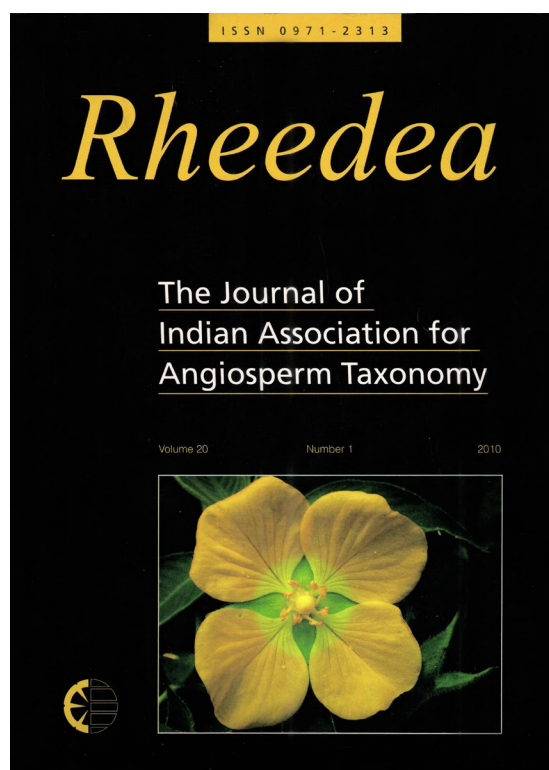




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The tribe Rhynchosporeae (Cyperaceae) in India

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Abstract

The tribe Rhynchosporeae (Nees) is represented by 4 genera and 11 species in India. A detailed taxonomic account of its members is provided here.

Keywords: *Cladium*, Cyperaceae, India, *Machaerina*, *Rhynchospora*, Rhynchosporeae, *Schoenus*

Introduction

Nees (1835) classified Cyperaceae into 9 tribes viz., Cypereae, Hypolytraeae, Chrysitricheae, Scirpeae, Rhynchosporeae, Cladieae, Sclerieae, Elyneae and Cariceae. Clarke (1893 – 1894) in Hooker's Flora of British India divided Cyperaceae into 4 suborders viz., Cypereae, Hypolytraeae, Sclerieae and Cariceae and included tribe Rhynchosporeae within the suborder Cypereae. He reported 7 genera viz., *Cladium* P. Browne (5 species and 1 variety), *Gahnia* J.R. & G. Forst. (1 species), *Lepidosperma* Labill. (1 species and 1 variety), *Microschoenus* C.B. Clarke (1 species), *Remireia* Aubl. (1 species), *Rhynchospora* Vahl (11 species) and *Schoenus* L. (1 species) for the tribe in British India. Present study reveals that tribe Rhynchosporeae is represented by 4 genera viz., *Cladium* P. Browne (1 species), *Rhynchospora* Vahl (8 species), *Machaerina* Vahl (1 species) and *Schoenus* (1 species) in India.

Cladium P. Browne is represented in India by *C. mariscus* (L.) Pohl. *C. riparium* (Nees) Benth. var. *crassa* (Thwaites) C.B. Clarke an earlier reported variety has been merged with *Machaerina rubiginosa* (Spreng.) T. Koyama. Simultaneously, *C. riparium* (Nees) Benth. var. *crassum* (Thwaites) C.B. Clarke has been elevated to subspecies under *Machaerina rubiginosa* by Koyama (1980) which has also been merged with *M. rubiginosa* (Spreng.) T. Koyama.

Rhynchospora Vahl is represented in India by 8 species. Clarke (1893 – 1894) reported 11 species from British India, out of which *R. malasica* C.B. Clarke and *R. triflora* Vahl from Malaya Peninsula and Ceylon (Sri Lanka) respectively are not treated in the present work. *R. griffithii* Boeck. and *R. sikkimensis* C.B. Clarke are treated as synonymous to *R. rugosa* (Vahl) Gale. *R. submarginata* Kük. not included in

Hooker's Flora of British India is found to occur in India.

Schoenus L. is represented in India only by *S. calostachyus* R. Br. This species was earlier known from Malesian Islands. Sreekumar (1999) reported its occurrence for the first time from Andaman & Nicobar Islands.

Tribe Rhynchosporeae Nees

Nees in Linnaea 9: 294. 1834.

Culms terete or trigonous, solid or hollow. Leaves tristichous or distichous. Inflorescence paniculate or capitate. Spikelets 1 – 3-flowered. Glumes many; lower 1 – 4 sterile; terminal ones either sterile or with a male flower, the remaining fertile glumes with bisexual flowers. Rachilla straight or anfractuous. Perianth absent or represented by 3 – 6 rigid or delicate, antrorsely scabrid bristles. Style undivided or deeply bifid or divided into 3 branches, dilated or rarely dilated at base, caducous. Style-base fused with the nut or persistent on the nut, conical or subulate. Nuts ovoid, obovoid, ellipsoid or oblong, terete, trigonous or triquetrous, rugulose, papillose, setulose or glabrous, smooth or 3-ribbed.

Key to the genera

1. Culms hollow; nuts drupaceous, borne on a disc **Cladium**
1. Culms solid; nuts neither drupaceous nor borne on a disc **2**
2. Glumes spiral; styles articulate with the ovary; style-base dilated and persistent on the nut **Rhynchospora**

2. Glumes distichous; styles continuous with the ovary; style-base neither dilated nor persistent on the nut3
3. Leaves distichous; internodes of rachilla nearly uniform in length.....**Machaerina**
3. Leaves tristichous; internodes of rachilla vary in length between lower (empty) and upper glumes.....**Schoenus**

Cladium P. Browne

P. Browne, Civ. Nat. Hist. Jamaica: 114. 1756. - Type: non designatus (Farr *et al.*, 1979).

Cladium sect. *Eucladium* Benth. in Bentham & Hooker, Gen. Pl. 3: 1065. 1883; Pax in Engler & Prantl, Nat. Pflanzenfam. 2, 2: 116. 1888.

Cladium subg. *Eucladium* C.B. Clarke in Hooker, Fl. Brit. India 6: 673. 1894; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 43. 1989.

Stoloniferous perennials. Culms terete, noded, hollow. Leaves flat, linear, caudate-acuminate, prickly on margins and keel. Inflorescence paniculate, with several axillary, corymbiform, branched, partial panicles, solitary or in pairs in the axils of leafy bracts; apex of the terminal branches with 3 – 15 sessile spikelets. Spikelets 2(or 3)-flowered, both flowers bisexual or one of them (the lower or the upper one) male. Glumes imbricate; lowest 2 – 4 sterile, next 1 – 3 contain unisexual or bisexual flower. Hypogynous bristles absent. Stamens 2 or 3, free; anthers linear. Style linear, dilated at base, fused with nut, 3-branched. Nut ovoid or conical, truncate at base, inserted on a saucer-shaped disc.

Cosmopolitan, 3 species; 1 species in India.

Cladium mariscus (L.) Pohl, Tent. Fl. Bohem.: 32. 1809; Clarke in Hooker, Fl. Brit. India 6: 673. 1894 p.p. (excl. sp. *C. jamaicense*); Stewart in Bull. Bot. Surv. India 9: 157. 1967; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 43. 1989. *Schoenus mariscus* L., Sp. Pl. 1: 42. 1753. **Fig. 1**

Type: "Habitat in Europae paludibus" (Lectotype, LINN 68.1, image, LINN!).

Cladium chinense Nees ex Hook. & Arn., Bot. Beech. Voy.: 227. 1841.

C. jamaicense Crantz subsp. *chinense* (Nees) T. Koyama in Hara *et al.*, Enum. Fl. Nepal. 1: 105. 1978, *syn. nov.*

Type: Habitat in China, in and around Macao and in adjacent islands, G.H. Vachell 59.

Perennial herbs, up to 1 m high. Culms terete, smooth, hollow. Leaves cauline, spiral throughout

the culm; blades flat, linear, 20 – 60 × 0.5 – 0.7 cm, gradually tapering into a long-acuminate apex; midrib (ventral) and margins sharply scabrous; sheath strongly clasping the culm, persistent; sheath-mouth truncate, eligulate. Inflorescence paniculate, comprising many distant, compound anthelodiums, 8 – 10 × 10 – 12 cm, ending with cluster of spikelets. Spikelets 3 – 10(– 14) in each cluster, oblong-lanceolate when young, ovoid or ellipsoid at maturity, 3 – 4 × 1.5 – 2 mm, acute. Glumes 5 or 6, broadly ovate, obtuse, membranous; lower 2 or 3 glumes sterile, 1 – 1.5 mm long; fertile glumes 2 – 4 mm long. Nut terete, 2 – 4 × 1.3 – 2 mm, acuminate, smooth, glossy, dark brown; style-base ovoid, fused into nut.

Flowering & Fruiting: June – July.

Distribution: India (Jammu & Kashmir), Africa, Asia, Central America, Europe, Madagascar Region, Pacific Islands (except NW Pacific), South America (Western and Southern) and USA (S. West, S. Central and S. Eastern).

Specimens examined: INDIA, **Jammu & Kashmir**, Srinagar, 1585 m, 14.9.1876, C.B. Clarke 29075 (CAL); Kashmir, Nil Nag lake, 2000 m, 11.6.1959, T.A. Rao 9398 (BSD).

Notes: The genus *Cladium* exhibits polymorphism. Kükenthal (1942), recognized 3 subspecies, viz., subsp. *mariscus*, subsp. *jamaicense* Crantz (including *C. leptostachyum* Nees *et* Meyen and *C. chinense* Nees) and subsp. *intermedium* Kük. Blake (1943), recognised 5 species, viz., *C. leptostachyum* Nees *et* Meyen, *C. mariscus* (L.) Pohl, *C. procerum* S.T. Blake, *C. chinense* Nees and *C. jamaicense* Crantz. Kern (1974), opined that there is no sharp line of demarcation among Blake's species and followed Kükenthal's (*l.c.*) treatment. Koyama (1978) reduced *C. chinense* Nees to subspecies under *C. jamaicense* Crantz. He opined that the species described by Clarke (1894) in Flora of British India is *C. jamaicense* subsp. *chinense* (Nees) T. Koyama. However, the diagnostic character as given by Koyama (*l.c.*) shows that *C. jamaicense* Crantz is distinguished from *C. jamaicense* subsp. *chinense* only by the length of the nut i.e., *c.* 2.5 mm in the former and 1.8 – 2 mm in the latter. Critical observation of available specimens reveals that the length of the nut varies between 2 and 3 mm and therefore, *C. jamaicense* subsp. *chinense* (Nees) T. Koyama is treated synonymous to *C. mariscus* (L.) Pohl subsp. *mariscus* in the present study. The Indian plant, reported only from Kashmir is characterized by terete culm and compact partial inflorescences with 3 – 10(– 14) spikes in each cluster. It is identical with the type specimen of

