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FASCICLE 14
POACEAE: TRIBE—ISACHNEAE
VED PRAKASH AND S. K. JAIN

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(VED PRAKASH AND S. K. JAIN)

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POACEAE : TRIBE—ISACHNEAE

VED PRAKASH* AND S. K. JAIN**

ISACHNEAE


Annual or perennial grasses, usually with slender culms. Leaf-sheaths mostly loose; ligule a fringe of hairs or 0; blades usually broad and flat. Inflorescence a panicle or infrequently raceme or spike. Spikelets alike, 1 or 2-flowered, hermaphrodite, small to minute, often plump, mutlicous; rachilla disarticulating between the florets and above the glumes, not produced beyond the upper floret. Florets 1 or 2. ♂ when 1, similar or dissimilar when 2, with mostly lower ♀ or ♂ and upper ♀ or ♂, the two often separated by a very short or minute rachilla. Glumes 2, usually deciduous, persistent in some, usually subequal, shorter than or as long as spikelet, membranous, 3-9(-11)-nerved, rarely nerveless or 1-nerved. Lower lemma (when more than one) usually longer than upper, firmly membranous to chartaceous or coriaceous, nerveless or obscurely 5-7-nerved; palea as long as lemma, nerveless or 2-nerved. Upper lemma and palea similar to the lower or often smaller and firmer, sometimes thinner in texture. Lodicules 2, cuneate, truncate. Stamens 3 or 2 with linear-oblong anthers. Pistil with 2 distinct styles and plumose stigmas. Caryopsis free between the lemma and palea, ovoid or ellipsoid, plano-convex; embryo one-third to half the length of caryopsis.

Distrib.: 5 genera and ca. 125 species in the tropics and subtropics. 4 genera and 34 species in India. 1 genus and 20 species endemic to India.

Ecol.: Mostly hygrophilous or in forests and their margins, from sea level to ca. 3000 m alt.

Chr. No.: X=10 or 9.

Family Editor for Poaceae: Dr. S. K. Jain.
* Present address: Botany Division, Central Drug Research Institute, Lucknow 226 001.
** Botanical Survey of India, Howrah-711 103.
Anatomy: (i) Leaf-epidermis: Short cells in long rows with alternating silica and cork cells, usually present in costal zones only; silica bodies roughly cross-shaped, more or less cubical or rectangular with concave sides and acutely angled; long cells between the veins (on abaxial surface) relatively very small, cubical, hexagonal to polygonal with non-sinuous walls, and mostly bearing one large globose papilla; microhairs mostly present with nearly equal basal and distal cells; stomata with variable subsidiary cells. (ii) Leaf-anatomy: Vascular bundles mostly of 3 types and conspicuously angular in outline with well-developed outer sheath, made up of single or multilayered, large parenchymatous cells and without chloroplast; inner sheath scarcely evident or absent; mesophyll cells very long, narrow (elongated), somewhat loosely and distinctly radially arranged, but not as in chloridoid and panicoid grasses.

These characters show that the tribe Isachneae is panicoid in most characters, but the small, cubical intercostal long cells with papillae, narrow, elongated and radially arranged mesophyll cells and nature of outer bundle sheath are very characteristic of Isachneae and distinct from other panicoid grasses. The authors support Metcalfe's view in recognising Isachneae subtype under panicoid group in Anatomical grouping (Foliazal in Bot. Jahrb. 75: 551-559. 1952; Tateoka in Bot. Mag. Tokyo 70: 119-125. 1957; Metcalfe, Anat. Monocot. Vol. 1. 1960).

Notes: Originally, Bentham (l.c.) included 7 genera in his tribe Isachneae, these were: Prionachne Nees, Isachne R. Br., Zenkeria Trin., Micaira F. Muell., Coelachne R. Br., Airopsis Desv. and Eriachne R. Br.

C. E. Hubbard (l.c.) recircumscribed Isachneae to include five genera viz. Isachne R. Br., Coelachne R. Br., Limnopa C. E. Hubb., Sphaerocaryum Nees ex Hook. f. and Heteranthoea Stapf; this was supported by subsequent studies on morphology, anatomy, cytology, etc.

Spikelets in the tribe Isachneae share the characters of both the subfamilies Panicoideae & Pooidae. Based on combined studies of morphology, anatomy, cytology, ecology and starch grains, the authors are of the view that "the tribe Isachneae is panicoid in nature in most of the characters (e.g. Chr. No. X=10; silica cells cross-shaped or rectangular; starch grains simple, hexagonal, pentagonal or rectangular; seedling-leaf broad, spreading; distribution hygrophilous in tropics and subtropics), yet it stands apart from true panicoid grasses in some unique morphological and anatomical characters. Consequently, the tribe Isachneae should be placed either in the subfamily Panicoideae near Paniceae or it should better be treated as an independent subfamily."
1a. Spikelets 2-flowered:

2a. Inflorescence a small, solitary (occasionally two) spike-like raceme; plants aquatic ...3. Limnopoa

2b. Inflorescence open or contracted panicles, or racemes; plants aquatic or not:

3a. Upper floret indurated (coriaceous), borne on short to minute rachilla. Glumes longer or subequal to spikelet, rarely shorter; eventually deciduous ...2. Isachne

3b. Upper floret membranous to hyaline, borne on long rachilla. Glumes much shorter than the spikelet, persistent ...1. Coelachne

1b. Spikelets 1-flowered. Inflorescence small, open panicles. Glumes separately deciduous ...4. Sphaerocaryum

1. COELACHNE


Annual or perennial marsh grasses with slender culms. Leaf-sheaths loose, glabrous or hirsute; ligule absent or minute fringe of hairs; blades small, striate and scaberulous above, glabrous or hirsute beneath. Inflorescence an open or interrupted spiciform panicle with appressed and congested branches, sometimes a raceme. Spikelets small to very minute, ovate-oblong, awnless, gaping, 2-flowered; rachilla clongate between the florets; pedicels short unequal; callus bearded or glabrous. Glumes persistent, lower mostly shorter than upper, both much shorter than the spikelet, broadly ovate to elliptic or subrotund, membranous. Florets 2, exserted; lower ♂, subsessile, longer and thicker; upper ♀, stipitate, shorter and thinner. Lower lemma ovate-elliptic, obtuse, margins incurved, coriaceous, nerveless to obscurely 5-nerved, glabrous or sparsely hairy, its palea similar to lemma, nerveless or 2-nerved. Upper lemma ovate-lanceolate, obtuse, membranous, sometimes hyaline, 2-nerved, 2-keeled, hairy along keels and all over dorsal surface or nerveless, not keeled, glabrous, its palea similar to lemma.

Distrib.: ca. 10 species in the tropics and subtropics of Old World, 3 species in India. 1 species and 1 variety endemic to India.
1a. Spikelets 1.0-1.3 (-1.5) mm long. Stamens usually 2
   ...1. C. minuta

1b. Spikelets over 1.5 mm long. Stamens 3:
   2a. Panicles few-flowered, very lax. Spikelets 2.5-4.0 mm long. Florets
densely bearded at base
   ...2. C. perpusilla
   2b. Panicles many-flowered, mostly contracted spiciform. Spikelets
1.5-2.5 (-3.0) mm long. Florets glabrous at base
   ...3. C. simpliciuscula


   Figs. 1-13 (P. 4)

   Annual, tufted, ca. 5-15 cm high, erect with very slender culms. Leaf-
blades 0.5-3.0×0.1-0.4 cm, lanceolate, acute. Panicle 2-8 cm long, effuse,
branches up to 1.5 cm long, capillary, spreading. Spikelets 1.0-1.3 (-1.5) mm
long, globose-obovoid. Glumes glabrous or with few bristles, lower ca.
0.25-0.5 mm long, nerveless or 1-3-nerved, upper 0.5-1.0 mm long, 3-5-nerved.
Lower lemma 1.0-1.2 mm long, folded, nerveless or obscurely 5-nerved, its
palea elliptic, grooved, nerveless, glabrous; anthers 0.3-0.5 mm long. Upper
lemma and palea 0.8-1.0 mm long, lanceolate, 2-keeled, hairy along keels
and on dorsal surface.

   Type: India: Bombay (Maharashtra), Mahabaleshwar, Sept. 14, 1958,
   H. Santapau 22731 (K, Photo !).

   Fls. & Frts.: Aug.-Sept.

