

GENUS *ISCHAEMUM* L. (POACEAE) IN INDIA

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ABSTRACT

The present paper presents the Taxonomic treatment of the genus *Ischaemum* in India. In all 56 species have been recognised, of which 43 are endemic to India.

Keywords : Endemics, *Ischaemum*, India, Taxonomy.

ISCHAEMUM L.

L., Sp. Pl. ed. 1. 1049. 1753 & Gen. Pl. ed. 5. 469. 1754; Hack. in DC., Monogr. Phan. 6: 200. 1889; Hook.f., Fl. Brit. India 7: 126. 1896; Prain, Bengal Pl. 1194. 1903; T. Cooke, Fl. Pres. Bombay 2: 957. 1908; Ridl., Fl. Malay. Penin. 5: 199. 1925; Gamble, Fl. Pres. Madras 1917. 1934; Prain, Fl. Trop. Africa 9: 28. 1934; Bor, Fl. Assam 5: 421. 1940; Pilger in Engl. & Prantl, Pflanzenfam. 14e: 125. 1940; Bor, Grass. Burma Ceylon India Pakistan 171. 1960; Clayton & Renvoize, Gen. Gram. 345. 1986. *Schoenanthus* Adans., Fam. Pl. 2: 38. 1763. *Colladoa* Cav., Ic. Pl. 5: 37. t. 460. 1789. *Meoschium* P. Beauv., Ess. Agrost. 111. 1812. *Ischaemopogon* Griseb., Fl. Brit. W. Ind. 560. 1864.

Annuals or perennials; culms erect or creeping. Leaves sessile or rarely petioled, linear or linear-lanceolate or oblong-lanceolate, rounded, cordate or semisagittate at base, acute to acuminate at apex, smooth or scabrid along margins, glabrous or sparsely to densely villous; sheaths often loose; ligule membranous to coriaceous. Inflorescence terminal or axillary racemes. Racemes 2, sometimes 3 or more, digitate or fascicled, rarely solitary, articulate, fragile; joints hairy or glabrous. Spikelets usually in pairs; upper sessile, lower pedicelled, usually awned, 2-flowered; pedicelled spikelets often dissimilar to sessile. Lower floret male or sterile; upper floret bisexual. Sessile spikelets usually ovate-lanceolate, oblong-elliptic or oblong-lanceolate; callus glabrous, bearded, pilose or villous; lower glume usually ovate, oblong, elliptic or lanceolate, acute or acuminate, rarely obtuse, at times bicuspidate, biaristate or rarely 2- to 3-lobed, coriaceous or chartaceous to crustaceous, very rarely membranous, smooth or nodulose or transversely wrinkled, glabrous or hairy; upper glume boat-shaped, dorsally keeled, minutely winged, margins infolded; lower lemma variously shaped, usually acuminate, 3 - 5 - nerved, margins incurved; lower palea usually oblong-lanceolate, elliptic or elliptic-lanceolate, 2-nerved; upper lemma usually oblong, oblong-lanceolate or linear-lanceolate, acute to acuminate, usually notched to lobed, 3 - 7-nerved, awned or rarely awnless; upper palea 2-keeled, usually oblong, oblong-elliptic, oblong-lanceolate or lanceolate, delicate; lodicules 2, cuneate; stamens 3; ovary linear-oblong, style long, stigma linear-oblong, short. Pedicelled spikelets ovate to oblong, awnless; pedicel half as long as sessile spikelet or shorter; lower glume ovate to oblong, coriaceous; upper glume boat-shaped; lower lemma, lower palea, upper lemma and upper palea as in sessile spikelets but smaller with upper lemma notchless and awnless. Lower floret male; upper floret hermaphrodite or male or sterile. Grains oblong or lanceolate, dorsally compressed, embryo reaching middle of grain.

Type species : Ischaemum muticum L.

Distribution: About 70 species in tropical region of the world, mainly in Asia; 56 species in India. Of these, 43 species are endemic to India confining their distribution to Peninsular India including Maharashtra and North-east India.

Pollen : Pollen grains usually 1-ulcerate, spheroidal - ovoid. Sexine about as thick as nexine, pilate or reticulate. Aperture slightly protruding, crassimarginate, operculate (Erdtman, Pollen Morphology and Plant Taxonomy, 1952).

Ecology : In India *Ischaemum* L. mainly inhabits tropical areas, while some are found throughout. It thrives best in water-logged and marshy areas.

KEY TO THE SPECIES

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|---|--------------------------------|
| 1a. Racemes 3 - 20 | 2 |
| 1b. Racemes usually 2, very rarely solitary or 3 | 5 |
| 2a. Inflorescence a fascicle of long peduncled racemes; lowest group of spikelets in threes | 24. <i>I. keralense</i> |
| 2b. Inflorescence not a fascicle of long peduncled racemes; lowest group of spikelets in pairs | 3 |
| 3a. Margins of lower glume of sessile spikelets narrowly and evenly inturned from base to apex | 38. <i>I. pilosum</i> |
| 3b. Margins of lower glume of sessile spikelets expanded below middle | 4 |
| 4a. Lower glume of sessile spikelets 3-nerved, glabrous | 12. <i>I. duthiei</i> |
| 4b. Lower glume of sessile spikelets 11 - 13-nerved, villous | 36. <i>I. nilagiricum</i> |
| 5a. Spikelets awnless or awns rudimentary (not more than 3 mm) and concealed | 6 |
| 5b. Spikelets prominently awned, awns well exerted | 13 |
| 6a. Lower glume of sessile spikelets with shallow semilunar pits in lower two third | 21. <i>I. impressum</i> |
| 6b. Lower glume of sessile spikelets without such pits | 7 |
| 7a. Lower leaves petioled | 8 |
| 7b. Lower leaves not petioled | 11 |
| 8a. Sessile spikelets 3 - 4 mm long | 4. <i>I. bolei</i> |
| 8b. Sessile spikelets 6 - 7.5 mm long | 9 |
| 9a. Lower glume of sessile spikelets without side nodules but with transverse wrinkles in lower half | 53. <i>I. vembanadense</i> |
| 9b. Lower glume of sessile spikelets with side nodules at base, connected by ridges | 10 |
| 10a. Lower glume of pedicelled spikelets with a broad wing on one margin; racemes paired | 51. <i>I. travancorensis</i> |
| 10b. Lower glume of pedicelled spikelets without a broad wing on one margin; racemes usually solitary | 20. <i>I. huegelii</i> |
| 11a. Racemes concealed or hardly exerted from spathe, c. 3.5 cm long | 34. <i>I. muticum</i> |
| 11b. Racemes well-exserted from spathe, 4 - 10 cm long | 12 |
| 12a. Keel of upper glume of sessile spikelets minutely winged at apex; nodes glabrous; pedicels c. 1 mm long | 23. <i>I. jayachandranii</i> |
| 12b. Keel of upper glume of sessile spikelets not winged; nodes hairy; pedicels c. 2.5 mm long | 15. <i>I. flumineum</i> |
| 13a. Margins of lower glume of sessile spikelets expanded in lower half | 14 |
| 13b. Margins of lower glume of sessile spikelets narrowly and evenly inflexed from base to apex | 23 |
| 14a. Keel of upper glume of sessile spikelets winged at or above middle | 15 |
| 14b. Keel of upper glume of sessile spikelets not winged | 20 |
| 15a. Keel of lower glume of sessile spikelets not winged | 16 |
| 15b. Keel of lower glume of sessile spikelets narrowly or broadly winged in upper half | 17 |
| 16a. Joints of racemes with a 3 - 3.5 mm long tooth-like projection on inner side | 49. <i>I. thomsonianum</i> |
| 16b. Joints of racemes without such tooth-like projection on inner side | 2. <i>I. agasthyamalayanum</i> |
| 17a. Wings of lower glume of sessile spikelets broad, often auriculate; lower glume less than 6 mm long | 18 |
| 17b. Wings of lower glume of sessile spikelets very narrow, lower glume 6 - 8 mm long | 19 |
| 18a. Callus long, glabrous; upper glume of both spikelets dorsally broadly winged | 30. <i>I. lisboae</i> |
| 18b. Callus short, bearded; upper glume of both spikelets narrowly winged | 22. <i>I. indicum</i> |
| 19a. Racemes very hairy; leaves cuneate at base | 28. <i>I. lacei</i> |
| 19b. Racemes glabrous; leaves rounded at base | 17. <i>I. heterotrichum</i> |
| 20a. Lower glume of sessile spikelets even in texture throughout, herbaceous - chartaceous | 18. <i>I. hirtum</i> |
| 20b. Lower glume of sessile spikelets subcoriaceous below, herbaceous above | 21 |
| 21a. Joints of racemes with a 3 - 5 mm long tooth-like projection on inside; glumes glabrous; sessile spikelets 4 - 6 mm long | 22 |
| 21b. Joints of racemes without such a projection; glumes hairy on upper half; sessile spikelets 3 - 4 mm long | 50. <i>I. timorensis</i> |
| 22a. Lower leaves petioled, petioles up to 5 cm long | 56. <i>I. zeylanicum</i> |

- 22b. Lower leaves not petioled 49. *I. thomsonianum*
- 23a. Lower leaves or in some cases upper ones distinctly petioled; leaf-base usually sagittate or deeply cordate or rarely shallowly cordate, rounded or cuneate at base 24
- 23b. Lower leaves or upper ones not petioled; leaf- base usually narrow, cuneate or rarely rounded or shallowly cordate 35
- 24a. Pedicels more than one-third the length of sessile spikelets 25
- 24b. Pedicels less than one-third the length of sessile spikelets 29
- 25a. Leaves deeply cordate or sagittate or cordate at base; lower glume of pedicelled spikelets not broadly winged on one side 26
- 25b. Leaves cuneate or narrowly rounded at base; lower glume of pedicelled spikelets broadly winged on one or both sides 27
- 26a. Sessile spikelets 3.5 - 4 mm long 31. *I. malabaricum*
- 26b. Sessile spikelets 6 - 7 mm long 28
- 27a. Lower glume of pedicelled spikelets broadly and more or less uniformly winged throughout on both sides 37. *I. pappiniseriense*
- 27b. Lower glume of pedicelled spikelets broadly winged only on one side 30
- 28a. Nodes glabrous; awn of upper lemma of sessile spikelets 1.7-2.2 cm; anthers 3-3.5 mm long 16. *I. glabriglaucum*
- 28b. Nodes villous; awn of upper lemma of sessile spikelets 1.3-1.5 cm long; anthers 1.25-2.5 mm long 39. *I. pushpangadanii*
- 29a. Upper glume of sessile spikelets narrowly winged at apex; culms creeping and mat forming 40. *I. quilonense*
- 29b. Upper glume of pedicelled spikelets not winged at apex; culms not creeping and mat forming 8. *I. commutatum*
- 30a. Lower glume of sessile spikelets broadly winged on one margin 31
- 30b. Lower glume of sessile spikelets not broadly winged on one margin 33
- 31a. Lower glume of sessile spikelets with distinct side nodules separated by deep or shallow furrows 32
- 31b. Lower glume of sessile spikelets with or without side nodules; side nodules when present, not separated by deep or shallow furrows 3. *I. barbatum*
- 32a. Culms diffuse or erect; lower glume of sessile spikelets with 4 - 6 side nodules separated by deep furrows 42. *I. rangacharianum*
- 32b. Culms creeping, rooting at nodes, mat forming; lower glume of sessile spikelets with 3 or rarely 4 side nodules separated by shallow furrows 14. *I. fischeri*
- 33a. Joints of racemes linear-clavate 10. *I. dalzellii*
- 33b. Joints of racemes distinctly turbinate 34
- 34a. Sessile spikelets very narrow in comparison to size, 6 - 8 x c. 1.5 mm; pedicelled spikelets very shortly pedicelled; side nodules interlocking 44. *I. ritchiei*
- 34b. Sessile spikelets not very narrow, 6 - 7.5 x c. 2 mm; pedicelled spikelets prominently pedicelled; side nodules not interlocking 36
- 35a. Joints of rachis, pedicels and callus densely white woolly; lower glume crustaceous 29. *I. lanatum*
- 35b. Joints of rachis, pedicels and callus not woolly; lower glume chartaceous 47. *I. semisagittatum*
- 36a. Pedicels more than one third the length of sessile spikelets 37
- 36b. Pedicels less than one third the length of sessile spikelets 48
- 37a. Lower glume of sessile spikelets with two tufts of hairs on margins about the middle 38
- 37b. Lower glume of sessile spikelets without such tufts of hairs on margins about the middle 39
- 38a. Pedicelled spikelets imperfect, awnless 11. *I. diplopogon*
- 38b. Pedicelled spikelets well developed, awned (awn c. 4 mm long) 41. *I. raizadæ*
- 39a. Upper glume of sessile spikelets with a tuft of hairs in upper third 25. *I. kingii*
- 39b. Upper glume of sessile spikelets without such a tuft of hairs in upper third 40
- 40a. Lower glume of pedicelled spikelets not winged on one margin 41
- 40b. Lower glume of pedicelled spikelets winged on one margin 42
- 41a. Leaves linear, 10 - 15 x 0.5 - 0.8 cm, cuneate or rounded at base , not deeply cordate or sagittate 38. *I. pilosum*

- 41b. Leaves triangular, ovate-lanceolate or lanceolate, 1 - 10 x 0.5 - 1.5 cm, deeply cordate or sagittate at base 31. *I. malabaricum* 43
- 42a. Lower glume of sessile spikelets narrowly winged above the middle 44
- 42b. Lower glume of sessile spikelets not winged above the middle 44
- 43a. Leaves broadly auriculate at base, tubercle-based hairy on both surfaces 19. *I. hubbardii*
- 43b. Leaves cuneate at base, glabrous 27. *I. kumarakodiense* 45
- 44a. Keel of upper glume of sessile spikelets minutely winged at least towards apex 47
- 44b. Keel of upper glume of sessile spikelets not winged 47
- 45a. Upper glume of sessile spikelets humped in middle 13. *I. elimalayanum* 46
- 45b. Upper glume of sessile spikelets not humped in middle 46
- 46a. Lower glume of sessile spikelets smooth or wrinkled with few side nodules, usually hairy; leaves up to 20 x 1 cm; culms not robust 7. *I. kannanorens*
- 46b. Lower glume of sessile spikelets with several side nodules connected by sharp ridges, glabrous; leaves 10 - 60 x 1 - 2 cm; culms robust 35. *I. nairii*
- 47a. Lower glume of sessile spikelets unequally and narrowly winged, faintly transversely wrinkled; upper glume of sessile spikelets humped below; culms up to 1.5 m; nodes bearded 1. *I. abrahamii*
- 47b. Lower glume of sessile spikelets not winged or transversely wrinkled; upper glume of sessile spikelets not humped; culms up to 30 cm; nodes glabrous 48. *I. tadulingamii* 49
- 48a. Lower glume of sessile spikelets coriaceous or rarely chartaceous 57
- 48b. Lower glume of sessile spikelets crustaceous below 26. *I. koenigii* 50
- 49a. Sessile spikelets 8 - 10 mm long 51
- 49b. Sessile spikelets not more than 7 mm long 54
- 50a. Leaves linear or linear-lanceolate, up to 40 cm long, narrowed towards base, base rounded or cuneate 51
- 50b. Leaves ovate-lanceolate, lanceolate or triangular, not narrowed towards base, base shallowly to deeply cordate or sagittate 54
- 51a. Lower glume of sessile spikelets broadly and auriculately winged on one side towards apex; lower glume of pedicelled spikelets broadly winged on one margin 32. *I. mangaluricum* 52
- 51b. Lower glume of sessile spikelets narrowly winged towards apex or not winged; lower glume of pedicelled spikelets not broadly winged 53
- 52a. Pedicelled spikelets prominent and well developed 55
- 52b. Pedicelled spikelets minute or rudimentary 32. *I. molle* 56
- 53a. Lower glume of sessile spikelets densely villous with silky hairs 3. *I. barbatum* 43. *I. raii* 56
- 53b. Lower glume of sessile spikelets not densely villous 46. *I. santapau* 55. *I. yadavii* 9. *I. copeanum* 58
- 54a. Sessile spikelets 3 - 4 mm long 52. *I. tumidum* 6. *I. calicutense* 5. *I. bombaiense* 59
- 54b. Sessile spikelets more than 4 mm long 54. *I. vembanadense* 60
- 55a. Racemes in fascicles up to 7.5 cm long, well exerted from spatheolate; spikelets rudimentary 45. *I. rugosum*
- 55b. Racemes not in fascicles up to 3.5 cm long, shortly exerted from spatheolate; minute c. 4 mm long 54. *I. wayanadense*
- 56a. Lowest group of spikelets in threes, one awned, others awnless
- 56b. Lowest group of spikelets in pairs
- 57a. Leaves 1 - 4 cm long; pedicelled spikelets awnless
- 57b. Leaves up to 10 cm long; pedicelled spikelets awned
- 58a. Sessile spikelets 8-9 mm long
- 58b. Sessile spikelets up to 6 mm long
- 59a. Leaves lanceolate, cordate at base
- 59b. Leaves linear-lanceolate, cuneate at base
- 60a. Lower glumes of sessile spikelets oblong-ovate, sharply ridged; pedicelled spikelets at times rudimentary
- 60b. Lower glume of sessile spikelets obscurely ridged; pedicelled spikelets well developed

1. *Ischaemum abrahamii* Ravi, Mohanan & Rajesh in Bot. Bull. Acad. Sin. 42: 225. 2001.