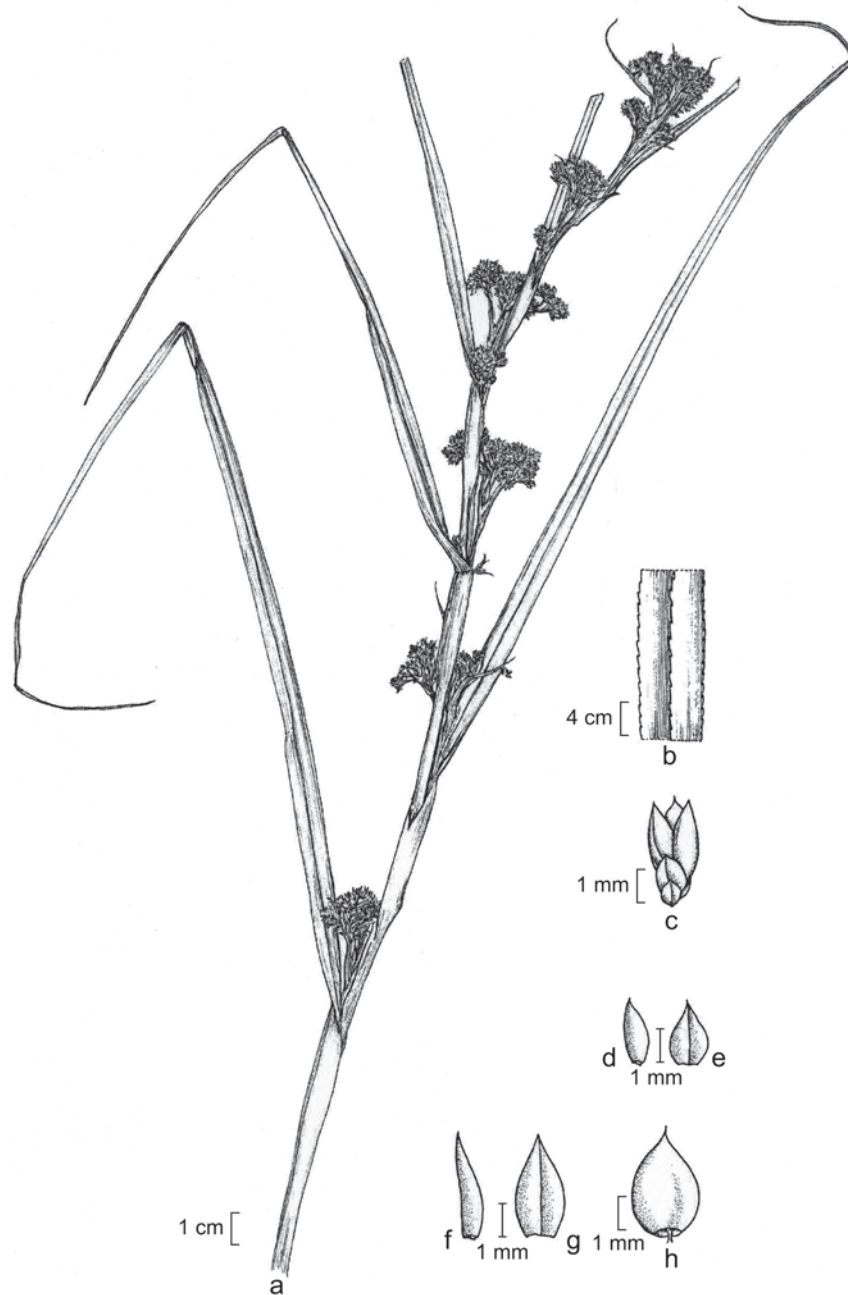


Fig. 1. *Cladium mariscus* (L.) Pohl: a. Inflorescence; b. Portion of leaf-blade; c. Spikelet; d, e. Sterile glume, lateral and spread out views; f, g. Fertile glume, lateral and spread out views; h. Nut (T.A. Rao 9398, BSD).

C. mariscus and concurs with the diagnostic characters given in the protologue, i.e., *Culmo tereti, corymbis confertis, floribus fasciculatis* (Culm terete, corymbs crowded, with clustered flowers) and therefore, following Kükenthal (*l.c.*), it is identified as *C. mariscus* (L.) Pohl subsp. *mariscus*.

Machaerina Vahl

Vahl, Enum. Pl. 2: 238. 1806; Rao & Verma, Cyperaceae N.E. India: 52. 1982; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 62. 1989.

Type: *Machaerina restioides* (Sw.) Vahl (*Schoenus restioides* Sw.)

Cladium sect. *Baumea*, *Vincentia* Benth. *et* Hook.f., Gen. Pl. 3: 1065. 1883.

Cladium subg. *Machaerina*, *Vincentia*, *Baumea* C.B. Clarke in Bull. Misc. Inform. (Addit. Ser.) 8: 124. 1908.

Perennial herbs, rhizomatous. Culms tufted, ancipitous or biconvex, usually smooth, rarely asperulous, pithy, sometimes transversely septate. Leaves distichous, smooth, sometimes asperous,

rarely transversely septate; blades sometimes much-reduced, eligulate. Inflorescence paniculate; panicle branches often in fascicles and branchlets zigzag. Bracts sheathing with short blades. Spikelets clustered, ovate-lanceolate, compressed, 1 to several-flowered; rachilla persistent, straight, with very short internodes. Glumes distichous, subtended by 1 or 2 transverse bracts, keeled, the lower 1 – 4 empty, the fertile female flower bearing bract is the largest, the uppermost usually small, either empty or with a male flower. Hypogynous bristles usually absent, rarely consisting of up to 6 capillary, antrorsely scabrid bristles. Stamens (1 or 2) – 3; filaments free; anthers linear. Style continuous with the ovary; style-base prominently incrassate, conical or pyramidal, often hairy, persistent on the fruit. Nut ovoid, ellipsoid or oblong-ellipsoid, almost terete to triquetrous, stipitate or sessile, smooth or rugulose, crowned by the adnate base of the style which is sometimes indistinguishable except for a slight discoloration.

Tropics, c. 50 species; 1 species in India.

Machaerina rubiginosa (Spreng.) T. Koyama in J. Fac. Sci. Univ. Tokyo, Sect. 3(8): 123. 1961; Rao & Verma, *Cyperaceae N.E. India*: 52, ff. 38a – c. 1982; Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 62. 1989. *Fuirena rubiginosa* Spreng., *Mant. Prim. Fl. Hal.*: 29. 1807.

Type: Habitat in Nova Zeelandia (B, destroyed).

Chapelliera riparia Nees, *Pl. Preiss.* 2: 76. 1846.

Baumea crassa Thwaites, *Enum. Pl. Zeyl.*: 353. 1864.

Cladium riparium (Nees) Benth. var. *crassa* (Thwaites) C.B. Clarke in Hooker, *Fl. Brit. India* 6: 675. 1894 & *Ill. Cyper.*: t. 85, ff. 5 – 8. 1909; Prain, *Bengal Pl.* 2: 1134. 1903 [2: 854. 1963 (Repr. ed.)].

C. crassum (Thwaites) Kük. in *Bull. Jard. Bot. Buitenzorg Ser. 3*, 16: 311. 1940.

Machaerina crassa (Thwaites) T. Koyama in *Bot. Mag. (Tokyo)* 69: 63. 1956.

M. riparia (Nees) T. Koyama in *Bot. Mag. (Tokyo)* 69: 65. 1956.

M. rubiginosa (Spreng.) T. Koyama subsp. *crassa* (Thwaites) T. Koyama in *Bot. Mag. (Tokyo)* 93: 352. 1980 & in Dassan. & Fosberg, *Rev. Handb. Fl. Ceylon* 5: 331. 1985.

Schoenus rubiginosus Sol. ex G. Forst., *Fl. Ins. Austr.*: 89. 1786, nom. nud.

Type: Shillong, Khasia, 5000 ft., C.B. Clarke s.n. (CAL!).

Culms tufted, compressed-biconvex to subterete. Leaves distichous, spongy; basal leaves shorter or

as long as the culm, biconvex with obtuse edges to subterete, smooth, pungent. Panicles erect, narrow, (10 –) 25 – 40 cm long, with 3 – 5 (– 7) fascicles of branches; lower branches distant, often solitary; upper ones 2 – 4 together, approximate. Spikelets usually clustered, ovate-lanceolate, 5 – 6 mm long, 2 or 3-flowered, maturing into 1 (or 2) nuts. Glumes 5, distichous, ovate-lanceolate, long-ciliate, those of fertile flowers 5 – 6 mm long. Style-base swollen, continuous with the nut, persistent, villous. Nut sessile, ellipsoid or oblong-ellipsoid, 3 – 4 mm long, smooth, crowned by the style-base which is sometimes discernible by slight discoloration.

Distribution: India (Meghalaya), Australia, Bangladesh, Indonesia (Java, Maluku and Sumatra), Madagascan Region, Malaysia, New Zealand, Philippines, SW Pacific Islands (New Caledonia and New Guinea), Sri Lanka and Vietnam.

Specimen examined: INDIA, **Meghalaya**, Shillong, 1524 m, C.B. Clarke 38228 B (CAL).

Notes: *Machaerina rubiginosa* (Spreng.) T. Koyama till date is represented in Indian herbaria by a single specimen collected by Clarke from lakes situated at an elevation of 5000 ft (1524 m) in Shillong, Meghalaya. Clarke (*l.c.*), opined that this species might be an “introduced” one from Bangladesh as it is also found in “Soondreban” (Lower Burisal), which is a part of Bangladesh. Due to deforestation and habitat destruction in Khasia hills, this species might have become rare or possibly extinct from Meghalaya. Intensive field survey is necessary to assess the status of this species in India. As the specimen deposited at CAL is a very old, inner details of the spikelets cannot be studied in detail, hence, only the photograph of this species is provided in the present work and the description is partially based on Rao & Verma (1982).

Koyama (1985) distinguished subsp. *crassa* by dense narrow panicle interrupted by partial panicles, wider leaves 3.5 – 11 mm in length and achenes 4 – 5 mm long including beak (in typical subspecies inflorescence is subglobose/narrow having partial panicles, leaves are up to 5 mm wide and achenes 3 – 4 mm long). Therefore, present study reveals that subsp. *crassa* falls within the variability of typical subspecies and supports Govaerts & Simpson (2007). Hence, *M. rubiginosa* subsp. *crassa* (Thwaites) T. Koyama is treated as synonymous to *M. rubiginosa* (Spreng.) T. Koyama.

Rhynchospora Vahl, nom. & orth. cons.

Vahl, *Enum. Pl.* 2: 229. 1806 (*‘Rynchospora’*; corr. Willd., *Enum. Pl.*: 71. 1809); Bentham in Bentham & Hooker, *Gen. Pl.* 3: 1058. 1883; Pax in Engler &

Prantl, Nat. Pflanzenfam. 2, 2: 116. 1887; Clarke in Hooker, Fl. Brit. India 6: 668. 1893; Kükenthal in Bot. Jahrb. Syst. 74: 375. 1949; Verma & Veena Chandra in Bull. Bot. Surv. India 22(4): 126. 1982; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 67. 1989; Prasad & Singh in J. Econ. Taxon. Bot. (Addit. Ser.) 21: 290. 2002.

Type: *Rhynchospora alba* (L.) Vahl (*Schoenus albus* L.).

Perennials or annuals. Culms usually tufted, rarely solitary, erect, more or less trigonous, sometimes almost terete. Leaves basal and/or cauline; blades linear, flat or canaliculated; sheaths closed without ligule; sheath-mouth sometimes with a scarious appendage opposite leaf blade. Inflorescence paniculate, consisting of terminal or axillary corymbiform anthelas or capitate, consisting of a solitary, terminal, subglobose head; bracts foliaceous. Spikelets sessile or pedunculate, solitary or in clusters, lanceolate or ovate, terete or flat, usually few-flowered. Rachilla straight, sometimes anfructuose. Glumes 5–8, spiral or subdistichous, imbricate, keeled, chartaceous, 1-nerved; the basal 2 or 3 glumes empty, the remaining ones bearing an axillary flower; the uppermost glume often empty. Flowers all bisexual, or the lowest flower bisexual and the upper ones male or sterile, or the lowest flower female and the upper one(s) male. Perianth-bristles in bisexual and female flowers 3–6, antrorsely scabrid, in male flowers absent or few. Stamens 1–3; anthers linear with shortly produced connective. Style slender, articulate with the ovary, almost undivided to deeply bifid, dilated at base; style-base persistent on the nut, compressed-conical or subulate. Nut sessile or shortly stipitate, obovate, elliptic or oblong, smooth or transversely rugulose, papillose, setulose or glabrous.

Cosmopolitan, *c.* 250 species; 8 species in India.

Key to the subgenera

1. Style undivided or very shortly bilobed
..... subg. **Haplostylis**
1. Style deeply bifidsubg. **Rhynchospora**

Subgenus: **Haplostylis** (Nees) Pax

(Nees) Pax in Engler & Prantl, Nat. Pflanzenfam. 2, 2: 116. 1887; Kükenthal in Bot. Jahrb. Syst. 74: 387. 1949 (*Haplostyleae*). *Haplostylis* Nees in Edinburgh New Philos. J. 17 (n. 34): 265. 1834. Ser. *Haplostyleae* Benth. in Bentham & Hooker, Gen. Pl. 3: 1059. 1883; Clarke in Hooker, Fl. Brit. India 6: 668. 1893 & in Bull. Misc. Inform. (Addit. Ser.) 8: 117. 1908.