   Distrib.: INDIA: Western ghats, endemic to Maharashtra at ca. 650-
1375 m alt. Grows in open, rocky, moist grassland with species of Utricularia,
Eriocaulon, Murdania and Isachne.

   Notes: This is a very rare grass, represented by a few collections
(Maharashtra, Ratnagiri Dt., Amboli, Aug. 12, 1971, B. G. Kulkarni 131615
(BSI, CAL); Amboli Hill station, Sept. 13, 1971. V. N. Naik 1300 (BSI,
Marathwada Univ.).

f. in Trim. Fl. Ceyl. 5: 270. 1900; Fischer in Fl. Pres. Madr. Pt. 10:
1804. 1934 (Repr. ed. 3: 1249, 1957); Senaratna, Grass. Ceyl. 111.

   Perennial, densely tufted, ca. 12-40 (-50) cm tall, ascending. Leaf-blades
ca. 0.6-3.5 cm long, filiform, involute, or linear-lanceolate, flat. Panicle
up to 8 cm long, lax, branches up to 3 cm long, distant, spreading. Spikelets
2.5-4.0 mm long, obovoid-oblong. Lower lemma 2-3 mm long, folded, coriaceous, nerveless, glabrous or sparsely hairy near the base, its palea elliptic, grooved, 2-nerved or nerveless; glabrous or sparsely hairy; stamens 3.

1a. Culms capillary with involute filiform blades. Spikelets 2.5-3.0 mm long. Lower glume 1.0-1.5 mm long, 3-7-nerved; upper glume 1.5-2.0 mm long, 7(-9)-nerved. Upper lemma and palea 1.5-2.0 mm long, 2-keeled, 2-nerved, hairy along keels and all over dorsal surface. Anthers 0.8-1.0 (-1.5) mm long ...var. perpusilla

1b. Culms slender with flat linear-lanceolate blades. Spikelets 3.5-4.0 mm long. Lower glume 1.7-2.0 mm long, 1-3-nerved; upper glume 2.3-2.5 mm long, 7-nerved. Upper lemma and palea ± 2.5 mm long, not keeled, nerveless (-1-nerved), glabrous or sparsely hairy in lower half. Anthers 1.5-1.7 mm long ...var. nilagirica


Type : India : Tamil Nadu, Nilgiri Dt., Parthimund, 2300 m, July 11, 1970, J. L. Ellis 34627 (Holotype, CAL ; Isotype, MH ).

Fls. & Frts. : July-Sept.

Distrib. : So far known only by type collections.


Type : Ceylon (Sri Lanka), Wight 2043 (K, Photo !).

Fls. & Frts. : Sept.-Nov.

Distrib. : INDIA : Tamil Nadu; SRI LANKA. In marshy places at ca. 1200-2100 m alt.

Note : This variety has not been collected from India during this century and it is so far known only by two collections [Nilgiri, Schmid s. n. (K); Nilgiri, Stahl s. n. (K) from India].


Annual, tufted, ca. 5-45 cm long, prostrate or ascending. Leaf-blades 0.5-3.5 x 0.15-0.5 cm, linear-lanceolate. Panicle 1.5-10.0 cm long, interrupted spiciform or open, branches up to 1 (-1.5) cm long densely crowded with spikelets. Spikelets 1.5-2.5 (-3.0) mm long, lanceolate. Glumes glabrous, lower 0.8-1.0 mm long, 3-nerved, upper 1.0-1.2 mm long, (4-) 5(-6)-nerved. Lower lemma 1.5-2.5 mm long, nerveless, glabrous or sparsely hairy, its palea similar but narrower; stamens 3, anthers 0.3-0.4 mm long. Upper lemma and palea 1-2 mm long, nerveless, 2-keeled, hairy along keels and on dorsal surface.

Type: Ceylon (Sri Lanka), Wight 2044 (K, Photo !).

Fls. & Frts.: Throughout the year.

Distrib.: Widely distributed in S. E. Asia at 550-1800 m alt. India: Sikkim, Arunachal Pradesh, Assam, Nagaland, Meghalaya, West Bengal, Bihar, Orissa, Andhra Pradesh, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu, Kerala; Nepal, China, Burma, Thailand, Laos (Indochina), Sri Lanka, Madagascar.

Grows gregariously and forming a dense mat in damp and marshy places, also weed in paddy fields.


Notes: This species shows much variation in the size of plants, spikelets and form of panicle. It is closely allied to C. pulchella R. Br. and Hooker (l. c.) placed Indian specimens under 3 varieties of the latter. C. pulchella R. Br. is known from Queensland, Australia and it was insufficiently described until Hubbard (Hook. f. Pl. t. 3440. 1943) redescribed it.

2. ISACHNE

Annual or perennial, mostly hygrophilous. Culms tufted, very slender to robust, often rooting at lower nodes. Leaf-sheaths loose, glabrous or hirsute with tubercle based hairs; ligule a fringe of hairs or absent; blades mostly broad and flat, striate above, glabrous or hirsute on one or both surfaces. Inflorescence an open panicle, occasionally raceme. Spikelets small to very minute, subglobose or obovoid, gaping, 2-flowered, awnless; rachilla short, disarticulating above the glumes and between the florets; pedicels unequal with or without glandular bands. Glumes separately deciduous (except I. setosa) at maturity, longer, equal or subequal to spikelet, ovate, elliptic or orbicular-oblong, acute to acuminate, slightly concave, margins incurved, 5-11-nerved, herbaceous, glabrous or setose on back. Florets 2, ellipsoid-hemispherical, similar or dissimilar in shape, size and texture; both fl. variable in sex (♂, ♀; ♀, ♀; ♀, ♀; ♀, ♀; ♀, ♂; ♀, ♂; ♀, ♀; ♀, ♀; ♀, ♂; ♀, ♂; ♀, ♀) Stamens 3.

Distrib. : ca. 110 species in the tropics and subtropics of both hemispheres. 29 species in India. 18 species endemic to India.

1a. Lower and upper floret almost similar in shape, size and texture; both fl. subequal, plano-convex, indurate, subsessile (sometimes upper fl. slightly smaller and stipitate). Lemmas elliptic to hemispherical, concave, coriaceous-crustaceous, nerves obscure (-5-nerved), mostly pubescent on back. Paleas similar to lemmas but flat, nerveless (-2-nerved) with incurved margins ...Sect. 1. Albentes

1b. Lower and upper floret dissimilar (Heteromorphous); lower fl. longer, flatter, thinner, subsessile; upper fl. shorter, plano-convex, indurate, stipitate. Lower lemma elliptic, slightly concave, thinly chartaceous, 5(-7)-nerved, glabrous. Upper lemma ovate-elliptic (-hemispherical), deeply concave, coriaceous-crustaceous, nerves obscure, pubescent on back. Paleas similar to respective lemmas but flat, nerveless (-2-nerved) ...Sect. 2. Isachne

Section 1. Albentes Ved Prakash & Jain Sect. nov.


Herba annua perennisve laminis linearibus ad lanceolatis ovatisve. Inflorescentia plerumque paniculata. Spiculae floesulis subsimilaribus. Flœculus superior inferiorque subaequalis, plano-convexus, anguste ad late ellipsoideus vel hemisphaericus induratus, glaber pubescensve.

Species typica—I. albens Trin.
1a. Spikelets 1.0-1.3 (-1.5) mm long:

2a. Plants very delicate, 3.0-8.5 cm high, leaf-blades short, ovate:

3a. Leaf-sheaths and blades glabrous. Spikelets ± 1.5 mm long. Lemmas with woolly hairs at the base

...28. I. veldkampii

3b. Leaf-sheaths and blades hirsute. Spikelets ± 1.2 mm long. Lemmas glabrous or pubescent on dorsal side

...21. I. mysorensis

2b. Plants not very delicate, (6-) 10-50 cm high; leaf-blades elliptic, lanceolate or ovate:

4a. Leaf-blades distant, ovate, thick, stiff, pectinately ciliate along margins. Ligule absent

...7. I. confusa

4b. Leaf-blades elliptic or lanceolate, thin soft, not ciliate on margins. Ligule a fringe of 0.5-1.0 mm long hairs

...6. I. clarkei

1b. Spikelets 1.5-4.5 mm long:

5a. Spikelets 3.5-4.5 mm long (Panicle very long lax, few-flowered. Plant robust)

...29. I. walkerii

5b. Spikelets 1.5-3.5 mm long:

6a. Glumes conspicuously longer than the spikelet:

7a. Leaf-blades linear. Culms wiry, climbing, woody (bamboo like), ca. 1-2 m long. Spikelets 2.3-2.6 mm long

...2. I. anglandei

7b. Leaf-blades lanceolate or ovate to ovate-lanceolate. Culms not as above:

8a. Florets hemispherical. Glumes densely setose all over dorsal surface. Spikelets 2.5-3.0 mm long, few on short, setose and horizontally spreading branches

...18. I. lisboae

8b. Florets barge-shaped or ellipsoid. Glumes glabrous or sparsely setose in upper-half only. Spikelets 2.5-3.5 mm long, many on rather long, glabrous and erect branches

...17. I. kunthiana

6b. Glumes shorter, equal or slightly longer than the spikelet:

9
9a. Florets broadly ellipsoid to hemispherical. Spikelets mostly globose:

10a. Leaf-blades linear:

11a. Leaf-blades 15-35 x 0.2-1.0 cm. Culms up to 5 mm wide ...19. I. meeboldii

11b. Leaf-blades up to 15 x 0.6 (-0.8) cm. Culms up to 2.5 mm wide:

12a. Florets with tuft of long, copious, woolly hairs. Panicle lax, narrow. Spikelets 2.5-3.0 mm long ...4. I. bori

12b. Florets without tuft of hairs. Panicle loose to compact, ovoid, densely-flowered. Spikelets 2.0-2.5 mm long ...10. I. elegans

10b. Leaf-blades narrowly to broadly lanceolate:

13a. Plants 35-95 cm tall, robust. Leaf-blades 5-16 x 0.5-1.7 cm. Panicle 8-18 cm long ...27. I. swaminathanii

13b. Plants up to 40 cm tall. Leaf-blades up to 4.5 x 0.8 cm. Panicle up to 7 cm long, few-flowered:

14a. Spikelets (2-) 2.2-3.2 mm long, purple. Florets rounded on back. Panicle branches and pedicels with one to several glandular bands ...3. I. bicolor

14b. Spikelets 1.8-2.0 mm long, not purple. Florets flattened like crumplets or milestones. Panicle branches and pedicels without glandular bands ...9. I. dimyloides

9b. Florets narrowly ellipsoid or barge-shaped. Spikelets ellipsoid or oblong or obovoid to obovoid-elliptic:

10
15a. Leaf-blades linear (sometimes narrowly lanceolate in *I. himalaica*):

16a. Culms mostly densely tufted and branched mainly at base. Leaf-blades 1-3(-4) mm broad, hairy beneath, hairs very soft and fugacious  

...8. *I. deccanensis*

16b. Culms solitary or loosely tufted, branches all along the culm or not. Leaf-blades 2-7 (-9) mm broad, occasionally narrowly lanceolate, glabrous or scabrous  

...14. *I. himalaica*

15b. Leaf-blades narrowly lanceolate to broadly lanceolate:

17a. Spikelets (1.0-) 1.5-1.8 mm long. Panicles decompound, densely flowered:

18a. Panicle branches and pedicels with conspicuous glandular bands. Leaf-sheaths densely hirsute and ciliate with long hairs along margins  

...15. *I. hirsuta*

18b. Panicle branches and pedicels without glandular bands:

19a. Leaf-sheaths mostly hirsute with tubercle-based hairs in upper half; ligules 2.5-5.5 mm long hairs, blades very scabrid, only mid-nerve prominent beneath. Spikelets deciduous  

...24. *I. scabrosa*

19b. Leaf-sheaths glabrous; ligules 1-2 (-3) mm long hairs; blades glabrous, mid-nerve and 3-6 pairs of lateral nerves very prominent beneath. Spikelets persistent  

...1. *I. albens*

17b. Spikelets (1.8-) 2.0-2.5 mm long, smooth, shining. Panicle not densely flowered:

20a. Leaf-blades 2-5 mm broad, elliptic or linear-lanceolate, soft, hairy, without cartilaginous thickened margins. Pedicels without glandular bands  

...26. *I. sikkimensis*
20b. Leaf-blades 5-10 mm broad, lanceolate, stiff, hairy or glabrous, distichously arranged with cartilaginous thickened margins. Pedicels with 1-3 glandular bands

...16. I. kinabaluensis

Section 2. Isachne

1a. Spikelets 1 mm long. Leaf-blades elliptic ...13. I. gracilis

1b. Spikelets 1.5-4.0 mm long:

2a. Inflorescence a raceme. Plants up to 5 cm high ...11. I. fischeri

2b. Inflorescence a panicle; plants mostly much taller (except I. setosa):

3a. Spikelets 3-4 mm long; glumes often setose, much longer than the rest of the spikelet ...5. I. bournorum

3b. Spikelets 1.5-3.0 mm long; glumes setose or not, shorter or equal to spikelet, rarely longer (I. setosa):

4a. Upper floret about half the length of the lower floret, mostly both fl. included within the glumes:

5a. Plants 3-18 cm high; glumes caudate-acuminate, mostly setose with tubercle-based hairs on dorsal side ...25. I. setosa

5b. Plants ca. 40 cm high; glumes acute-obtuse, smooth ...22. I. oreades

4b. Upper floret more than half the length of the lower floret, mostly both or at least lower fl. protruding beyond the glumes:

6a. Spikelets (1.2-) 1.5-1.6 (-1.8) mm long. Anthers of lower floret 0.3-0.6 mm long. Glumes unequal, lower shorter and narrower than upper ...23. I. pulchella

6b. Spikelets 1.8-2.8 mm long. Anthers of lower floret 1.0-1.5 mm long. Glumes subequal:

7a. Leaf-blades 1.0-2.5 (-3.5) cm long, mostly without cartilaginous margins. Ligules 0.8-1.5 (-2.0) mm long hairs. Nodes hairy. Spikelets 1.5-2.0 (-2.2) mm long ...20. I. miliacea
7b. Leaf-blades (1.5-) 3.0-12.0 cm long, mostly with cartilaginous thickened margins. Ligules (1.5-) 2.0-3.5 mm long hairs. Nodes glabrous. Spikelets (1.8-) 2.0-2.8 mm long

...12. I. globosa


Perennial, 20-150 cm high, erect or ascending with slender to stout culms. Leaf-blades 5.0-24.5 × 0.5-2.4 cm, linear-lanceolate to broadly lanceolate, acute to acuminate, flat, occasionally hirsute, nerves very prominent beneath. Panicle 7-40 cm long, decompound, effuse; branches up to 16 cm long, profusely divided, densely flowered, eglandular. Spikelets (1.0-) 1.2-1.6 (-1.8) mm long, oblong or globose-obvoid. Glumes subequal to spikelet. Florets ± 0.8-1.3 mm long.

Type: Nepal: Sanko, Aug. 1821, Wallich s. n., Wall. Num. List No. 8658 (CAL !, K, Photo !).

Fls. & Frts.: Throughout the year.

Distrib.: Widely distributed in South-East Asia and Himalayan region at 300-2000 m alt. India: Himachal Pradesh, Uttar Pradesh, West Bengal, Sikkim, Assam, Arunachal Pradesh, Manipur, Nagaland, Meghalaya; Nepal, Bhutan, Bangladesh, Burma, Thailand, Malasia, China.

Uses: This grass is readily eaten by cattle.


Perennial, ca. 1-2 m long, climbing or spreading. Culms wiry, bamboo-like, profusely branched, branching often one-sided and very long. Leaf-sheaths very loose, splitting, glabrous; blades 3-12 × 0.15-0.7 cm, linear, flat or involute. Panicle 5-8 cm long with erect-spreading, up to 4 cm long branches. Spikelets 2.3-2.6 mm long, obvoid. Glumes 2.3-2.6 mm long, longer than the florets, cuspidate, glabrous or hirtellous at tip. Florets 1.5-2.0 mm long, included.
Type: India: Palni Hills, Shembagnur, 6000 ft (±1800 m), L. Anglade 914 (Holotype, K, Photo !); Shembagnur, 5500 ft (±1650 m), Van Malderen 1283 (Paratype, CAL !); Anaimalai, 4000-5500 ft (1200-1650 m), May 1917, E. Blatter & Hallberg 182 (Paratype, CAL !, K).

Fls. & Frts.: Oct.-May.

Distrib.: INDIA: Endemic to Tamil Nadu at 1200-1800 m alt. (known only from Palni and Anaimalai Hills).

Notes: It was known only from the original collections until one of us relocated it after several decades in 1978 [Tamil Nadu, Madurai Dt., Kodaikanal, Silver cascade ±1800 m, March 5, 1978, Ved Prakash 91A, B (CAL)].