Type : India : Kerala; Manathumangalam, $\pm$ 50 m, 15 Dec. 1996, *Ravi* 33027 (*Holo* : TBGT; *Iso* : CAL, MH, KFRI).

Robust perennials; culms tufted, up to 1.5 m long; nodes ciliate. Leaves linear to linear-elliptic, c. 40 x 1.2 cm, cuneate, rounded, acuminate; sheaths c. 15 cm long; ligules triangular-ovate, up to 6 mm long. Racemes 2, up to 10 cm long; joints clavate, triquetrous, c. 3 mm long, densely pilose on angles. Sessile spikelets oblong-elliptic to lanceolate, 5 - 6 mm long; callus ciliate, c. 1 mm long; lower glume oblong-elliptic, 4.5 - 5.5 mm long, coriaceous, laterally keeled, unequal, narrowly winged, 11 - 13-nerved; upper glume boat-shaped, 4.75 - 5.75 mm long, margins inrolled, humped, 5 - 7-nerved; lower lemma linear, 4.5 - 5 mm long, 3-nerved, margins ciliate towards apex; lower palea linear-elliptic, 4.5 - 5 mm long, hyaline, 2-nerved; upper lemma 4 - 4.5 mm long, deeply cleft, awned from sinus; awn geniculate, 1.6 - 2 cm long with 6 - 9 mm long column; upper palea oblong-lanceolate, c. 4 mm long, 2-nerved. Pedicelled spikelets: pedicels clavate, 2 - 3 mm long, pilose; lower glume laterally keeled, incurved at margins, winged on one side; upper glume 4 - 5 mm long, coriaceous, keeled, 5 - 7-nerved; lower lemma, lower palea and upper palea similar to sessile spikelets; upper lemma lanceolate, 4 - 4.5 mm long, 3-nerved, shortly notched and imperfectly awned; awn up to 4 mm long. Lodicules 2, c. 0.5 mm long. Stamens 3; anthers c. 2 mm long. Ovary c. 0.5 mm long; style c. 2 mm long; stigma c. 2.5 mm long.

Flowering & Fruiting : Oct. - Jan.

Ecology : Along roadsides and water channels, in hilly tracts.

Distribution : INDIA : Kerala (Malappuram). Endemic.

Note : *I. abrahamii* is allied to *I. elimalayanum* Sreek. & al., but differs in having robust habit, longer and densely woolly racemes, thicker joints of rachis, pedicel and lower glume of both spikelets.

2. *Ischaemum agasthyamalayanum* Sreek., Janarth. & A.N. Henry in J. Bombay Nat. Hist. Soc. 84(3): 643. 1987; Sreek. & V.J. Nair, Fl. Kerala Grass. 121. 1990.

Type : India : Kerala; Thiruvananthapuram, western slopes of Agasthyamalai, 1800 m, 6.10.1973, *J. Joseph* 446340 (*Holo* : CAL).

Perennials; culms up to 80 cm tall, stoloniferous, rarely erect; nodes bearded or glabrous. Leaves elliptic to linear-lanceolate, 2 - 10 x 0.5 - 1 cm, cordate at base, acuminate at apex, densely hairy; sheaths keeled; ligules ovate, 2 - 4 mm long, membranous. Racemes 2, rarely 3, 3 - 5 cm long, densely hairy; joints turbinate, 2.5 - 3 mm long, hairy. Sessile spikelets oblong-lanceolate, 7 - 8 mm long, densely villous, awned; callus bearded; lower glume ovate-lanceolate, 5 - 6 mm long, 3-lobed at apex or rarely bicuspidate, chartaceous, 11 - 13-nerved, hairy; upper glume boat-shaped, 6 - 8 mm long, shortly bifid, acuminate, 3 - 5-nerved, margins infolded, arista 2 - 3 mm long; lower lemma ovate-oblong, c. 5 mm long, 3 - 5-nerved, ciliate at apex; lower palea elliptic-lanceolate, 2-nerved, margins infolded; upper lemma awned, c. 5 mm long, lobes acute; awn 1.2 - 1.5 cm long; column 5 - 6 mm long; upper palea oblong-lanceolate, 2-nerved. Lower floret male; upper floret bisexual. Pedicelled spikelets oblong-lanceolate, 6 - 7 mm long, awn sometimes present; pedicels c. 2 mm long, villous; lower glume ovate-lanceolate, 5 - 6 mm long, 9 - 11-nerved, dorsally villous; upper glumes, lemmas and florets as in sessile spikelets.

Flowering & Fruiting : Sept. - Dec.

Ecology : In grassy hill slopes and grasslands.

Distribution : INDIA : Kerala (Agasthyamalai). Endemic. Rare.

3. *Ischaemum barbatum* Retz., Obs. Bot. App. 6: 35. 1791; Bor in Kew Bull. 15: 411. 1961; Sreek. & V.J. Nair, Fl. Kerala Grass. 123. 1990; U. Shukla, Grass. N.E. India 102. 1996; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 515. 1996. *I. aristatum* L. var. *barbatum* Hack. in DC., Monogr. Phan. 6: 203. 1889; Hook.f., Fl. Brit. India 7: 127. 1896. *I. aristatum* L. var. *imbricatum* sensu J. N. Mitra, Fl. Pl. E. India 1: 204. 1958, non Hook.f. 1896. *I. imbricatum* (Hack.) Stapf ex Ridl., Fl. Malay. Penin. 5: 200. 1925. *I. goebellii* Hack. in Oest. Bot. 51: 149. 1901.

Annuals or perennials; culms 60–120 cm tall, erect, tufted; nodes glabrous. Leaves linear-lanceolate, 10–30 x 0.5–1 cm, narrowed at base; sheaths loose; ligules 3–5 mm long, coriaceous. Racemes 2, appressed, 6–15 cm long; joints clavate-turbinate, 5–6 mm long. Sessile spikelets oblong-lanceolate, 6–7 mm long, awned; callus glabrous; lower glume ovate, 6–7 mm long, acute, 13–15-nerved, with or without 4–6 side nodules, tip narrowly winged on one side; upper glume 6–7 mm long, boat-shaped, keeled on dorsal side, margins infolded; lower lemma elliptic-lanceolate, c. 6 mm long, 3–5-nerved; lower palea elliptic-lanceolate, hyaline, 2-keeled, 2-nerved; upper lemma with 8–10 mm long awn; upper palea oblong, c. 4.5 mm long, 2-nerved, sprinkled with wart like dots. Lower floret male; upper floret bisexual. Pedicelled spikelets ovate-oblong, 5–6 mm long, awnless; pedicels clavate, c. 2 mm long; lower glume 5–6 mm long, 9–11-nerved, broadly winged on one margin; upper glume c. 5 mm long, boat-shaped, 5–7-nerved; lemmas and paleas as in sessile spikelets but smaller. Lower floret male.

Flowering & Fruiting : July–Dec.

Ecology : Along roadsides in moist places.

Distribution : INDIA: E. & N.E. India, Karnataka and Tamil Nadu; CHINA, HONGKONG, JAPAN, MALAY PENINSULA, NEPAL and SRI LANKA.

Note : Robust leafy grass probably used as fodder; growing wild in Meghalaya.

4. *Ischaemum bolei* Almeida in Indian For. 98: 236. 1972; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 515. 1996.

Type : India : Maharashtra; Ratnagiri Dt., Savantwadi, 18.11.1970, *M.R. Almeida* 1735 (*Holo* : BLAT).

Perennials; culms up to 80 cm tall, erect, or decumbent, branched at nodes. Leaves linear, 4–12 x 0.8–1 cm, cordate to sagittate at base, acuminate, bulbous hairy, upper leaves sessile; petioles up to 4 mm long in lower leaves; sheaths rounded, 4–6 cm long, glabrous; ligules 2–4 mm long, hairy at margins. Racemes 2, c. 4 cm long, compressed. Sessile spikelets oblong-lanceolate, 3–4 mm long, acute, awnless; lower glume lanceolate, c. 3.5 mm long, margins inturned, dorsal surface with 2–4 nodules, many nerved; upper glume boat-shaped, 3–4 mm long, 1-nerved, upper half ciliate along margins; lower lemma lanceolate, c. 3 mm long, obtuse to acute, hyaline; upper lemma acute, upper half of margins laciniate, hyaline; upper palea acute, hyaline. Lower floret male; upper floret bisexual. Pedicelled spikelets with broad wing on one margin; glumes, lemmas and paleas as in sessile spikelets.

Flowering & Fruiting : Sept.–Dec.

Ecology : Grows on grassy hill slopes.

Distribution: INDIA : Maharashtra. Known only from the original collection. Endemic to Sawantwadi in Ratnagiri.

Note : *I. bolei* is closely allied to *I. huegelii* but differs in having smaller sessile spikelets. It also resembles *I. barbatum* in having 2–3 nodules on margins of lower glume.

5. *Ischaemum bombaiense* Bor in J. Bombay Nat. Hist. Soc. 49: 165. 1950 & Grass. Burma, Ceylon India Pakistan 178. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 515. 1996.

Type : India : Maharashtra; Khandala, *Blatter* 9904 (K).

Annuals; culms up to 30 cm tall, slender, glabrous. Leaves linear-lanceolate, c. 12 x 7 cm, narrowed at base, acuminate at apex, hairy on both surfaces, shortly petioled; sheaths villous, loose; ligules 2–3 mm long, scarious. Racemes 2; joints triangular, c. 7 mm long, ciliate at one angle. Sessile spikelets oblong, 8–9 mm long, acute; lower glume c. 8 mm long, coriaceous, rugose, with 3–4 stout ridges, noduled on margins; upper glume boat-shaped, c. 8 mm long, keeled above, 3-nerved; lower lemma oblong-elliptic, c. 8 mm long, acute, hyaline; lower palea smaller; upper lemma c. 6 mm long, cleft halfway down with geniculate awn; awn c. 2 cm long, twisted; upper palea c. 6 mm long, hyaline. Lower floret male; upper floret bisexual. Stamens 3, c. 3 mm long; styles 2; stigma plumose, purple. Pedicelled spikelets c. 7.5 mm long; pedicels c. 1.5 mm long, villous on outer margin; lower glume c. 7.5 mm long, broadly winged on one margin; upper glume boat-shaped, c. 7 mm

long, with 2 - 3 prominent nodules on dorsal surface; lower lemma and palea elliptic-lanceolate, hyaline; upper lemma and palea as in lower floret. Lower floret empty; upper floret female.

Flowering & Fruiting : Sept. Dec.

Ecology : Along margins of lakes.

Distribution : INDIA : Madhya Pradesh (Sagar), Maharashtra (Mumbai, Pune), Rajasthan (Chittorgarh) and Uttar Pradesh. Endemic. Rare.

Note : Closely allied to *I. rugosum* but differs in having large sessile spikelets and overall robust habit.

6. *Ischaemum calicutense* Sreek., V.J. Nair & N.C. Nair in J. Econ. Taxon. Bot. 4: 1007. 1983, '*calicutensis*'; Sreek. & V.J. Nair, Fl. Kerala Grass.125. 1991.

Type : India : Kerala; Calicut Dt., Pokkunnamalai near Nanminola, $\pm$ 850 m, 29.10.1981. P.V. Sreekumar 71803 (*Holo*: CAL).

Perennials; culms 25 - 80 cm tall, creeping; nodes hairy or glabrous. Leaves lanceolate, 2-10 x 0.7-1.4 cm, cordate at base, acuminate at apex; sheaths c. 1.5 cm long, nearly glabrous; ligules ovate, 1-2 mm long, membranous. Racemes 2, 4 - 6 cm long, villous, enclosed in spathe; joints turbinate, 3 - 4 mm long, villous. Sessile spikelets ovate-lanceolate, c. 5 mm long, awned; lower glume ovate, c. 5 mm long, coriaceous, villous, hairs c. 1.5 mm long, smooth or with few obscure nodules; upper glume boat-shaped, c. 5 mm long, 5-nerved, winged at apex; lower lemma lanceolate, 4 - 5 mm long, 5 - 7-nerved, margins infolded; lower palea delicate, 2-nerved; upper lemma 3 - 3.5 mm long, notched, lobes acute, 3-nerved; awns 2 - 2.5 cm long, column c. 1 cm long; upper palea oblong, delicate, 2-nerved. Lower floret male or bisexual with rudimentary pistil; upper floret bisexual. Pedicelled spikelets oblong, 5 - 6 mm long, awned; pedicels 1-1.5 mm long, villous; lower glume oblong-lanceolate, 4.5 - 5 mm long, 5 - 7-nerved, villous; upper glume boat-shaped, keel rounded, villous; lower lemma lanceolate, c. 4.5 mm long, delicate, 3 - 5 - nerved, margins infolded; lower palea oblong-lanceolate, 2-nerved, glabrous; upper lemma c. 3.5 mm long, notched, lobes acute; awn 1.2-1.5 cm long, column c. 5 mm long; upper palea oblong, c. 2.5 mm long, rounded at apex. Lower floret male, often with rudimentary pistil; upper floret bisexual.

Flowering & Fruiting : Fl. & Fr. : Oct.- Dec.

Ecology : Along dry rocky hill slopes.

Distribution : INDIA : Kerala (Calicut). Endemic. Rare.

7. *Ischaemum kannanorensis* Sreek., V.J. Nair & N.C. Nair in J. Econ. Taxon. Bot. 4(3): 1009. 1983, '*kannanorensis*'; Sreek. & V.J. Nair, Fl. Kerala Grass.127. 1991.

Type : India : Kerala; Cannanore Dt., Paramba, On way to Bendudka, $\pm$ 150 m, 16th Oct. 1981, P.V. Sreekumar 71713 (*Holo*: CAL; *Iso*: K, MH).

Perennials; culms up to 60 cm tall, erect. Leaves, lanceolate, 3 -10 x 0.4-0.6 cm, rounded or cordate at base, long acuminate at apex, villous or nearly glabrous; sheaths 2 - 6 cm long, keeled, glabrous; ligules oblong, 2 - 3 mm long. Racemes 2, 2 - 5 cm long, enclosed in a spathe; joints clavate, 2.5-3.5 mm long, villous on dorsal side and along margins. Sessile spikelets ovate-oblong, c. 5 mm long, hairy or glabrous, awned; lower glume ovate-oblong, c. 4 mm long, smooth or wrinkled with few nodules, hairy or glabrous, 11 - 13-nerved; upper glume boat-shaped, 4 - 5 mm, 2 - keeled, 3 - nerved, margins incurved, glabrous; lower lemma oblong-lanceolate, c. 3.5 mm long, 3-nerved; lower palea 3 - 4 mm long, delicate, 2-nerved; upper lemma notched, c. 3.5 mm long, lobes acute, faintly 3-5-nerved, glabrous; awn 1.5 - 2 cm long, column c. 1 cm long; upper palea oblong, c. 0.5 mm long; style c. 1 mm long; stigma c. 1 mm long, feathery. Pedicelled spikelets ovate, 3.5 - 5 mm long, usually unawned; pedicels c. 2 mm long, villous; lower glume ovate, 4 - 5 mm long, winged on one side; upper glume lanceolate, 3.5 - 4.5 mm long, glabrous; lower lemma and palea similar to sessile spikelets; upper lemma ovate-lanceolate, 3 - 5-nerved, glabrous. Lower floret male; upper floret bisexual.

Flowering & Fruiting : Oct. Dec.

Ecology : In marshy places.

Distribution: INDIA: Kerala (Cannanore). Endemic. Rare.

8. *Ischaemum commutatum* Hack. in DC., Monogr. Phan. 6: 209. 1889; Hook.f., Fl. Brit. India 7: 131. 1896; C.E.C. Fisch., in Gamble, Fl. Pres. Madras 1722. 1934; Bor, Grass. Burma Ceylon India Pakistan 178. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 129. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 516. 1996.

Type : Sri Lanka (Ceylon), *Thwaites* 2625 (CAL).

