, pubescent. Seeds many 6×3 mm, obovoid; aril lacerate, 6—8 narrow lobes, white.

Distribution: Endemic to Western Ghats and midlands of Kerala.

Ecology: It grows as undergrowth in forests or along the margins of forests, and in coconut groves and rubber plantations in the plains.

Flowering: August-October. *Fruiting:* September-November.

Notes: The only S. Indian species of the subgen. *Hitcheniopsis* restricted to the monsoon areas of Asia (Larsen & Smith, 1928), it resembles *C. parviflora* of Thailand and Burma in its ecalcarate anthers, central inflorescence and long-petioled leaves, but differs in its slightly cordate leaves, yellow or orange yellow staminodes which exceed petals and the 3-lobed lip which is scarcely larger than the staminodes.

Our observations reveal that the colour of fertile bracts varies from green to rose and that of coma from white to dark rose. We have also found that, unlike in the original description of the species, the flowers are characterised by epigynous glands.

Specimens examined: KERALA: Kozhikode Dt.: Perambra, *Joseph* 39144 (CALI); Chelannur, *Sabu* 39175 (CALI). Ernakulam Dt.: N. Paravoor, *Mangaly* 6688 (CALI); Alwaye, *Mangaly* 6673 (CALI). Kannur Dt.: Kottiyoor, *Sabu* 37388 (CALI). Kollam Dt.: Thenmalai *Sabu* 37371 (CALI); Kulathupuzha, *Swarupanandan & Mangaly* 6714 (CALI). Kottayam Dt.: Palai, *Mangaly* 17406 (MH). Malappuram Dt.: Nilambur, *Sabu* 37385 (CALI); Calicut Univ. Bot. Gard. *Sabu* 37353 (CALI); Palakkad Dt.: Attapady, *Mangaly & Sabu* 37303 (CALI); Kanjirappuzha, *Sivarajan & Indu* AVS 1947 (CALI); Mannarghat, *Swarupanandan & Mangaly* 6711 (CALI); Pathanamthitta Dt.: Konni, *Sabu* 39174 (CALI); Rajampara, *Swarupanandan & Mangaly* 10298 (CALI); Sabaripeetam, *Swarupanandan & Mangaly* 10300 (CALI). Wynad Dt.: Mananthody, *Sabu* 37347 (CALI).

Curcuma haritha Jose K. Mangaly & M. Sabu, sp. nov.

Curcuma haritha est valde similis *C. aromaticae* sed differt ab ea in sufflavus canus, non-aromaticus rhizoma, scorteus semiplicativa erecta folia, alba corolla, leavis sufflaeum labello cum obscura, sufflaea vitta. Etiam simiis est *C. raktakanta* sed differt ab ea habens pseudocaulis cum notis levibus puniceus alba corolla lobis et placenta tumenta.

Type: Kolathara, Calicut Dt., Kerala, *Sabu* 39113 (CALI).

(Fig. 1. N, 3.A-I)

Rhizome large, 4–5 X 3.5–4 cm, yellowish-grey inside, non-aromatic; sessile tubers many, finger shaped, long, branched; roots many, fleshy. Leafy shoot 70–100 cm tall, pseudostem c. 30 cm, sheaths green with a few light pink dots. Leaves 4–6, distichous, petiolate; lamina 30–50 X 10–14 cm, ovate-elliptic, tip acuminate, base acute, thick, leathery, green, densely puberulent on the lower surface, sparsely hairy above, erect, semiplicate. Inflorescence lateral, produced early in the season, 30–40 cm; peduncle 10–15 cm; spike 20–25 cm, with a distinct coma. Coma bracts 8–10, 6–8 X 2.5–3 cm, fused only at the base, bright pink. Fertile bract 10–15, 5–5.5 X 5 cm, broadly ovate, tip rounded, lower bracts green, upper green with pink tips. Bracteoles large, 3.5–4 X 2 cm, innermost smaller, white to light green with light pinkish shade at the tip. Flowers 4.5–5 cm, almost equal to or slightly smaller than the bracts, 3–4 in each bract. Calyx 1 cm, tip 3-lobed, deeply split on one side, minutely hairy. Corolla tube 3 cm, white; dorsal lobe 1.5 X 1.5 cm, ovate-oblong, hooded; hood 5 mm long, white; lateral lobes 1.6 X 1.2 cm, tip rounded, white, glabrous. Labellum 2 X 2 cm, shortly 3-lobed, middle lobe shortly emarginate, wavy, light yellow with a median dark yellow band. Lateral staminodes 1.6 X 0.8 cm, tip incurved, a patch of glandular hairs at the centre on inner side, pale yellow. Stamen white, anther 4 mm, spurred at base, spurs divergent. 2 mm long, crest absent, glandular hairs on the connective. Epigynous glands two, 5 mm long, dark yellow. Ovary 5 mm, trilocular, trilobular with many ovules on swollen placenta, densely pubescent. Style long filiform; stigma bilipped, slightly exserted from the anther. Fruit not known.

Distribution: Known only from Kerala.

Ecology: It is common throughout the coastal regions in coconut groves along with *C. caesia* and *C. raktakanta*, but is also rarely found in high altitude grasslands.

Flowering: April - May.

Notes: Closely related to *C. aromatica*, it differs in the yellowish-grey, non-aromatic rhizome, leathery, semiplicate, erect leaves, white corolla, and light yellow lip with a median dark yellow band. It also resembles *C. raktakanta* but differs from it in having green pseudostem with light pink spots, white corolla lobes and swollen placenta.

Specimens examined: KERALA : Calicut Dt. : Kolathara, *Sabu* 39106 (CALI); Chungam, *Sabu* 39113 (CALI); Payyoli, *Sabu* 39192 (CALI). Malappuram Dt. : Nilambur, *Sabu* 39141 (CALI); Karimpuzha *Sabu* 34137 (CALI). Palakkad Dt. : Parambikulam, *Sabu* 39101 (CALI).

Curcuma inodora Blatter J., Proc. Asiat. Soc. Bengal 26 : 357. 1930; Santapau J. Bombay Nat. Hist. Soc. 51: 135. 1952; Phatak & Oza, J. Bomay Nat. Hist. Soc. 56: 368. 1959.

Type: Bombay Presidency, Moolgaum, Salsette, *Hallberg* 12724 (BLAT).

Etymology: The specific epithet *inodora* (Latin) refers to the non-aromatic nature of the plant.

(Fig. 1. M)

Rhizome conical, 2.5–3.5 × 2–2.5 cm, pale yellow in the centre, whitish towards the periphery; roots fleshy, root tubers many, ovoid, 3–5 × 2–2.5 cm, white inside, non-aromatic. Leafy shoot 30–60 cm tall. Pseudostem 8–10 cm long. Leaves distichous, 3–5, petiolate; petiole 20–25 cm long; lamina 15–30 × 7–12 cm, elliptic, base oblique, tip acuminate, minutely hairy along the prominent side veins on the upper side, lower side glabrous; ligule 2 mm long, hyaline. Inflorescence both lateral and central; peduncle 10–15 cm long; spike 12–15 × 4–5 cm with a distinct violet coma. Coma bracts large, 4–4.5 × 1.5 cm, tip rounded, fused only about lower 1/4, dense violet, outer surface minutely hairy. Fertile bracts 3.5–4 × 1.5 cm, tip slightly acute, not recurved, pale green with a purple patch at the tip, lower 1/3 fused, each subtends 3–4 flowers. Bracteoles small, outer 1.5 × 0.6 cm, inner 4 × 2 mm, linear, purple, minutely pubescent. Flowers c. 4 cm long, equal to the bracts. Calyx tubular, 1–1.2 cm long, shortly and irregularly 3-lobed at apex, white, tube minutely pubescent. Corolla tube c. 2.5 cm long, deep purple, pubescent; lobes unequal, dorsal lobe c. 1.5 × 1 cm, apiculate, lateral lobes c. 1 × 0.5 cm, ovate-lanceolate, deep purple, glabrous. Labellum obovate, obscurely 3-lobed, tip emarginate, purple with a median bright yellow band. Lateral staminodes oblong, 1.5 × 0.5–0.7 cm, deep purple, glabrous. Anther 4 mm long, thecae parallel, white with a pink base, spurs bent inwards; filament purple. Epigynous glands two, 5 mm long, linear. Ovary c. 4 × 3 mm, trilocular, with many ovules on axile placenta, densely pubescent, hairs directed upwards. Style long, filiform, pink; stigma bilobed. Fruit globose to ovoid, with persistent calyx, 1–1.2 × 0.9 cm, brown hairy. Seeds many, 3 × 2 mm, brown, aril white, lacerate.