Key to the sections

1. Inflorescence paniculate; lowest flower bisexualsect. **Longirostres**
1. Inflorescence a single, terminal globose or subglobose head; lowest flower female
.....sect. **Haplostylis**

Section: **Longirostres** Kunth

Kunth, Enum. Pl. 2: 292. 1837; Kükenthal in Bot. Jahrb. Syst. 74: 408. 1949. Div. *Calyptrostylis* sect. *Aureae* C.B. Clarke in Bull. Misc. Inform. (Addit. Ser.) 8: 118. 1908.

Key to the species

1. Style-base prominently grooved on both sides; nut truncate at apex, 3.5–4 mm long, irregularly rugulose**R. corymbosa**
1. Style-base entire; nut constricted into a striate, reddish brown neck at apex, 5–6 mm long, smooth**R. hookeri**

Rhynchospora corymbosa (L.) Britton in Trans. New York Acad. Sci. 11: 84. 1892; Fischer in Gamble, Fl. Madras 9: 1672. 1931 (3: 1160. 1957); Kükenthal in Bot. Jahrb. Syst. 74: 410. 1949; Verma & Veena Chandra in Bull. Bot. Surv. India 22(4): 131, f. 6a–b. 1980 (1982); Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 67. 1989; Prasad & Singh in J. Econ. Taxon. Bot. (Addit. Ser.) 21: 291. 2002. *Scirpus corymbosus* L., Cent. Pl. 2: 7. 1756. **Fig. 2**

Type: Habitat in India, Linn. No. 71.48 (Lectotype: image, LINN!).

Rhynchospora aurea Vahl, Enum. Pl. 2: 229. 1806; Clarke in Hooker, Fl. Brit. India 6: 670. 1893.

Type: No specimen cited.

Perennial herbs. Culms solitary or few together, stout, erect, triquetrous, smooth or scaberulous on the angles upwards, multistriate, 75–120 (–180) cm high. Leaves basal and cauline; blades flat, broadly linear, 20–70 × 0.8–1.5 cm, long-acuminate, rigid, subcoriaceous, scabrid on margins and the midrib beneath; sheath-mouth of the cauline leaves with a scarious 2–3 mm long, obtuse appendage opposite the leaf-blade. Inflorescence paniculate, 10–35 cm long, consisting of 2–5 distant corymbiform anthelas; anthelas compound, diffuse, with many 10–12 cm long primary rays; secondary rays up to 3 cm long; terminal anthela 10–15 × 10–15 cm; lateral anthelas 5–7 × 4–6 cm. Involucral bracts 4–6, foliaceous, 10–30 × 0.5–1 cm. Spikelets numerous, pedicelled

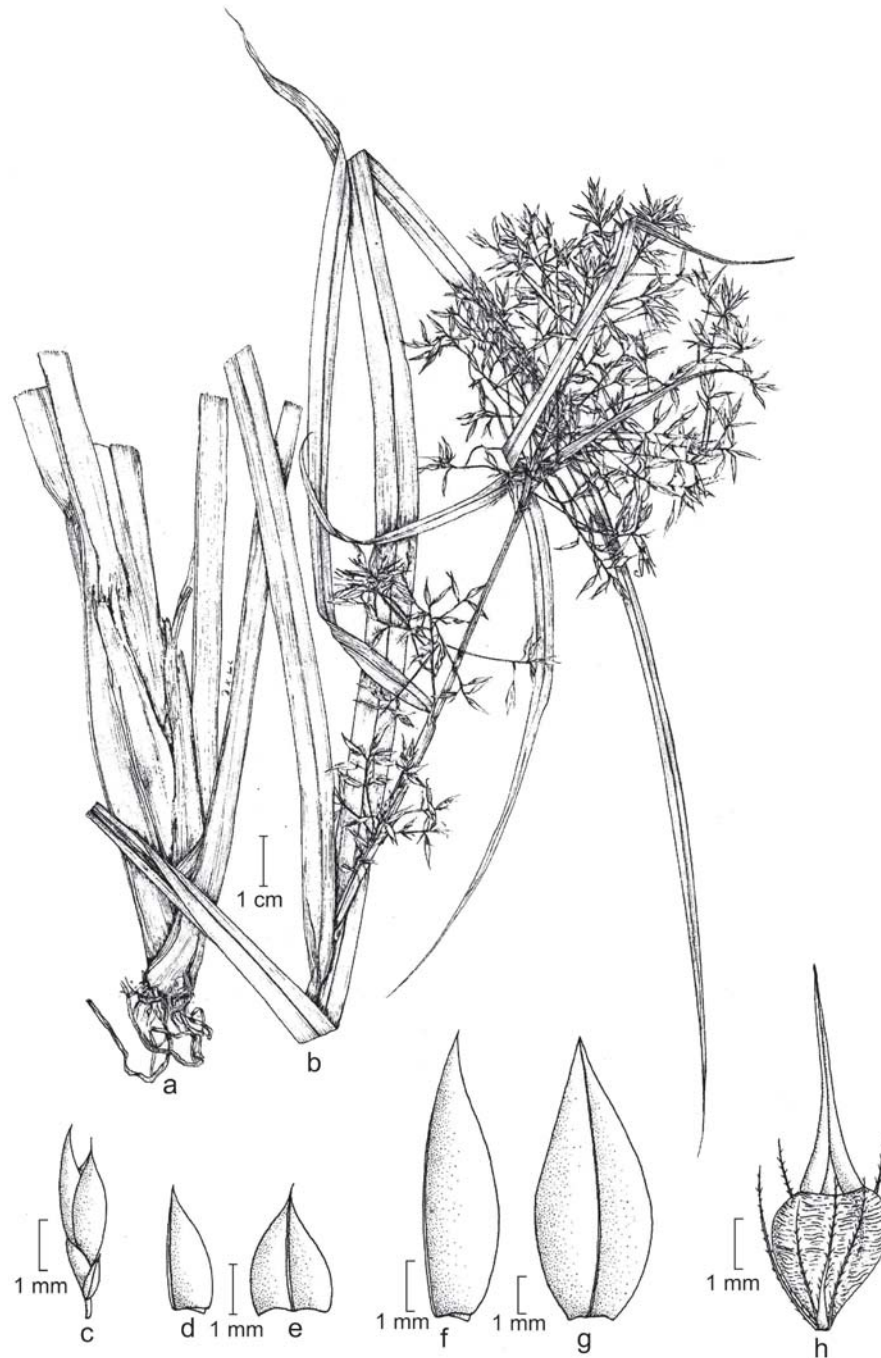


Fig. 2. *Rhynchospora corymbosa* (L.) Britton: a. Habit; b. Inflorescence; c. Spikelet; d, e. Sterile glume, lateral and spread out views; f, g. Fertile glume, lateral and spread out views; h. Nut with style-base and bristles (*Sangita Dey 9909, CAL*).

(pedicel 1.8 – 2 mm long), lanceolate, 9 – 10 mm long, acute, 2 or 3-flowered. Lowest flower bisexual; upper one(s) male. Glumes 5 or 6, subdistichous; sterile glumes ovate-oblong, 2.5 – 3 mm long, mucronate; fertile glumes broadly ovate, 6 – 7 mm long, acute. Bristles in the bisexual flower 6, 3 – 5 mm long, antrorsely scabrid, brown; those of the staminate flowers 3, 1 – 3 mm long. Stamens 3; anthers linear, 2 – 2.5 mm long. Style almost

undivided to shortly bilobed at apex; style-base elongated-conical, 4 – 5 mm long, compressed, prominently grooved on both sides, smooth or asperulous. Nut obovate, compressed, 3.5 – 4 × 2 – 2.5 mm, truncate at apex, irregularly rugose; epidermal cells isodiametric.

Flowering & Fruiting: Throughout the year.

Habitat: Marshy habitats.

Chromosome No.: $2n = 18$ (Kumar & Subramaniam, 1986).

Distribution: India (except northern plains), Australia (Queensland and New South Wales), Bangladesh, Borneo, Caribbean, Indonesia (Java, Maluku, Sulawesi and Sumatra), Madagascan Region, Malaysia, Mexico, Myanmar, Philippines, South America, SC China, SW Pacific Islands (Papua New Guinea), Sri Lanka, Taiwan, Thailand, Tropical Africa (except S. Tropical Africa) and Vietnam.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Andamans, 1862 – 1863, *Helper* 6275; Nicobar Islands, Kamorta, February 1875, *S. Kurz s.n.* (CAL). **Assam**, Goalpara, December 1885, *G. Man* 25; Holtugaon, 11.1.1933, *Dina Nath* 10462; Sadiya, 23.7.1935, *G.K. Deka* 15926; Kamrup, Burni, 25.10.1935, *G.K. Deka* 12629 (ASSAM). **Karnataka**, N. Kanara, Yellapore, 1.10.1884, *W.A. Talbot* 1045 (CAL); Belgaum, Anmod, 900 m, 9.12.1969, *C.J. Saldanha* 3514 (JCB); Belgaum, Nerse, 30.10.2007, *Sangita Dey* 9929 (CAL). **Kerala**, Trichur, Parambicum submergible area, 607 m, 14.2.1963, *K.M. Sebastine* 15657 (CAL); Kottayam, Thekkadi, 875 m, 29.5.1965, *K. Vivekananthan* 24384 (MH); Calicut, Kutiyadi submergible area, 190 m, 25.6.1965, *B.D. Naithani* 24626; Tiruvananthapuram, TBGRI campus, 600 m, 8.10.2004, *Sangita Dey* 9908. **Manipur**, Tihirighat, 457 m, November 1907, *A. Meebold* 5727 (CAL). **Meghalaya**, Silchar, 14.5.1868, *C.B. Clarke* 7005 (CAL); K & J hills, on the way to Sonapur within 2 miles from the main road Shillong to Guwahati, 16.11.1956, *G. Panigrahi* 4460 (ASSAM, CAL); Mount Khasia, *s. die*, *Hooker & Thomson s.n.* (CAL). **Nagaland**, Naga Hills, June 1935, *N.L. Bor* 21276 (ASSAM). **Sikkim**, towards Madregeora, 27.10.1868, *S. Kurz s.n.* (CAL). **Tamil Nadu**, Madurai, Upper camp Suranganar, Cambum Valley, 750 m, 31.6.1959, *K. Subramanyam* 8111 (CAL); Namakkal, Kolli hills, Pongal Kovil Shola, 1250 m, 10.8.1976, *K.M. Matthew & V. Alphonse Amalraj* 2999 (RHT); Nilgiri, Nadugani-Gudalur forest, 825 m, 20.11.1972, *E. Vajravelu* 42858 (MH); Tirunelveli, Way to Inchikuzhi, 750 m, 29.8.1963, *A.N. Henry* 17357; Pothiadikalai forest, 650 m, 23.4.1990, *R. Gopalan* 93215 (MH).

Note: A large sedge easily recognised by its densely corymbose branches is a common member of the tropical sedge marshes.

Rhynchospora hookeri Boeck. in *Linnaea* 37: 621. 1873; Clarke in *Hooker, Fl. Brit. India* 6: 671. 1893; Kükenthal in *Bot. Jahrb. Syst.* 74: 427. 1949; Verma & Veena Chandra in *Bull. Bot. Surv. India* 22(4): 130, ff. 5a – c. 1982; Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 67. 1989.

Type: *Hook. et Thoms. Herb. Ind. Or.*, India Orient., Mt. Khasia (CAL!).

Perennial. Culms trigonous, striate, glabrous and smooth, 60 – 90 cm high. Leaves basal, few cauline; blades linear, $20 - 35 \times 0.6 - 0.9$ cm, scabrous at margin, gradually tapering to a long-acuminate apex, rigid, coriaceous; sheath-mouth of the cauline leaves with a scarious, obtuse, 1.8 – 2 mm long appendage, opposite leaf-blade. Inflorescence consists of 4 or 5 distant corymbiform anthelas, 10 – 20 cm long; terminal anthela much branched with slender, up to 10 cm long rays; secondary branches 4 – 5 cm long. Involucral bracts leaf-like, $7 - 16 \times 0.5 - 0.6$ cm. Spikelets in clusters of 3 – 6, bisexual, sessile, ovate-lanceolate, 7 – 8 mm long, acute. Glumes ferruginous; sterile glumes ovate-oblong, 3 – 3.5 mm long, mucronate; fertile glumes broadly ovate, 4.8 – 5 mm long, acute, concave. Bristles in the bisexual flower 6, 4 – 5 mm long, antrorsely scabrid, ferruginous. Style-base conical-subulate, 2.8 – 3 mm long, subtorose at base, smooth or slightly scaberulous. Nut obovate to suborbicular, $5 - 6 \times 2 - 3$ mm, attenuate at base, apex constricted into a striate, hispidulous, reddish brown, cylindrical neck, densely punctulate, shining brown to almost black; epidermal cells isodiametric.