Perennials; culms up to 1 m tall, trailing or erect. Leaves ovate or oblong-lanceolate, 5 - 15 x 1 - 1.5 cm, cordate at base, acuminate at apex; lower leaves sessile or sometimes petioled; petioles 2-6 cm long, hairy to glabrous; sheaths slightly keeled; ligules ovate, c. 1.5 mm long. Racemes 2, rarely 3, 2.5 - 6 cm long; joints turbinate, densely ciliate on one angle. Sessile spikelets oblong, 5-6 mm long, awned; lower glume oblong, obtuse to acute, smooth, glabrous, 11 - 13-nerved, margins infolded; upper glume boat-shaped, faintly 3-nerved, ciliate and rounded at apex; lower lemma oblong-lanceolate, c. 5 mm long, hyaline, 3 - 4-nerved; lower palea oblong-lanceolate, c. 4 mm long, delicate, 2-nerved; upper lemma c. 5 mm long, notched, acute, ciliolate along margins, awned; awn 1 - 1.5 cm long; upper palea oblong, hyaline, delicate. Lower floret male; upper floret bisexual. Pedicelled spikelets ovate, c. 5 mm long, acute, awnless; lower glume ovate, c. 4.5 mm long, acute, winged on margins; upper glume ovate-lanceolate, dorsally keeled; florets male; lower lemma and palea as in sessile spikelets, but smaller; upper lemma entire, awnless.

Flowering & Fruiting : June - Sept.

Ecology : In marshy agricultural fields and forest edges.

Distribution : INDIA : Karnataka, Kerala, Maharashtra, Tamil Nadu; SRI LANKA.

Note : Leafy plant used as fodder.

9. *Ischaemum copeanum* Sreek., V.J. Nair & N.C. Nair in J. Bombay Nat. Hist. Soc. 82: 390. 1985; Sreek. & V.J. Nair, Fl. Kerala - Grass. 130. 1991.

Type : India : Kerala; Cannanore Dt., Cherkala, $\pm$ 250 m, 24.11.1981, *P.V. Sreekumar* 71838 (*Holo* : CAL).

Annuals; culms up to 40 cm tall, creeping. Leaves ovate-lanceolate, 2 - 5 x 0.5 - 1 cm, rounded or cordate at base, acuminate at apex; sheaths up to 5 cm long, striate, glabrous; ligules ovate, 1 - 2 cm long. Racemes 2; peduncles 2-3 cm long, exserted; joints clavate, villous along margins and dorsal side. Lowest group of spikelets in threes, two are unawned. Unawned sessile spikelets linear-oblong, c. 5 mm long, single flowered, floret male; lower glume lanceolate, silky villous towards base, margins infolded. Awned sessile spikelets ovate, c. 4.5 mm long, acute; lower glume ovate-oblong, 11 - 13-nerved, narrowly winged on one side, scabrid towards apex; upper glume boat-shaped or lanceolate, 3-nerved, keeled; lower lemma oblong-lanceolate, c. 4 mm long, delicate, 3 - 5-nerved; lower palea 2-keeled, glabrous; upper lemma c. 3.5 mm long, notched, lobes acute; awn 1 - 1.5 cm long, geniculate, column 4 - 6 mm long, bristle pale; upper palea oblong, glabrous. Lower floret male; upper floret bisexual. Stamens 1.5 - 3 mm long, filaments short; ovary oblong, c. 0.5 mm long; style c. 1 mm long; stigma c. 1.5 mm long, feathery. Pedicelled spikelets oblong-lanceolate, 4 - 4.5 mm long, unawned; pedicels c. 1 mm long, villous; lower glume linear-oblong, c. 4.5 mm long, villous in lower half; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Nov. - Dec.

Ecology : Along banks of streams.

Distribution : INDIA : Kerala (Cannanore). Endemic. Rare.

Note : *I. copeanum* is closely allied to *I. keralense* except for the former having racemes 2 in number on each peduncle whereas the latter has racemes in fascicle of 5 - 8 from spathe. The types of both these species have been collected from the same locality and also from the same habitat. Detailed study is needed to differentiate these two taxa for which more collections are required. At present only the type specimen is available.

10. *Ischaemum dalzellii* Stapf ex Bor in Kew Bull. 1951: 448. 1952 & Grass. Burma Ceylon India Pakistan 178. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 132. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 516. 1996.

Type : India : Karnataka; North Kanara, 25.10.1854, W.A. Talbot 738 (*Iso* : CAL).

Annuals or perennials; culms 30-100 cm tall, tufted, creeping or trailing. Leaves linear-lanceolate, 4-15 x 1-1.5 cm, cordate at base, long acuminate at apex, lower leaves distinctly petioled; petioles up to 5 cm long; ligules ovate, acute, membranous. Racemes 2, slender, 3-6 cm long; joints linear-clavate, 3-4 mm long, ciliate along margins. Sessile spikelets oblong, 5-7 mm long, awned; callus bearded; lower glume linear-oblong, coriaceous below with 3-5 side nodules, 7-9-nerved, villous along margins in upper half; upper glume boat-shaped, 5-6 mm long, 3-5-nerved, keeled in lower half; lower lemma oblong-lanceolate, delicate, hyaline, 3-nerved; lower palea elliptic-lanceolate, delicate, 2-nerved; upper lemma c. 4 mm long, deeply notched, awned; awn 1.5-2.5 cm long; upper palea oblong, delicate. Lower floret male or bisexual with a rudimentary pistil; upper floret bisexual. Pedicelled spikelets smaller, oblong-lanceolate, c. 6 mm long, awned or awnless; pedicels c. 2 mm long, densely ciliate, glumes and florets as in sessile spikelets.

Flowering & Fruiting : Oct. Dec.

Ecology : On rocky hill slopes.

Distribution : INDIA : Karnataka, Kerala and Maharashtra. Endemic. Rare.

Note : This can easily be distinguished from other Indian *Ischaemum* species by its long-petioled lower leaves with hastate base, shining, linear-clavate or clavate joints and pedicels and narrowly oblong-lanceolate spikelets.

11. *Ischaemum diplopogon* Hook.f., Fl. Brit. India 7: 129. 1896; Bor, Grass. Burma Ceylon India Pakistan 178. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 516. 1996.

Type : India : Bombay (near Bhorkus), Oct. 1892, Woodrow s.n. (*Iso* : CAL).

Annuals; culms 30-45 cm long, branched from base and upwards; nodes glabrous; internodes long. Leaves linear-lanceolate, 7-15 x 0.5-1.5 cm, narrowed at base, acuminate at apex, dark green, shining above; nerves 3-4 pairs; sheaths spathiform, glabrous; ligule oblong, glabrous. Racemes 2, compressed, 2.5-5 cm long; peduncles many, filiform from upper spathiform sheaths; joints and pedicels half the length of pedicelled spikelets. Sessile spikelets c. 6 mm long; lower glume oblong, c. 5 mm long, shortly bicuspidate, obscurely nerved, margins narrowly incurved with two tufts of hairs on margins about the middle, bulged in lower third; upper glume ovate, c. 5 mm long, subacute, 3-nerved, shortly bifid with white awn, c. 5 mm long; lower lemma linear-oblong, 1-nerved; upper lemma 4 mm long, bifid at apex, lobes hyaline, awn 1-6 mm long; upper palea small, oblong. Lower floret male, upper floret bisexual. Pedicelled spikelets awnless, often imperfect; lower glume elliptic, 2-cuspidate.

Flowering & Fruiting : Sept. Dec.

Ecology : On wet rocks in streams.

Distribution : INDIA : Madhya Pradesh, Maharashtra and Rajasthan. Endemic. Rare.

12. *Ischaemum duthiei* Stapf ex Bor in Kew Bull. 1950: 188. 1950 & Grass. Burma Ceylon India Pakistan 178. 1960; G.P. Roy, Grass. Madhya Pradesh 102. 1984.

Type : India : Bihar; Neterhat, 100 m., Oct. 1918, H.H. Haines 5896 (*Iso* : CAL). Neterhat, Nov. 1898, H.H. Haines 128 (*Para* : CAL).

Perennials; culms c. 80 cm tall, branched; nodes densely hairy. Leaves linear-lanceolate, c. 20 x 2 cm, attenuate at base, acute at apex, pubescent beneath, glabrous above; ligules 2.5-3 mm long, membranous. Racemes 5-12, 3-7 cm long, subdigitate, hairy; joints c. 2 mm long, hairy on one angle. Sessile spikelets c. 6 mm long; callus c. 1 mm long, densely pilose; lower glume lanceolate, 4-5.5 mm long, bicuspidate, winged on either side at apex, glabrous; upper glume lanceolate, 4-5 mm long, acuminate, rounded at base, compressed above, 5-nerved; lower lemma elliptic, c. 3.5 mm long, acute; lower palea 2-nerved, as long as lemma; upper lemma c. 3.5 mm long, hyaline, notched, bilobed, awned; awn 7-8 mm long; upper palea lanceolate, hyaline, equal to lemma. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2.5 mm long. Ovary oblong; stigma feathery. Pedicelled spikelets c. 5.5 mm long; lower glume flattened, lanceolate, c. 4.5 mm long, acute, dorsally pilose, many nerved; upper glume c. 4.5 mm long, rounded at base, keeled towards apex, aristate; lemmas, paleas and florets as in sessile spikelets.

Flowering & Fruiting : Nov. Feb.

Ecology : In marshy habitats.

Distribution : INDIA : Bengal, Bihar, Himachal Pradesh and Madhya Pradesh. Endemic.

13. *Ischaemum elimalayanum* Sreek., V.J. Nair & N.C. Nair in Sreek. & V.J. Nair, Fl. Kerala Grass. 134, 459. 1991.

Type : India : Kerala; Cannanore Dt., Elimala, $\pm$ 300 m, 20 Oct. 1981, P.V. Sreekumar 71773 (*Holo* : CAL; *Iso* : K, MH).

Tufted perennials; culms up to 1 m tall, erect; nodes villous. Leaves linear-lanceolate, 6-20 x 0.5 - 1 cm, acuminate; lower ones narrowed at base, upper ones rounded; sheaths 5 - 15 cm long, keeled, densely pilose; ligules ovate, 3 - 6 mm long, acute, membranous. Racemes 2, 4 - 10 cm long, stout, hairy; peduncle shortly exserted; joints liner-clavate, 2.5 - 3 mm long, villous along margins and dorsal angles. Sessile spikelets elliptic, 5 - 5.5 mm long, awned; callus bearded; lower glume ovate or oblong, c. 4.5 x 1.5 - 2 mm, acute, crustaceous with 4 - 5 side nodules, deeply wrinkled, 9 - 11-nerved, margins inturned; upper glume boat-shaped, 4.5 - 5 x 1 - 1.5 mm, humped in middle, tip minutely winged, sparsely hairy; lower lemma oblong-lanceolate, 4 - 4.5 x 1 - 1.5 mm, 3-nerved, ciliate in upper half; lower palea delicate, hyaline, 2-nerved, glabrous; upper lemma 3 - 3.5 mm long, notched, margins ciliolate at upper half, 3-nerved; awn 1.2 - 1.5 cm long, geniculate; upper palea 2.5 - 3 mm long, hyaline, 2-keeled, 2-nerved, glabrous. Lower floret male; upper floret bisexual. Stamens 3; anthers 1 - 1.5 mm long. Ovary oblong; style c. 1 mm long; stigma feathery. Pedicelled spikelets oblong, 4 - 4.5 mm long, unawned; pedicels 2.5 - 5 mm long, densely hairy; lower glume c. 5 mm long, broadly winged on one margin, scabrid, 7 - 9-nerved; upper glume lanceolate, c. 4 mm long, keel rounded, 3 - 5-nerved, margins infolded; lower lemma oblong, acute, 3-nerved, ciliate; palea lanceolate, upper lemma 3 - 3.5 mm long, 3 - 5-nerved, glabrous; palea and florets as in sessile spikelets.

Flowering & Fruiting : Sept. Jan.

Ecology : Along grassy hill slopes.

Distribution : INDIA : Kerala (Cannanore). Endemic.

14. *Ischaemum fischeri* Ravi & Kiran Raj in Bot. Bull. Acad. Sin. 42: 227. 2001. *I. rangacharianum* C.E.C. Fisch. in Kew Bull. 1933. p.p. quoad specim. (Paratypus) V. Narayanaswamy 1743 (CAL).

Type : India : Kerala; Thiruvananthapuram Dt., Palode - TBGRI Campus, $\pm$ 150 m, 12 Feb. 1998, Ravi 36706 (*Holo* : TBGT; *Iso* : CAL, MH, KFRI).

Perennials; culms creeping, mat forming, up to 75 cm long. Leaves elliptic to lanceolate, up to 15 cm long, lower ones tapering into pseudo- petioles, acute to acuminate at apex; sheaths up to 8 cm long, keeled; ligules triangular-ovate, 2 - 5 mm long. Racemes 2, up to 10 cm long; joints oblong-clavate, triquetrous, 3 - 5 mm long. Sessile spikelets oblong-elliptic, 5 - 7 mm long, callus ciliate; lower glume oblong-elliptic, 4 - 6 mm long, laterally keeled, 2 - 4-nodulose in lower half, laterally winged unequally, 11 - 13-nerved; upper glume boat-shaped, 4.5 - 6.5 mm long, keeled, narrowly winged, 5 - 7-nerved; lower lemma elliptic-lanceolate, 3 - 5 mm long, 3-nerved, incurved; lower palea elliptic-lanceolate, 3 - 5 mm long, hyaline, 2-nerved, narrowly winged; upper lemma oblong-elliptic, 3 - 4.5 mm long, deeply cleft, awned; awn geniculate, up to 1.5 cm long, column c. 6.5 cm long; upper palea oblong-elliptic, 3 - 5 mm long, 2-nerved, incurved. Pedicelled spikelets : pedicels 1 - 2 mm long, triquetrous; lower glume oblong-elliptic, 4 - 6.5 mm long, laterally keeled, winged on one side, 1 - 3 nodulose, notched at apex, 11 - 13-nerved; upper glume, lower lemma lower palea and upper palea as in sessile spikelets; upper lemma oblong-elliptic, 3 - 4 mm long, shortly bifid or imperfectly awned; awn usually shorter. Lodicules 2, c. 0.7 mm long. Stamens 3; anthers 2 - 3 mm long. Ovary c. 0.5 mm long; styles c. 2 mm long; stigma c. 2 mm long.

Flowering & Fruiting : Oct. April

Ecology : Forms extensive mats over hill slopes.

Distribution : INDIA : Kerala (Ernakulam, Kollam, Pathanamthitta, Thiruvananthapuram). Endemic.

Note : *I. fischeri* is closely allied to *I. rangacharianum* but differs in perennial habit, creeping and mat forming culms, 1 or 2 peduncles and 2 or 3 to 4-nodulose lower glumes of sessile spikelets.

15. *Ischaemum flumineum* Bor in Kew Bull. 1949: 572. 1950 & Grass. Burma Ceylon India Pakistan 178. 1960.

Type : India : Maharashtra; Bombay, Jog, 28.4.1939, *N.L. Bor* 11390 (K, DD).

Perennials with long wiry, fibrous roots; culms woody, branched, erect, glabrous, smooth; nodes hairy. Leaves narrow, elliptic, c. 10 x 5 cm, acuminate at apex, attenuate at base, nearly glabrous or sparsely hairy above, margins scabrous. Racemes 2, c. 4–5 cm long, exserted on long peduncle; joints c. 3 mm long, thin, hairy on one side. Sessile spikelets lanceolate or narrowly elliptic, c. 5 mm long; callus c. 1 mm long; lower glume broadly ovate, c. 4 mm long, margins ciliate, apex bimucronate, coriaceous below, chartaceous above; upper glume c. 4 mm long, rounded at base, keeled on both sides towards apex, 3-nerved, glabrous, aristate; arista 2–3 mm long, hairy; lower lemma elliptic, c. 4 mm long, acuminate, 5-nerved, hyaline; lower palea as long as lemma, hyaline, 2-nerved; upper lemma oblong, 2–2.5 mm long, bilobed, rounded on dorsal side, notched at tip, 3-nerved, awned; awn 1–2 mm long, geniculate, twisted. Lower floret male; upper floret bisexual. Stamens 3; anthers 1–1.2 mm long. Ovary c. 0.5 mm long, oblong; style c. 1 mm long; stigma feathery. Pedicelled spikelets lanceolate, c. 5 mm long, compressed laterally; pedicels c. 2.5 mm long; lower glume lanceolate, c. 5 mm long, keeled, 5-nerved, hairy on dorsal surface, aristate; arista c. 1.5 mm long; upper glume c. 4.5 mm long, rounded at base, keeled above, densely pilose; arista c. 2.5 mm long; lower lemma lanceolate, c. 3.5 mm long, hyaline, glabrous; palea hyaline, 2-nerved; upper lemma oblong, c. 2.5 mm long, notched; awn c. 1 cm long, geniculate; column c. 5 mm long, twisted. Lower and upper florets male.

Flowering & Fruiting : Oct. – Dec.

Ecology : In crevices of rocks near marshy beds of rivers.

Distribution : INDIA : Andaman Islands, Maharashtra and Tamil Nadu. Endemic.

Note : Apparently resembles *I. thomsonianum* and *I. timorense* in having wiry tufted habit and bicuspidate arista in lower glume of sessile spikelets.

16. *Ischaemum glabriglaucum* Sunil in Candollea 60(2): 387. 2005.