Distribution: Endemic to peninsular India from Maharashtra extending upto North Karnataka.

Ecology: Common in barren laterite areas, plains, and road side cuttings.

Flowering: April - May, August - October.

Fruiting: May - June; September - December.

Notes: Closely related to *C. decipiens*, this can be distinguished by its flowers equaling the bracts, 3–4 flowered cincinni, purple corolla and staminodes and labellum with a dark yellow band at the centre.

Specimens examined: KARNATAKA: N. Kanara Dt.: Karwar, Sabu 37366 (CALI).

Curcuma kudagensis Velay., Pillai & Amal., J. Econ. Tax. Bot. 14: 476. 1990.

Type: Karnataka, Coorg Dt. Thalakkavari, Velayudhan V 3461 (E).

Etyymology: The specific epithet is based on the name of the locality Coorg (Kudag), from where it was originally collected.

Rhizome small, 2–2.5 × 1.5 cm, ellipsoid, white inside; sessile tubers absent; roots fibrous, slightly fleshy terminating in elongated fusiform root tubers, 5 X 1.5 cm, white within. Leaves distichous; lamina c. 30 X 11 cm, elliptic to lanceolate or oblong-lanceolate, base obtuse or cuneate, margin entire, tip acuminate, pubescent; ligule less than 4 mm. Inflorescence lateral; peduncle 9 cm long; Spike 7 cm, with a distinct coma. Coma bracts 3–4, not spreading, 1 X 0.4 cm, light pink. Fertile bracts 8–9, 2.5 X 1.2 cm, pale yellow-green with purple tip. Flowers 2 in each bract, 4–5 cm long, exserted. Calyx less than 1 cm, tip 3-lobed. Corolla tube 1.5 cm, funnel-shaped, bright yellow, dorsal lobe 2 cm long, oblanceolate, concave; lateral lobes 1.5 cm long, lanceolate, glabrous. Labellum suborbicular, bright yellow, deeply lobed. Lateral staminodes oblong, tip rounded. Anther-thecae 7 mm, spurred; connective very narrow, basal spur 1–1.5 mm. Ovary 5 mm, oblong. Fruits not seen.

Distribution: Endemic to Karnataka. Known only from the type locality (Velayudhan *et al.*, 1990).

Ecology: Grassy slopes adjacent to shola vegetation.

Flowering: May – June.

Notes: This plant resembles *C. nilgherrensis*, but differs by its lax inflorescence, smaller and fewer coma bracts, highly exserted flowers, deeply lobed labellum and very long fusiform root tubers.

Specimens examined: KARNATAKA : Coorg Dt : Thalakkaveri, Velayudhan 3561 (NBPGR).

Curcuma longa Linn., Sp. Pl. 1: 2. 1753, *pro max. parte*; Koenig in Retz., Obs. Bot. 3: 72. 1783; Roxb., Asiat. Res. 11: 340. 1810 & Fl. Indica 1: 32. 1820; Dalz. & Gibs., Bombay Fl. Suppl. 87. 1861; Baker in Hook. f., Fl. Brit. India 6: 214. 1890; Schum. in Engler, Pflanzenr. 4 (46): 108. 1904; Cooke, Fl. Pres. Bombay 2: 732. 1907; Fischer in Gamble, Fl. Pres. Madras 8: 1483. 1928; Burtt & Smith, Notes Roy. Bot. Gard. Edinburgh 31: 185. 1972 & in Dassan., Rev. Handb. Fl. Ceylon 4: 500. 1983; Burtt, Notes Roy. Bot. Gard. Edinburgh 35: 209. 1977 & in Mani., Bot. Hist. Hort. Malab. 144, 1980; Nicols. *et al.*, Interpret. Hort. Malab. 317. 1988.

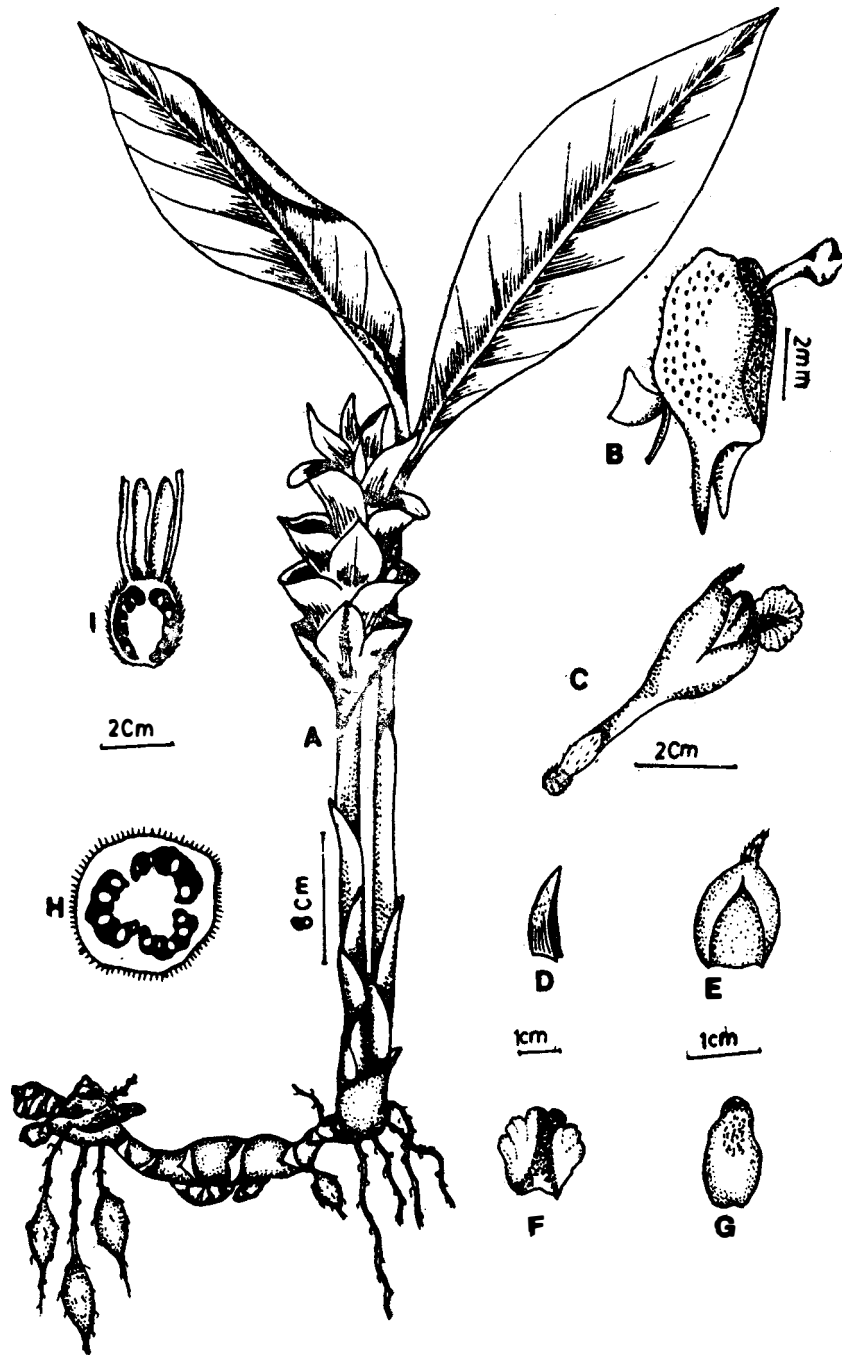


Fig. 3. *Curcuma haritha*: A, habit; B, anther lateral view; C, flower; D, bracteole; E, dorsal corolla lobe; F, labellum; G, lateral staminode; H, ovary in T. S.; I, ovary in L. S.