Flowering & Fruiting: August – September.

Habitat: On hill slopes and along roadsides.

Distribution: India (Assam, Bihar, Jharkhand, Meghalaya, Nagaland, Uttar Pradesh and West Bengal), Bangladesh, Indonesia (Java), Malaysia, Myanmar, Thailand and Vietnam.

Specimens examined: INDIA, **Assam**, *s. die*, *Jenkins s.n.* (CAL). **Meghalaya**, Mont. Khasia, *Hooker & Thomson s.n.* (CAL). **Nagaland**, Naga hills, *s. die*, *N.L. Bor* 22287 (ASSAM). **Uttar Pradesh**, Kheri district, Chandan Chowki, 9.8.1979, *J.K. Maheswari* EBH-96 (LWG).

Notes: *R. hookeri* is morphologically similar to *R. corymbosa* as both have corymbose inflorescences but corymbiform anthelas of *R. hookeri* are loosely branched in contrast to *R. corymbosa* which has diffusely branched dense anthelas. It occurs in Gangetic plains and extends up to Northeast India.

Section: Haplostylis Benth.

Benth. in *Bentham & Hooker, Gen. Pl.* 3: 1059. 1883; Clarke in *Hooker, Fl. Brit. India* 6: 669. 1893. Sect. *Sphaeroschoenus* C.B. Clarke in *Hooker, Fl. Brit. India* 6: 668. 1893.

Fig. 3

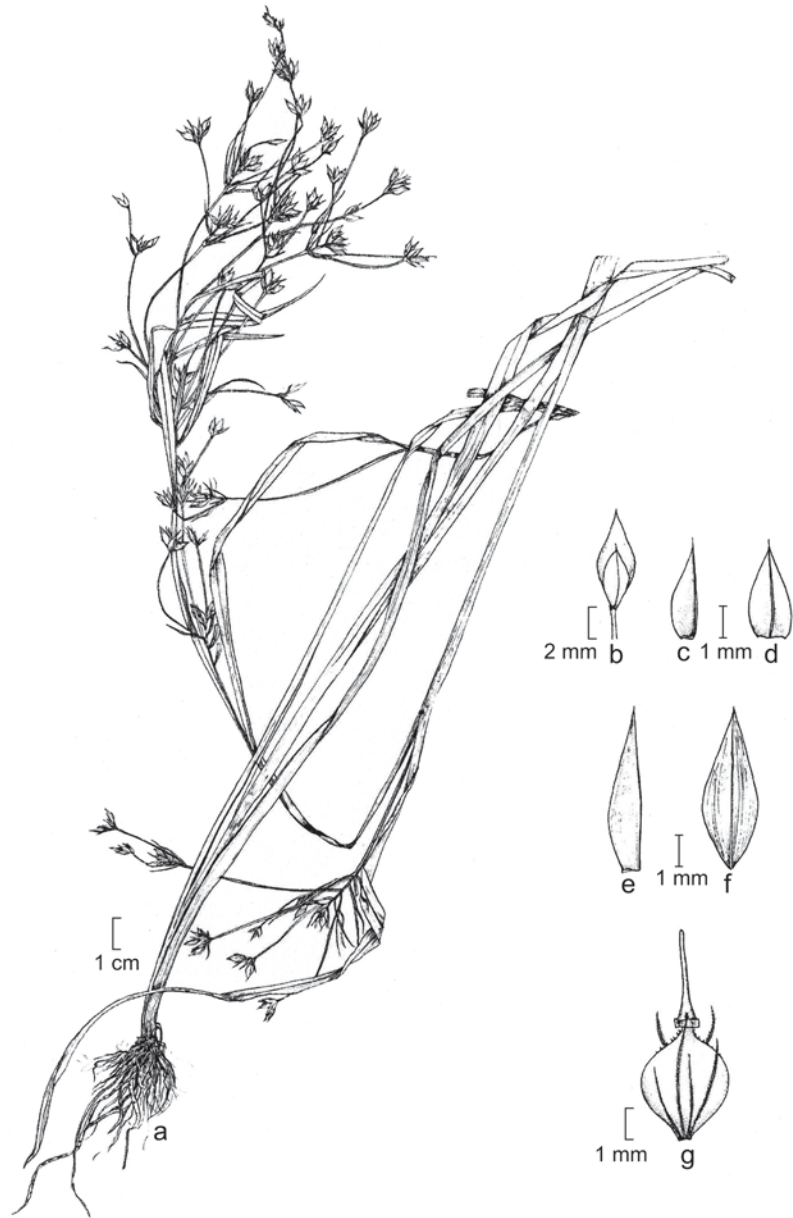


Fig. 3. *Rhynchospora hookeri* Boeck.: a. Habit; b. Spikelet; c, d. Sterile glume, lateral and spread out views; e, f. Female fertile glume, lateral and spread out views; g. Nut with style-base and bristles (*N.L. Bor* 22287, ASSAM).

- 1. Nuts obovoid; bristles usually distinctly shorter than the nut, sometimes as long as the nut or absent **R. rubra**
- 1. Nuts oblongoid; bristles always present, some of the bristles distinctly longer than the nut2
- 2. Spikelets 10 – 12 mm long; bristles prominently antrorsely scabrous in the upper half and plumose in the lower; style-base prominently grooved on both sides**R. longisetis**
- 2. Spikelets 5 – 7 mm long; bristles scabrous throughout; style-base terete3
- 3. Nuts papillose tuberculate; bristles exerted **R. wightiana**

3. Nuts setulose to almost glabrous; bristles included by the glumes **R. submarginata**

Rhynchospora longisetis R. Br., Prodr.: 230. 1810; Clarke in Hooker, Fl. Brit. India 6: 669. 1893 & in Ill. Cyper.: t. 65, f. 2. 1909; Kükenthal in Bot. Jahrb. Syst. 74: 488. 1949; Mooney, Suppl. Bot. Bihar Orissa: 152. 1950; Raizada, Suppl. Duthie's Fl. Gangetic Plain: 314. 1976; Verma & Veena Chandra in Bull. Bot. Surv. India 22: 134, ff. 8a, b. 1982; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 67. 1989.

Fig. 4

Type: *Nova Hollandia*, *Banks s.n.* (Holotype, BM 000901440, image, BM!).

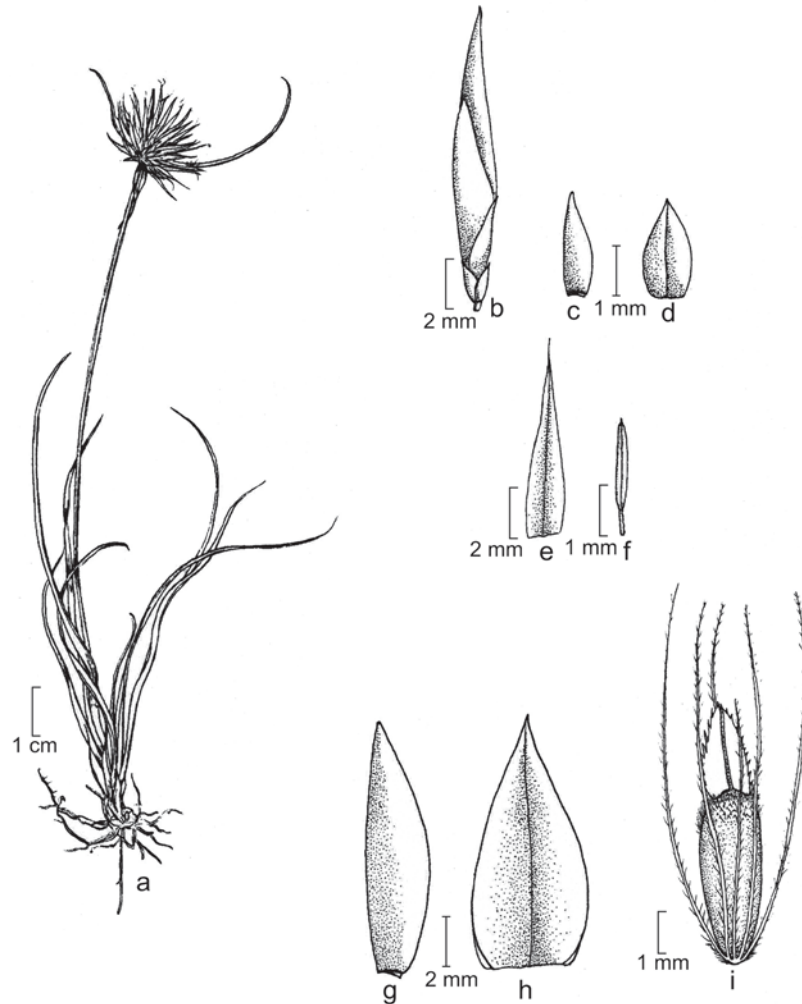


Fig. 4. *Rhynchospora longisetis* R. Br.: a. Habit; b. Spikelet; c, d. Sterile glumes; e. Male fertile glume; f. Stamen; g, h. Female fertile glume, lateral and spread out views; i. Nut with style-base and bristles (C. Sudhakar Reddy s.n., CAL).

Annual, erect herbs, with fibrous slender roots. Culms tufted, slender, 10–45 cm high, trigonous, striate, smooth. Leaves basal; blade linear, 6–20 × 0.1–0.3 cm, rigid, flat or conduplicate, scaberulous at margin, gradually tapering to a subacute apex; sheath-mouth truncate. Inflorescence a terminal, globose or semiglobose dense head, 1–2 × 2–2.5 cm; involucre bracts 4 or 5, patent or reflexed, 2–7 cm long (the lowest up to 7 cm long), densely ciliate at the dilated base. Spikelets numerous, sessile, linear-lanceolate, 10–12 mm long, acuminate, 2-flowered; lower flower female; upper one male. Glumes 5 or 6, distichous, ovate-lanceolate, 2–10 mm long, acute, yellowish brown. Bristles in the female flower 6, 5 of them rigid, 8–10 mm long, prominently antrorsely scabrid in the upper half and plumose in the lower, the remaining one slender, 4–5 mm long, antrorsely scabrid throughout. Stamens 2; anthers linear, 2.5–3 mm long. Style 5–6 mm long, shortly bilobed. Style-base oblong-

conical, 2.5–3 × 2–2.5 mm, acute, grooved on both sides, smooth or weakly scabrous. Nut oblongoid, dorsiventrally compressed, 2.5–3 × 1–1.5 mm, hispidulous towards apex, brown; epidermal cells isodiametric.

Flowering & Fruiting: September–October.

Habitat: Marshy places, in rock crevices, along road sides, near paddy fields and moist ditches.

Distribution: India (Andhra Pradesh, Madhya Pradesh, Maharashtra, Orissa and Uttar Pradesh), Australia (Queensland), Cambodia, Laos, Myanmar, SW Pacific Islands (New Guinea), Thailand and Vietnam.

Specimens examined: INDIA, **Andhra Pradesh**, Hyderabad, Deccan, s. die, M.R. Saxena 255 (DD). **Madhya Pradesh**, Balaghat, Khurmundi, 21.9.1973, V.J. Nair 18245; Raigarh, Tamtora, 250 m, 28.9.1974, N.C. Rathakrishnan 21167; Panna,

Panna-Amanganj Road, 13.10.1980, *Rampal* 31212 (BSA); Jubbolpore, without collector's name and number (MH). **Maharashtra**, Chunda, 10.10.1889, A.E. Lowrie 9873 (DD); Ramtek, Nagarjuna hill forest, 18.10.1959, K.M. Balapure 70606 (LWG); Nagpur, Khindsi, 2.10.1962, V.P. Donde D 51 (CAL); Chandrapur, Mahalgaon forest tank, 22.10.1972, B.M. Wadhwa 13075; Bhandara, Telankari way, 24.9.1976, S.K. Malhotra 144775 (BSI). **Orissa**, Sundargarh, Birmitrapur, 16.9.1988, D. Namhata MN 3889; Bargarh, Debrigarh Sanctuary, 26.9.2005, C. Sudhakar Reddy s.n. (CAL). **Uttar Pradesh**, Chanda district, Central Province, 17.12.1889, J.F. Duthie 9873 (CAL); South Banda, 15.10.1921, Sri Ram 46377 (DD).