Perennial, 14-40 cm long, ascending with rhizomatous base and stiff culms. Leaf-blades 1.0-4.5×0.2-0.8 cm, linear-lanceolate to ovate-lanceolate, acute, sparsely hirsute above, densely hirsute beneath, margins cartilaginous thickened and serrulate. Panicle 2-7 cm long, few-flowered, on long-exserted peduncle; branches and pedicels with one to several glandular bands. Spikelets 2.2-3.2 mm long, globosely-ovoid, dark purple. Glumes slightly shorter than spikelet, glabrous or sparsely setose on dorsal side. Florets almost similar, 1.7-2.5 mm long.

Type: India: Maharashtra, Aurangabad Dt., Mhaismal 600 m, Oct. 8, 1973, B. W. Patunkar 1849A (Holotype, CAL !); B. W. Patunkar 1849 B-E (Isotypes, Marathwada Univ.).


Distrib.: INDIA: Endemic to Maharashtra at 600-1000 m alt. Grows in open, moist grassland with Eriocaulon, Swertia, Utricularia, Cyperus and small grasses.

Notes: This species was collected from first table land of Panchgani (Maharashtra) in Oct. 1979 [Ved Prakash 346 A-F (CAL)]. It is difficult to locate plant of this species in the field as the panicles with few dark purple spikelets on a naked peduncle are the only erect and visible part; the branching culms with leaf-blades remain at the creeping base.


Annual, 15-75 cm high, erect with slender culms. Leaf-blades 6-15×0.25-0.6 cm, linear, flat, hirsute with tubercle-based hairs, margins cartil-
ginous thickened. Panicle 5-20 cm long, with capillary branches up to 5 cm long; pedicels with one to several glandular bands. Spikelets globose. Glumes equal to or slightly shorter than the spikelet, setosely hirsute on dorsal side. Florets almost similar, subequal, 2.0-2.8 mm long.

**Type**: India: Maharashtra, Pune Dt., Dhak Khilla ±27 km west of Junar, Sept. 27, 1968, Hemadri 117968 A (Holotype, CAL!); B-I (Isotypes, B-D in BSI!); F in K; G in L; H in MO; I in I.F); Bushi lake, Ambavne near Lonavla, Aug. 20, 1964, Reddi 98672 A-E (Paratype, BSI!).

**Fls. & Fruits**: Aug.-Dec.

**Distrib**: INDIA: Endemic to Maharashtra (so far known only from the type collections).

**Notes**: This recently described species is quite distinct from all other known species of this genus owing to the presence of long, copious woolly hairs on the callus of both florets.


**Figs. 1-15 (P. 16)**

Perennial, 10-105 cm tall, erect or ascending with profusely branched culms and rhizomatous base. Leaf-blades 1.5-6.5 × 0.2-1.0 cm, elliptic-lanceolate or ovate-lanceolate or linear-lanceolate, glabrous or hirsute, margins cartilaginous thickened. Panicle 2-13 cm long, lax; branches 0.5-6.0 cm long stiff, angular (-winged), often with tuft of hairs near the base. Spikelets obovoid. Glumes 3-4 mm long, much longer than the florets, cuspidate-acuminate, often setose with long, stiff, tubercle-based hairs. Florets included, dissimilar (heteromorphous): lower ± 2.0-3.2 mm long, upper ±1-2 mm long, stipitate, plano-convex, thick-leathery.

**Type**: India: Palni Hills, Kodaikanal, 6500 ft (± 1950 m), June, 14, 1898, Sir A. G. & Lady Bourne 2491 (Holotype, K, Photo !; Isotype, CAL!, K).

**Fls. & Fruits**: Aug.-June.

**Distrib**: INDIA: Endemic to Tamil Nadu and Kerala at ca. 1200-2200 m alt.

Isachne bourneorum Fischer

Annual, (6-) 10-40 (-50) cm long, erect with weak and slender culms. Leaf-blades 1.8 × 0.2-0.8 cm, mostly elliptic, acute, hirsute. Panicle 1-11 cm long, effuse; branches up to 5 cm long, often horizontally spreading at maturity. Spikelets 1.0-1.3 (-1.5) mm long, globose. Glumes almost as long as spikelet, sparsely hairy on dorsal side. Florets (0.8-) 1.0-1.25 mm long, upper fl. often slightly larger and stipitate.

Type: India: Lachooong Valley, 8000-11000 ft (Lachung valley, ± 2400-3300 m), J. D. Hooker s. n. (Syntype, K); Kohima, 5000 ft (± 1500 m), C. B. Clarke s. n. (Syntype, K, Photo!).


Distrib.: INDIA: Endemic to Sikkim, Meghalaya and Nagaland at ca. 1500-3300 m alt. Grows in shady and damp places, also in paddy fields.


Perennial, 15-50 cm high, ascending with slender culms. Leaf-sheaths very short, tubercled or hispid; blades 0.5-2.0 × 0.2-0.65 cm, ovate, acute, amplexical, striate, margins ciliate with tubercle-based hairs. Panicle 1.5-3.5 cm long, narrow, few-flowered; branches up to 1 cm long, horizontally spreading at maturity, pedicels with glandular bands. Spikelets ±1.2 mm long, globose. Glumes 1.0-1.2 mm long, setose on dorsal side. Florets ±1 mm long.

Type: Sumatra: Ins. Bangka, Bunnemeyer 1577 (BO, Photo!).

Fls. & Frts.: Sept.-Oct. (-Feb.).

Distrib.: Widely distributed. INDIA: Nicobar Islands; BURMA (Tenasserim), SUMATRA, JAVA, BORNEO, NEW GUINEA, AUSTRALIA.

Notes: Although Ohwi named it as I. confusa, but this species could hardly be mistaken for anything else. Its very short leaf-sheaths, small, ovate, pectinately ciliate blades and minute spikelets make it quite distinct from all other species of the genus.

Perennial, ca. 19-62 cm high, ascending with branched, slender culms and wiry rhizomes. Leaf-blades 1-11 × 0.1-0.4 (-0.6) cm, linear, stiff, scabrid, often hairy beneath, hairs very soft and fugacious. Panicle 4-10 cm long, compact or effuse; branches up to 5 cm long, capillary, flexuous; pedicels with or without glandular bands. Spikelets 1.6-2.2 (-3.0) mm long, obovoid, mostly purple. Glumes as long as spikelet or slightly shorter to longer than the spikelet, glabrous or hirtellous. Florets 1.3-1.8 mm long.

*Type:* India: Nilgiri, Ootacamund, Arambly 7500 ft (± 2250 m), Aug. 1884, *J. S. Gamble* 15290 (Holotype, K, Photo !; Isotype, DD ! K).

*Fls. & Frts.:* May-Oct.

*Distrib.:* INDIA: Endemic to Tamil Nadu at ± 2000-2250 m alt.

*Notes:* This species is very allied to *I. himalaica* Hook. f. but they inhabit areas apart as also suggested by their names. They are similar in many characters and under certain circumstances it is difficult to say which is which. The important distinguishing character of *I. deccanensis* is softly pilose leaf-blade, but it is not always helpful as the hairs are fugacious. There are slight differences in habit and panicle of both species, which also give clue for identification.


Annual, weak, up to ca. 32 cm high, ascending. Leaf-blades 1-3 (-4.5) × 0.3-0.7 (-1.0) cm, lanceolate, acute, glabrous, margins cartilaginous thickened. Panicle 1.5-2.0 cm long, narrow, few-flowered; branches up to 8 mm long, pyramidal, ascending. Spikelets 1.8-2.0 mm long, globose. Glumes subequal, almost as long as spikelet. Florets almost similar, ±1.5-1.7 mm long flattened like milestones, smooth mostly upper fl. slightly smaller and stipitate.

*Type:* India: Sikkim Terai, Dulkajhar, 5000 ft (± 1500 m), Oct. 16, 1884, *C. B. Clarke* 36764 (Holotype, K, Photo !; Isotype, CAL !).

*Fls. & Frts.:* Aug.-Nov.

*Distrib.:* INDIA: Sikkim; a very rare grass, so far known only from the type collections.

*Note:* Panicle with few small spikelets (±1.8-2.0 mm long) and flattened florets make it distinct from other species.

*Isachne elegans* Dalz.

Lisboa, Bomb. Grass. 7. 1897; Cooke, Fl. Pres. Bomb. 2 : 923. 1908

Figs. 1-10 (P. 19)

Deonda (Mar.).