Lectotype: *Manjellakua* Rheede, Hort. Malab. 11: 21. t. 11. 1692.

Curcuma domestica Veleton, Bull. Jard. Buitenzorg 2 ser., 27: 31. 1918; Ridley, Fl. Malay Penin. 4: 254. 1924; Holttum, Gard. Bull. Singapore 13: 68. 1950; Burt & Smith, Notes. Roy. Bot. Surv. India 14: 122. 1972; Matthew & Brit. in Matthew Fl. Tamilnadu Carnatic 2: 1615. 1983.

Vernacular names: Kan. *Arishina Manjal*; Mal. *Manjal*; Tam. *Manjal*; Tel. *Pasupu* (Fig. 1.L).

Rhizome medium sized, 2–3×2–3 cm, conical, deep orange-yellow inside, strongly aromatic; sessile tubers many, cylindrical, branched; root tubers rare. Leafy shoot 80–120 cm tall, pubescent c. 30 cm long. Leaves 4–6, distichous; petiole 35–40 cm long; lamina 45–60×15–20 cm, oblong-lanceolate, tapering at both ends, margins wavy, glabrous, pubescent towards the extreme tip; ligule short, near the lamina. Inflorescence central, 25–30 cm; peduncle 15 cm, concealed within the leaf sheaths; spike 8–10 cm long, with a distinct, white coma. Coma bracts 8–10, 7 X 35 cm spreading. Fertile bracts 25–30, 4.5–5.5×3–4.5 cm, compactly arranged, lower half of adjacent bracts fused to form pouches, tip recurved, pale green, outer surface minutely pubescent, inner surface glabrous. Lower bracts subtend cincinni of two flowers, upper bracts one flowered. Flowers 4.5–5.5 cm, equal to the bracts. Bracteoles large, outer 3×2 cm, ovate-oblong, inner 1.5×1 cm. Calyx truncate, 1 cm long, minutely 3-lobed at the tip, white, outer surface minutely pubescent. Corolla tube 2.5 cm long, white, glabrous; lobes unequal; dorsal lobe larger, 1.5×1.7 cm, concave, white, hooded, hood hairy, lateral lobes linear, 1.5×1.2 cm, white, glabrous. Labellum c. 2.2×2.5 cm, trilobed, middle lobe emarginate, light yellow with a broad median dark yellow band. Lateral staminodes linear, 1.5×0.8 cm, tip slightly incurved. Anther-thecae 4 mm, spurred; spurs 3 mm long, parallel. Epigynous glands two, 5 mm long. Ovary 5 mm, tricarpeal, syncarpous; ovules many on axile placenta, pubescent towards the tip. Style long, filiform; stigma bilipped. Fruiting not seen.

Cytology: 2n = 62, 63, 64 (Raghavan & Venkatasubban, 1943; Chakravorti, 1948; Sharma & Bhattacharyya, 1959, Ramachandran, 1969).

Distribution: The plant is cultivated throughout the tropics, but is doubtfully wild anywhere in India. Though Prain (1903) says it may perhaps be indigenous in Chota Nagpur and Ridley (1924) considers it to be a native of Java, many authors are doubtful about it.

Flowering: September - October.

Notes: This species closely resembles *C. amada*, but can be distinguished by the orange-yellow rhizomes, white coma, larger bracteoles, 2-flowered cincinni, flowers equal to the bracts and white corolla lobes.

Uses: *C. longa* is extensively cultivated all over India for its rhizome. It is commonly used as a condiment and also as a source of a yellow dye. Due to the strong antiseptic properties, it has been used as a reputed remedy for all kinds of poisonous affections, ulcers and wounds. It is aromatic, antiperiodic, germicidal, carminative, stimulant, tonic and vermifuge. A paste of turmeric alone or combined with a paste of *Azadirachta indica* leaves, is used to cure ring worm infections, obstinate itching, eczema and other parasitic skin diseases and also in chicken pox and small pox. The drug is also useful in cold, cough, bronchitis, conjunctivitis and liver affections (Nadkarni, 1954)

The anti-rheumatic activity of curcumin, isolated from the rhizomes of *C. longa*, has been clinically demonstrated in case of rheumatoid arthritis by Deodhar *et al.*, (1980). The powdered rhizomes has been found to be effective in the treatment of sprain and inflammation. Koso *et al.*, (1983) found that the rhizomes exhibits intense anti-hepatotoxic action. Kuttan *et al.*, (1987) found that an ethanol extract of turmeric and an ointment of curcumin produce remarkable relief in patients with external cancerous lesions.

Specimens examined: KARNATAKA: S. Kanara Dt.: Udupi, *Bhat* 1981 (PPCH). KERALA: Calicut Dt.: Olavanna *Sabu* 37400 (CALI). Ernakulam Dt.: North Parur, *Mangaly* 10265 (CALI). Kollam Dt.: Kulathupuzha, *Mohanam* 63180 (MH), Thrissur Dt.: Mannuthy, *Sabu* 39172 (CALI).

Curcuma montana Roxb., Pl. Corom. 2: 28. t. 151. 1802, Asiat. Res. 11: 342. 1810 & Fl. Indica 1: 35. 1820; Baker in Hook. f., Fl. Brit. India 6: 214. 1890 (in part); Schum. in Engler, Pflanzenr. 4 (46): 106. 1904; Fischer in Gamble, Fl. Pres. Madras 8: 1483. 1928; Burt & Smith, Notes Roy. Bot. Gard. Edinburgh 31: 226. 1972; Rao & Verma, Bull. Bot. Surv. India 14: 122. 1972; Rao & Razi, Synopt. Fl. Mysore Dist. 581. 1981.

Iconotype: Roxburgh, Pl. Corom. 2: t. 151. 1802.

(Fig. 1. C, 5. A-C).