Notes: *Rhynchospora longisetis* is morphologically similar to *R. wightiana*, but can be easily distinguished by the nut, which is large (2.5 – 3 × 1 – 1.5 mm) with 8 – 10 mm long bristles in the former and small (1.8 – 2 × 1 – 1.2 mm) with 5 – 6 mm long bristles in the latter. Kapoor *et al.* (1963) discussed about the distribution and nature of bristles in *R. longisetis*. The present study also confirms their views that in *R. longisetis*, one bristle is shorter than the other 5 and is antrorsely barbed throughout its length. The remaining five are antrorsely barbed only in the upper region and plumose in the lower region or one of the longer bristles may be almost glabrous at the very base.

Rhynchospora rubra (Lour.) Makino in Bot. Mag. (Tokyo) 17: 180, t. 7. ff. 1 a, b. 1903; Kükenthal in Bot. Jahrb. Syst. 74: 491. 1949; Verma & Veena Chandra in Bull. Bot. Surv. India 22: 132, ff. 7a – b. 1980(1982); Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 67. 1989. *Schoenus ruber* Lour., Fl. Cochinch. 1: 41. 1790 & in ed. Willd. 52. 1793. **Fig. 5**

Type: 'Habitat in Cochinchina', specimen not cited.

Rhynchospora wallichiana Kunth, Enum. Pl. 2: 289. 1837; Clarke in Hooker, Fl. Brit. India 6: 668. 1893.

Type: Wallich, Cat. No. 3422 a (CAL!).

Perennial. Culms tufted, erect, up to 1 m high, slender, trigonous below, triquetrous in the upper part, striate, smooth, glabrous. Leaves mainly basal, few cauline; blades linear, 5 – 60 × 0.3 – 0.4 cm, scaberulous at margin near apex, gradually tapering to a subacute apex, rigid, coriaceous; sheath-mouth truncate. Inflorescence capitate, subglobose to globose, 1 – 2 × 1 – 1.5 cm, dense, brown. Involucral bracts 4 – 8, patent, 2 – 8 cm long, rigid, densely ciliate at the dilated base. Spikelets sessile, many, ovate-lanceolate, 5 – 7 mm long, acute, compressed, 2-flowered; lowest flower female, the

remainder male. Glumes 6 – 8, distichous, ovate-lanceolate, acute, keeled; empty glumes 1.8 – 2.2 mm long; fertile glumes 4.2 – 6.5 mm long. Bristles 0 – 3(– 6), 0.5 – 1.0 mm long, antrorsely scabrous. Stamens 2 (or 3); anthers linear, c. 2 mm long. Style 6 – 7 mm long, undivided; style-base pyramidal, c. 0.5 × 1 mm, obtuse, punctulate. Nut obovate to oblong-obovate (young), 1.5 – 2 × 1 – 1.5 mm, cuneate at base, biconvex, minutely punctulate, hispidulous-scabrous, brown to black; epidermal cells isodiametric.

Flowering & Fruiting: June – November.

Habitat: Wet grasslands, hill slopes and along roadsides.

Distribution: India (Andaman & Nicobar Islands, Assam, Bihar, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Sikkim, Tamil Nadu and Tripura), Australia (New South Wales and Queensland), Borneo, Indonesia (Java, Maluku, Sulawesi and Sumatra), Japan, Korea, Madagascan Region, Malaysia, Nepal, North West Pacific Islands (Caroline and Mariana Islands), Philippines, SC and SE China, SW Pacific Islands (New Guinea), Sri Lanka, Taiwan, Thailand and Tropical Africa.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Nicobar islands, Kamorta, February 1875, S. Kurz s.n.; Car Nicobar, Arong, 27.2.1976, N.G. Nair 3578 (CAL). **Assam**, Lukikhas forest, 2 miles south of Singra, 20.6.1964, A.S. Rao 39137 (ASSAM, CAL); s. loco, s. die, Jenkins s.n.; s. loco, s. die, Masters s.n.; s. loco, s. die, Simons s.n. (CAL). **Bihar**, Manbhum, J. Campbell 78 (CAL). **Manipur**, Kaupam, 1524 m, November 1907, A. Meebold 5974 (CAL). **Meghalaya**, K & J hills, Sohra, 19.10.1871, C.B. Clarke 15516 A (CAL); Pongtung, 29.8.1935, S.R. Sharma 12360; Shella forest, 1.11.1936, G.K. Deka 22288; Cherrapunji, 28.7.1946, G.K. Deka 22248 (ASSAM); Jowai-Badarpur road, 90 miles from Shillong, 22.7.1957, G.K. Deka 10127 (ASSAM, CAL); Cherrapunji, 19.9.1959, G.K. Deka 19033 (CAL); Jarain, 19.8.1968, D.M. Verma 37857; Garampani, s. die, D.M. Verma 37866 (ASSAM); s. loco, s. die, Hooker & Thomson 58; s. loco, s. die, Griffith s.n.; Mausmai, s. die, Griffith s.n.; Cherrapunji, 609 m, 20.8.2006, Sangita Dey 9923 (CAL). **Orissa**, Rairakhol, Buromal, 213 m, 5.9.1950, H.F. Mooney 3995 (DD). **Sikkim**, Dulkajhar, 500 ft, without collector's name and number (CAL). **Tamil Nadu**, Kanyakumari district, Way to Muthukuzhivayal, 1000 m, 31.8.1976, A.N. Henry 48167 (CAL). **Tripura**, Agartala, Nongmaijing, s. die, D.B. Deb 2530 (CAL).

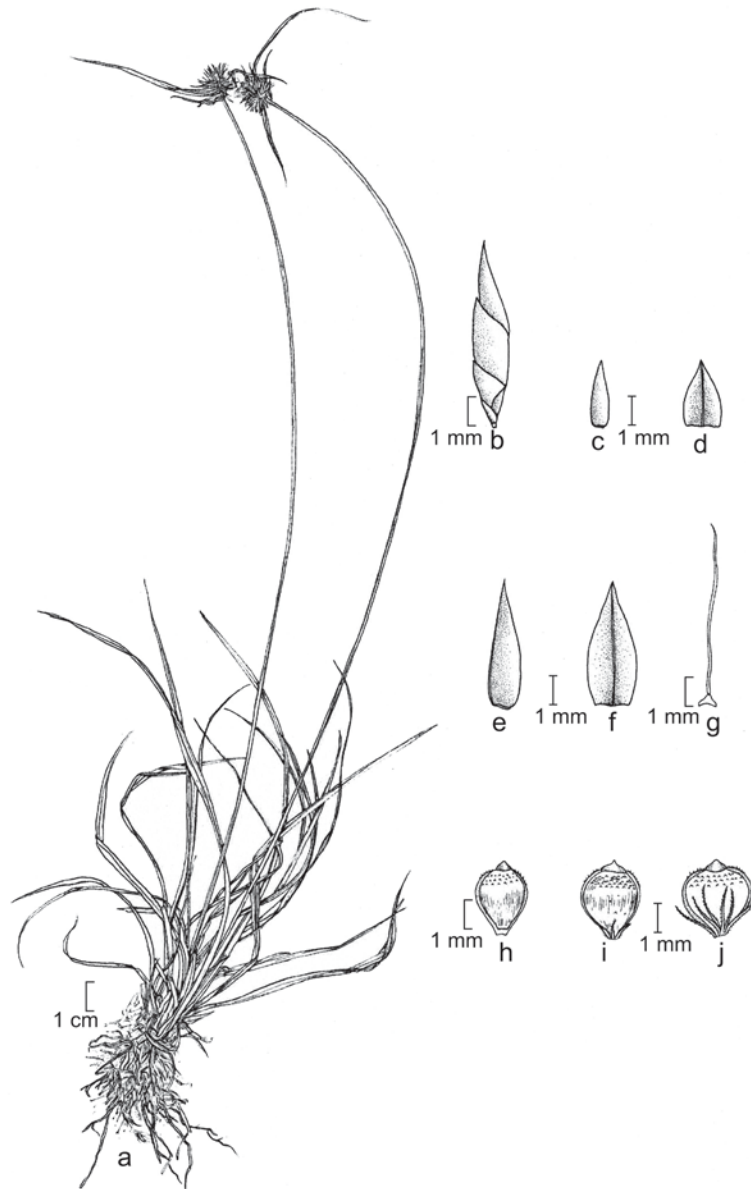


Fig. 5. *Rhynchospora rubra* (Lour.) Makino: a. Habit; b. Spikelet; c, d. Sterile glume, lateral and spread out views; e, f. Female fertile glume, lateral and spread out views; g. Stigma; h – j. Nuts (a – i from Sangita Dey 9922, CAL; j from A.N. Henry 48187, CAL).

Notes: *Rhynchospora wallichiana* treated as synonymous to *R. rubra* by most of workers but it has been treated as a distinct species by Koyama (1996). He differentiated these two species by shape and size of the achenes which is suborbicular and c. 1.75×1.70 mm in the former and obovate and c. 1.50×1.25 mm in the latter. However, these minor variations can be considered as ecological variations as he collected *R. wallichiana* from sunny, grassy mountain slopes of dry deciduous forest whereas, *R. rubra* is from moist habitats where water-logging is there throughout the year. Therefore, *R. wallichiana* is treated conspecific to *R. rubra* in the present work.

Rhynchospora submarginata Kük. in Bot. Jahrb. Syst. 74: 498. 1949; Verma & Veena Chandra in Bull. Bot. Surv. India 22: 134, ff. 9a – d. 1980; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 68. 1989.

Fig. 6

Type: Nord-Australien: Nordküste, *R. Brown* n. 5993 p.p. (B 10 0030578, image!.)

R. marginata C.B. Clarke in Bull. Misc. Inform. (Addit. Ser.) 8: 89. 1908.

Type: Australia, *R. Brown* (in hb. Kew. Berol. Image!); North Coast, *R. Brown* 5993 p.p. (image, BM!).

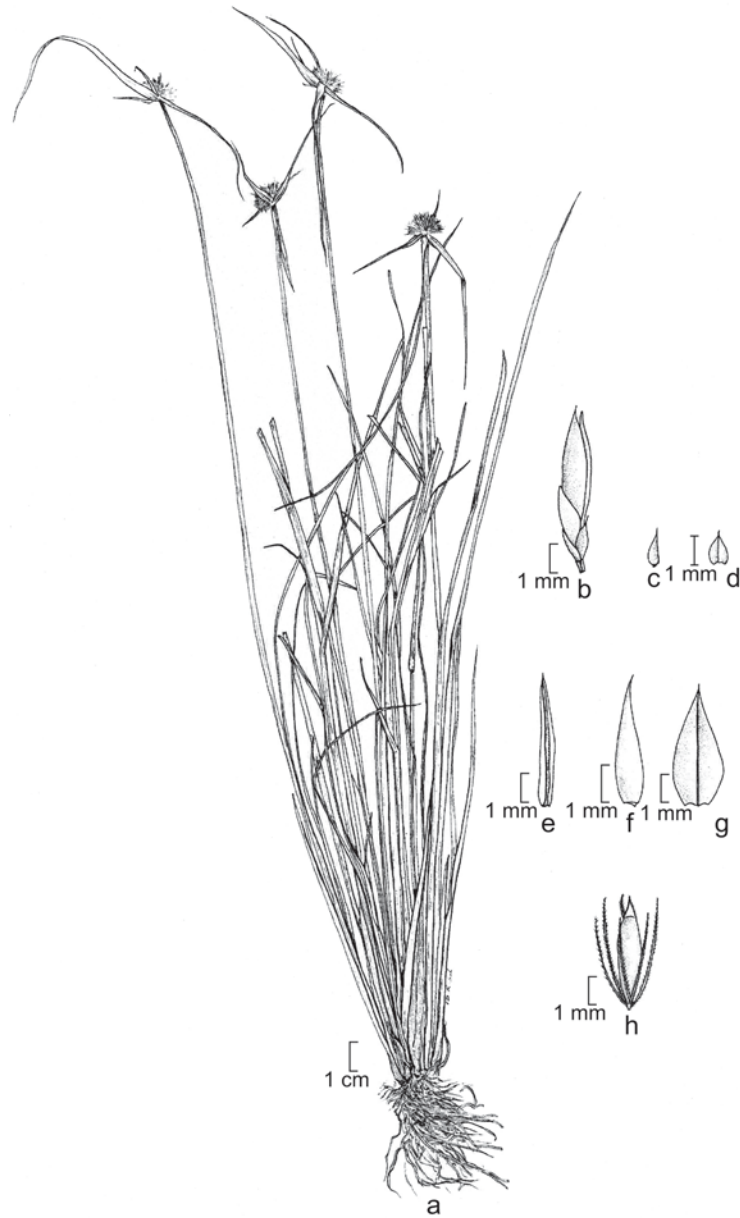


Fig. 6. *Rhynchospora submarginata* Kük.: a. Habit; b. Spikelet; c, d. Sterile glume, lateral and spread out views; e. Male fertile glume; f, g. Female fertile glume, lateral and spread out views; h. Nut with style-base and bristles (A.R. Viji & J.S. Suja 57391, TBGT).