Type : INDIA : Kerala, Vazhachal, Trichur distr., 300 m, 4.10.1999, *Sunil* 2235 (holo; K; ISO; CALI, BRIT, L)

Annual. Culms tufted, erect to diffuse, up to 170 cm long, young internodes glaucous towards the nodes; nodes glabrous. Leaves all along the culm; sheath 3–9 cm long, ligule coriaceous, 1–6 mm long, obtuse or notched. Leaves linear-lanceolate or elliptic-lanceolate, narrowed towards base, membranous, sparsely bulbous-pilose above and below, upper blades ovate-lanceolate, base deeply cordate-hastate, nearly to sessile, margins scabrous, apex acuminate, coriaceous, glabrous. Inflorescence terminal or axillary with (1)2–5 peduncles; racemes 2, 3–8 cm long, glabrous towards base and densely long-villous upwards; joints of rachis crustaceous, 2.5–4 mm long densely long-villous. Sessile spikelets : Lower ones unawned or rudimentary awn, others awned, 5–6.5 mm long, linear-lanceolate. Lower glume linear-lanceolate, 5–6 x 1.5 mm apex obtuse, hyaline-membranous thickly coriaceous, 13-nerved, incurved at margins, laterally 1–3 nodulous in the lower portion of the raceme, densely long-villous in the lower half. Upper glume up to 6 x 1 mm linear-lanceolate, keeled, thickly coriaceous. Lower lemma hyaline, 5–6 x 1.25–1.5 mm, linear-lanceolate, 3-nerved. Lower palea linear-lanceolate, hyaline, 5–5.5 x 1–1.25 mm, apex acute, 2-nerved. Upper lemma linear-oblong or elliptic 4–4.5 x 0.75–1 mm; awns at sinus, (15)17–22 mm long. Upper palea linear-lanceolate, hyaline, 4–4.5 x 1 mm, acute, incurved on margins. Pedicelled spikelets : linear-elliptic to lanceolate, up to 6 x 2 mm. Lower glume linear-lanceolate or linear-elliptic, 5–6 x 1.5–2 mm thickly coriaceous, 9–11 nerved, bifid at apex, 1–2-nodulose, glabrous. Upper glume, lower lemma and lower palea similar to those of the sessile spikelets. Upper lemma linear-lanceolate, hyaline; awn 4 mm long, apex acute to acuminate, 4–5 mm long. Upper palea similar to sessile spikelets but smaller. Lodicules 2, c. 1 x 0.5 mm, apex truncate, lobed. Stamens 3; anthers 3–3.5 mm long. Ovary 0.5–0.75 x c. 0.5 mm, ovate; styles 1–1.5 mm long; stigmas c. 2 mm long, feathery. Grains 2–2.5 x 0.75–1 mm, ellipsoid, slightly trigonous, apiculate.

Flowering & Fruiting : Oct. – Jan.

Ecology : Growing on open rocky slopes near Vazahachal river at 300 m altitude.

Distribution : INDIA : Kerala

Note : This species is allied to *I. pushpangadanii* but distinguished by its glabrous nodes, glaucous young culms, much shorter pedicels, longer awn of upper lemma of sessile spikelets and anthers.

17. *Ischaemum heterotrichum* Hack. in DC., Monogr. Phan. 6: 220. 1889; Hook.f., Fl. Brit. India 7: 134. 1896; Bor, Grass. Burma Ceylon India Pakistan 179. 1960.

Type : India : Nicobar, *Jelink* s.n. (Vind).

Perennials; culms 40 - 60 cm tall, slender, prostrate, glabrous. Leaves linear-lanceolate, 5 - 15 x 0.7 - 3 cm, glabrous, rounded at base, margins undulate, scabrid; sheaths compressed, keeled; ligules short, truncate, ciliate. Racemes 2, 4.5 - 6.5 cm long, stout, erect, glabrous; joints bearded. Sessile spikelets 8 - 10 mm long; callus bearded at base; lower glume lanceolate, 6 - 8 mm long, acute, membranous, 4-nerved, margins involute below the middle, narrowly winged on upper half; upper glume subcoriaceous, mucronate at apex, margins ciliate, keel winged above; lower lemma short, ovate, acute, chartaceous, 3-nerved, ciliate; lower palea membranous; upper lemma broadly oblong, ciliolate, notched, awned; awn confluent with lemma. Lower floret male; upper floret bisexual. Pedicelled spikelets c. 6 mm long; lower glume winged at middle towards apex, glabrous; upper glume not dorsally winged; lemmas and paleas as in sessile spikelets except for lower lemma 5-nerved with lanceolate acuminate ciliate lobes.

Flowering & Fruiting : Sept. - Jan.

Ecology : Along seashores, often forming mats in coconut plantations.

Distribution : INDIA : Andaman & Nicobar Islands; MASCARENE ISLAND.

18. *Ischaemum hirtum* Hack., in DC., Monogr. Phan. 6: 228. 1889, p.p.; Hook.f., Fl. Brit. India 7: 135. 1896; Bor, Grass. Burma Ceylon India Pakistan 179. 1960; U. Shukla, Grass. N.E. India 104. 1996.

Type : India : Meghalaya; Khasia, 2000 m; *Hook. & Thomson*, "*Spodiopogon* no. 13", (*Iso* : CAL).

Perennials; culms 30 - 60 cm tall, unbranched, ascending from a decumbent base. Leaves linear lanceolate, c. 20 x 0.5 cm, acuminate, hairy on both surfaces, membranous; sheaths loose, glabrous below, hirsute above, striate; ligules truncate. Racemes 2, occasionally 3, up to 11 cm long; joints c. 4 mm long, pilose on outer edge. Sessile spikelets 6 - 7 mm long; lower glume lanceolate, chartaceous, hairy in upper half, unequally bicuspidate at apex, 6 - 9-nerved, margins expanded below middle; upper glume c. 7 mm long including arista, 3 - 5-nerved, scabrid on keel and on back; lower lemma oblong-lanceolate, c. 5 mm long, acuminate, membranous, faintly 3-nerved; lower palea oblong, c. 4 mm long, hyaline; upper lemma ciliolate, awn slender, confluent with lemma; upper palea as long as lemma. Lower floret male or sterile; upper floret hermaphrodite. Pedicelled spikelets smaller, reduced to glumes.

Flowering & Fruiting : June - Nov.

Ecology : In waste places near flowing water.

Distribution : INDIA : Assam, Bihar, Meghalaya and Orissa BANGLADESH, MALAY PENINSULA and SRI LANKA.

19. *Ischaemum hubbardii* Bor in Indian For. Rec. (Bot.) 1(3): 98. 1938 & Grass. Burma Ceylon India Pakistan 179. 1960; U. Shukla, Grass. N.E. India 104. 1996.

Type : India : Meghalaya; Cherrapunjee, *N.L. Bor* 21368 (*Iso* : ASSAM).

Perennials; culms up to 90 cm tall, compressed at base, covered with old leaf-sheaths; nodes glabrous or bearded. Leaves linear-lanceolate, 5 - 14 x 1 - 1.5 cm, tubercled hairs on both surfaces, broadly auricled at base, acute at apex; sheaths loose, glabrous. Racemes 2, 4 - 8 cm long; joints c. 6 mm long, pilose on outer edge. Sessile spikelets 6 - 7 mm long; lower glume oblong, c. 6 mm long, obtuse, slightly convex on back, narrowly winged on margins above the middle; upper glume with a narrow wing below the apex; lower lemma c. 6 mm long, hyaline; lower palea shorter than lemma; upper lemma c. 5 mm long, cleft at apex, awned; awn

c. 2 cm long, geniculate, twisted. Lower floret male; upper floret bisexual. Pedicelled spikelets usually smaller, reduced to glumes; lower floret male if present; upper floret absent.

Flowering & Fruiting : Aug. Oct.

Ecology : In marshy places in hilly areas.

Distribution : INDIA : Assam and Meghalaya. Endemic.

20. ***Ischaemum huegelii*** Hack. in DC., Monogr. Phan. 6: 252. 1889; Hook.f., Fl. Brit. India 7: 139. 1896; Bor, Grass. Burma Ceylon India Pakistan 179. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 517. 1996. *I. inerme* Stapf ex Bor in Kew Bull. 1951: 448. 1952.

Type : India : Bassahir, Huegel (Vienna).

Perennials; culms slender, glabrous, branched below, rooting at lower nodes, purple. Leaves 10 - 25 x 1 - 2 cm, linear, flat, flaccid, upper sessile, cordate-lanceolate, lower ones shortly petiolate. Racemes mostly unbranched, solitary, 3.5 - 5 cm long, stout; joints clavate, dorsally convex. Sessile spikelets 6.5 - 7.5 mm long, awnless; lower glume oblong, obtuse, coriaceous towards base, with 3 - 4-nodes on margin connected by ridges, glabrous or dorsally ciliate, margins narrowly inflexed; upper glume ovate, deeply keeled; lower lemma oblong, hyaline, glabrous; lower palea membranous; upper lemma linear-lanceolate, acute, 1-nerved, awnless; upper palea linear-lanceolate. Lower floret male; upper floret bisexual. Pedicelled spikelets awnless; pedicels less than 1/3 the length of sessile spikelets; lower glume linear-lanceolate, flat, acuminate, many nerved; upper glume, lemma and florets as in sessile spikelets.

Flowering & Fruiting : Aug. Dec.

Ecology : In wet places.

Distribution : INDIA : Maharashtra (Mumbai). Endemic. Rare.

21. ***Ischaemum impressum*** Hack. in DC., Monogr. Phan. 6: 210. 1889; Hook.f., Fl. Brit. India 7: 132. 1896; Bor, Grass. Burma Ceylon India Pakistan 180. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 517. 1996.

Type : Asia : Huegel 4018 (K).

Annuals; culms 20 - 30 cm tall, erect, branching upwards, nearly glabrous. Leaves oblong to linear-lanceolate, 5 - 10 x 0.8 - 1.8 cm, lower narrower, petiolate, hairy on both surfaces, margins thickened, scaberulous, crenulate; sheaths compressed, glabrous; ligules oblong. Racemes 2, 2 - 5 cm long; callus short, bearded; joints stout, forked at apex. Sessile spikelets 6 - 8 mm long; lower glume ovate, 6 - 7 mm long, hairy with depression in lower third on dorsal surface, concave in upper half, margins inturned; upper glume obtuse, chartaceous, ciliate, humped in center of dorsal surface, keel winged, wing auricled; lower lemma oblong-lanceolate, 3-nerved, ciliate; lower palea oblong; upper lemma short, glabrous, cleft above middle, unawned or very shortly awned in the cleft; upper palea oblong-obtuse, glabrous. Lower floret male; upper floret bisexual. Pedicelled spikelets c. 5 mm long, obliquely ovoid; pedicels more than 1/3 the length of sessile spikelets; lower glume obtuse, glabrous, many nerved, winged on one margin; upper glume 7-nerved; upper lemma mucronate; lower lemma and florets as in sessile spikelets.

Flowering & Fruiting : Aug. Dec.

Ecology : In marshy places.

Distribution : INDIA : Gujarat, Maharashtra and Rajasthan; PAKISTAN.

22. ***Ischaemum indicum*** (Houtt.) Merr. in J. Arn. Arbor. 19: 320. 1938; Bor, Grass. Burma Ceylon India Pakistan 180. 1960; G.P. Roy, Grass. Madhya Pradesh 103. 1984; Sreek. & V.J. Nair, Fl. Kerala - Grass. 136. 1991; U. Shukla, Grass. N.E. India 104. 1996; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 517. 1996. *Phleum indicum* Houtt., Nat. Hist. (2): 13, 198. t. 90. f. 2. 1782 var. *wallichii* (Hack.) Bor, Grass. Burma Ceylon India Pakistan 180. 1960. *Ischaemum ciliare* Retz., Obs. Bot. 6: 36. 1791; Hook.f., Fl. Brit. India 7: 133. 1896. *I. ciliare* Retz. var. *wallichii* Hack. in DC., Monogr. Phan. 6: 227. 1889. *I. aristatum* L., Sp. Pl. 1049. 1753; Hook.f., Fl. Brit. India 7: 226. 1896. *I. aristatum* L. var. *wallichii* (Hack.) Bor in Indian For. Rec. (Bot.) 1: 3, 98. 1938.

Annuals; culms 20–90 cm long, slender, creeping, rooting at nodes; nodes nearly glabrous to hairy. Leaves linear-lanceolate, 0.5–8 x 0.2–0.5 cm, acute, rounded at base, glabrous to densely hairy or villous, entire or undulate along margins; sheaths keeled; ligules ovate, acute, membranous. Racemes 1–3, 2–8 cm long; joints turbinate, 1–2 m long, densely villous. Sessile spikelets ovate-oblong, 4.5–6.5 mm, awned; callus bearded; lower glume ovate-oblong, 4–5 x 1–1.5 mm, hairy or glabrous, notched, 7–9-nerved, broadly winged on both sides in upper half, margins long ciliate; upper glume boat-shaped, 4–5 x 1.5–2 mm, aristate, arista 1–3 mm long, dorsally keeled, minutely winged; lower lemma ovate-lanceolate, 3–4 x 1–1.5 mm, 3-nerved; lower palea elliptic, 3–3.5 x 0.5–1 mm, chartaceous, 2-keeled, 2-nerved, margins infolded; upper lemma 3–4 x 1.5–2 mm, notched, awned, 3-nerved; awn 8–15 mm long, column 3–5 mm; upper palea oblong, 3–3.5 x c. 1 mm, delicate, 2-nerved. Lower floret male; upper floret bisexual. Stamens 3; anthers 1.5–2 mm long. Ovary oblong, c. 0.5 mm long; style 1–1.5 mm long; stigma 1–1.5 mm long. Pedicelled spikelets ovate, 5–6 mm long, awned; pedicels 1.5–2 mm long, villous; lower glume ovate-lanceolate, 9–11-nerved, winged on one margin, densely villous in upper half; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Aug.–Nov.

Ecology : In marshy places.

Distribution : INDIA : Andaman & Nicobar Islands, Assam, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Rajasthan and Tripura; BANGLADESH, JAVA, MYANMAR, PHILIPPINES and SINGAPORE.

KEY TO THE VARIETIES

- | | |
|---|------------------------------|
| 1a. Pores distinct on ventral surface of racemes; spikelets 4.5–6.5 mm long | 22.1. var. <i>indicum</i> |
| 1b. Pores indistinct on ventral surface of racemes; spikelets 5.5–6.5 mm long | 2 |
| 2a. Lower glume of sessile spikelets hairy; leaves glabrous or pubescent | 22.3. var. <i>wallichii</i> |
| 2b. Lower glume of sessile spikelets glabrous; leaves densely hairy | 22.2. var. <i>longipilum</i> |

22.1. var. *indicum*

KEY TO THE SUBVARIETIES

- | | |
|---|--------------------------------------|
| 1a. Culms slender, creeping | 2 |
| 1b. Culms stout, erect | 3 |
| 2a. Lower glume of sessile spikelets smooth towards apex; acuminate | 22.1.1. subvar. <i>indicum</i> |
| 2b. Lower glume of sessile spikelets scrobiculate towards apex; acute | 22.1.3. subvar. <i>scrobiculatum</i> |
| 3a. Leaves densely villous with erect hairs | 22.1.4. subvar. <i>villosum</i> |
| 3b. Leaves nearly glabrous | 22.1.2. subvar. <i>malacophyllum</i> |

22.1.1. subvar. *indicum* : Sreek. & V.J. Nair, Fl. Kerala Grass. 137. 1991. *Phleum indicum* Houtt., Nat. Hist. 11. 13: 198. t.90, f.2. 1782. *I. ciliare* Retz. var. *prorepens* Hack. in DC., Monogr. Phan. 6: 226. 1889; Hook.f., Fl. Brit. India 7: 134. 1896.

Type : India : Karnataka; Hook.f. & Thomson s.n. (CAL).

Culms slender. Leaves glabrous to sparsely hairy. Pores distinct on ventral surface of racemes; joints densely hairy. Spikelets 4.5–5 mm long; lower glume of sessile spikelets smooth towards apex, acuminate; prominently 7–9-nerved, broadly winged on either side in upper half, wings auriculate.

Flowering & Fruiting : Jan.–Sept.

Ecology : Along paddy fields and roadsides.

Distribution : Throughout India including Andaman & Nicobar Islands. Common.

22.1.2. subvar. *malacophyllum* (Hochst. ex Steud.) Bor, Grass. Burma Ceylon India Pakistan 180. 1960. *Andropogon malacophyllus* Hochst. ex Steud., Syn. Pl. Glum. 1: 372. 1854. *Ischaemum ciliare* Retz. var. *malacophyllum* (Hochst. ex Steud.) Hack. in DC., Monogr. Phan. 6: 226. 1889; Hook.f., Fl. Brit. India 7: 134. 1896.

Types : India : Tamil Nadu; Nilgiri, *Hohenacker* 917 (CAL); Terai, *W. Gomez*, Oct. 1827, *Wallich* 8852 (CAL).

Culms tall, stout. Leaves pubescent or nearly glabrous. Pores distinct on ventral surface of racemes. Sessile spikelets c. 5 mm long; lower glume broadly winged towards apex.