Annual, densely tufted, 13-32 cm high, erect with many slender fibrous
roots. Leaf-blades 1.0-10.5 x 0.1-0.4 (-0.8) cm, linear, occasionally linear-
lanceolate, margins cartilaginous thickened. Panicle 3.5-14.5 cm long,
loose to compact, densely flowered; branches 0.8-4.0 cm long, erect, alternate,
subcapillary; pedicels mostly eglandular. Spikelets (1.8-) 2.0-2.5 mm long,
globose or globose-ovoid. Glumes glabrous or setose on dorsal side.
Florets almost similar, subequal, 1.4-2.4 mm long. Lemmas pubescent and
mostly purple in upper-half on back.

Type: India: Deccan, Dalzell s.n., on the margins of rivulets in the
Deccan (?). Following specimens may be regarded as type: Bombay,
Dalzell s.n. (Herb. of N. Dalzell, Bombay, purchased in 1878) (CAL !, DD !,
K, Photo !).


Distrib.: INDIA: Endemic to Western Ghats, Maharashtra, Karnataka?
at ca. 600-1000 m alt. Grows gregariously along the margins of swamps.

Notes: Fischer (in Fl. Pres. Madr. Pt. 10 : 1797. 1934), Tiwari (Indian
For. 81 : 109. 1955), Panigrahi et al. (Bull. bot. Surv. Ind. 6 : 237-266.1964)
and Kanodia & Rao (Ann. Arid Zone 5 : 49-62. 1962) reported it from Tamil
Nadu, Madhya Pradesh, Orissa and Rajasthan respectively. But a critical
examination of material reveals that interestingly this species is endemic to
Western Ghats (mainly in Maharashtra). The specimens from other regions
on which new distributions were reported belonged to another species i.e.
I. globosa.

Blatter & McCann (Bomb. Grass. 187, t. 121. 1935) had erroneously
included specimens of several species under it. For example, the specimens
McCann 9555, Woodrow 175, Blatter 5080, Talbot 2305, quoted by them
belong to I. swaminathanii, I. globosa, I. bicolor and I. meeboldii respectively.


Figs. 1-9 (P. 21)

Annual, low grass up to 5 cm high, erect or ascending. Leaf-blades
5-8 x 1.0-3.5 mm, lanceolate or elliptic, hirsute on both surfaces. Inflo-
Isachne fischeri Bor

rescence a simple raceme (-panicle), up to 1.5 cm long, lax, few-flowered. Spikelets 2.7-3.0 mm long, obovoid-oblong, geminate on unequal pedicels. Glumes 1.8-2.8 mm long, cuspidate-acuminate, setose on dorsal side. Florets: lower 2.5-3.0 mm long, upper 1.5-2.0 mm long, shortly stipitate, plano-convex, indurate. Lower lemma elliptic, thinly chartaceous, 5-7-nerved, glabrous. Upper lemma ovate-elliptic, concave, coriaceous, nerves obscure, pubescent on back.

Type: India : Kerala (formerly Madras), summit of Anaimudi, Travancore, High range, 8840 ft (±2650 m), Sept. 1933. E. Barnes s. n. (K, Photo !).

Fls. & Frts.: Sept.-Nov.

Distrib.: INDIA: Endemic to Kerala at above 2,500 m alt.

Note: It is a very rare grass which has been collected only once after the type [Kerala, Kottayam Dist., Anaimudi summit, 2575 m, Nov. 19, 1965, B. V. Shetty 26533 (MH)].


Figs. 1-13 (P. 23)

Annual or perennial, tufted (10-) 20-80 cm high, erect or ascending with slender branched culms. Leaf-blades 3-12×0.3-1.2 cm, linear-lanceolate to
*Isachne globosa* (Thunb.) O. Ktze.

Isachne gracilis C. E. Hubb.

ovate-lanceolate, occasionally hirsute on one or both surfaces. Pancile up to 18 cm long, compact or effuse; branches up to 9 cm long, ascending, capillary, flexuous; pedicels with or without glandular bands. Spikelets (1.8-) 2.0-2.5 (-2.8) mm long, globose or globosely-obovoid. Glumes glabrous or setosely hirsute on dorsal side. Florets: lower as long as spikelet, mostly protruding beyond the glumes; upper 1.5-2.0 (-2.4) mm long. Lower lemma elliptic, thinly chartaceous, obscurely 5-nerved, glabrous. Upper lemma ovate-elliptic, concave, coriaceous, nerves obscure, often pubescent on back.

_Type:_ Japan, Thunberg s.n. [UPS, Microfiche (No. 2041)].

_Fls. & Frts.: _Throughout the year.

_Distrib.:_ Widely distributed from sea level to 2000 m alt., grows gregariously in wet and marshy places, often troublesome weed in rice fields. _INDIA:_ Uttar Pradesh, Assam, Manipur, West Bengal, Bihar, Orissa, Madhya Pradesh, Rajasthan, Gujrat, Maharashtra, Goa, Daman, Nagar Haveli, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu; _SRI LANKA_, _BURMA_, _CHINA_, _JAPAN_, _MALAYSIA_, _SUMATRA_, _JAVA_, _AUSTRALIA_, _NEW ZEALAND_.

_Uses:_ The species is regarded as a good fodder. The grass is ploughed in as green manure. Tender tops are reported to be eaten in Java.


_Notes:_ This is a polymorphic species, showing great variation in qualitative and quantitative characters. The variation in this wide-spread species is complex and it is not possible to segregate the material into more than one taxon due to intergradation of characters among the specimens.


_Figs. 1-15 (P. 24)_

Annual, very weak and delicate, 12-30 (-40) cm high, erect from the decumbent base. Leaf-blades 1-7×0.25-1.4 cm, elliptic, acute, very thin and soft, glabrous or sparsely hirsute. Panicle 2-8 cm long, effuse with 0.8-2.5 cm long capillary branches; reddish glandular bands on branches and pedicels. Spikelets ± 1 mm, globose. Glumes setosely hirsute on back; lower ± 0.7-0.85 mm long, 7-nerved; upper 0.9-0.95 mm long, 7-9-nerved. Florets: lower ± 1 mm long, subsessile; upper 0.5-0.55 mm long stipitate, plano-convex, indurate.
Isachne himalaica Hook. f.

**Type**: India: Mysore (Karnataka), Bababudan Hills, Santaveri, 4000 ft (±1200 m), Oct. 1908, *Meebold* 10781 (Holotype, K, Photo !; Iso-type, CAL !).

**Fls. & Frts.**: Aug.-Nov.

**Distrib.**: India: Madhya Pradesh, Maharashtra, Karnataka, endemic. Very delicate and handsome grass grows in deep shade on rocks and walls in moist places at elevations from ca. 620-1800 m alt.


Figs. 1-12 (P. 26)

Perennial, 30-100 cm high, erect or ascending with rhizomatous base. Blades 4.5-15.0 (-20.0) × 0.2-0.9 cm, linear (-linear-lanceolate), acuminate, stiff, glabrous or hirsute, margins cartilaginous thickened. Panicle 4-14 cm long effuse with up to 5 cm long, subcapillary flexuous branches, pedicels with 1-3 glandular bands. Spikelets (1.5-) 2.0-2.5 mm long, globosely-obovoid, often purple. Glumes glabrous or hirtellous. Florets 1.3-2.1 mm long.

**Type**: India: Khasi Hills, 4000-5000 ft (± 1200-1500 m), *J. D. H. & T. T. s. n.* (Syntype, CAL !, K, Photo !).

**Fls. & Frts.**: Aug.-Dec.

**Distrib.**: Himalayan region at 1000-1500 m alt. in damp places along beds of streams. **India**: Jammu & Kashmir, Punjab, Himachal Pradesh, Uttar Pradesh, Assam, Meghalaya; **Nepal**, **Pakistan**, **Afghanistan**.

**Chr. No.**: 2n=50 (Mehra & Sood in Taxon 23 : 807-808. 1974).


Perennial. ca. 50-100 cm high, ascending. Leaf-sheaths densely hirsute with tubercle-based hairs; sparsely hairy beneath, margins cartilaginous thickened, midrib and lateral nerves slightly distinct beneath. Panicle 8-19 cm long, open compound; branches up to 8 cm long, pyramidal; branches and pedicels with one to several glandular bands. Spikelets 1.5-1.8 mm long, oblong or ovoid. Glumes 1.4-1.8 mm long, sparsely hirsute on back. Florets 1.3-1.5 mm long.