Annuals, with reddish brown fibrous roots. Culms solitary or tufted, slender, erect, 35–60 cm high, terete to trigonous, striate, smooth, glabrous. Leaves mainly basal, few cauline; blades linear, 10–55 × 0.3–0.4 cm, scaberulous at margin near apex, gradually tapering to an acute apex, conduplicate, rigid, coriaceous; sheath-mouth truncate. Inflorescence capitate, subglobose to globose, 0.5–0.8 × 0.8–1 cm, dense; involucre bracts 4 or 5, rigid, patent, 2–7 cm long, densely ciliate at the dilated base. Spikelets numerous, sessile, lanceolate, 4.5–5 mm long, acute, 2-flowered; lower flower female; upper one male. Glumes 5 or 6, distichous, ovate-lanceolate, acute, faintly keeled; sterile glumes

1.2–2.2 mm long; fertile glumes 4–4.2 mm long. Bristles in the female flower 6, antrorsely scabrid, 3.5–4 mm long, included within the glumes; bristles absent in male flowers. Stamens 1 or 2; anthers linear, c. 1.5 mm long. Style-base triangular, 0.4–0.5 × 0.5–0.8 cm, scabrous, decurrent on the shoulders of the nut. Nut oblong, dorsiventrally compressed, 2.8–3 × 1–1.2 mm, setulose to almost glabrous, blackish brown; epidermal cells isodiametric.

Flowering & Fruiting: September – October.

Habitat: Marshy places, in rock crevices, along roadsides, near paddy fields and moist ditches.

Distribution: India (Kerala), Indonesia (Sumatra), Malaysia, SW Pacific Islands (New Guinea), Thailand and Vietnam.

Specimens examined: INDIA, Kerala, Kollam, Wight 2911 (CAL); Sasthamkottah lake bank, 23.2.2006, A.R. Viji & J.S. Suja 57391; Sasthamkottah lake bank, 27.7.2006, A.R. Viji & J.S. Suja 58625 (TBGT).

Notes: Wight, during 1834 – 1836 collected this species from Kollam, Kerala. Almost 170 years after Wight, Research scholars from Tropical Botanic Garden and Research Institute (TBGRI), Thiruvananthapuram, collected this species from the same region in the year 2006.

Rhynchospora wightiana (Nees) Steud., Syn. Pl. Glumac. 2: 148. 1855; Clarke in Hooker, Fl. Brit. India 6: 669. 1893; Verma & Veena Chandra in Bull. Bot. Surv. India 22: 134, ff. 10a, b. 1982; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 68. 1989; Prasad & Singh in J. Econ. Taxon. Bot. (Addit. Ser.) 21: 293, f. 53. 2002. *Haplostylis wightiana* Nees in Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19 (Suppl.) 1: 101. 1843 p.p. (excl. spec. Wight, Quilon). **Fig. 7**

Type: *Haplostylis meyenii* Herb. Wight n. 1903. (ex parte scil. spec. ex Cannanore relata) 1836/1259 ex parte (Holotype, n.v., E; Isotype, CAL!).

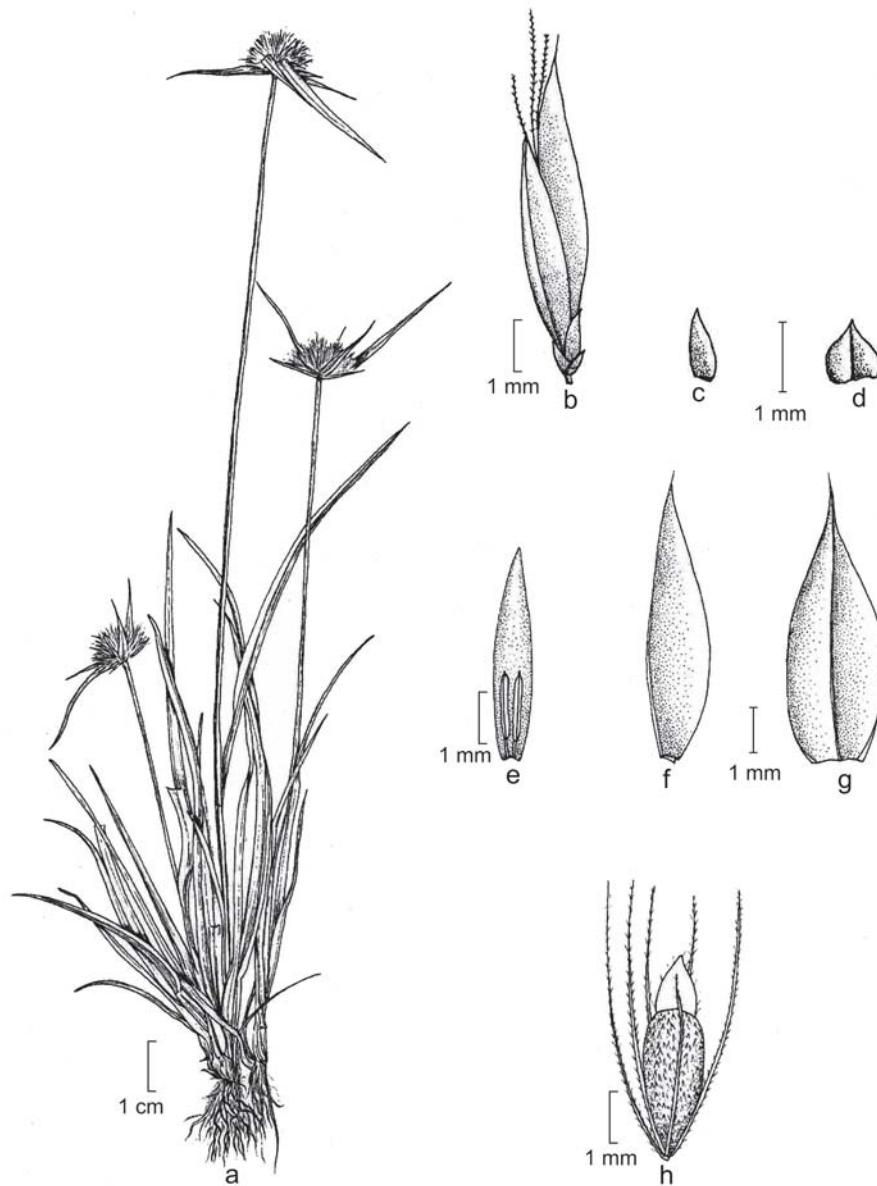


Fig. 7. *Rhynchospora wightiana* Nees: a. Habit; b. Spikelet; c, d. Sterile glume, lateral and spread out views; e. Male fertile glume with stamens; f, g. Female fertile glume, lateral and spread out views; h. Nut with style-base and bristles (Sangita Dey 9926, CAL).

Annuals, with fibrous roots. Culms solitary or tufted, erect, 12 – 45 cm high, slender, trigonous below, compressed towards apex, striate, glabrous. Leaves basal; blades linear, 5 – 15 × 0.2 – 0.3 cm, scaberulous at margin near apex, gradually tapering to an acuminate apex, coriaceous; sheath-mouth truncate. Inflorescence capitate, subglobose to globose, 1 – 1.5 × 1 – 1.5 cm, dense, brown. Involucral bracts 4 – 6, patent or reflexed, 2 – 6 cm long, densely ciliate at the dilated base, rigid. Spikelets many, sessile, linear-lanceolate, 6 – 7 mm long, compressed, 2-flowered; lower flower female; upper one male. Glumes 6 or 7, subdistichous; sterile glumes broadly ovate to oblong-ovate, 1 – 3 mm long, acute, faintly keeled; female fertile glume broadly ovate, 5 – 6 mm long, acuminate, keeled; male fertile glume lanceolate, acute. Bristles in the female flower 6, rigid, antrorsely scabrid, 5 of them c. 6 mm long; shorter one 3 – 4 mm long; bristles in male flower 0 – 4, 4 – 5 mm long. Style-base compressed, triangular, 1.5 – 2 × 0.8 – 1 mm, obtuse, scabrid. Nut oblong, 1.8 – 2 × 1 – 1.2 mm, compressed, covered by white-papillose tubercles, brown to black, margins bordered by a whitish line; epidermal cells minute, isodiametric.

Flowering & Fruiting: August – November.

Habitat: Grasslands and low hill slopes.

Chromosome No.: 2n = 20 (Kumar & Subramaniam, 1986).

Distribution: India (Andhra Pradesh, Dadra & Nagar Haveli, Daman & Diu, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra and Orissa), Indonesia (Java), SW Pacific Islands (New Guinea), Sri Lanka and Vietnam.

Specimens examined: INDIA, **Dadra & Nagar Haveli**, Dadra, 29.9.1963, M.Y. Ansari 93827; Khanvel, 5.10.1963, M.Y. Ansari 94220 (CAL). **Daman & Diu**, Daman, 24.9.1963, M.A. Ansari 93568 (CAL). **Goa**, Budasari, Goundugarha, 9.11.1962, R.S. Rao 84556 (BSI, CAL). **Karnataka**, North Kanara, Yellapur, 10.10.1884, W.A. Talbot 815; Karwar, August 1887, W.A. Talbot 814 (BSI); Belgaum, Khanapur, 30.10.2007, Sangita Dey 9926 (CAL). **Kerala**, Cannanore, Wight 1903; Pilathara, 100 m, 8.10.1979, R. Ansari 64806 (CAL). **Maharashtra**, Jutara, Bandra, 28.9.1903, G.M. Ryan 1344 (BSI); Mumbai, Jogeswari, Nangar Das Road, 30.9.1945, J. Sinclair 448 (CAL); Khandala, rock pools, 5.9.1951, H. Santapau 13363 (BLAT). **Orissa**, Sambalpur, Motijharan hill, 183 m, 1.9.1946, H.F. Mooney 2743 (DD).

Notes: Nees (1834) cited two specimens viz., Wight Cat. No. 1903 and Wallich, Cat. No. 3428 in the protologue of *Haplostylis meyenii*. Later,

Wallich, Cat. No. 3428 is identified as *R. rubra* (= *R. wallichiana* Kunth) and therefore, Nees (1843) gave a new name *H. wightiana* to Wight Cat. No. 1903. Wight No. 1903 at E has some important features from typification point of view: The E specimen is a part of G.A. Walker's herbarium to whom Wight sent his identified specimens, the specimen has the number 1836/1259 mentioned in the protologue, and it is a heterogeneous mixture of two specimens, viz., a specimen from Cannanore and a specimen from Quilon with a different number 1836/1251 (H.J. Noltie, pers. comm., 2007). Further, the type citation in the protologue *ex parte scil. Specimina ex Cannanore relata.....* partly but certainly based on Cannanore specimen altogether indicate that the E specimen is the holotype of *R. wightiana* Nees. However, it has also been found that Wight no. 1903 in CAL and CGE belong to 2 different species. The CAL specimen is *R. wightiana* Nees, and the CGE specimen is *R. submarginata* Kük. Wight's specimens are deposited in many herbaria (Stafleu & Cowan, 1976 – 1988) and therefore, Wight No. 1903 in other herbaria must be correctly identified before designating them as type of *R. wightiana* Nees.