Flowering & Fruiting : July Dec.

Ecology : In marshy places of hotter parts of India.

Distribution : INDIA : Assam, Bihar, Tamil Nadu and West Bengal.

22.1.3. subvar. *scrobiculatum* (Nees ex Steud.) Bor, Grass. Burma Ceylon India Pakistan 180. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 138. 1991. *Spodiopogon scrobiculatus* Nees ex Steud., Syn. Pl. Glum. 1: 373. 1854. *Ischaemum ciliare* Retz. var. *scrobiculatum* (Nees ex Steud.) Hack. in DC., Monogr. Phan. 6: 226. 1889; Hook.f., Fl. Brit. India 7:134. 1896.

Culms slender, creeping. Leaves puberulous. Joints of racemes sparsely hairy; pores distinct on ventral surface of racemes. Sessile spikelets c. 5 mm long; lower glume of sessile spikelets scrobiculate towards base, acute at apex, narrowly winged, keel of upper glume ciliate.

Flowering & Fruiting : Oct. Dec.

Ecology : Along roadsides, hill slopes and wastelands.

Distribution : INDIA: Kerala, Meghalaya and Tamil Nadu; SRI LANKA and TAIWAN.

22.1.4. subvar. *villosum* (Nees) Bor, Grass. Burma Ceylon India Pakistan 180. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 138. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 519. 1996. *Spodiopogon villosum* Nees in Hook. & Arn., Bot. Beech. Voy. 242. 1838. *Ischaemum ciliare* Retz. var. *villosum* (Nees) Hack. in DC., Monogr. Phan. 6: 227. 1889; Hook.f., Fl. Brit. India 7: 134. 1896.

Type : India : Chanda, *Duthie*, s.n. (CAL).

Culms stout, tufted, erect. Leaves elliptic-lanceolate, acuminate, longer than other subvarieties, densely villous with erect hairs; sheaths keeled, densely villous.

Flowering & Fruiting : Aug. Jan.

Ecology : In open grasslands, hillslopes and rocky places; usually in drier areas.

Distribution : INDIA : Karnataka, Kerala, Madhya Pradesh, Maharashtra and Tamil Nadu; SRI LANKA.

22.2. var. *longipilum* (Hack.) Bor, Grass. Burma Ceylon India Pakistan 181. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 140. 1991; *I. ciliare* Retz. var. *longipilum* Hack. in DC., Monogr. Phan. 6: 227. 1889.

Culms stoloniferous, creeping; nodes nearly glabrous. Leaves petiolate, densely covered with tubercled hairs. Pores indistinct on the ventral surface of racemes. Lower glume glabrous with broad auriculate wings towards apex.

Flowering & Fruiting : Nov. -Dec.

Ecology : Along hill slopes.

Distribution : INDIA : Kerala. Rare; SRI LANKA.

22.3. var. *wallichii* (Hack.) Bor, Grass. Burma Ceylon India Pakistan 180. 1960. *Ischaemum ciliare* Retz. var. *wallichii* Hack. in DC. Monogr. Phan. 6: 227. 1889.

Type : Sylhet, *Wallich* 8860B (CAL)

Culms erect, tufted; nodes densely villous. Leaves glabrous or hairy. Pores indistinct on ventral surface of racemes. Sessile spikelets 5 - 6 mm long; lower glume slightly notched at apex, densely pilose, winged on either side.

Flowering & Fruiting : Aug. Sept.

Ecology : In open grass-lands and hill slopes.

Distribution : INDIA : Assam, Kerala, Manipur, Meghalaya and Tripura; BANGLADESH.

- 23. *Ischaemum jayachandranii*** R. Ansari, V.S. Ramach. & Sreek. in Curr. Sci. 53(3): 151. 1984; Sreek. & V.J. Nair, Fl. Kerala Grass.140. 1991.

Type : India : Kerala; Cannanore, Nileshwar, 175 m, 29.1.1979, V.J. Nair 59981 (*Holo* : CAL).

Stoloniferous perennials; culms c. 50 cm tall, slender; nodes glabrous. Leaves elliptic-lanceolate, 3 - 12 x 0.2 - 0.6 cm, lower ones narrowed at base, upper ones rounded, margins minutely serrulate; sheaths 4 - 10 cm long, striate, glabrous; ligules ovate, c. 2.5 mm long. Racemes 2, 4 - 10 cm long, exerted from spathe; joints c. 4 x 2 mm, coriaceous, glabrous. Sessile spikelets oblong-lanceolate, 5 - 6 x c. 2 mm, unawned; callus glabrous; lower glume oblong-lanceolate, c. 5 x 1.75 mm, 11 - 13-nerved, margins incurved; upper glume boat-shaped, c. 5.5 x 2 mm, sharply keeled, minutely winged at apex, 3 - 5-nerved; lower lemma lanceolate, c. 5 - 6 x c. 1.5 mm, margins incurved; lower palea 4 - 5 x 1 - 1.5 mm, 2-nerved, glabrous; upper lemma ovate-lanceolate, 4.5 - 5 x 1.5 - 2 mm, entire or rarely notched, 5-nerved, median nerve prominent, prolonged into a rudimentary awn when notched, wart like outgrowth in upper half; upper palea glabrous. Lower floret male; upper floret bisexual. Stamens 3; anthers 1.5 - 2 mm long; filaments short. Ovary oblong, c. 0.5 x 0.3 mm; style 1.5 - 2 mm long; stigma c. 1 mm long, feathery. Pedicelled spikelets oblong, c. 5 - 5.5 mm long, acute, unawned; pedicels c. 1 mm long; lower glume ovate, 5 - 5.5 x c. 1.75 mm, acute, narrowly winged on one margin; upper glume lanceolate, 4.5 - 5 mm long, keel rounded, coriaceous; florets as in sessile spikelets.

Flowering & Fruiting : Dec. Jan.

Ecology : In marshy places.

Distribution : INDIA : Kerala (Cannanore). Endemic.

- 24. *Ischaemum keralense*** Sreek., V.J. Nair & N.C. Nair in Adansonia 2: 135, t.1. 1985, '*keralensis*'; Sreek. & V.J. Nair, Fl. Kerala Grass. 142. 1991.

Type : India : Kerala; Cannanore, Cherkala, ± 250 m, 24.11.1981, P.V. Sreekumar 71839 (*Holo* : CAL).

Creeping annuals; culms 20 - 50 cm tall; upper nodes villous. Leaves lanceolate, 4 - 10 x 0.5 - 1.5 cm, acuminate, cordate at base, lower leaves petioled; petioles 0.5 - 1.5 cm long; sheaths 2 - 5 cm long, glabrous; ligules ovate, 1 - 1.5 mm long. Racemes in fascicles of 5 - 8 long peduncles from a spathe, 2 - 5 cm long; joints c. 4 mm long, villous. Lowest group of spikelets in threes, two pedicelled, awnless, one sessile, awned. Sessile spikelets oblong-lanceolate, 4 - 5 x c. 1.25 mm; callus bearded; lower glume oblong, 4.5 - 5 mm long, 9 - 11-nerved, with few side nodules, margins incurved; upper glume boat-shaped, 4.5 - 5 x c. 1.75 mm, keeled, 3-nerved, hairy on upper half on dorsal side; lower lemma ovate-lanceolate, 3 - 5-nerved, margins infolded, ciliolate in upper half; lower palea elliptic-lanceolate, 4 - 5 mm long, 2-nerved, glabrous; upper lemma 4 - 4.5 mm, notched, lobes acuminate, 3-nerved; awn 1.2 - 1.6 cm long, geniculate, column 4 - 6 mm long, brown, scabrid; upper palea linear, 2-nerved, wart like dots towards apex. Lower floret male; upper floret bisexual. Stamens 3; anthers 1 - 1.5 mm long (2 - 3 mm long in bisexual florets). Ovary c. 0.5 mm long; style c. 1.5 mm long, slender; stigma c. 2 mm long, feathery. Pedicelled spikelets 4.5 - 5 mm long, sparsely villous; lower glume, upper glume, lemma and florets more or less as in sessile spikelets.

Flowering & Fruiting : Oct. Dec.

Ecology : In moist rocky places.

Distribution : INDIA : Kerala (Cannanore). Endemic.

- 25. *Ischaemum kingii*** Hook.f., Fl. Brit. India 7: 129. 1829; Bor, Grass. Burma Ceylon India Pakistan 182. 1960; B.V. Shetty & V. Singh, Fl. Rajasthan 3: 1067. 1993; B.D. Sharma & al., Fl Maharashtra State (Monocot.) 519. 1996.

Type : India : Maharashtra; Bombay, *King* s.n. (*Iso* : CAL).

Annuals; culms 25 - 30 cm tall, erect, glabrous. Leaves ovate-lanceolate, 3.5 - 6 x 0.5 - 1.2 cm, rounded or subcordate at base, lower ones petioled, upper sessile, hairy beneath, margins scaberrulous, midrib slender; sheaths lax, spathiform; upper ones glabrous; ligules short, membranous. Racemes 2, c. 4 cm long; joints stout,

densely ciliate. Sessile spikelets ovate, 6 - 8 mm long; callus rounded, bearded; lower glume oblong-lanceolate, 4 - 5 mm long, dorsally glabrous, sides bulging at about lower 1/3; upper glume scabrid, 2-toothed at apex, armed with tuft of stiff hairs on upper third; lower lemma lanceolate, 1-nerved; lower palea membranous; upper lemma ovate, short, 3-nerved, lobes triangular, awned; awn c. 2.5 cm long; upper palea as long as lemma, ovate-lanceolate, 2-nerved. Lower floret male; upper floret bisexual. Pedicelled spikelets smaller than sessile; pedicels nearly half the length of sessile spikelets; lower glume elliptic, acute, many nerved, margins not incurved; upper glume awnless.

Flowering & Fruiting : Sept. Dec.

Ecology : In drier parts of grassy hills.

Distribution : INDIA : Maharashtra and Rajasthan. Endemic.

- 26. *Ischaemum koenigii*** (Hook.f.) Stapf ex C.E.C. Fisch., in Gamble, Fl. Pres. Madras 1722. 1934; Bor, Grass. Burma Ceylon India Pakistan 182. 1960. *I. aristatum* L. ssp. *koenigii* Hook.f., Fl. Brit. India 7: 127. 1896. *I. fasciculatum* Rottler, nom. nud.; Hook.f., Fl. Brit. India 7: 127. 1896 pro syn.

Type : India : Deccan Peninsula (Precise locality unknown). *Koenig* s.n. (K).

Robust perennial herbs; culms 70 - 90 cm tall, glabrous. Leaves narrow, 30 - 45 x 2.5 - 3 cm, rounded or emarginate at base, nearly sessile. Racemes 2 - 3, 8 - 10 cm long; joints c. 3 mm wide. Sessile spikelets 8 - 10 mm long, nearly glabrous; lower glume oblong-lanceolate, c. 3.5 mm long, acute, with 3 - 4 nodules on each margin in lower part, often connected by rounded transverse ridges; upper glume boat-shaped, acute; lower lemma oblong-lanceolate; lower palea delicate; upper lemma notched, shortly bifid, narrowly lobed, awned; awn c. 5 mm long; upper palea oblong. Lower floret male; upper floret bisexual. Pedicelled spikelets awnless; pedicels 2 - 3 mm long; glumes, lemmas and paleas as in sessile spikelets.

Flowering & Fruiting : Aug. Dec.

Ecology : In marshy habitats.

Distribution : INDIA : Tamil Nadu. Endemic.

- 27. *Ischaemum kumarakodiense*** Ravi, Mohanan & Kiran Raj in Rheede 8(2): 149. 1998, '*kumarakodiensis*'.

Type : India : Kerala; Alappuzha Dt., Pallama, Dec. 29, 1996. *Ravi* 33084 (*Holo* : TBGT; *Iso* : K, MH, KFRI).

Perennials, densely tufted; culms up to 75 cm long. Leaves linear-oblong-lanceolate, c. 1.5 x 0.5 cm, rounded at base, acuminate at apex, keeled on midrib, glabrous; sheaths compressed, c. 7 cm long, glabrous; ligules 3 - 4 mm long, truncate. Racemes 2, 4 - 7 cm long; joints clavate, 3 - 4 mm long, ciliate on outer angle. Sessile spikelets elliptic, c. 5 mm long, glabrous, 9 - 11-nerved, weakly noduled, irregularly wrinkled without nodular interconnection; upper glume boat-shaped, 4 - 5 mm long, 5-nerved, margins incurved, sharply keeled on back, humped below; lower lemma elliptic-lanceolate, c. 4 mm long, 3-nerved; lower palea elliptic-lanceolate, margins incurved, 2-nerved; upper lemma elliptic-lanceolate, cleft to middle, awned, 3-nerved; awn c. 1.2 cm long; upper palea linear-lanceolate, 2-nerved, sparsely ciliolate on margins. Lower floret male; upper floret bisexual. Pedicelled spikelets ovoid, 4 - 5 mm long; pedicels c. 3 mm long, ciliate; lower glume ovate, 9 - 11-nerved, obtuse, notched, winged on one side; upper glume c. 4 mm long, coriaceous; lower lemma and palea as in sessile spikelets; upper lemma elliptic-lanceolate, c. 3 mm long; palea linear, 2-nerved.

Flowering & Fruiting : Sept. March.

Ecology : Forms thick tufts in marshy places.

Distribution : INDIA : Kerala. Endemic.

- 28. *Ischaemum lacei*** Stapf ex Bor in Kew Bull. 1950: 187. 1950 & Bor, Grass. Burma Ceylon India Pakistan 182. 1960; U. Shukla, Grass. N.E. India 105. 1996; Sur in J. Econ. Taxon. Bot. 25(2): 421. 2001.

Type : Amherst, Daiona, Muleyit Peak, 2000 m, 27.1. 1912, *F.A. Lace* 5627 (K).

Perennials; culms c. 120 cm tall, erect, ascending, branched; nodes hairy. Leaves elliptic, 15 x 1.5 cm, attenuate at base, densely hairy above, scabrid at margins, median prominent; sheaths lax, compressed, striate, pilose; ligules oblong, c. 5 mm long. Racemes 2, 5-6 cm long; joints 4-5 mm long, ciliate. Sessile spikelets 7-9 mm long; callus c. 1 mm long, hairy; lower glume lanceolate or ovate, c. 8 mm long, narrowly winged, bilobed towards apex, rounded at base, notched at apex, margins involute towards apex, pilose in middle; upper glume lanceolate, c. 9 mm long, dorsally keeled, 3-nerved, winged on both sides; arista c. 2.5 mm long, scabrous; lower lemma elliptic, c. 6 mm long, acute, 3-nerved, hyaline; lower palea as long as lemma, 2-nerved; upper lemma c. 6.5 mm long, 3-nerved, notched with narrow fissure, awned; awn c. 2 cm long, column c. 1 cm long, twisted, brown. Lower floret male; upper floret bisexual. Pedicelled spikelets 8-10 mm long; lower glume c. 8 mm long, strongly compressed, keeled, dorsally winged, pilose, arista short; upper glume 7-8 mm long, rounded at base, keel winged towards apex, scabrid, hairy in middle; florets similar to sessile spikelets, arista c. 1 cm long.

Flowering & Fruiting : Sept. Dec.

Ecology : In paddy fields.

Distribution : INDIA : Meghalaya; MYANMAR.

Note : Bor (*l.c.*) states that *I. lacei* seems to be endemic to Burma (Myanmar).

29. *Ischaemum lanatum* Ravi, Mohanan & Shaju in Rheede, 10(2): 91. 2000.

Type: India : Kerala; Kasaragode Dt., Hosdurg Taluk, Periya, $\pm$ 50 m, 29 Nov. 1999. *Ravi* 41535 (*Holo* : TBGT: *Iso* : K, CAL, MH, KFRI, TBGT).

Annuals; culms slender, up to 1 m tall; nodes villous. Leaves up to 10 x 1 cm, cordate or semisagittate at base; sheaths up to 9 cm long, keeled on back; ligules triangular, c. 5 mm long, coriaceous. Racemes 2, up to 7 cm long, densely woolly; joints 4-6 mm long, white woolly. Sessile spikelets elliptic to oblong-lanceolate, 6-7 mm long; lower glumes 5-6 mm long, elliptic-lanceolate, laterally keeled, 2-3-nodulose, 9-11-nerved, woolly; upper glume oblong-lanceolate, 5-6.5 mm long, 5-7-nerved, incurved at margins; lower lemma elliptic-lanceolate, 4-5.5 mm long, acuminate, margins inrolled; lower palea 4-5.5 mm long, 2-nerved, keeled along nerves; upper lemma oblong-elliptic, 3.75-5 mm long, deeply cleft, awned; awn 1.3-1.9 cm long with 5-8 mm long column; upper palea linear-lanceolate, 3.5-4.5 mm long, 2-nerved. Pedicelled spikelets : Pedicels 1.5-2.5 mm long, silky villous; lower glume oblong-lanceolate, 4.5-6.5 mm long, crustaceous to coriaceous, 7-11-nerved, silky woolly; upper glume, lower lemma, lower palea, upper lemma and upper palea slightly shorter otherwise as in sessile spikelets. Lodicules 2, c. 1 mm long. Stamens 3; anthers c. 3 mm long, yellow. Ovary c. 1 mm long; style 2-2.5 mm long; stigma 3-3.5 mm long, purple.