Rhizome medium sized, 3–4 × 2.5–3.5 cm, ovate-conical, uniform light orange-yellow within; sessile tubers many, branched; roots fleshy; root tubers fusiform. Leafy shoot 80–100 cm tall. Leaves 15–17 cm, oblanceolate, base tapering, lower surface puberulent. Inflorescence central, 30–35 cm long, peduncle 20 cm long, concealed within the petioles; spike 10–15 cm with a distinct, coma. Coma bracts 7–8, 5 × 3 cm, white with pink in the distal half. Fertile bracts 20–24, 5 × 4 cm, obovate, lower half fused, tip slightly recurved, light green with a pink patch, minutely pubescent. Bracteoles large, 2.5 × 2 cm, tip rounded, white, transparent. Flowers 4.5–4.7 cm, almost equal or slightly smaller than bracts. Calyx 8 mm long, truncate, 3-lobed, lobes broad and round. Corolla tube 3 cm

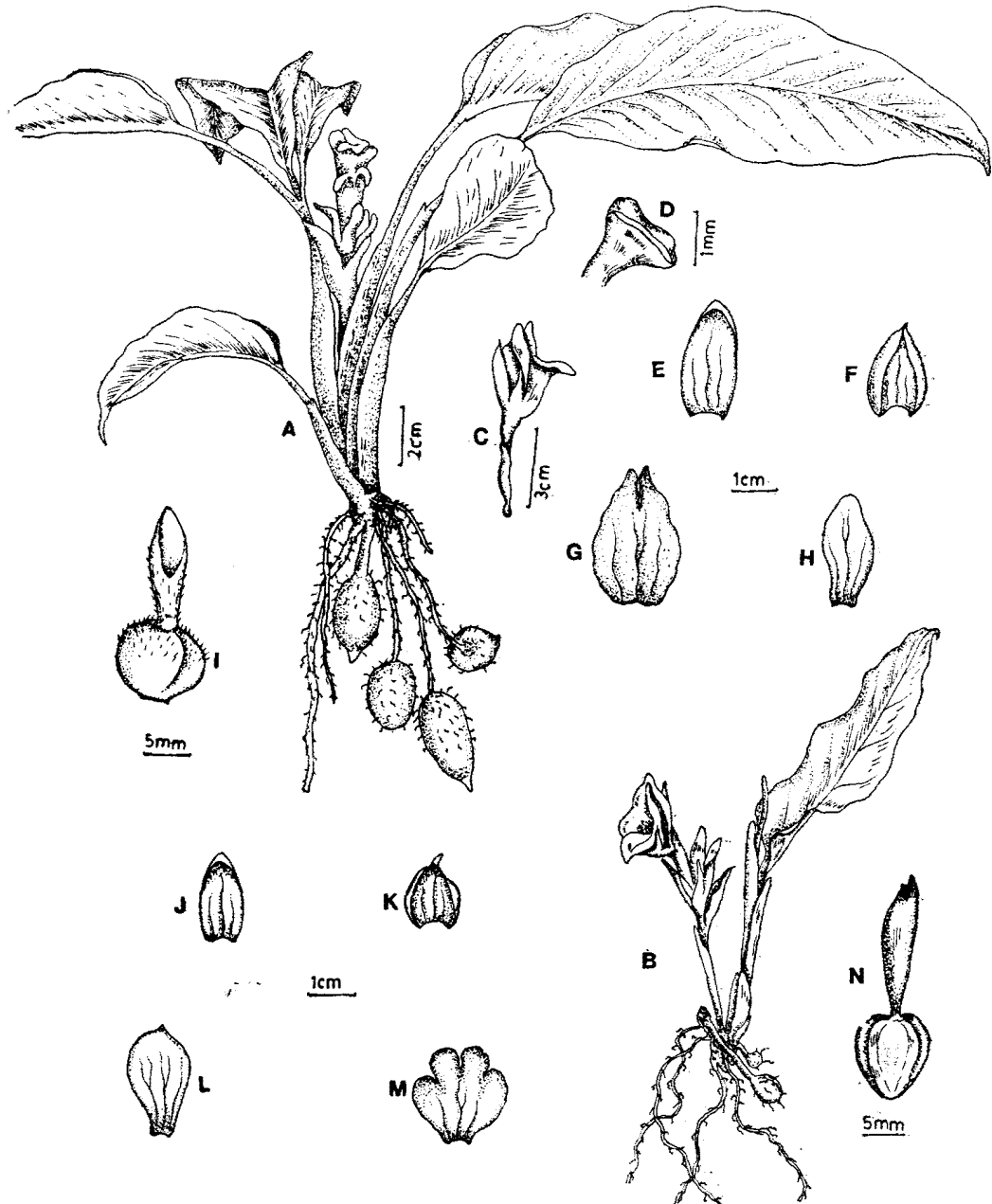


Fig. 4. A-I: *Curcuma oligantha* var. *oligantha*: A. plant with central spike; B, plant with lateral spike; C, flower; D, stigma; E, lateral corolla lobe; F, dorsal corolla lobe; G, labellum; H, lateral staminode; I, fruit with calyx; J-N, *C. oligantha* var. *lutea*: J, lateral corolla lobe; K, dorsal corolla lobe; L, lateral staminode; M, labellum; N, fruit with calyx.

long, lobes unequal; dorsal lobe 1.5×1.2 cm, hooded at tip, hood pubescent, white, lateral lobes linear, 1×1.2 cm, white. Labellum 1.8×1.6 cm, 3-lobed, lobes rounded, almost equal, middle lobe with an apical notch, margin undulate, deep yellow. Lateral staminodes 1.2×1 cm, tip incurved, included within the corolla lobe, light yellow. Stamen light yellow; filament broad; anther-thecae 4 mm, connective prolonged into a hood; base spurred; spurs 3 mm long. Epigynous glands two, 4 mm long, linear, pointed. Ovary 2–3 mm, trilocular with many ovules on apparently axile placenta; style long, filiform; stigma bilipped, included within the hood and thecae. Fruiting not known.

Distribution: South India (Kerala, Karnataka, Tamil Nadu & Andhra Pradesh).

Ecology: High altitude grasslands, margins of dense thickets and bamboo forests.

Flowering: September - October.

Specimens examined: ANDHRA PRADESH: E. Godavari Dt.: Tadepalli, *Rama Rao & Narasimhan* 84354 (MH). Srikakulam Dt.: Althi, *Sreekumar* 76883 (MH). KARNATAKA: Mysore Dt.: Billigirirangana hills, *Rao* 80212 (CAL). KERALA: Ernakulam Dt.: Cochin. *Meebold* 12232 (CAL). Kollam Dt.: Punalur, *Venkatasubramaniyam* 8396 (FRC). Palakkad Dt.: Anamalais, *Fischer* 3459 (FRC); Walayar, *Raju & Ratnavelu* 18626 (CAL). TAMIL NADU: Coimbatore Dt.: Onatithu, *Fischer* 21 (CAL). Nilgiri Dt.: Gudalur, *Sabu* 37368 (CALI).

Curcuma neilgherrensis Wight, Pl. Ind. Orient. t. 2006. 1853; Baker in Hook. f., Fl. Brit. India 6: 210. 1890; Schum. in Engler, Pflanzenr. 4 (46): 109. 1904; Cooke. Fl. Pres. Bombay 2: 728. 1907; Fyson, Fl. Nilgiri & Pulney Hilltops 1: 408. 1915 & Fl. S. Indian Hill Stat. 2: 598. 1932; Fischer in Gamble, Fl. Pres. Madras 8: 1482. 1928; Ramam. in Sald. & Nicols., Fl. Hassan Dist. 766. 1976; Rao & Razi, Synopt. Fl. Tamil. Carnatic 2: 1615. 1983; Mani., Fl. Silent Valley 312. 1988; Ramach. & Nair, Fl. Cannanore 468. 1988.

Type : Not known.

Curcuma angustifolia auct non. Roxb.; Dalz. & Gibs., Bombay Fl. 274. 1861.

Etymology: The species is named after the type locality i.e. Nilgiris.

Vernacular name: (Tam.) *Kattu Manjal*.

(Fig. 1. H)

Rhizome small, c. 3×1 cm, conical, white inside; sessile tubers absent; roots many, some ending in root tubers, 3.5×0.7 cm. fusiform, white inside.