Subgenus: *Rhynchospora* Vahl

Ser. *Dichostyleae* Benth. in Bentham & Hooker, Gen. Pl. 3: 1059. 1883. Ser. *Diplostyleae* C.B. Clarke in Hooker, Fl. Brit. India 6: 671. 1893 & in Bull. Misc. Inform. (Addit. Ser.) 8: 119. 1908. Subg. *Distylis* Pax in Engler & Prantl, Nat. Pflanzenfam. 2, 2: 117. 1887. Subg. *Diplostyleae* Kük. in Bot. Jahrb. Syst. 74: 500. 1949.

Key to the sections

1. Hypogynous bristles present; rachilla straight sect. **Glaucæ**
1. Hypogynous bristles absent; rachilla anfractuous..... sect. **Campylorhachis**

Section: *Campylorhachis* Benth.

Benth. in Bentham & Hooker, Gen. Pl. 3: 1061. 1883. Sect. *Tenues* Kük. in Bot. Jahrb. Syst. 75: 186. 1950.

Rhynchospora gracillima Thwaites, Enum. Pl. Zeyl.: 435. 1864; Clarke in Hooker, Fl. Brit. India 6: 671. 1893; Fischer in Gamble, Fl. Madras 9: 1672. 1931 [3: 1160. 1957 (Repr. ed.)]; Kükenthal in Bot. Jahrb. Syst. 75: 273. 1951; Verma & Veena Chandra in Bull. Bot. Surv. India 22: 130, ff. 4a, b. 1982; Karthikeyan *et al.*, Fl. Ind. Enum. Monocotyl.: 67. 1989.

Type: Ceylon, Hewessa, Thwaites C.P. 3818 (Holotype, PDA, n.v.; Isotype, 000357555, image, K!). **Fig. 8**

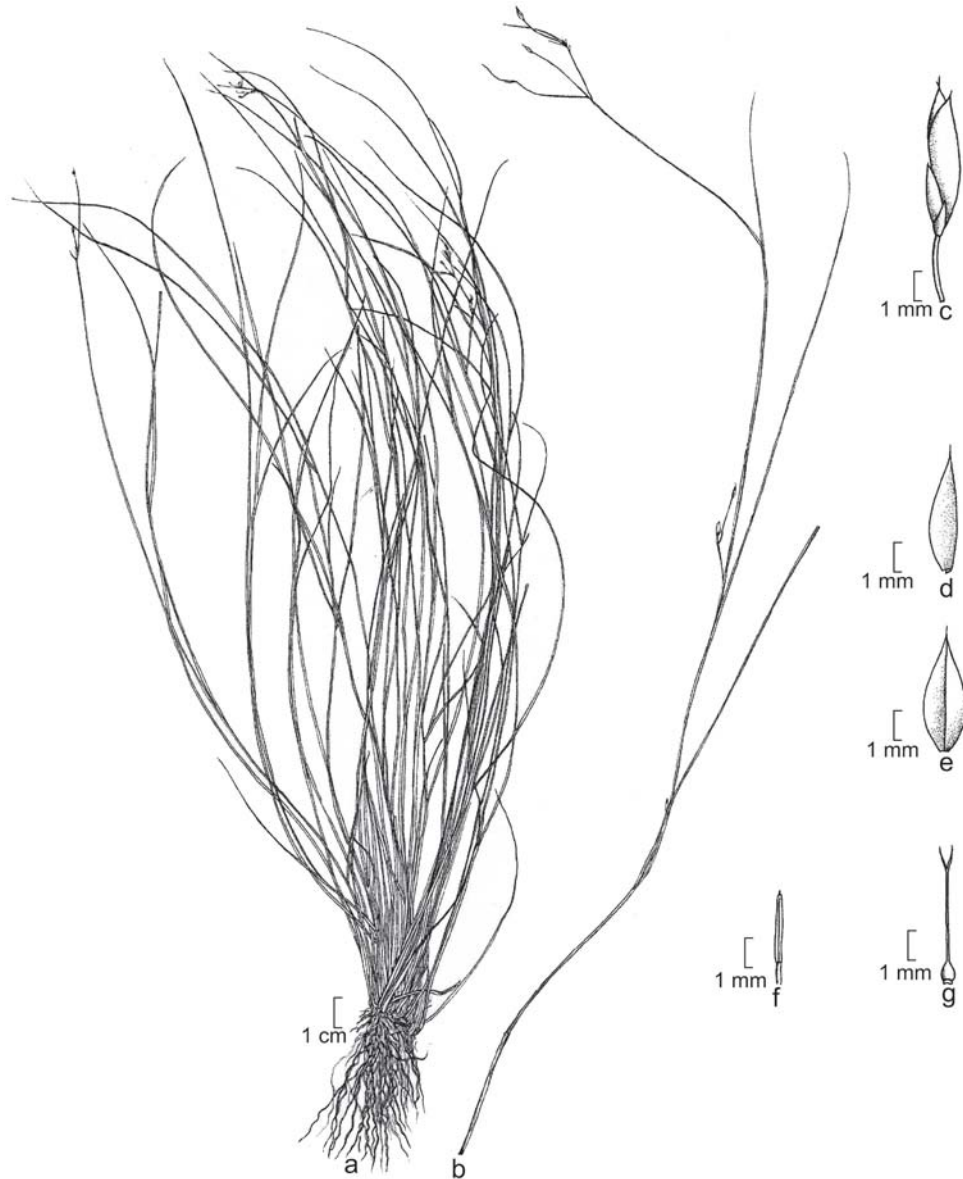


Fig. 8. *Rhynchospora gracillima* Thwaites: a. Habit; b. Inflorescence; c. Spikelet; d, e. Female fertile glume, lateral and spread out views; f. Stamen; g. Pistil (a from *S. Kurz s.n.*, CAL; b – g from *N.P. Balakrishnan 10773*, MH).

Perennial herbs. Culms tufted, filiform, erect, up to 50 cm high, trigonous, smooth. Leaves basal and cauline; blades setaceous, 10 – 25 × 0.05 – 0.1 cm, smooth or scaberulous at apex. Inflorescence lax, consists of 1 – 3 distant, corymbiform anthelas; terminal anthela larger than the lateral ones, c. 4 cm long; rays terminated by 1 or 2 spikelets; lateral anthelas simple, their peduncles exerted from the sheaths. Bracts setaceous, 2 – 4 cm long. Spikelets solitary, lanceolate, 5 – 6 mm long, acute, 3 or 4-flowered, usually maturing into 2 nuts. Glumes 6 or 7, spiral, broadly ovate, mucronulate, membranous, purplish lineolate, pale ferruginous. Flowers bisexual, upper one(s) sterile.

Bristles absent. Stamens 2 or 3. Style halfway bifid; style-base depressed, saddle-shaped, c. 0.25 mm long, bilobed. Nut broadly obovoid, 1.5 – 2 × 1.5 – 2 mm, truncate at apex, biconvex, transversely wavy-wrinkled, greyish white; epidermal cells linear, longitudinally arranged.

Flowering & Fruiting: July – August.

Habitat: Grasslands and along hill slopes.

Distribution: India (Andaman & Nicobar Islands, Andhra Pradesh, Meghalaya and Tamil Nadu), Australia (Queensland), Indonesia (Sulawesi and Sumatra), SW Pacific Islands (New Guinea), Sri Lanka and Thailand.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Nicobar Island, Kamorta, *Kurz s.n.* (CAL). **Andhra Pradesh**, Visakhapatnam, Araku valley, 950 m, 23.8.1960, *N.P. Balakrishnan* 10773 (MH).

Notes: This slender sedge is reported from Andaman & Nicobar Islands (*Kurz s.n.*), Meghalaya (Clarke, *l.c.*), Orissa (Mooney, 1950; Saxena & Brahmam, 1996) and Tamil Nadu (Fischer, *l.c.*) during the 18th and 19th century. However, there is no further collection of this species from any of these regions. The only recent collection of this species is from Andhra Pradesh.

Section: Glaucæ C.B. Clarke

C.B. Clarke in *Urb., Symb. Antill.* 2: 106. 1900 & in *Bull. Misc. Inform. (Addit. Ser.)* 8: 120. 1908. *Sect. Stenophyllæ* Kük. in *Bot. Jahrb. Syst.* 75: 142. 1950.

Rhynchospora rugosa (Vahl) Gale in *Rhodora* 46: 275, t. 835, ff. 1a, b. 1944; Kükenthal in *Bot. Jahrb. Syst.* 75: 143. 1950; Verma & Veena Chandra in *Bull. Bot. Surv. India* 22: 128, ff. 2a – b. 1980 (1982); Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 67. 1989; Prasad & Singh in *J. Econ. Taxon. Bot. (Addit. Ser.)* 21: 292. 2002. *Schoenus rugosus* Vahl, *Eclog. Amer.*: 5. 1798. **Fig. 9**

Type: Habitat in America meridionali, *Von Rohr* 27 (Holotype, image, C!).

Rhynchospora glauca Vahl, *Enum. Pl.* 2: 233. 1806, nom. illeg.; Clarke in Hooker, *Fl. Brit. India* 6: 671. 1893.

R. glauca var. *chinensis* C.B. Clarke in Hooker, *Fl. Brit. India* 6: 672. 1893 & in *Ill. Cyper.*: t. 73, ff. 8 – 11. 1909.

Type: *C.P.* 677 (CAL!), Helfer, Kew distr. n. 6303 (CAL!), Griffith, Kew distr. n. 6302 (K000357821, image, K!).

R. chinensis Boeck. in *Linnaea* 37: 586. 1873 [excl. spec. Chine (Meyen)].

Type: India Orient.: Sikkim, alt. 7 – 10,000 ped. (forma tenuis) (CAL!); Mont. Khasia, alt. 4 – 6000 ped., *Hooker & Thomson s.n.* (CAL!); Ceylone, *Thwaites* 677 (CAL!).

R. griffithii Boeck. in *Linnaea* 38: 404. 1874; Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 68. 1989.

Type: East Bengal, *Griffith* 6303 (CAL!)

R. griffithii var. *β levisetis* C.B. Clarke in Hooker, *Fl. Brit. India* 6: 672. 1893.

Type: Based on *R. chinensis* “forma tenuis” Boeck.

R. sikkimensis C.B. Clarke in Hooker, *Fl. Brit. India* 6: 672. 1893; Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 68. 1989.

Type: Upper Sikkim, Catsuperrri Lake, alt. 8000 ft., J.D. Hooker (Holotype, 000357822, image, K!)

R. rugosa var. *griffithii* (Boeck.) D.M. Verma *et* Veena Chandra in *Bull. Bot. Surv. India* 22: 128. 1982, *syn. nov.*

R. rugosa var. *sikkimensis* (Boeck.) D.M. Verma *et* Veena Chandra in *Bull. Bot. Surv. India* 22: 128. 1982, *syn. nov.*

Perennial herbs; rhizome short with reddish brown fibrous roots. Culms tufted, erect, up to 75 cm high, slender, trigonous, smooth or slightly scaberulous near apex, striate. Leaves basal and few cauline; blades flat or canaliculate, linear, 10 – 55 × 0.2 – 0.5 cm, scabrid at margin, acuminate at apex, rigid, coriaceous; sheath-mouth of the cauline leaves truncate. Inflorescence paniculate, consists of 2 – 4 anthelas; anthelas corymbiform, simple, dense to rather loose, 2 – 5 cm long; peduncle compressed, exerted from the sheath, scabrous; bracts leaf-like, erect, 10 – 20 × 0.2 – 0.4 cm, sheathing. Spikelets solitary or in clusters, subsessile, ovate-lanceolate, 6 – 7 mm long, acute, 2 or 3-flowered; pedicel 1 – 1.5 mm long. Glumes broadly ovate, mucronate; sterile glumes 2 – 3 mm long; fertile glumes *c.* 4 mm long, fuscous. Flowers bisexual; upper one(s) male. Bristles 5 – 7, 1.5 – 2 mm long (shorter than the nut or sometimes subequalling the nut beak), antrorsely scabrid, brown. Stamens 1 – 3; anthers linear, *c.* 1.5 mm long. Style halfway bifid, conical at base, 0.75 – 1 mm long, acute, compressed, glabrous, white to grey. Nut obovate, 1.5 – 1.8 × 1 – 1.5 mm, biconvex, transversely wrinkled, light brown to castaneous; epidermal cells longitudinally oblong.