Flowering & Fruiting : Oct. Jan.

Ecology : On black loamy soil of a rocky grassy hill in shady places.

Distribution : INDIA : Kerala (Kasaragod). Endemic.

Note : *I. lanatum* is somewhat allied to *I. semisagittatum* Roxb., but differs in having densely white woolly joints of rachis, pedicel, callus and crustaceous lower glumes.

30. *Ischaemum lisboae* Hook.f., Fl. Brit. India 7: 133. 1896; Bor, Grass. Burma Ceylon India Pakistan 182. 1960.

Type : India : North Kanara, *Lisboa* s.n. (CAL).

Perennials; culms 20-35 cm long, creeping below, stout, rooting at nodes, glabrous. Leaves oblong, 3-5 x 0.6-1 cm, acute, tomentose or brown villous on both surfaces; sheaths 1.2-2.5 cm long, villous; ligules short, hairy. Racemes 2, c. 5 cm long, tomentose; joints c. 2 mm long; villous, stout. Sessile spikelets 3-3.5 mm long; callus large, glabrous; lower glume dorsally convex, c. 3 mm long, thick, coriaceous, bifid, ciliate towards apex, margins incurved; upper glume c. 3.5 mm long, dorsally rounded below wing, keel winged above middle, shortly awned; lower lemma ovate-oblong, obtuse, ciliate along margins; lower palea obovate, chartaceous, 2-nerved; awn c. 6-7 mm long; upper palea lanceolate, nerves ciliate. Lower floret male; upper floret bisexual. Pedicelled spikelets laterally compressed; lower glume convex, broadly winged, villous; upper glume, lemma and palea as in sessile spikelets; upper lemma shortly awned or awnless.

Flowering & Fruiting : Aug. Dec.

Ecology : In wet places.

Distribution : INDIA : Goa, Karnataka, Maharashtra and Tamil Nadu. Endemic.

- 31. *Ischaemum malabaricum*** Sreek., V.J. Nair & N.C. Nair in Kew Bull. 39: 743. 1984; Sreek. & V.J. Nair, Fl. Kerala Grass. 144. 1991.

Type : India : Kerala; Cannanore, Paramba, on way to Bandudka, ± 150 m, 16.10.1981, P.V. Sreekumar 71720 (*Holo* : CAL).

Annuals; culms creeping; upper nodes villous. Leaves ovate-lanceolate, 10 x 0.5-1.5 cm, cordate at base, long acuminate, usually sessile, at times lower ones with a short petiole; sheaths 1-6 cm long, glabrous; ligules 2-3 mm long. Racemes 2, 2-6 cm long, slender, villous towards base; joints linear-clavate, c. 3 mm long, margins villous. Sessile spikelets ovate-oblong, 3-5 mm long, callus bearded; lower glume 3-4 x 1-1.5 mm, smooth, 9-11-nerved, hairy on dorsal surface; upper glume boat-shaped, 3-3.5 x c. 1.5 mm, 3-5-nerved, margins shortly ciliate; lower lemma elliptic, 3-4 x c. 1 mm, acute, 3-5-nerved, hairy along margins; lower palea linear-oblong, 3-3.5 x c. 1 mm, margins inturned; upper lemma 2.5-3 x c. 1 mm, notched, awned; awn 1.2-1.5 cm long, column c. 5 mm long; upper palea oblong, obtuse. Lower floret male; upper floret bisexual. Stamens 3; anthers 1-1.5 mm, filaments short. Pistil c. 3 mm long; ovary elliptic; style c. 1.5 mm long; stigma c. 1 mm long, feathery. Pedicelled spikelets elliptic, 3-4 mm long, awnless; callus villous; pedicels linear, c. 2 mm long, villous along margins; lower glume elliptic, 3.5-4 x c. 1 mm, acute, 9-11-nerved, nearly glabrous towards base; upper glume elliptic, 3-4 x c. 1.25 mm, acute, margins short ciliate; lower lemma elliptic-lanceolate, 3-3.5 x c. 1 mm, glabrous except along margins; lower palea lanceolate, glabrous; upper lemma elliptic, 2-3 x c. 1 mm, margins inturned; upper palea linear-oblong, glabrous. Lower and upper florets male. Stamens 1-2 mm long, filaments short.

Flowering & Fruiting : Oct. Jan.

Ecology : In dry areas, usually trailing over old compound walls.

Distribution : INDIA : Kerala. Endemic. Common.

- 32. *Ischaemum mangaluricum*** (Hack.) Stapf ex C.E.C. Fisch. in Gamble, Fl. Pres. Madras 1723. 1934; Bor, Grass. Burma Ceylon India Pakistan 182. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 147. 1991. *I. aristatum* sensu Hack. subsp. *imberbe* Hack. var. *mangaluricum* Hack. in DC., Monogr. Phan. 6: 204. 1889; Hook.f., Fl. Brit. India 7: 127. 1896; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 519. 1996. *I. aristatum* subsp. *imberbe* var. *fallax* Hack. in DC., Monogr. Phan. 6: 204. 1889.

Type : India : Tamil Nadu (Madras); Manglur, *Hohenacker* 184 (K).

Perennials; culms up to 80 cm tall, densely tufted, rarely rooting at lower nodes. Leaves linear-lanceolate, 3-20 x 0.45-0.7 cm, narrowed at base; ligules ovate, acute. Racemes 2, 3-10 cm long; joints clavate, 4-5 mm long, ciliate on one angle. Sessile spikelets oblong, 4-6 mm long, awned; callus bearded; lower glume oblong, 4-6 x c. 1.5 mm, crustaceous below, usually with 4-6 side nodules never interconnected, tip of lower glume auriculately winged on one side; upper glume boat-shaped, 4-6 x c. 1-2 mm, chartaceous, dorsally keeled, keel narrowly winged at apex; lower lemma 4-5 x 1-2 mm, 3-5-nerved; lower palea oblong-lanceolate or elliptic-lanceolate, 3-5 x c. 1 mm, delicate; upper lemma 4-4.5 x 1.5-2 mm, notched, awned; awn 1-1.5 cm long, column 5-6 mm long; upper palea oblong, 3-4 x c. 1 mm, sprinkled with wart like dots in upper half; Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2 mm long. Ovary ovate-oblong, c. 0.5 mm long; style 1-1.5 mm long; stigma c. 1 mm long. Pedicelled spikelets ovate-oblong, 4-5 mm long; pedicels 1-1.5 mm long, densely ciliate; lower glume ovate-oblong, broadly winged on one margin; upper glume, lemma and palea similar to sessile spikelets but smaller; florets male; upper lemma awnless.

Flowering & Fruiting : Oct. Feb.

Ecology : Common along marshy places and bunds of paddy fields.

Distribution : INDIA : Karnataka, Kerala, Maharashtra and Tamil Nadu; SRI LANKA.

Note : *I. mangaluricum* is nearer to *I. barbatum* but differs in having smaller culms and auriculate wings on lower glumes.

33. *Ischaemum molle* Hook.f., Fl. Brit. India 7: 128. 1896; Bor, Grass. Burma Ceylon India Pakistan 183. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 148. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 523. 1996.

Type : India : Madhya Pradesh; Chanda, 28.11.1889, J.F. Duthie 9962 (Syn : CAL).

Perennials; culms 60 - 150 cm tall, erect, densely tufted; nodes bearded. Leaves linear-lanceolate, 10 - 25 x 0.5 - 1 cm, acuminate, sparsely hairy, cordate at base; sheaths 10 - 15 cm long, nearly glabrous, mouth villous; ligules ovate, truncate, fimbriate, membranous. Racemes 2, 4 - 10 cm long, densely villous; joints turbinate or triangular, 3 - 4 mm long. Sessile spikelets ovate, 5 - 6 mm long, acute, densely villous, awned; callus broad; lower glume oblong-lanceolate, 5 - 6 x c. 1.5 mm, coriaceous, 9 - 11-nerved, densely curved with white hairs, ridges obscure; upper glume boat-shaped, 5 - 7 x 2 - 3 mm, chartaceous, faintly 3 - 7-nerved, dorsally keeled, humped in middle, ciliate; lower glume oblong-lanceolate, 4.5 - 5.5 x c. 1.5 mm, 3 - 5-nerved, margins infolded, ciliolate towards apex; lower palea elliptic-lanceolate, chartaceous, 2-nerved; upper lemma c. 4.5 x 1.5 mm, notched, awned, 3-nerved; awn c. 2 cm long; column 6 - 8 mm long; upper palea oblong-lanceolate, delicate, hyaline, 2-nerved, margins infolded. Lodicules obovate. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2 mm long. Ovary ovate-oblong, c. 0.5 mm long; style c. 1 mm long; stigma c. 5 mm long, feathery. Pedicelled spikelets elliptic or oblong-lanceolate, 4 - 6 mm long, awnless; pedicels turbinate, 1 - 2 mm long, villous; lower glume winged on one margin; upper glume as in sessile spikelets but smaller, not humped. Florets, lemmas and paleas as in sessile spikelets.

Flowering & Fruiting : Oct. - Dec.

Ecology : In dense clumps along wetlands and in ditches.

Distribution : INDIA : Peninsular to Central India and Rajasthan. Endemic.

Note : *I. molle* is closely allied to *I. rugosum* but differs in having taller robust culms, shortly petiolate upper leaves and smoother faintly rugose and densely villous lower glumes of sessile spikelets.

Uses : A fodder grass.

34. *Ischaemum muticum* L., Sp. Pl. 1049. 1753; Hook.f., Fl. Brit. India 7: 132. 1896; Bor, Grass. Burma Ceylon India Pakistan 183. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 149. 1991. *I. repens* Roxb., Fl. Ind. 1: 325. 1820. *I. glabratum* J. Presl ex C. Presl, Rel. Haenk. 1: 328. 1830. *Andropogon muticus* Steud., Syn. Pl. Glum. 1: 374. 1854. *A. polymorphus* Steud., l.c. 1: 375. 1854.

Perennials; culms 10 - 80 cm tall, creeping or trailing, stoloniferous, rooting at nodes. Leaves ovate-lanceolate, 1 - 10 x 0.4 - 1 cm, cordate at base, acuminate at apex; sheaths ciliate at margins; ligules truncate, membranous. Racemes 2, up to 3.5 cm long, concealed or hardly exerted from spathe; joints turbinate, nearly glabrous. Sessile spikelets oblong, 5 - 7 mm long, awnless, or awn rudimentary; callus glabrous; lower glume 5 - 6.5 x 1 - 3 mm, coriaceous, 7 - 11-nerved, minutely winged at apex; upper glume boat-shaped, 5 - 7 x 2 - 3 mm, chartaceous, 3 - 7-nerved, dorsally keeled; lower lemma ovate-lanceolate, 5 - 6.5 x 1.5 - 2.5 mm, 3-nerved, margins infolded; lower palea oblong-lanceolate, 2-nerved; upper lemma oblong-lanceolate, 5 - 7 x 1 - 2 mm, 3-nerved; upper palea elliptic to oblong-lanceolate, acute, margins infolded, ciliolate towards apex. Lodicules 2, obovate, retuse. Lower floret male; upper floret bisexual. Stamens 3; anthers 1.5 - 2 mm long. Ovary ovate-oblong, 0.5 - 1 x c. 0.5 mm; style 1 - 1.5 mm long; stigma c. 2 mm long, feathery. Pedicelled spikelets elliptic or oblong-lanceolate, 4 - 6 mm long, awnless or sometimes reduced into a small structure; pedicels turbinate, 2.5 - 5 mm long.

Flowering & Fruiting : July - March.

Ecology : Common along banks of back-waters, coastal sands and salt marshes.

Distribution : INDIA : Coasts of South India, Andaman & Nicobar Islands, Kerala, Lakshadweep, Maharashtra and Tamil Nadu; MALAYSIA, MYANMAR and SRI LANKA.

Note : *I. muticum* is distinct from other species of the genus in having thick rootstock, racemes concealed in spathe and awnless or rudimentary spikelets. This grass acts as a soil binder.

- 35. *Ischaemum nairii*** V.J. Nair & Sreek. in J. Econ. Tax. Bot. 5: 1205. 1894; Sreek. & V.J. Nair, Fl. Kerala Grass. 150. 1991.

Type : India : Kerala; Calicut Dt., Kanjeerakkadav, near Kakkayam, ± 900 m, 26.11.1981, P.V. Sreekumar 71843 (*Holo* : CAL).

Perennial tufted herbs; culms 1 - 2 m tall, erect; nodes villous. Leaves linear-lanceolate, 10 - 60 x 1 - 2 cm, acuminate, lower ones narrowed at base, upper rounded or cordate at base, villous; sheaths 10 - 80 cm long, villous on upper half; ligules ovate, 2 - 6 mm long, membranous. Racemes 2, 5 - 12 cm long, nearly glabrous; joints c. 3 mm long, villous along margins and dorsal angles. Sessile spikelets elliptic, 5 - 6 mm long, awned; callus densely bearded; lower glume ovate, 4.5 - 5.5 x 1.5 - 2 mm, acute, with several side nodules joined by sharp ridges; upper glume boat-shaped, c. 5 x 1.5 mm, dorsally keeled, tip minutely ridged, 7 - 9-nerved, margins ciliate in upper half; lower lemma oblong-lanceolate, c. 5 x 1.5 mm, 3-nerved; lower palea elliptic-lanceolate, 2-keeled, margins infolded; upper lemma notched, 3 - 4 x c. 1.5 mm, lobes acute, 3-nerved, margins ciliolate; awn 1.4 - 1.6 cm long, column 6 - 7 mm long, brown; upper palea lanceolate, c. 3.5 x 1 mm, 2-nerved, wart like dots towards apex. Lodicules 2, obovate, oblique at apex. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2 mm long, filaments c. 0.5 mm long. Ovary oblong; style c. 1 mm long; stigma 1 - 1.5 mm long, feathery. Pedicelled spikelets ovate, 5 - 6 mm long, acute, unawned; pedicels linear-clavate, 2 - 2.5 mm long, villous on dorsal angle; lower glume narrowly winged on one margin, wing scabrid, wrinkled with shallow depressions, side nodules indistinct; upper glume ovate-lanceolate, 4 - 4.5 mm long, 5-nerved; lower lemma delicate, margins infolded, minutely ciliate in upper half; palea oblong-lanceolate, 4 - 5 x c. 1.25 mm, texture similar as in sessile spikelet; upper lemma ovate-lanceolate, c. 4 x 2 mm, 3 - 5-nerved; palea 3 - 3.5 x c. 1 mm. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 3 mm long. Pistil similar to sessile spikelets.

Flowering & Fruiting : Sept. - Dec.

Ecology : Tall grass, growing in clumps along shallow streams and marshy places.

Distribution : INDIA : Kerala (Calicut). Endemic.

- 36. *Ischaemum nilagiricum*** Hack. in Oesterr. Bot. Z. 51: 150. 1901; Bor, Grass. Burma Ceylon India Pakistan 183. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 153. 1991. *I. hirtum* sensu Hook.f., Fl. Brit. India 7: 135. 1896, non Hack. 1889.

Type : India : Tamil Nadu (Madras); Conoor, C.B. Clarke 10791 (K, CAL).

Perennials; culms up to 120 cm tall, tufted, erect; nodes glabrous. Leaves elliptic-lanceolate or linear-lanceolate, 5 - 20 x 0.5 - 1.7 cm, acuminate; upper ones rounded at base, lower narrowed at base, softly hairy; sheaths ciliate at margins; ligules ovate, acute, membranous. Racemes 3 - 5 (up to 20), paniculate, each 2 - 10 cm long; joints 3 - 5 mm long, apex with teeth-like projections, angles densely ciliate. Sessile spikelets elliptic-lanceolate, 5 - 6 mm long; densely villous; lower glume 4 - 5 x 1 - 2 mm, notched at apex, 11 - 13-nerved, villous; upper glume boat-shaped, 5 - 6 x 1.5 - 2 mm, acuminate, recurved, 5 - 7-nerved; lower lemma elliptic-lanceolate, c. 5 x 1 mm, shortly acuminate, 3-nerved, margins ciliolate towards apex; lower palea elliptic-lanceolate, chartaceous, 2-nerved; upper lemma notched, awned, 5 - 7-nerved; awn 6 - 12 mm long, brown; upper palea lanceolate, 2-nerved with wart-like dots towards apex. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 3 mm. Ovary oblong, c. 1 mm long; style 1 - 2 mm long; stigma 2 - 3 mm long, brown. Pedicelled spikelets 5 - 6 mm long, awned; pedicels 2 - 3 mm long, ciliate; lower glume ovate-lanceolate, 5 - 6 x 1.5 - 2 mm, villous, chartaceous, 13 - 15-nerved; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Nov. - April.