27
Isachne kunthiana (Wight et Arn. ex Steud.) Thw.

Type: India: Cachar, June 1874, R. L. Keenan s.n. (Syntype, K, Photo !); Bangladesh: Sylhet, Sept. 1820, Wallich s.n. Wall. Num. List No. 8657 (Syntype, K, Photo !).

Fls. & Frts.: Aug.-March.

Distrib.: India: Assam; Bangladesh, Malaysia, China.

Note: It has not been collected so far from Indian subcontinent after the type.


Perennial, 20-90 cm high, ascending with semi-robust culms. Leaf-sheaths mostly overlapping, hirsute; blades 2-9×0.5-1.0 cm, lanceolate, erecto-patent, margins cartilaginous thickened, mostly hirsute with tubercle-based hairs beneath, glabrate in age. Panicle 6-16 cm long, effuse, compound; branches up to 11 cm long, spreading, capillary, flexuous. Spikelets 1.8-2.2 (-2.5) mm long, globose smooth. Florets 1.6-2.0 mm long. Lemmas elliptic, concave, coriaceous, nerves obscure, pubescent on upper quarter.

Type: British North Borneo, Mount Kinabalu, 1450-3000 m, Nov. 15, 1916, Clemens 10704 (L).

Fls. & Frts.: Aug.-March.

Distrib.: South-East Asia at ±1500-2000 m alt. India: Meghalaya; Burma, Thailand, Malaysia, Sumatra, Borneo.

Note: Occurrence of this grass in India has recently been reported by Ved Prakash (l.c.).


Figs. 1-10 (P. 28)
Perennial, 15-120 cm tall, erect or ascending from long creeping and rooting base. Leaf-sheaths mostly hirsute with tubercle-based hairs; blades 1.5-10.0×0.3-1.7 (-2.5) cm, ovate to ovate-lanceolate or elliptic to elliptic-lanceolate or lanceolate, acute, amplexicaul, hirsute, margins cartilaginous thickened. Panicle 2-13 cm long, lax, branches up to 6 cm long, canaliculate, winged, stiff, often setose at the base. Spikelets (2-) 2.5-3.5 mm long, obovoid-elliptic. Glumes (2.0-) 2.5-3.5 mm long, much longer than the florets, cuspidate-acuminate, setose mostly in upper half. Florets included, almost similar, 1.5-2.5 mm long.

Type: Ceylon (Sri Lanka), Wight 1659 (K, Photo!).

Fls. & Frts.: Throughout the year.

Distrib.: Widely distributed in South-East Asia at ca. 1500-2600 m alt. India: Tamil Nadu, Kerala, Karnataka; Sri Lanka, Sumatra, Java, Borneo, Malaysia.


Notes.: There is a great variation in the size of the plants and size & shape of leaf-blades. The two varieties namely I. kunthiana var. elatior and I. kunthiana var. latifolia were entirely based on quantitative characters. After the study of large number of specimens, it is seen that there is a continuous range of variation in size of plants and leaf-blades. Consequently it has not been considered proper to maintain these two as distinct varieties.


Annual, 6-23 cm long, prostrate or ascending with creeping base and long wiry roots. Leaf-sheaths very loose, hirsute or glabrous; blades 1.0-3.5×0.25-1.3 cm lanceolate (elliptic), amplexicaul, thin, soft, hirsute above, margins pectinately ciliate with long tubercle-based hairs. Panicle 1.5-6.0 cm long, lax, few-flowered; branches few, up to 2 cm long, erect to horizontally spreading, angular, stiff, setose; pedicels very short. Spikelets globose. Glumes 2-3 mm long, distinctly longer than the florets, obtusely-cuspidate, densely setose on back. Florets included, ± 1.5-1.8 (-2.0) mm long. Lemmas hemispherical, glistening-punctulate.

Type: India: Mahabaleshwar, Lisboa s. n. (K. Photo!).

Fls. & Frts.: Aug.-Nov.
Distrib.: INDIA: Endemic to Maharashtra and Karnataka at ±1000-1500 m alt. (Western Ghats). Subgregarious in marshy places.

Notes: This is a rare grass apparently inhabiting only the Panchgani and Mahabaleshwar plateau (Maharashtra). Only once collected from Bababudan Hills, Karnataka. The populations of this species seem to be decreasing; we failed to find it at Mahabaleshwar in 1979.


Perennial, up to ca. 80 cm high, erect, with long fibrous roots. Leaf-sheaths broad at base, splitting & tapering at apex, glabrous; blades 15-35×0.2-1.0 cm, linear, flat, tapering from middle towards base and apex, hirsute. Panicle 10-24 cm long, compact or effuse, densely flowered; branches up to 9 cm long, subcapillary, glabrous; pedicels & branches with 1-3 reddish glandular bands. Spikelets ca. 2.0-2.5 mm long, globose. Glumes setose on back. Florets included or slightly exserted, 1.5-1.8 mm long.

Type: India: Mysore, Shimoga, 2000-3000 ft (±600-900 m), Oct. 1908, A. Meebold 10747 (Holotype, K, Photo!; Isotype, CAL!); A. Meebold 10746 (Paratype, CAL! K); Kumsi, 2000-3000 ft (±600-900 m), Oct. 1908, A. Meebold 10745 (Paratype, CAL!, K).

Fls. & Frts.: Sept.-Nov.

Distrib.: INDIA: Endemic to Karnataka at ±600-900 m alt. A weed in rice fields.


Perennial, low, weak, 8-35 (-50) cm high, erect or ascending with long creeping and rooting base. Leaf-blades 1-3 (-6)×2.5-6.0 (-10) cm, ovate-lanceolate to lanceolate (-linear-lanceolate), mostly obtuse, striate and rough above, glabrous or sparsely hirsute on one or both surfaces, margins not cartilaginous. Panicle up to 6 (-10) cm long lax; branches up to 3.5 cm long, capillary, flexuous, glabrous; branches and pedicels with or without
glandular bands. Spikelets (1.5-) 1.7-2.0 mm long, obovoid. Florets: lower as long as spikelet; upper 1.0-1.6 mm long.

Type: India Orientali, 1814, B. Heyne s. n. (Holotype, B, Photo !).

Fls. & Fris.: Aug.-Nov.

Distrib.: Widely distributed in South-East Asia from sea level to 2000 m alt. INDIA: Sikkim, Assam, Meghalaya, West Bengal (N. Bengal), Maharashtra?, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Andaman & Nicobar Islands; SRI LANKA, BURMA, THAILAND, CHINA, MALAYSIA, SUMATRA, JAVA.

Uses: A good fodder readily eaten by cattle and horses.


Notes: This species is very allied to I. globosa (Thunb.) O. Ktze. and sometimes it is very difficult to definitely assign certain specimens to proper species. As Hooker (l.c.) stated that small plants of I. miliacea (mostly from Eastern India: Assam, Meghalaya) look very different from typical I. globosa, but larger (mostly from South India) appear to unite them by many intermediates. Both are wide spread species and show qualitative and quantitative variation in all characters. The major distinction between the two species is in spikelet size: in I. miliacea spikelets are usually 1.5-2.0 mm and these are 2.2-2.8 mm in I. globosa.

The identity of I. miliacea in Indian Floras (Prain, Beng. Pl. 2: 1172. 1903; Cooke, Fl. Pres. Bombay 2: 923. 1908; Haines, Bot. Bih. & Or. 984. 1925; Fischer in Fl. Pres. Madr. Pt. 10: 1797. 1934; Blatter & McCann, Bombay Grass. 189, t. 123. 1935; Bor in Fl. Assam 5: 198. 1940) is doubtful because this species is apt to be confused with I. pulchella Roth which is also found in most of the states in India but is not treated in any Indian Floras.

The grass referred in Indian Floras as I. dispar Trin. had throughout been wrongly identified. The scrutiny of protologue, illustration and type of I. dispar [Trin. Sp. Gram. 1: t. 86. 1828; Nepal, Wallich s.n. (K, Photo !)] revealed that it is very close to I. globosa and I. miliacea in structure of spikelets but it differs from the latter in having different types of leaf-blades which are mostly short, ovate-lanceolate or ovate-elliptic with conspicuous cartilaginous thickening on undulate margins. This type of leaf-blades are not found in Indian plants and the specimens which were assigned to I. dispar in Indian Herbaria & Floras actually belong either to I. globosa or to I. miliacea.