Flowering & Fruiting: Throughout the year.

Habitat: Wet grasslands along hill slopes at an elevation of 900 – 2300 m.

Distribution: India (Andaman & Nicobar Islands, Gujarat, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tamil Nadu), Australia (Queensland and W. Australia), Borneo, Indonesia (Maluku and Java), Japan, Malaysia, Myanmar, Nansei Shoto, NW Pacific Islands (Caroline Islands), Philippines, Solomon Islands, SE China, SW Pacific Islands (New Guinea), Sri Lanka, Thailand and Vietnam.

Specimens examined: INDIA, **Andaman & Nicobar Islands**, Andamans, 1862 – 1863, *Helfer* 6302, 6303 (CAL). **Kerala**, Idukki district, Pooanampara,

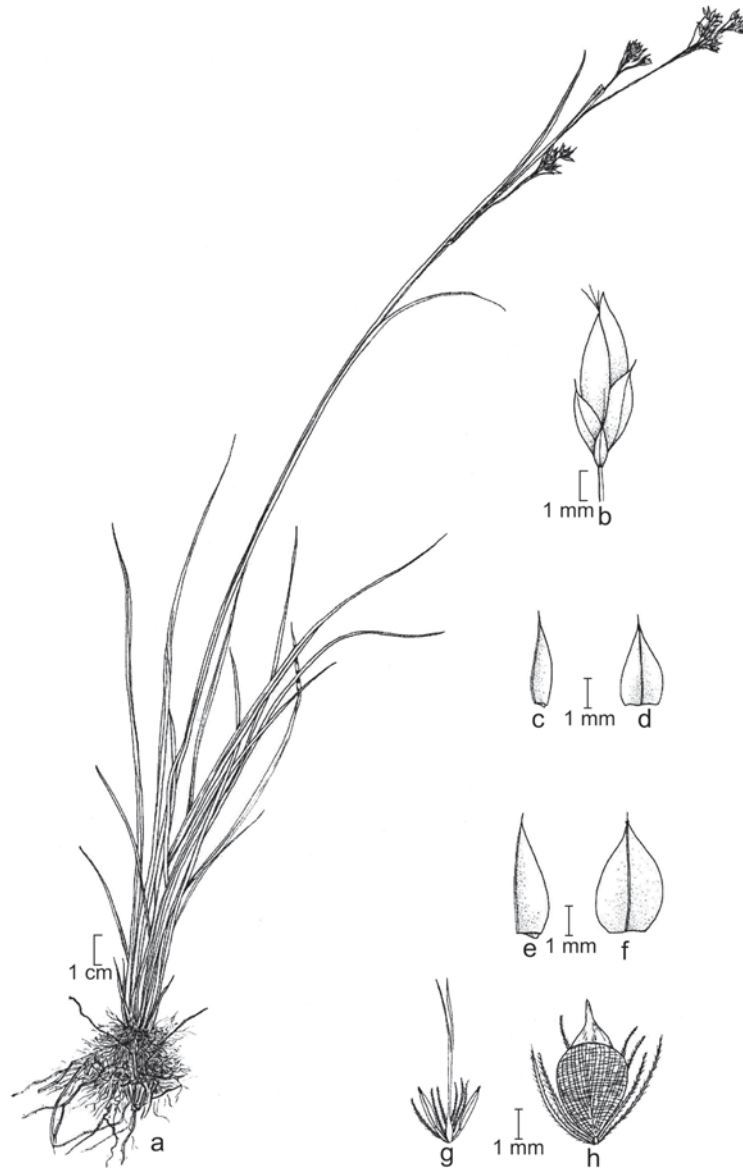


Fig. 9. *Rhynchospora rugosa* (Vahl) Gale: a. Habit; b. Spikelet; c, d. Sterile glume, lateral and spread out views; e, f. Female fertile glume, lateral and spread out views; g. Pistil, stamens and bristles; h. Nut with style-base and bristles (from *A.N. Henry* 68872, CAL).

2300 m, 19.10.1989, *P. Bhargavan* 91830; Kottayam district, Umaiymalai, Devicolam, 2075 m, 3.2.1970, *B.V. Shetty* 31800 (MH). **Meghalaya**, Shillong, 4.7.1885, *C.B. Clarke* 38349F; Sohra, 19.10.1891, *C.B. Clarke* 15514 C; Cherra road, on way to Mausmai, 609 m, 20.8.2006, *Sangita Dey* 9922 (CAL). **Nagaland**, Naga hills, June 1935, *N.L. Bor* 2323 (ASSAM). **Sikkim**, *s. loco, s. die*, *Hooker & Thomson s.n.* (CAL). **Tamil Nadu**, Kanyakumari district, Muthukuzhivayal hill top, 1450 m, 29.9.1980, *A.N. Henry* 68872; Nilgiri district, Coonoor, 16.3.1870, *C.B. Clarke* 10937; Neddnatlur, 17.8.1878, *G. King s.n.* (CAL); Nilgiri, Pykara, 950 m, 2.2.1988, *P. Bhargavan* 87358 (MH, CAL).

Notes: Gale (1944), opined that specimens of *R. rugosa* from the East Indies and adjacent continental lands are not conspecific with *R. rugosa* of the West Indies, Central and South America. She also pointed out that although the Asiatic plants are closely related to *R. rugosa*, they have strict, compound fascicles with mainly ascending sessile spikelets in small ultimate clusters, achenes are larger, more nearly orbicular than pyriform and the surface of the achene is generally castaneous pitted and finely ridged, without prominent yellowish band-like corrugations which characterize the achenes of *R. rugosa*. Kern (1974), mentioned that *R. rugosa* in the wide sense is extremely

polymorphous. Study of wide range of specimens from India reveals that the Indian *R. rugosa* is characterized by the following features i.e., spikelets 5 – 6 mm long, 2 or 3-flowered; anthers 1 – 1.5 mm long; usually maturing only one nut. Nut 1.5 – 1.8 × 1 – 1.5 mm; style-base 0.75 – 1 mm long; bristles 1.5 – 2 mm long (shorter than the nut or sometimes subequalling the nut beak); epidermal cells faintly wavy-wrinkled to undulate rugose. The nut drawn on the type sheet of *R. rugosa* is slightly shorter than Indian specimens i.e., *c.* 0.8 × 0.56 mm; beak *c.* 0.4 mm long with bristles subequalling the beak and the surface of the nut has prominent band-like corrugations. According to Kern (*l.c.*), the size of the nut in the American specimen varies between 1.5 and 2 mm and therefore, Indian *R. rugosa* is treated as typical *R. rugosa* in the present work.

Boeckler (*l.c.*), described *R. griffithii* based on Griffith's collection from East Bengal which was later reduced to a variety by Verma & Veena Chandra (*l.c.*). The characters mentioned are narrowly obovoid-ellipsoid nut and hypogynous bristles reaching up to the apex of the nut-beak. A study of wide range of *R. rugosa* specimen shows that young nuts are elliptic-obovoid but the same at maturity becomes pyriform/globose and the bristles are shorter than to almost subequalling or exceeding the nut beak. Therefore, the variety is now merged under *R. rugosa*.

Clarke (*l.c.*), described *R. sikkimensis* based on a single specimen by Hooker's collection from Catsuperrri Lake, Upper Sikkim which was later reduced as a variety by Verma & Veena Chandra (*l.c.*). The characters mentioned are 3 – 8 pistiliferous flowers bearing 3 – 6 nuts per spikelet, narrowly obovoid, truncate nut and ovoid beak which are longer and broader than the nut. Study of the type specimen shows that the young nuts are obovoid, truncate and beak is ovoid, longer and broader than mature nut but mature nuts are like that of typical *R. rugosa* and both types of nuts are present in the same specimen. Spikelets having three florets mentioned in the protologue of *R. rugosa* seems to be a common character for this species and the same specimen may show spikelets with (1 –) 2(– 6) florets maturing into (1) – 2 – 3(– 5) nuts like that of *R. sikkimensis*. Therefore, this variety is further reduced to synonym of *R. rugosa*.

Schoenus L.

L., *Sp. Pl.* 1: 42. 1753 & *Gen. Pl.* ed. 5, 5: 26. 1754; Boeckler in *Linnaea* 38: 273. 1874; Bentham in Bentham & Hooker, *Gen. Pl.* 3: 1062. 1883; Pax in Engler & Prantl, *Nat. Pflanzenfam.* 2, 2: 115. 1888; Clarke in *Bull. Misc. Inform. (Addit. Ser.)* 8: 12.

1908; Kükenthal in Feddes *Repert.* 44: 5. 1938; *l.c.* 161; *ibid* 48: 246. 1940; Karthikeyan *et al.*, *Fl. Ind. Enum. Monocotyl.*: 70. 1989. - Type: *Schoenus nigricans* L.

Perennials, with shortly creeping rhizome. Stems erect, or ascending and rooting at the nodes, terete or obtusely trigonous, striate or sulcate, usually smooth. Leaves either all basal, or basal and cauline, linear, often setaceous, canaliculated, often reduced to mucronate sheaths; ligule absent; basal sheaths open; sheaths of the cauline leaves closed, tubular, often bearded at mouth. Inflorescence terminal, racemose or paniculate, consists of some distant fascicles of branches subtended by a leafy bract, or contracted and head-like. Spikelets solitary or clustered, compressed, lanceolate to oblong-lanceolate, usually few-flowered. Rachilla straight and with very short internodes in the lower part (between the empty glumes), the upper internodes (between the fertile glumes) elongated and prominently zigzag. Glumes distichous, keeled, 1-nerved; the lower ones empty, the upper (flower-bearing) ones usually decurrent on the rachilla ('rachilla winged'), the terminal one often strongly reduced and empty. Flowers in the hollows of the zigzag rachilla, usually bisexual, but the uppermost often more or less reduced. Perigone consists of up to 6, filiform or linear-lanceolate, ciliate to plumose or antrorsely scabrid bristles, or absent. Stamens (1 –) 3(– 6). Style slender, continuous with the ovary, rarely dilated at base, caducous; stigmas 3. Nut sessile or shortly stipitate, ovoid, obovoid, or ellipsoid, trigonous, often 3-ribbed, very rarely biconvex, smooth, rugulose or scrobicular, glabrous or hispidulous in the upper part; epidermal cells isodiametric to oblong.

Cosmopolitan, *c.* 100 species; 1 species in India.

Schoenus calostachyus (R. Br.) Poir. in *Lam., Encycl. Suppl.* 2: 251. 1811; Clarke in Hooker, *Fl. Brit. India* 6: 673. 1894 & in *Ill. Cyper.*: t. 78, ff. 7 – 9. 1909; Sreekumar in *J. Bombay Nat. Hist. Soc.* 96: 180. 1999. *Chaetospora calostachya* R. Br., *Prodr.*: 233. 1810. - Type: Nova Hollandia (Holotype, 000900959, image, BM!).

Perennial herbs, with woody rhizome. Culms tufted, erect, 50 – 100 cm high, sub-terete, smooth, leafy. Basal leaves tough, acuminate, 3-ribbed on lower surface, with purplish sheaths. Inflorescence racemose, up to 60 cm long with 2 – 6 distant fascicles of branches. Branches compressed, scaberulous on the angles, each holding 1 – 3 spikelets. Spikelets oblong-lanceolate, 20 – 25 × 3 – 6 mm. Glumes lanceolate, 8 – 15 mm long (fertile ones

up to 20 mm long), coriaceous, ciliate on upper margin. Nuts trigonous, oblique, 2 angles convex and the other straight, $2.5 - 3.5 \times 1.5 - 2$ mm, rugose.

Habitat: Occasional in open grasslands and heaths.

Distribution: India (Andaman & Nicobar Islands), Australia (New South Wales and Queensland), Borneo, Japan, NW Pacific Islands (Caroline Islands), Indonesia (Sumatra), Malaysia, Nanshei Shoto, SW Pacific Islands (New Guinea), Thailand and Vietnam.

Note: It is included here based on the earlier report from Nicobar Island by Sreekumar (1999).

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