Leafy shoot 20–30 cm tall, pseudostem 8–19 cm tall. Leaves 6–9, distichous; petiole 10–15 cm, green; lamina 12–18×6–9 cm, ovate-elliptic to obovate, base subequal, tip acute lower surface sparsely pubescent ligule small, 5 mm long, hyaline. Inflorescence both lateral and central, 8–20×5–6 cm, with a distinct coma. Coma bracts 5–7, oblong-lanceolate, fused only at the base, light to dark pink or violet. Fertile bracts 6–15, 2.5–3×1.1–1.5 cm, fused about lower 1/3, slightly recurved, margin wavy, green or green with a pink or violet spot at the tip, densely pubescent. Bracteoles 2–3×2 mm, triangular. Flowers longer than the bracts, 4.5–5.5 cm, 3–4 in each bract, light yellow. Calyx 1–1.2 cm, 3-lobed, at apex, violet dotted, densely pubescent. Corolla tube light yellow, lobes unequal, pubescent; dorsal lobe 1.8 cm long, hooded at tip, hood 2 mm long; laterals, 1.7×0.7 cm, linear-elliptic, outer surface sparsely hairy. Labellum 2×2 cm, with a median cleft, yellow with a deep yellow median band. Lateral staminodes 2.2×1.3 cm, yellow, glabrous. Anther-thecae 5 mm long, parallel, hooded, glandular hairy on the back, spurred; spurs 2 mm long, downwardly pointing. Epigynous glands two, 3 mm long, linear. Ovary 4 mm long, trilocular with many ovules, on apparently axile placenta, style long, filiform; stigma bilipped, appressed within the thecae. Fruit 1.3×1 cm, obovate, yellowish-green, fruit wall semitransparent, pubescent, with persistent calyx. Seeds 3.5–5 mm, obovate; aril white, lacerate.

Cytology: $2n = 42$ (Ramachandran, 1969).

Distribution: Endemic to South India.

Ecology: Shady situations in mixed forest, or open grassy meadows, margins of dense thickets at higher altitudes.

Flowering: April - June; August-October. *Fruiting:* June; September-November.

Notes: This species is closely related to *C. oligantha*, but differs from it mainly in the presence of a distinct coma and larger bracteoles.

Specimens examined: KARNATAKA: Chikmagalur Dt.: Bababudan Hills, *Saldanha & Ramesh* 1722 (CAL). Coorg Dt.: Tadiandamol, *Yoganarasimhan et al.* 3862 (RRCBI); Talacaveri, *Bhat* 1978 (PPCH). Mysore Dt.: Melagadu, *Rao* 80097 (CAL); Bandipur R. F., *Naithani* 23864 (MH); Biligirirangana Hills, *Bhat* 1969 (PPCH). KERALA: Wynad Dt.: Periya, *Sabu* 19304 (CALI); Alattil, *Sabu* 37327 (CALI); Chandanathode, *Ramachandran* 61641, (MH); Sulthan Bathery., *Ellis* 24017 (MH) TAMIL NADU: Coimbatore Dt.: *Fischer* 901 (CAL); Ayinigiri Shola. *Jacob* 348 (MH) Kollegal, *Narayanaswami* 3464, 3851 (MH). Selem Dt.: Yeurcaud, *Karthikeyan* 26999 (MH). Tirunelvelly Dt.: Kalakad, *s. n.* 12402 (MH).

Curcuma oligantha Trimen, J. Bot. 23: 245. 1885 & Handb. Fl. Ceylon 4: 242 1898; Baker in Hook. f., Fl. Brit. India 6: 215. 1890; Schum. in Engler,

Pflanzenr. 4 (46): 109. 1904; Burtt & Smith in Dassan., Rev. Handb. Fl. Ceylon 4: 504. 1983; Bhat, Indian J. For. 10: 66. 1987; Ramach. & Nair, Fl. Cannanore 468. 1988.

Type: Uma Oya, *Trimen s. n.* (PDA).

Curcuma kannanorensis Ansari, Nair & Nair, Curr. Sci. 51. 293. 1982.

Type: Kerala, Cannanore Dt., Karimbam, *Ansari* 67822 (CAL. MH).

Rhizome small, 1–1.2 × 0.5–0.7 cm, conical, non-aromatic, yellow inside; sessile tubers absent; roots many, fibrous, root tubers large, 4–5 × 2–3 cm, ovate or fusiform, white inside. Leafy shoots 15–35 cm tall; pseudostem 5–7 cm long. Leaves distichous; petiole 7–10 cm long; lamina 10–20 × 8–10 cm, ovate-elliptic, tip acuminate base oblique, glabrous or minutely pubescent; ligulate at about half distance from the rhizome. Inflorescence lateral and central, 10–19 × 3.3–5 cm; peduncle 6–8 cm long; spike 3–5 × 2–3.5 cm; without any distinct coma. Fertile bracts 5–10, 3–3.5 × 1.5 cm, lanceolate, obtuse recurved at apex, green or with a pinkish tinge. Bracteoles small, 1.5 × 0.5 cm, lanceolate, inner smaller. Flowers longer than the bracts, 5–6.3 cm. Calyx truncate, 1.5–1.75 cm, lobes subequal, ovate-triangular, white to light green, puberulent outside. Corolla tube equal to or longer than the bract, 3–4 cm, funnel-shaped, light yellow, yellow or pinkish tinged outside, puberulent; lobes unequal; dorsal lobe 1.5–2.3 × 1.7–2 cm, hooded, yellow or greenish-white with a pinkish tinge; lateral lobes 1.5–2 × 0.8–1 cm, rounded at apex. Labellum 1.8–2.3 × 1.8–2 cm, obovate, shortly 3-lobed, deeply split at apex, lobes oblong cuneate, white with a yellow spot at the middle or orange-yellow throughout. Lateral staminodes 2.5–2.7 × 1.2–1.5 cm, ovate-oblong, white or orange-yellow, minutely gland dotted. Filament broad, 5–7 × 4 mm, oblong; anther 6–8 × 3–4 mm, thecae parallel, spurred at base; connective produced into a small crest, orange-yellow. Epigynous glands two, 3 mm long. Ovary 3 × 2 mm, oblong-obovoid, puberulous. Style long, filiform; stigma bilipped, appressed within the thecae and crest. Fruit 1–1.5 × 1.5 cm, subglobose, with persistent calyx. Seeds many, 3 × 2 mm, obovate with a basal depression, aril white lacerate.

Distribution: Sri Lanka and South India. In South India it occurs in North Kerala, and southern parts of Karnataka, along the west coast.

Ecology: It grows in laterite soil, both at low and high elevations.

Flowering: April–May, July–August. *Fruiting:* May–June; August–September.

Notes: This plant is closely allied to *C. albiflora*, but differs in the smaller size of leaves with acuminate and apiculate apex; the petiole always shorter than lamina, shorter spike and larger size of flowers. It is also related to *C. neilgherrensis* but differs from it mainly in the absence of a coma and smaller bracteoles.

Two varieties have been described under this species, as given below:

Key to the varieties

1. Flowers white, 5.5 cm or more; labellum 2.3×1.5 cm, lobes pointed.....var. *oligantha*
1. Flowers yellow, less than 5.5 cm; labellum 1.8×1.5 cm, lobes rounded.....var. *lutea*

Curcuma oligantha Trimen var. *oligantha*. Bhat, Indian. J. For. 10: 68. 1987.

Type: As for the species,

Curcuma kannanorensis var. *kannanorensis* Ansari, Nair & Nair, Curr. sci. 61: 293. 1982.

(Fig. 4. A-I)

Flowers 5.5 cm or more. Corolla tube light yellow; dorsal lobe 2.2×1.9 cm, ovate-elliptic; lateral lobes 1.8×1 cm, greenish-white. Labellum 2.3×1.8 cm, obovate, deeply split at tip, lobes acute, white. Lateral staminodes 2.6×1.5 cm, tip rounded white.

Distribution: As for the species.