Annual, delicate grass up to 8 cm high, erect. Leaf-sheaths hirsute; blades 7-12 × 3-8 mm, ovate to ovate-elliptic, amplexicaul, soft, hirsute near the apex. Panicle up to 2.3 (-3.0) on long, lax; branches up to 0.8 cm long, capillary; pedicels with reddish glandular bands. Spikelets ± 1.2 mm long, globose. Glumes setosely hirsute on back; lower ± 1 mm long, nervesless; upper ± 1.2 mm long, 5-nerved. Florets ± 0.9 mm long. Lemmas elliptic, concave, coriaceous, nerves obscure, glabrous or pubescent.

Type: India : Karnataka (Mysore), Shimoga Dist., Kundaguda near Agumbe, Aug. 19, 1963; Sundararaghavan 90008 A (Holotype, CAL !); Sundararaghavan 90008 B-E (Isotypes, BSI !).

Fls. & Frts.: Aug.-Nov.

Distrib.: INDIA: So far known only from the type collection from Karnataka, endemic.


Perennial, up to ca. 40 cm high, ascending. Leaf-blades 2.5-6.0 × 0.5-1.0 cm, lanceolate, sparsely hirsute on one or both surfaces, margins cartilaginous thickened. Panicle up to ± 8.5 cm long, effuse; axis subangular, conspicuously flexuous; branches up to ± 3.5 cm long, horizontally spreading, capillary, flexuous; pedicels with or without glandular bands. Spikelets 2.0-2.7 mm long, ellipsoid, acute or obovoid, gaping, dorsally subcompressed. Glumes glabrous. Florets included, lower 1.8-2.7 mm long.

Type: India: Tamil Nadu, Nilgiri Hills. Goodaloor Ghat, 5000 ft (Gudalur, 1500 m), Lawson 6 (K, Photo!).

Fls. & Frts.: Aug.-Nov.

Distrib.: INDIA: Tamil Nadu, endemic to Nilgiri Hills at ± 1500-2000 m alt.

Notes: This species is allied to I. globosa (Thunb.) O. Ktze., but can be distinguished from the latter in having obovoid spikelets, included florets and conspicuously flexuous axis and branches of panicles.

It is a rare grass so far known only from the type locality (Nilgiri). It has been collected after several decades by one of us [Nilgiri, near Cinchona plantations Pykara, Feb. 24. 1978, Ved Prakash 2 (CAL)].

Annual, tufted or not, 6-76 cm high, ascending. Culms slender, freely branched upwards, often glandular band ± 1 mm below each node. Leaf-sheaths short with tubercled hairs or glabrous; blades 1.5-4.0 × 0.3-1.0 cm, ovate-lanceolate to ovate-elliptic, amplexicaul, hirsute on both surfaces, ciliate with long, tubercled hairs near the base, margins cartilaginous. Panicle 1.0-7.5 cm long; branches up to 3.5 cm long, spreading at maturity, capillary, glabrous; 1-3 reddish glandular bands on branches and pedicels. Spikelets (1.2-) 1.5-1.6 (-1.8) mm long, globosely-obovoid. Glumes glabrous; lower 1.0-1.3 mm long, 5 (-7)-nerved; upper 7(-9)-nerved. Florets: lower 1.2-1.6 mm; upper 1.0-1.25 mm long.

*Type:* India Orientali, 1814, *Heyne* s. n. (Holotype, B, Photo!)

*Fls. & Frts.::* Sept.-Feb.

*Distr.*: Widely distributed in South-East Asia up to ca. 1400 m alt., *India*: Tamil Nadu, Andhra Pradesh, Maharashtra, Orissa?, Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Assam, Nagaland, Manipur, Nicobar Islands; *Burma*, *Thailand*, *Malaysia*, *Java*, *Borneo*, *Sumatra*, *Philippines*.

*Notes:* Hooker (Fl. Brit. Ind. 7: 246: 1897) relegated *I. pulchella* Roth under *Sphaercaryum elegans* Nees (now correctly known as *S. malaccense* (Trin.) Pilger, a name based on earlier *Panicum malaccense* Trin. But (as Bor also stated in Kew Bull.: 321-323. 1952), it is a perfectly good species of *Isachne* which has been neglected and is not treated in any Indian floras.

This species is apt to be confused with *Isachne miliacea* Roth and recently latter has been reduced under *I. pulchella* Roth by Gilliland (Fl. Malaya 3: 120. 1971). Most obvious distinguishing characters between these are: Spikelets 1.5-1.6 mm long; anthers 0.3-0.5 mm long and blades with thick cartilaginous margins in *I. pulchella* and spikelets 1.8-2.0 mm long, anthers 1.0-1.5 mm long and blades without cartilaginous margins in *I. miliacea*. The description given by Gilliland (*l. c.*.) fits only for *I. pulchella*.


Perennial, ca. 30-120 cm high, suberect or rambling and geniculate at base. Leaf-sheaths loose, hirsute in upper half; blades 3.5-16.5 × 0.5-1.4 cm, linear-lanceolate (-lanceolate), acuminate, rigid, very scabrid, sparsely hairy on one or both surfaces, only mid-rib prominent beneath. Panicle 6-20 cm long, compound, effuse; branches up to 11 cm long, pyramidal, capillary, eglandular. Spikelets 1.5-1.8 mm long, globose. Florets 1.0-1.3 mm long.

*Type:* India: Khasi Hills, 4500-5000 ft, *C. B. Clarke* s. n. (CAL. !).
Fls. & Frts.: Aug.-Nov. (-April).

Distrib.: INDIA: Endemic to Meghalaya (Khasi Hills) at 1200-1800 m alt. Grows in shady places along the bank of streams with ferns & other grasses.

Note: This species has recently been reported from Nepal by Hara et al. (Enum. Fl. Pl. Nepal 1: 136. 1978). However the identity needs checking.


Annual, low, 3-18 cm long, erect with slender culms and fibrous roots. Leaf-sheaths mostly hirsute; blades 0.5-2.8 × 0.2-1.0 cm, ovate to ovate-elliptic, margins slightly cartilaginous, hirsute with tubercle-based hairs. Panicle up to 5 cm long, narrow, branches up to 1.5 cm long, angular, stiff, glabrous; pedicels eglandular. Spikelets 2.0-3.0 mm long, obovoid-elliptic, often secund. Glumes 2.0-3.0 mm long, often longer than the florets, caudate-acuminate setose with tubercle-based hairs. Florets: lower 1.9-2.4 mm long, thinner; upper 0.9-1.5 mm long.

Type: INDIA: Cochin, at Kavalai, 3000-4000 ft (± 900-1200 m), A. Meebold 12125 (Holotype, K, Photo!); Travancore, at Devicolam, 6000 ft (± 1800 m), A. Meebold 13586 (Paratype, in Breslau herbarium).

Fls. & Frts.: July-Sept.

Distrib.: INDIA: Endemic to South India at 290-1800 m alt., Tamil Nadu, Kerala, Karnataka.

Notes: The upper glume is always distinctly longer than the floret (in situ). The relative length of lower glume and lower floret is variable. The lower glume may be slightly shorter or as long as or distinctly longer than the lower floret. The indumentum of glumes is also variable. They may be setose with tubercle-based hairs or completely glabrous. This species is allied to I. bourneorum Fischer.


Annual, weak, up to ca. 40 cm tall, erect from the decumbent base. Leaf-sheaths glabrous or sparsely hirsute, margins densely ciliate; blades 1.5-6.0 × 0.2-0.5 cm, narrowly elliptic or linear-lanceolate, acute, soft, hirsute. Panicle 5-10 cm long, effuse; branches up to 4 cm long, capillary, flexuous, eglandular. Spikelets ± 2 mm long, ellipsoid, smooth, shining. Florets
included, 1.4–1.5 mm long, often upper slightly smaller. Lemmas ovate-elliptic, obtuse, concave, coriaceous, nerves obscure, glabrous.

Type: India: Sikkim, Karponang, 8500 ft (± 2550 m), Aug. 5, 1948, Dr. Bor’s Collector No. 781 (Holotype, K, Photo !; Isotype, DD!).

Fls. & Frts.: July-Sept. (-Nov.).

Distrib.: INDIA: Eastern Himalaya at ± 1800-2800 m alt., Sikkim, West Bengal, (Uttar Pradesh?); NEPAL.