Ecology : Commonly growing along lakes, streams, ponds and canals, sometimes floating above water.

Distribution : INDIA : Karnataka, Kerala and Tamil Nadu. Endemic.

- 37. *Ischaemum pappinisseriense*** Ravi, Mohanan & Rajesh in Rheede 8 (2): 155. 1998, '*pappinisseriensis*'.

Type : India : Kerala; Kannur Dt., Pappinisseri, Dec. 12, 1996, Ravi 33707 (*Holo* : TBGT; *Iso* : K, MH, KFRI).

Annuals; culms up to 60 cm long, decumbent, terete. Leaves oblong-lanceolate, c. 8 x 0.5 cm, lower sessile, upper short petioled, rounded at base, acuminate at apex; sheaths up to 7 cm long, glabrous, dorsally keeled; ligules up to 5 mm long, oblong, notched. Racemes 2, up to 5 cm long; joints turbinate, c. 3 mm long, ciliate on outer angle. Sessile spikelets oblong-elliptic, c. 5 mm long, densely ciliate; lower glume 4 - 5 mm long, margins incurved, broadly winged on upper half, deeply 3 - 5-noduled on sides in lower half, 13 - 15-nerved; upper glume boat-shaped, c. 5 mm long, dorsally keeled, margins incurved, 5-nerved; lower lemma elliptic-lanceolate, 4 - 5 mm long, 3-nerved; margins incurved; lower palea c. 4 mm long, hyaline, short ciliate at margins towards apex; upper lemma oblong-lanceolate, deeply cleft, lobes acute, awned from sinus; awns up to 2.2 cm long. Lower floret male; upper floret bisexual. Pedicelled spikelets reduced and empty; pedicels linear-lanceolate, c. 3 mm long, ciliate; lower glume oblong, c. 3 mm long, 9 - 11-nerved, winged along margins; upper glume c. 1 mm long, reduced, acute; all other parts compressed.

Flowering & Fruiting : Oct. March.

Ecology : In lowland along water courses.

Distribution : INDIA : Kerala. Endemic.

- 38. *Ischaemum pilosum*** (Klein ex Willd.) Wight in Madras Lit. Sci. J. 138. 1835; Hook.f., Fl. Brit. India 7: 130. 1896; Bor, Grass. Burma Ceylon India Pakistan 183. 1960; G.P. Roy, Grass. Madhya Pradesh 103. 1984; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 523. 1996. *Andropogon pilosus* Klein ex Willd., Sp. Pl. 4: 920. 1806.

Type : India : Tamil Nadu; Wallich 8817 (CAL).

Perennial decumbent herbs; culms 60 - 90 cm tall, slender, terete, glabrous. Leaves linear, finely acuminate, glabrous; sheaths glabrous; ligules 2 - 3 mm long, membranous, glabrous. Racemes sub-digitate, 2 - 6, fascicled, 2.5 - 12 cm long, brown, pilose; joints and pedicels slender, compressed, sparsely ciliate. Sessile spikelets narrowly lanceolate, c. 6 mm long; callus bearded with hairs; lower glume narrow, chartaceous, dorsally hairy, margins incurved, nerves anastomosing; upper glume ovate-lanceolate, longer than lower glume, laterally compressed, 5-nerved; lower lemma linear-oblong, obtuse, ciliate above; lower palea membranous, glabrous; upper lemma equal to lower lemma, cleft almost to middle into acute ciliate lobes, awn 6 - 10 mm long; upper palea lanceolate-subulate. Lower floret male; upper floret bisexual. Stamens 3, filaments c. 0.6 cm long. Style c. 1.5 mm long; stigma c. 1.5 mm long, feathery, brown. Pedicelled spikelets c. 4.5 mm long; pedicels shorter than sessile spikelets; awn short, sometimes reduced; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Sept. Feb.

Ecology : In marshy places on black soil.

Distribution : INDIA : Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu. Endemic.

Note : Known for its fodder value when young and acts as soil binder in semi-desert areas.

- 39. *Ischaemum pushpangadanii*** Ravi, Mohanan & Kiranraj in Rheedia 10(1): 49 - 53. 2000.

Type : India : Kerala; Kozhikode Dt., Kailandy Taluk, Kakkasyam hills, ± 420 m, Ravi 41460, 26.10.99 (*Holo* : TBGT; *Iso* : CAL, MH, KFRI, TBGT).

Annuals; culms tufted, erect to diffuse, stilt-rooted at base; upper nodes villous. Leaves all along culms, ovate to ovate-lanceolate, c. 15 x 2 cm, cordate-hastate at base, acute at apex; sheaths keeled, up to 5 cm long; ligules 2 - 7 cm long, notched, coriaceous. Racemes 2, up to 5 cm long, glabrous towards base, densely long villous upwards; joints clavate, 3 - 4 mm long, crustaceous. Sessile spikelets linear-lanceolate, lower ones unawned, upper awned, 6 - 7 mm long; callus c. 1 mm long; lower glume linear-lanceolate, c. 6 mm long, keeled on back, 2-nerved; lower lemma 4 - 5 mm long, hyaline, incurved on margins, 3-nerved; lower palea 4 - 5 mm, hyaline, incurved, 2-nerved; upper lemma oblong, 3.5 - 4 mm long, bifid, 3-veined and awned from sinus; awn 1.3 - 1.5 cm with column 6 - 7 mm long; upper palea linear-lanceolate, c. 3.5 mm long, margins incurved. Pedicelled spikelets linear-elliptic, 3 - 3.5 mm long, smaller; pedicels up to 5 mm long; lower glume 4.5 - 5.5 mm long, coriaceous, 2 - 3-nodulose in basal spikelets; upper glume, lower lemma, lower palea and upper palea as in sessile

spikelets but smaller; upper lemma elliptic-lanceolate, 3-nerved. Lodicules 2, c. 0.75 mm long. Stamens 3; anthers 1.75 - 2.5 mm long. Ovary c. 0.6 mm long; style c. 1.5 mm long; stigma c. 2.5 mm long.

Flowering & Fruiting : Sept. Dec.

Distribution : INDIA : Kerala. Endemic.

Note : Allied to *I. dalzellii* Bor ex Stapf but differs in having more robust habit, sessile spikelets with short c. 1 mm long callus, lower glume of sessile spikelets 2 - 4-nodulose, pedicel longer and awn shorter.

40. *Ischaemum quilonense* Ravi & Shaju in Rheedea 8(2): 152. 1998, 'quilonensis'.

Type : India : Kerala; Kollam Dt., Perumkulam Ela near Kollam Town, Oct. 27. 1996, *Ravi* 24098 (*Holo* : TBGT; *Iso* : K, MH, KFRI).

Perennials; culms up to 80 cm tall, tufted, creeping; nodes glabrous. Leaves linear-lanceolate, up to 20 x 1 cm, membranous, rounded at base, cuneate at apex; petioles c. 2.5 cm long, glabrous; sheaths up to 12 cm long, glabrous; ligules triangular-ovate, up to 5 mm long, glabrous. Racemes 2, rarely 3, up to 10 cm long; joints clavate, nearly glabrous or sparsely ciliate. Sessile spikelets ovate-oblong, 5 - 7 mm long; callus nearly glabrous; lower glume oblong, 5 - 7 mm long, margins incurved, with 3 - 5 nodules, narrowly winged on one side, 11 - 13-nerved; upper glume boat-shaped, 5 - 6 mm long, dorsally keeled, 3 - 5-nerved; lower lemma elliptic, c. 5 mm long, margins incurved, 3 - 5-nerved; lower palea shortly notched at apex; upper lemma elliptic, 4 - 5 mm long, cleft at apex, awned; awn up to 1 cm long; upper palea lanceolate, c. 4 mm long, notched, 2-nerved. Lower floret male, upper floret bisexual. Pedicelled spikelets oblong-elliptic, pedicels triquetrous, c. 2 mm long, nearly glabrous; lower glume oblong-elliptic, thickly keeled on sides, margins incurved; upper glume, lower lemma and palea as in sessile spikelets; upper lemma oblong-elliptic, 4 - 5 mm long, aristate or shortly awned; awn up to 4 mm long. Lower floret male; upper floret bisexual.

Flowering & Fruiting : Aug. March.

Ecology : Common in marshy places, roadside pools and bunds of paddy fields.

Distribution : INDIA : Kerala. Endemic.

41. *Ischaemum raizadae* Hemadri & Billore in Indian For. 96: 318. 1970; Bor in Indian For. 97: 73. 1971; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 523. 1996. *I. borii* S.M. Almeida in J. Bombay Nat. Hist. Soc. 66: 513. 1969.

Type : India : Maharashtra; Thane Dt., Sadryaghat near Harischandragarh, 16.11.1968, *K.V. Billore* 115450A (*Holo*: CAL).

Annuals; culms 15 - 40 cm tall, erect, tufted, glabrous; nodes hairy or glabrous. Leaves linear-lanceolate, 4 - 10 x 0.5 - 1 cm, rounded at base, acute to acuminate at apex, sparsely hairy on both surfaces; sheaths 4 - 6 mm long, striate, margins glabrous; ligules 1 - 2 mm long, scarious. Racemes 2, on long peduncle up to 10 cm, hidden in sheath, 2 - 4 cm long; joints slender, c. 2 mm long, hairy along margins. Sessile spikelets lanceolate; callus c. 1 mm long, bearded with white hairs; lower glume lanceolate, 4 - 5 x 1 - 1.5 mm, ending in 2 long arista, with small hump on lower half, dorsally glabrous, 4 -nerved, margins incurved with two tufts of hairs; arista 1.3 - 2 cm long; upper glume boat-shaped, 4 - 5 x 1 - 1.25 mm, with hump and tufted hairs in center, keeled above hump, apex bifid, aristate; arista c. 4.5 cm long; lower lemma oblong-lanceolate, 3 - 3.5 x 0.6 - 0.8 mm, 1-nerved; lower palea hyaline, 2-nerved; upper lemma boat-shaped, 3 - 3.5 x c. 0.5 mm, apex bifid with long awn; awn 3.5 - 5 cm long, scabrid. Pedicelled spikelets lanceolate; pedicels similar to rachis-joint; lower glume 4 - 5 x c. 1 mm, coriaceous, compressed, margins keeled in upper half, apex bifid, ending in 4 mm long arista; upper glume oblong-lanceolate, 3-nerved, dorsally covered with white hairs; lower lemma oblong, 3 - 3.5 mm long, 3-nerved, margins ciliate; palea hyaline; upper lemma similar to lower lemma, 3-nerved, apex bifid; palea absent. Stamens c. 1 mm long.

Flowering & Fruiting : Sept. Nov.

Ecology : On rocks and rock crevices.

Distribution : INDIA : Maharashtra. Endemic.

42. *Ischaemum rangacharianum* C.E.C. Fisch. in Kew Bull. 1933: 352. 1933 & in Gamble, Fl. Pres. Madras 1722. 1934; Bor, Grass. Burma Ceylon India Pakistan 184. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 155. 1991.

Type : India : Malabar, Shoranur, 23.11.1900, *K. Rangachari* s.n. (*Iso* : K, CAL).

Creeping or erect annuals; culms 20 - 80 cm long, rooting at nodes; nodes glabrous. Leaves elliptic-lanceolate, 1 - 13 x 0.5 - 1.3 cm, upper ones cordate at base, acuminate, sessile, lower narrowed and petioled at base, covered with tubercle-based hairs; ligules ovate, c. 2.5 mm long, acute, membranous. Racemes 2, adpressed together, appears as solitary, 2 - 6 cm long; joints turbinate, densely ciliate in two rows at one angle. Sessile spikelets lanceolate, 5 - 6 mm long, awned; lower glume oblong-lanceolate, 5 - 6 x 1 - 1.5 mm, coriaceous below with 4 - 5 distinct side nodules, chartaceous, 9 - 11-nerved above, keeled, glabrous or sparsely ciliate in upper half; upper glume elliptic-lanceolate, acuminate, 3-nerved, dorsally keeled; lower lemma oblong-lanceolate, 4 - 5 mm long, delicate, hyaline; lower palea elliptic-lanceolate, 2-nerved; upper lemma notched, 3 - 4 mm long, hyaline, awned, 3-nerved; awn 1.2 - 1.8 cm long; column 6 - 8 mm long; upper palea linear or oblong-lanceolate, 3 - 4 mm long, 2-keeled, 2-nerved. Lower floret male; upper floret bisexual. Stamens 3; anthers 1.5 - 2 mm long. Ovary elliptic-oblong, c. 0.5 x 0.2 mm.; style 1.5 - 2 mm long; stigma 1.5 - 2 mm long, purple-red. Pedicelled spikelets lanceolate, c. 4.5 mm long; pedicels ciliate, less than 1/3 the length of sessile spikelets, awnless; lower glumes oblong or obovate, 4 - 5 mm long, broadly winged on one margin, faintly 11 - 13-nerved, villous towards base, sometimes with few shallow side nodules on one margin, wing auriculate; upper glume and florets as in sessile spikelets; upper lemma entire and awnless.

Flowering & Fruiting : Sept. - March.

Ecology : Along hill slopes and roadsides.

Distribution : INDIA : Kerala and Tamil Nadu. Endemic.

Note : *I. rangacharianum* is distinct from other *Ischaemum* species in having broadly purple-red winged lower glume of pedicelled spikelets and narrowly lanceolate lower glume of sessile spikelets with several distinct side nodules.

43. *Ischaemum raui* Sreek., V.J. Nair & N.C. Nair, Fl. Kerala Grass. 157. 1991.

Type : India : Kerala; Cannanore Dt., Muguroad, ± 150 m, 17 Oct. 1981, *P.V.Sreekumar* 71747 (*Holo* : CAL; *Iso* : K, MH).

Creeping annuals; culms 10 - 35 cm tall, erect or geniculate; nodes villous. Leaves triangular to ovate-lanceolate, 1 - 3 x 0.5 - 1 cm, cordate at base, acute at apex; ligules ovate, c. 1 mm long, membranous. Racemes 1 - 2, 2 - 3 cm long, densely villous; peduncle long exserted; joints linear-clavate, 2 - 3 mm long, villous. Sessile spikelets ovate, 3 - 4 mm long, awned, silky villous; lower glume ovate, 3.5 - 4 x 1.5 - 2 mm, acute, 9 - 11-nerved, villous, margins infolded; upper glume ovate-lanceolate, keel rounded except towards apex, minutely winged, ciliate in upper half; lower lemma ovate-lanceolate, hyaline, 3 - 5-nerved, margins infolded, ciliate in upper half; lower palea lanceolate, delicate, faintly 3 - 5-nerved, margins infolded, ciliate in upper half; upper lemma notched, 3 - 3.5 x 1 - 1.25 mm, lobes acute, 3-nerved, ciliolate in upper half; awn 1 - 1.2 cm long, geniculate; column 6 - 7 mm long, brown, bristles pale, scabrid; upper palea oblong-lanceolate, 3 - 3.5 x 0.5 - 0.75 mm, delicate, hyaline, glabrous with warts towards apex. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 1.5 mm long, filaments short. Ovary ovate; style c. 1.5 mm long, slender; stigma c. 1.5 mm long, feathery. Pedicelled spikelets lanceolate, 3.5 - 4 mm long, unawned, densely villous; pedicels 0.5 - 1 mm long, villous; glumes and floret as in sessile spikelets.

Flowering & Fruiting : Sept. - Dec.

Ecology : In marshy places along roadsides.

Distribution : INDIA : Kerala (Cannanore). Endemic. Rare

44. *Ischaemum ritchiei* Stapf ex Bor in Kew Bull. 1951: 449. 1952 & Grass. Burma Ceylon India Pakistan 184. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 524. 1996.

Type : India : Bombay, Kanara, *Ritchie* s.n. (K).

Annual herbs; culms geniculately ascending, 60–80 cm tall, rooting at basal nodes. Leaves linear-lanceolate, acuminate; lower leaves c. 21 x 1.5 cm; upper ones c. 11 x 1.5 cm, glabrous; ligules c. 8 mm long, membranous. Racemes 2; joints distinctly turbinate. Sessile spikelets linear-oblong, 5–6 mm long, awned; callus bearded; lower glume c. 8 mm long, coriaceous up to $\frac{3}{4}$ the length, noduled at margins, dorsally ridged; upper glume oblong, c. 6.5 mm long, 3-nerved, apex bilobed, awned in sinus; upper palea linear-lanceolate, 2-nerved. Lower floret empty; upper floret bisexual. Style branched into 2, stigma plumose. Pedicelled spikelets linear-oblong; lower glume elliptic, c. 6 mm long, rugose dorsally, noduled at margins, nodules joined across dorsal surface; lower lemma hyaline, oblong-lanceolate, acute, 3-nerved; palea 2-nerved; upper lemma c. 4.5 mm long, 3-nerved. Lower floret male; upper floret bisexual.