Specimens examined: KARNATAKA: Chikmangalur Dt.: Mallandur, *Yoganarasimhan* 2934 (RRCBI); Charmadi Ghats, *Yoganarasimhan* 2873 (RRCBI); Kigga, *Bhat* 1977 (PPCH). N. Kanara Dt.: Manchikeri, *Fernandez* 1575 (BLAT); Jog falls, *Santapau* 1853 (BLAT); Shimshi Ghat, *Bhat* 1917 (PPCH). S. Kanara, Dt : Udupi, *Bhat* 1161 (PPCH). KERALA: Kannur Dt.: Kannothe, *Ramachandran* 66963 (MH); Ezhimala, *Sabu* 37388 (CALI); Payyannur, *Sabu* 38184 (CALI).

Curcuma oligantha Trimen var. *lutea* (Ansari, Nair & Nair) Bhat, Indian J. For. 10: 68. 1987; Ramach. & Nair. Fl. Cannanore 468. 1988.

Curcuma kannanorensis var. *lutea* Ansari, Nair & Nair, Curr. Sci. 51: 294. 1982.

Type: Kerala, Cannanore Dt.: Kalliasseri, *Ansari* 64999 (CAL & MH).

(Fig. 1. I; 4.J-N)

Flowers less than 5.5 cm. Corolla tube yellow; dorsal lobe 1.8×1.5 cm, ovate; lateral lobes 1.5×1 cm. yellow. Labellum $1.8-2 \times 1.8$, shortly 3-lobed, middle lobe deeply split, lobes rounded, orange-yellow. Lateral staminodes 2.5×1.2 cm, tip acute, orange-yellow.

Distribution: Reported only from North Kerala and Karnataka.

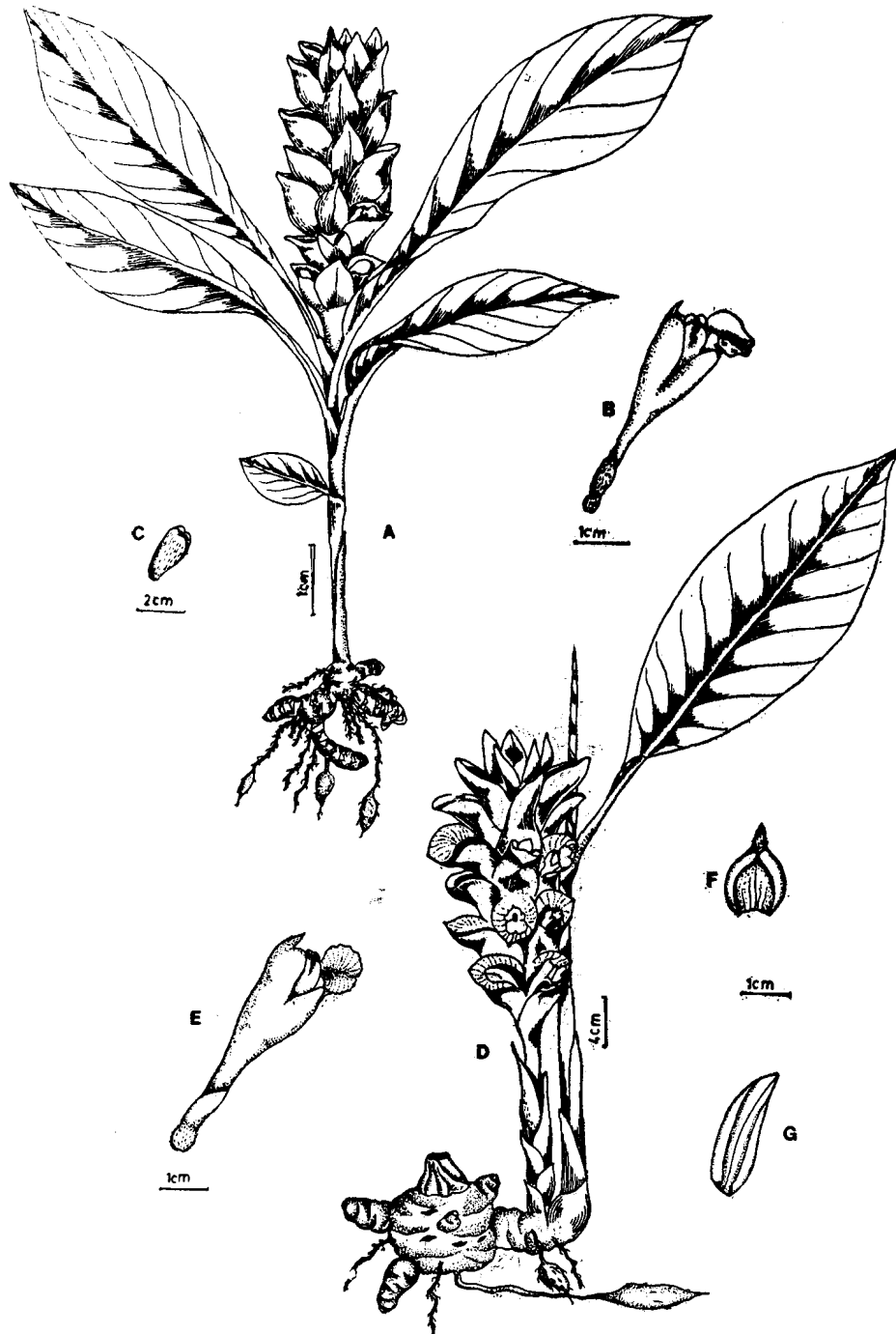


Fig. 5. A-C: *Curcuma montana*; A, habit; B, flower; C, bracteole; D-G, *C. zedoaria*; D, habit; E, flower; F, dorsal corolla lobe; G, bracteole.

Specimens examined: KARNATAKA: N. Kanara Dt. Udupi, *Sabu* 37396 (CALI); Kannadekatte, *Bhat* 1160 (PPCH). KERALA: Kannur Dt.: Ezhimalai, *Swarupanandan & Mangaly* 11565 (CALI). Malappuram Dt.: Calicut Univ. Bot. Gard, *Mangaly & Sabu* 10363 (CALI); *Sabu* 37309 (CALI). Palakkad Dt. : Parambikulam, *Mangaly* 17460 (CALI).

Curcuma pseudomontana Graham, Cat. Pl. Bombay 210. 1839; Dalz. & Gibs., Bombay Fl. 275. 1861; Cooke, Fl. Pres. Bombay 2: 730. 1907; Fischer, Rec. Bot. Surv. India 9: 177. 1921 & in Gamble, Fl. Pres. Madras 8: 1483. 1928; Santapau, J. Bombay Nat. Hist. Soc. 45: 618. 1945 & Fl. Khandala ed. 3, 273. 1967; Rao & Razi, Synopt. Fl. Mysore Dist. 581. 1981; Mani. & Sivar., Fl. Calicut 287. 1982; Mangaly & Sabu, J. Econ. Tax. Bot. 10: 159. 1987.

Type: Not known.

C. montana auct. non Rosc.; Baker in Hook. f., Fl. Brit. India 6: 24. 1890, *Pro parte*. *C. ranadei* Prain, J. Bombay Nat. Hist. Soc. 11: 463. 1898; Schum. in Engler, Pflanzenr. 4(46): 440. 1904.

Type: Poona, *Prain* s.n. 467219 (CAL).