Perennial, 30-95 cm tall, erect from decumbent base, with stiff culms. Leaf-blades 5-16 × 0.5-1.7 cm, linear-lanceolate to broadly-lanceolate, acute-acuminate, hirsute with tubercle-based hairs, margins cartilaginous thickened. Panicle 8-18 cm long, pyramidal, effuse; branches up to 6 cm long, subcapillary, flexuous, glabrous; one to several glandular bands on branches and pedicels. Spikelets 2.2-2.5 (-2.7) mm long, globose. Glumes glabrous or sparsely setose. Florets (1.8-) 2.0-2.2 mm long.

Type: India: Maharashtra, Satara Dist., Mahabaleshwar, 1372 m, Oct. 9, 1979. Ved Prakash 337 A (Holotype, CAL !); Ved Prakash 337 B-E (Isotype, CAL !).


Distrib.: INDIA: Endemic to Maharashtra above 600 m alt. Grows in damp and shady places in sandy rocky soil.


Annual, very low grass, 3.0-8.5 cm high, erect. Leaf-sheaths glabrous; blades up to 15 × 7 mm, ovate, glabrous or scabrous above on nerves, panicle branches up to 5 mm long with glandular bands. Spikelets ± 1.5 mm long globose. Glumes minutely hairy with few long hairs at the tip; lower ± 1.1 mm long, faintly 3-nerved; upper 1.2-1.4 mm long, faintly 5-nerved. Florets 1.2-1.5 mm long. Lemmas elliptic, concave coriaceous, nerves obscure, woolly hairs at base.

Type: India: Karnataka, South Kanara Dist., Manipal, 150 m, Oct. 29, 1977, K. G. Bhatt 468A (Holotype, CAL; Isotypes, L, MH, BSI & Mysore Univ.).
**Fls. & Frts.:** Oct.

**Distrib.:** INDIA: So far known only from the type collection from Karnataka, endemic. Grows in marshy places.


Perennial, 60-150 cm tall, robust, erect or ascending with stout culms & long slender roots. Leaf-blades (3.5-) 6-22 x 0.5-2.4 cm, lanceolate (-linear-lanceolate), acuminate, smooth above, glabrous or sparsely hairy beneath, margins cartilaginous thickened. Panicle 10-27 cm long, very lax, few flowered; branches up to 17 cm long, pyramidal, subcapillary, conspicuous, glandular bands on branches and pedicels. Spikelets 3.5-4.5 mm long, obovoid. Glumes glabrous or sparsely hairy on back. Florets 3-4 mm long.

**Type**: Ceylon (Sri Lanka), Wight 2046 (?); India: Nilgiri, Sispara, Hohenacker 1280 (Syntype, K, Photo!).

**Fls. & Frts.:** Aug.-June.

**Distrib.:** INDIA: Tamil Nadu, Kerala; SRI LANKA. Grows as underwood on slopes of hills at 100-2000 m alt.

**Chr. No.:** 2n=40 (Gould & Soderstrom in Canad. J. Brt. 52: 1075-1090, 1974).

3. **LIMNOPOA**


Aquatic, annual or perennial (?) with very slender culms and small leaf-blades. Inflorescence a terminal, solitary (occasionally two) spike-like raceme; rachis and pedicels flattened, slightly convex on back. Spikelets mostly in pairs, one sessile, the other pedicelled, obovate-oblong, 2-flowered, hermaphrodite, disarticulating between the florets and above the glumes. Glumes subequal, oblong to elliptic-oblong, obtuse, membranous glabrous; lower narrower, 3-nerved; upper broader, 5-nerved. Florets 2 dissimilar: lower 5, sub sessile, as long as spikelet, flatter, thinner, glabrous; upper 5, stipitate ca. two-third the length of lower, plano-convex, indurate pubescent. Lower lemma elliptic-oblong, truncate, margins incurved, thinly chartaceous, 5-nerved, glabrous, its palea equal to lemma, subacute, hyaline, 2-nerved. Upper lemma elliptic-oblong, rounded at the apex, margins incurved,
concave, coriaceous, l-nerved, pubescent on back, its palea similar to lemma, chartaceous, nerveless. Caryopsis oblong, obtuse, plano-convex.

**Distrib.** : A monotypic genus, endemic to Kerala (India).

*Limnocharis meeboldii* (Fischer) C. F. Huhb. in Hook. Ic. Pl. t. 3432. 1943;

Plants very delicate, elongate, floating on the surface of water. Leaf-sheaths very short; ligules fringe of ± 0.5 mm long hairs; blades 0.5-1.8 ×0.1-0.25 cm, linear-lanceolate, acute-acuminate, mostly bent downwards, glabrous. Spike-like raceme up to 3 cm long. Spikelets 3.5-4.0 mm long, obovoid-oblong, borne mostly in pairs, one sessile, the other pedicelled, pedicels 2.0-3.5 mm long, flattened. Glumes subequal, 2.5-3.0 mm long. Lower lemma ± 3.4 mm long; upper lemma 1.5-2.0 mm long. Stamens 3, anthers ± 2(-2.7) mm long. Caryopsis ± 1.5-1.6 mm long.

**Type** : India : Cochin, Chalakudi, Nov. 1910, *A. Meebold* 12520 (Holotype, K, Photo!; Isotype, CAL & Breslan Herb.).

**Fls. & Frts.** : Sept.-Nov.

**Distrib.** : INDIA : Endemic to Ernakulam Dist. (Cochin State), Kerala.

Grows apparently in tanks, forming thick mass of tangled stems on the surface of water in association with *Sacciolepis interrupta, Nymphoides indicum & Hydrilla sp.*

**Notes** : This strange aquatic grass has been found only in the type locality and is perhaps a very rare species which is represented only by a few populations. It was known only from the original collection made by A. Meebold in 1910 until Dr. Cook relocated it in 1973 and 1979. Dr. Cook (in Litt.) stated “A single population of this rather strange aquatic grass was found at Chottaniakare, ca. 14 km S. E. of Ernakulam (Cochin), Kerala. I first found this population in 1973, in 1979 it was unchanged. The population contains several hundred plants and occupies an area of about 100×300 m in a vast flood plane. That is otherwise uniform. An intense search was made surrounding the population but no additional plants were found”.

**4. SPHAEROCARYUM**


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Annual, ascending from prostrate and rooting base. Culms slender to semi-robust with short leaf-sheaths and ovate blades. Inflorescence an effuse, pyramidal panicle. Spikelets minute, 1-flowered, hermaphrodite, dorsally subcompressed, disarticulating above the glumes, glumes and florets separately deciduous. Glumes membranous, glabrous; lower shorter, nerveless; upper as long as spikelet, 1-nerved. Lemma equal to upper glume or slightly shorter, nerves obscure, pubescent on back. Palea similar to lemma but narrower. Stamens 3. Caryopsis ca. 1 mm long, terete with remnants of styles and basal appendages.

Distrib.: A monotypic genus; Tropical Asia.


Figs. 1-11 (P. 40)

Annual, 15-85 cm long, erect from decumbent base. Leaf-sheaths very short, hirsute or glabrous; ligules fringe of 1.0-1.5 (-2.0) mm long hairs; blades 1.0-5.5 × 0.8-2.0 cm, ovate to ovate-elliptic, acute, amplexicaul, margins mostly ciliate with tubercle-based hairs. Panicle 2-11 cm long, pyramidal, effuse; branches up to 4.5 cm long, capillary; glandular bands on branches and pedicels. Spikelets 1.0-1.5 mm long, ellipsoid or ovoid or obovoid. Glumes readily deciduous, oblong to elliptic-oblong, obtuse; lower 0.7-1.0 mm long, upper as long as spikelet. Lemma & palea as long as or slightly shorter than upper glumes. Anthers ± 0.5 mm long.

Type: Malacca, Willdenow s. n. (LE, Photo !).

Fls. & Frts.: Aug.-Nov. (June-July).

Distrib.: Widely distributed in South-East Asia at ±100-1800 m alt. India: Assam, Meghalaya, Nagaland; Bangladesh, Burma, Malaysia, Sri Lanka, Singapore, China, Japan. Grows gregariously in forest margins, shady banks, on damp or in swampy places.

Notes: This widespread species shows great variation in vegetative characters. Some plants are tender with small blades (up to 2.5 cm) and very slender culms, while others are tougher, tend to be semi-robust with large blades (2.5-5.5 cm) and thicker culms, but the variation is not considered to be of enough taxonomic significance.
Sphaerocaryum malaccense (Trin.) Pilger

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