(Fig. 1. F)

Rhizome small, 3–6 × 1–2.5 cm, conical or slightly cylindrical, yellow in the centre, white towards periphery, pleasantly aromatic; sessile tubers absent; roots many, fibrous, 10–20 cm long; root tubers 2–10 × 1–2.5 cm, fusiform or globose, white inside. Leafy shoot 80–125 cm or more; pseudostem c. 35 cm, green or purple to violetish. Leaves distichous, 6–7; Petioles 60–70 cm, longer than lamina, green or purple to violetish; lamina 40–50 × 6–9 cm, oblong-lanceolate, margin hyaline, tip acuminate or acute, base tapering, margins and terminal half of upper surface pubescent, lower surface lepidote; ligule 5–8 mm long. Inflorescence both lateral and central; lateral inflorescence smaller, 40–45 cm long, peduncle enclosed within sheaths, uppermost one or two sheaths foliaceous 15 × 10 cm, ovate to slightly elliptic, acute to acuminate; terminal inflorescence larger, 55–70 cm; spike 10–14 × 4.5 cm, with a distinct coma. Coma bracts 4–5, elliptic, tip rounded, bright pink or with shades of other colours. Fertile bracts 12–15, shorter than coma bracts, 2–3.7 × 1.4–2 cm, elliptic, tip obtuse, loosely arranged, fused to the adjacent ones by the lower portion only, green with purple tinge or purple. Bracteoles 5–6 mm, pink. Flowers 4–6 cm long, longer than the bracts, 4–5 in each bract. Calyx 1–1.2 cm, membranous, white or pale yellow, 3-lobed at tip, deeply split on one side. Corolla tube funnel-shaped, 3 cm long; dorsal lobe 1.7 cm, ovate, hooded at apex, yellowish-white; lateral lobes 1.5 cm, ovate-elliptic or obtuse, yellowish-white. Labellum 1.5–1.8 × 1.7 cm, clearly 3-lobed, middle lobe deeply cleft,

lateral lobes small, bright yellow. Lateral staminodes 1.5 X 0.7—0.8 cm, ovate-oblong, tip rounded or slightly oblique, bright yellow. Stamen 5—7 mm long; anther-thecae parallel, 4 mm long, spurred; spurs slightly divergent and pointed forward, connective slightly produced into a small hood. Epigynous glands two, 4—5 mm long. Ovary 3—5 mm long, cylindrical, tricarpellary, sometimes the septa incompletely fused at top; ovules many on apparently axile placenta, sparsely or densely pubescent. Style long, filiform; stigma slightly exerted above the anther lobes. Fruit trigonous, 3-locular, 1.4 X 1 cm. Seeds many, arillate; aril lacerate, hyaline.

Distribution: Endemic to Peninsular India. In South India it occurs in Andhra Pradesh, Karnataka and Kerala.

Ecology: Usually found in moist places in shade on banks of streams at 800 m or above.

Flowering: May - October. **Fruiting:** July - December.

Notes: Santapau (1945) noticed colour variations in the coma of *C. pseudo-montana* in Khandala. As far as the plants from Kerala are concerned, the coma is various shades of pink.

Uses: The tubers are boiled and eaten in times of scarcity (Graham, 1893).

Specimens examined: ANDHRA PRADESH: Karimnagar Dt.: Aklasapur, *Subba Rao* 20212 (MH). Visakapatanam Dt.: Basikonda, *Subba Rao* 42699 (MH). KARNATAKA: Dharwar Dt.: Devikopa, *Sedgwick* 3035 (BLAT). Mysore Dt.: Gopalswami Hills, *Yoganarasimhan* 0303 (RRCBI). KERALA : Calicut Dt.: Kuttiyadi, *Naithani* 24653 (MH). Palakkad Dt. : Anamalai, *Fischer* 3459 (CAL); Silent Valley, *Mangaly & Sabu* 10375 (CALI); Attappadi, *Mangaly* 17555 (MH); Silent Valley, *Subramaniam* 7107 (FRC).

Curcuma raktakanta Mangaly & Sabu, J. Econ. Tax. Bot. 12: 475. 1988.

Type: Kerala, Ernakulam Dt., Neerickode. *Mangaly* 10346A (MH).

Etymology: The specific epithet is derived from Sanskrit, *rakta* = blood and *Kanta* = stem) indicating the peculiar colour of the peduncle and pseudostem.

(Fig. 1. J.)

Rhizome medium sized, 3—4 X 2.5—4 cm, conical, greyish to yellow inside, whitish towards the periphery, aromatic; sessile tubers finger-shaped, branched, elongated; roots many, fleshy; root tubers 5 X 2.5 cm, fusiform, yellow inside with white peripheral region. Leafy shoot 40—60 cm tall; pseudostem reddish-purple. Leaves 4—6, distichous, petiolate; lamina 35—45 X 10—12 cm, oblong-lanceolate,

base and tip acuminate, green, puberulent below, glabrous above. Inflorescence lateral; peduncle 20–25 cm, covered by reddish-purple sheaths; spike 10–15 cm with a distinct coma. Coma bracts 6–8, linear, 7×4 cm, fused only at base, spreading, deep pink. Fertile bracts 8–10, 5–5.5×5 cm, broadly ovate, tip rounded, green with pink tip. Bracteoles, outer larger, 2.5×1.5 cm; inner most 2.2×0.8 cm, white to light pink. Flowers as long as or slightly smaller than the bracts, 3–4 in each bract. Calyx tubular, 1.5 cm, long, 3-lobed at apex, deeply cleft on one side, white, glabrous. Corolla tube funnel-shaped; lobes unequal; dorsal lobe 2×1.5 cm, hooded; hood 5 mm; laterals 1.5×1.3 cm, tip rounded, light pink. Labellum broad, c. 2×2.2 cm, margin wavy with a median cleft, light yellow with a median dark yellow band, glabrous. Lateral staminodes c. 2×1 cm, included within the dorsal corolla lobe, tip slightly incurved, a patch of glandular hairs at the centre on the inner side. Stamen 4 mm long, spurred at base; spurs 2 mm, divergent, with white, glandular hairs on the back, connective not produced into a crest. Epigynous glands two, 5 mm long, dark yellow. Ovary 5 mm, trilocular, with many ovules on apparently axile placenta, densely pubescent. Style long, filiform; stigma slightly exerted from the anther. Fruiting not known.

Distribution: Endemic to Kerala. Known to occur in Ernakulam and Thrissur districts only.

Ecology: It grows mostly in coconut and arecanut groves in alluvial soil. In many localities it grows sympatrically with *C. caesia* (Mangaly & Sabu, 1988).

Flowering: April - May (–June).

Notes: *C. raktakanta* closely resembles *C. caesia* but differs from it in the yellowish to grey colour of the rhizome, purple coloured pseudostem and peduncle and absence of purple patch on leaves.

Specimens examined: KERALA : Ernakulam Dt. : Neerckode, Mangaly 6663, 10346B (CALI); 10346 (E); Alwaye, Sabu 39195 (CALI). Thrissur Dt. : Chalakkudy, Indira & Mangaly 17593 (CALI).

Curcuma vamana Sabu & Mangaly, J. Econ. Tax. Bot. 10: 307. 1988.

Type: India, Kerala, Palghat Dt. : Monsoon forest, Sabu & Mangaly 37342 (MH).

Curcuma peethapushpa Sasidh. & Sivar., Notes Roy. Bot. Gard. Edinburgh 45: 425. 1989, *nom. superfl.*

Type: India, Kerala, Peechi, 250 m. Sasidharan & Sivarajan 4975 (KFRI).

(Fig. 1. E, 2. A-E)

Rhizome small, c. 3×0.5 cm, conical, orange within; sessile tubers absent; roots several, fibrous, some ending in fleshy, spherical or ellipsoid root

tubers, c. 2×1 cm pearl-white inside. Leafy shoot upto 50 cm tall. Pseudostem 8–10 cm long, covered basally by leafless sheaths. Leaves distichous, 4–5, petiolate; petiole 20–30 cm long; lamina 20–25×6–8 cm, oblong, tip acuminate, base subequal, closely pinnately nerved, glabrous; ligule small. Inflorescence central, 15–22 cm; peduncle 10–18 cm, concealed within the leaf sheaths, light green, glabrous; spike condensed, 2–4×2 cm, distinct coma absent. Bracts 4–8, loosely arranged, c. 3×3 cm, ovate to obovate, tip acute, slightly recurved, each substending 2–4 flowers one or rarely two sterile bracts towards the tip. Bractæoles small, c. 5×4 mm, ovate-acute, glabrous. Flowers shorter than the bracts, 1.8–2 cm long. Calyx truncate, 4 mm long, deeply 3-lobed, white, glabrous, persistent. Corolla tube 8 mm long; lobes almost equal, c. 5×4 mm, glabrous, yellowish-white. Labellum c. 8×7 mm, tip notched, lobe rounded, margin crisped, golden yellow, hairy at middle. Lateral staminodes c. 6×3 mm, golden yellow. Stamen c. 4 mm long, thecae parallel, convergent at base and form a beak, glandular hairy. Epigynous glands absent. Ovary tricarpellary, syncarpous, white, glabrous; ovules many; placentation apparently axile. Style long, filiform; stigma slightly exserted above the anther. Fruit obovoid, c. 10×8 mm, with persistent calyx, pericarp thin. Seeds brown when mature, arillate; aril filiform.

Distribution: Endemic to Kerala.

Ecology: Common in evergreen and semi-deciduous forest floor and teak plantations.

Flowering: July - August. *Fruiting:* August - October.

Notes: This plant closely resembles *C. burttii*, but differs from it in having subequal leaf base, much shorter condensed spike and bracts, few flowered cincinni, absence of anther-crest and presence spurs on fertile anther. (Sabu & Mangaly, 1988). This species produces the smallest flowers in the genus *Curcuma* reported so far from South India.

Specimens examined: KERALA: Idukki Dt.: Thekkadi, Fischer 3755 (CAL). Kollam Dt.: Thenmalai Sabu 33370 (CALI). Malappuram Dt.: Nilambur, Sabu 37356 (CALI). Palakkad Dt.: Kanjirapuzha Sabu 37342, 37343 (CALI); Dhony, Joseph 17231 (MH), Sabu 39108 (CALI); Parambikulam, Sebastine 14608 (MH).

Curcuma zedoaria (Christm.) Rosc., Trans. Linn. Soc. 8: 354. 1807 & Menandr., Pl. t. 109. 1825; Baker in Hook. f., Fl. Brit. India 6: 210. 1890; Trimen, Handb. Fl. Ceylon 4: 241. 1898; Schum. in Engler Pflanzenr. 4 (46): 110. 1904; Cooke, Fl. Pres. Bombay 2: 732. 1907; Fischer, Rec. Bot. Surv. India 9: 177. 1821 & in Gamble, Fl. Pres. Madras 8: 1482. 1928 ('*C. zedoaria*');

Ridley, Fl. Malay Pen. 4: 254. 1924; Holttum, Gard. Bull. Singapore 13: 71. 1950; Burtt & Smith, Notes Roy. Bot. Gard. Edinburgh 31: 226. 1972; Rao. & Verma, Bull. Bot. Surv. India 14: 122. 1972, Burtt, Gard. Bull. Singapore 30: 59. 1977 & in Mani., Bot. Hist. Hort. Malab. 144. 1980; Burtt & Smith in Dassan., Rev. Handb. Fl. Ceylon 4: 501. 1983; Nicols. *et al.*, Inter. Hort. Malab. 317, 1988.

Iconotype: *Kua*. Rheede, Hort. Malab. 11: 13, t. 7. 1692.

Amomum zedoaria Christm. in Christm. & Panzer. Linn. Pflanzensyst. 5: 12. 1779.

Curcuma zerumbet Roxb., Asiat. Res. 11: 332. 1810 & Pl. Corom. 3: t. 201. 1819 & Fl. Ind. 1: 20. 1820.

Type: As for *C. zedoaria*.

Vernacular names: Kan. *Kanchora* Mal. *Kachuri Kizhangu*; Tam. *Kichchlik-kishangu*; Tel. *Kuchur*, *Kichchiligaddala*.

(Fig. 1. A, 5. D-G)

Rhizome large, 5–8 × 7–9 cm, broadly ovoid, with smell of camphor, yellow to deep yellow inside; sessile tubers 3 cm thick, branched; roots many, thick and fleshy; root tubers 5 × 2 cm, fusiform, fleshy, pearl white inside. Leafy shoots 80–100 cm tall. Leaves 4–6, distichous petiolate; petiole 45–50 cm; lamina 40–60 × 15–20 cm, oblong to oblong-lanceolate, purple coloured patch on the upper side along the whole length of the midrib, fading in older leaves, glabrous. Inflorescence lateral; peduncle 20–25 cm; spike 15–18 × 8–10 cm, with a distinct coma. Coma bracts 4–6, 9 × 4 cm, fused only at base, dark pink. Fertile bracts 20–25, 5 × 4 cm, ovate, tip recurved, lower half fused, green with pink margin. Bracteoles 1.5–2 × 0.5–1 cm, white, inner smaller. Flowers almost equal to the bracts, 4–5 in each bract. Calyx 1 cm long, 3-lobed at the tip, deeply split on one side, greenish-white, pubescent. Corolla tube 2.5–3 cm, funnel-shaped, white with pinkish tinge; dorsal lobe 1.5 × 1.2 cm, broadly triangular, hooded; lateral lobes narrower. Labellum 1.5–2 cm wide, shortly 3-lobed, middle lobe emarginate, pale yellow with a deep yellow band. Lateral staminodes 1.4 × 0.8 cm, oblong, pale yellow. Anther-thecae 6 mm long, connective not produced into a crest, spurred. Epigynous glands two, 3 mm long, linear. Ovary 4 mm, tricarpeal, trilocular, ovules many on axile placenta, pubescent. Style long, filiform; stigma bilipped. Fruit ovoid, smooth, dehiscing irregularly.

Cytology: 2n = 63, 64 (Chakravorti, 1948; Ramachandran, 1969; Venkatasubban, 1946).

Distribution: Cultivated and naturalized throughout India and S. E. Asia.

Ecology: It grows in shade along the margins of forests, at high altitudes.

Flowering: April-May. **Fruiting:** May-July.

Uses: The fresh root is considered to be cooling and diuretic. It checks leucorrhoeal and gonorrhoeal discharges and purifies blood. The juice of the leaf is given in dropsy (Rheede, 1692).

Employed in ayurvedic medicines as a stomachic. and also applied to bruises and sprains. In colds, a decoction with long pepper, cinnamon and honey is reported to be good.

Specimens examined: KARNATAKA: Shimoga Dt.: Hulical Ghat, *Bhat* 1974 (PPCH). S. Kanara Dt.: Udupi, *Bhat* 1973 (PPCH). KERALA: Kannur Dt.: Taliparamba, *Anonymous* 83058 (MH). Kollam Dt.: Nilamel, *Sabu* 37379 (CALI). Kottayam Dt.: Vandiperiyar, *Vivekanandan* 24323 (MH). Malappuram Dt.: Calicut Univ. Bot. Gard. *Sabu* 10364 (CAL, & E). Palakkad Dt.: Anamalais, *Fischer* 3356 (FRC); Dhoni, *Fischer* 1975 (CAL). Pathanamthitta Dt.: Sabarigiri *Sabu* 37315 (CALI). Wynad Dt.: Thirunelly, *Sabu* 39171 (CALI). Without specific locality: Peninsular India, *Wight* 2807 (CAL).

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