Flowering & Fruiting : Aug. Dec.

Ecology : Growing in marshy places.

Distribution : INDIA : Karnataka and Maharashtra. Endemic.

Note : *I. ritchiei* is a very remarkable species with very narrow sessile and pedicelled spikelets in comparison to their length and enmeshed teeth of nodules of adjacent margins.

45. *Ischaemum rugosum* Salisb., Ic. Strip. Rar. 1, t. 1. 1791; Hook.f., Fl. Brit. India 7: 127. 1896; Bor, Grass. Burma Ceylon India Pakistan 184. 1960; G.P. Roy, Grass. Madhya Pradesh 104. 1984; Sreek. & V.J. Nair, Fl. Kerala - Grass. 159. 1991; U. Shukla, Grass. N.E. India 105. 1996; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 524. 1996.

Type : Nepal, 1821, Wallich 8864F (CAL); Sylhet, Wallich 8864H (CAL).

Vern. Names : Lag, Bardi, Bar Bher, Karkel, Tikigrass, Badawar, Marare (Beng.); Maradi (Santal).

Annual or perennial stoloniferous herbs; culms up to 1 m tall; upper nodes villous, lower ones glabrous. Leaves linear-lanceolate, 3–14 x 0.5–1.2 cm, tapering towards base, acuminate at apex; ligule ovate, membranous. Racemes 2, 3–9 cm long; joints turbinate, densely ciliate at one angle. Sessile spikelets oblong-lanceolate, 4–6 mm long; callus sparsely bearded; lower glume oblong-lanceolate, crustaceous below; with prominent side nodules connected by deep ridges, 13–15-nerved, scabrid towards apex; upper glume boat-shaped, membranous, keeled, humped on dorsal side; lower lemma oblong-lanceolate, delicate, 3-nerved; lower palea oblong or elliptic-lanceolate, 2-nerved, margins infolded, hyaline; upper lemma notched, deeply bifid up to half the length, awned in sinus; awn 8–12 mm long; upper palea shorter than lemma, 2-nerved with few wart-like growths towards apex. Lower floret bisexual; upper floret male. Stamens 3, c. 1.5 mm long; style c. 1.5 mm long; stigma c. 2 mm long. Pedicelled spikelets rudimentary or developed, up to 4.5 mm long, awnless; pedicels less than $\frac{1}{3}$ the length of sessile spikelets, lower glume c. 4.5 mm long, 11–15-nerved, winged on one margin; upper glume similar to sessile spikelets. Lower floret absent or sterile; upper floret hermaphrodite or sterile; awned or unawned.

Flowering & Fruiting : Dec. March.

Ecology : Frequent along margins of ponds, paddy fields and ditches.

Distribution : INDIA : Throughout including Andaman & Nicobar Islands; CHINA, MALAYA, MYANMAR, SRI LANKA and THAILAND.

Note : This species can be easily identified by its sharp ridged lower glumes, presence of side nodules across the back and rudimentary pedicelled spikelets.

Uses : Young plants are eaten by cattle and horse. Grains are eaten in poorer parts of Madhya Pradesh, as food. Nomadic tribes use it to construct their huts.

46. *Ischaemum santapau* Bor in J. Bombay Nat. Hist. Soc. 49: 167. 1950 & Grass. Burma Ceylon India Pakistan 185. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 524. 1996.

Type : India : Bombay, Karjat, G.I.P., Rly. River side, 11.12.1949, H. Santapau 9665 (K).

Annual caespitose herbs; culms up to 2 m tall, decumbent at base, with many stilt roots, nodes smooth, glabrous. Leaves linear, 15–25 x c. 1 cm, rounded or shallowly cordate at base, acute at apex, nearly glabrous or coarsely scabrid on both surfaces; ligules 2–3 mm long, lacerate, membranous. Racemes binate at apex, 5

- 6 cm long; joints c. 3 mm long, 3-angled, long hairy on one angle with oblique articulation. Sessile spikelets oblong; lower glume oblong, c. 4.5 x 2 mm, acute, 10 -11-nerved, margins incurved from base to apex; upper glume c. 4.5 mm long, boat-shaped, keeled on upper half, membranous, scabrid on dorsal surface; lower lemma hyaline; lanceolate, c. 4x 1.5 mm, acute; palea triangular, c. 3 mm long; upper lemma c. 3.5 mm long, with a geniculate awn in cleft; awn c. 1.5 cm long; column brown, twisted, c. 6mm long, bristle scabrid. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2.5 mm long. Style 2, stigma plumose. Lodicules 2, truncate, cuneate. Pedicelled spikelets rudimentary; pedicels c. 2 mm long, 2-angled; rudimentary glumes often small but towards base of raceme, c. 2 mm long, many nerved.

Flowering & Fruiting : Sept. Dec.

Ecology : In paddy fields, swamps and on sea-shores.

Distribution : INDIA : Maharashtra (Mumbai). Endemic.

Note : *I. santapau* is peculiar in its habit as it grows in tufts or clumps, with adventitious roots from many nodes.

Santapau states that this plant is very common all over Karjat in rice fields after harvest and along hedges and railway tracts between Khandala and Karjat.

47. *Ischaemum semisagittatum* Roxb., Fl. Ind. 1: 322. 1820; Hook.f., Fl. Brit. India 7: 130. 1896; Bor, Grass. Burma Ceylon India Pakistan 185. 1960; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 527. 1996. *Spodiopogon semisagittatum* (Roxb.) Voigt, Hort. Suburb. Calc. 706. 1845. *Meoschium semisagittatum* Schult., Syst. Veg. 2, Mant. 435. 1824. *Andropogon semisagittatum* Steud., Syn. Pl. Glum. 1: 376. 1854. *Ischaemum conjugatum* Roxb., Fl. Ind. 1: 323. 1820; Hook.f., Fl. Brit. India 7: 131. 1896.

Type : A native of pasture lands in Bengal.

Vern. Names : Dalaga, Ber, Saj-kadi, Kari.

Gregarious tufted herbs; culms up to 60 cm tall. Leaves linear to oblong-lanceolate, 2 - 10 cm long, sagittate at base, acute or acuminate; lower leaves distinctly petioled. Racemes 2 - 5 cm long, softly villous; joints distinctly turbinate. Sessile spikelets linear-oblong, 4 - 6 mm long; callus bearded with long hairs; lower glume with lateral 4 - 5 nodules connected by bar relief ridges, chartaceous, 7 - 9-nerved; upper glume boat-shaped, 3 - 5-nerved, keeled in lower half; lower lemma oblong-lanceolate, delicate, hyaline; upper lemma notched; awn c. 4 mm long. Lower floret male or bisexual; Stamens 3; anthers c. 3 mm long. Ovary linear-oblong; style 1 - 2 mm long; stigma 2 - 3 mm long. Pedicelled spikelets oblong-lanceolate, c. 6 mm long, awned or awnless; pedicels linear-clavate, 1 - 2 mm long, densely ciliate; glumes and florets as in sessile spikelets but smaller.

Flowering & Fruiting : Sept. Dec.

Ecology : On crest of ghats usually in shades of trees.

Distribution : INDIA : Andhra Pradesh, West-Bengal, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu; SRI LANKA.

48. *Ischaemum tadulingamii* N.C. Nair & Sreek. in Blumea 30: 385. 1985; Sreek. & V.J. Nair, Fl. Kerala Grass. 160. 1991.

Type : India : Kerala; Idukki, Eravikulam National Park, ± 2200 m, 7.4.1980, P.V. Sreekumar 71863 (*Holo* : CAL).

Tufted annuals or perennials; culms 10 - 30 cm tall; nodes glabrous. Leaves linear-lanceolate, 2 - 10 x 0.5 - 0.6 cm, narrowed at base, shortly acuminate, sparsely villous. Racemes 2 or 3, 2 - 6 cm long, stout. Sessile spikelets ovate-lanceolate, 6 - 7 mm long; lower glume ovate-lanceolate, acuminate, without nodules, covered with short hairs, margins infolded; lower lemma 4 - 5 mm long, 3-nerved, margins infolded, ciliate in upper half; upper lemma lanceolate, apex notched; awn 1 - 1.2 cm long, geniculate. Lower floret empty; upper floret bisexual. Stamens 3; anthers 1 - 1.5 mm long. Pedicelled spikelets ovate-lanceolate, 4 - 6 mm long, unarmed, usually reduced, striate; pedicels linear-turbinate, 3 - 4 mm long, villous along margins; lower glume

ovate-lanceolate, 4 - 6 mm long, winged on one margin; upper glume ovate-lanceolate, 3 - 5 mm long, glabrous, apex acute, florets empty.

Flowering & Fruiting : March - April.

Ecology : Along edges of streams and rocky areas in grasslands.

Distribution : INDIA : Kerala. Endemic.

- 49. *Ischaemum thomsonianum*** Stapf ex C.E.C. Fisch. in Gamble, Fl. Pres. Madras 1722. 1934; Bor, Grass. Burma Ceylon India Pakistan 185. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 163. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 527. 1996. *I. murinum* Hook.f., Fl. Brit. India 7: 135. 1896 non Forst. 1786.

Type : India : Tamil Nadu (Madras), 1852, *G. Thomson* s.n. (*Holo* : K; *Iso* : CAL).

Annuals; culms creeping or rooting at nodes, up to 1 m tall, rarely stoloniferous. Leaves lanceolate, 2 - 15 x 0.5 - 1.5 cm, rounded at base, acuminate, densely or sparsely hairy. Racemes 2 rarely 3; joints turbinate, 3 - 4 mm long, densely long ciliate on one angle with a tooth-like projection on inner side. Sessile spikelets elliptic-lanceolate, 5 - 6 mm long, awned; lower glume ovate-lanceolate, 5 - 6 mm long, cuspidate, 11 - 15-nerved; upper glume boat-shaped acuminate, shortly bifid, awned, 5-nerved, dorsally keeled, obscurely winged at apex; lower lemma elliptic, 4 - 5 mm long, acute, margins infolded, ciliolate towards apex; lower palea oblong-lanceolate, 2-nerved; upper lemma notched, awned; awn 1 - 1.5 cm long. Lower floret male; upper floret bisexual. Stamens 3; anthers 2 - 3 mm long. Ovary oblong; style 1 - 1.5 mm long; stigma c. 2 mm long. Pedicelled spikelets oblong-lanceolate, 5 - 6 mm long; lower glume ovate-lanceolate, acuminate, aristate, 11 - 15-nerved, dorsally keeled; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Dec. March.

Ecology : Along paddy fields, roadsides and wastelands.

Distribution : INDIA : Karnataka, Maharashtra, Tamil Nadu and Kerala. Endemic. Rare.

Note : Shows resemblance to *I. timorense* and *I. zeylanicum* but differs in having longer joints of racemes with tooth-like projections, larger spikelets and glabrous glumes and lower leaves and obscurely winged upper glume of sessile spikelets respectively.

- 50. *Ischaemum timorense*** Kunth, Rev. Gram. 1: 369, t. 98. 1830; Hook.f., Fl. Brit. India 7: 136. 1896 p.p.; C.E.C. Fisch. in Gamble, Fl. Pres. Madras 1722. 1934; Bor, Grass. Burma Ceylon India Pakistan 185. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 164. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 527. 1996. *Andropogon blumii* Nees ex Steud., Syn. Pl. Glum. 1: 373. 1854. *Spodiopogon blumii* Nees ex Steud., l.c. 1: 373. 1854. *Andropogon asthenos* Steud., l.c. 1: 376. 1834. *A. timorense* Steud., l.c. 1: 376. 1854.

Type : Java, 1827, Wallich 8863 (CAL).

Perennials; culms 60 - 120 cm tall, creeping, stoloniferous, rooting at nodes. Leaves linear-lanceolate, 1 - 2 x 0.1 - 0.8 cm, cordate, acuminate. Racemes solitary or in pairs, 1 - 4 cm long, hairy; joints turbinate, 2 - 3 mm long, ciliate along one angle. Sessile spikelets ovate-lanceolate, 3 - 4 mm long, shortly bicuspidate, 7 - 9-nerved; upper glume lanceolate, shortly bifid at apex, aristate in between; lower lemma oblong-lanceolate, c. 3 mm long, 3-nerved; lower palea lanceolate, 2-nerved; upper lemma notched, awned; awn 1 - 1.5 cm long. Lower floret male; upper floret bisexual. Stamens 3; anthers 1 - 1.5 mm long. Ovary oblong; style c. 1 mm long; stigma c. 1 mm long. Pedicelled spikelets oblong-lanceolate, 3 - 4 mm long; pedicels turbinate, long ciliate on one angle; lower glume ovate-lanceolate, acuminate, shortly aristate, 5 - 7-nerved; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Sept. Dec.

Ecology : Along roadsides, canals and marshy places; usually trailing on sandy soil in damp places.

Distribution : INDIA : Andaman & Nicobar Islands, Kerala, Maharashtra, N.E. India and Tamil Nadu; MALAY ISLANDS, MYANMAR and SRI LANKA.

Note : This species is distinct for its long, runner-like creeping and stoloniferous culms with rosette like nodal clusters of short lanceolate leaves.

51. *Ischaemum travancorens* Stapf ex C.E.C. Fisch. in Kew Bull. 1933: 353. 1933; Bor, Grass. Burma Ceylon India Pakistan 186. 1960; Sreek. & V.J. Nair, Fl. Kerala Grass. 165. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 530. 1996. *I. aristatum* L. subsp. *rottleri* Hook.f., Fl. Brit. India 7: 127. 1896.

Type : India : Travancore, Alleppey, 20.11.1893, M.A. Lawson 130 (Iso : CAL).

Perennial straggling herbs; up to 2 m tall, rooting at lower nodes. Leaves lanceolate, 5 - 30 x 0.5 - 1.5 cm, cordate, acuminate; petioles short, hairy. Racemes 2, adpressed together, appears solitary; joints clavate-turbinate. Sessile spikelets oblong-lanceolate, awnless; lower glume oblong with few side nodules connected by shallow ridges, 13 - 15-nerved, minutely winged at apex; upper glume boat-shaped, 5 - 7-nerved, dorsally keeled; lower lemma oblong-lanceolate, 3-nerved, margins infolded; lower palea 2-nerved; upper lemma notched with a rudimentary awn in between. Lower floret male; upper floret bisexual. Stamens 3. Ovary oblong; style c. 2 mm long; stigma c. 2 mm long, yellow. Pedicelled spikelets ovate-oblong, awnless; pedicels clavate, turbinate, 2 - 3 mm long, glabrous; lower glume ovate-oblong, winged on one margin; upper glume and florets as in sessile spikelets, but smaller.

Flowering & Fruiting : Sept. - March.

Ecology : Along streams, muddy fields and canals.

Distribution : INDIA : Daman, Diu, Kerala, Maharashtra and Tamil Nadu. Endemic. Occasional.

Note : Closely related to *I. vembanadense* but differs in having longer leaves, awnless sessile spikelets and broadly winged lower glume of pedicelled spikelets.

52. *Ischaemum tumidum* Stapf ex Bor in Kew Bull. 1951: 450. 1952 & Grass. Burma Ceylon India Pakistan 186. 1960; Sreek. & V.J. Nair, Fl. Kerala - Grass. 167. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 530. 1996.

Type : India : Concan, Stocks s.n. (K).

Annuals; culms 15 - 30 cm tall, creeping or geniculate; upper nodes bearded. Leaves ovate-lanceolate, up to 4 cm long, hairy on both sides, hairs deciduous, lower leaves usually not petioled, but at times with a short petiole, acute, cordate or shortly sagittate at base; ligules truncate, membranous. Racemes clavate, 2 - 4 cm long, swollen, shining. Sessile spikelets oblong, c. 6 mm long, awned; lower glume c. 6 mm long, coriaceous with 2 - 3 nodules on rounded keels, obscurely transversely ridged, shining below; upper glume elliptic, boat-shaped; lower lemma oblong-lanceolate, delicate, 3-nerved, margins infolded, ciliate on upper half; lower palea delicate, 3-nerved; upper lemma deeply notched, awned, lobes acute, ciliate towards apex. Lower floret male; upper floret bisexual. Stamens 3; anthers 1 - 2 mm long. Pedicelled spikelets lanceolate, 5 - 6 mm long, awnless, hairy; pedicels clavate, hairy; lower glume oblong-lanceolate, 9 - 11-nerved, hairy; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Oct. - Dec.

Ecology : Along dry, open and grassy hill slopes.

Distribution : INDIA : Kerala, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu. Endemic. Rare.

Note : *I. tumidum* is distinct from all other Indian species in having characteristic swollen raceme joints and smaller leaves.

53. *Ischaemum vembanadense* Patil & D'Cruz in J. Bombay Nat. Hist. Soc. 70: 324. (1973) 1974; Sreek. & V.J. Nair, Fl. Kerala Grass. 168. 1991.

Type : India : Kerala; Alleppey back-waters, 10.1.1970, Patil 1919 (K, CAL).

Perennials; culms 30 - 150 cm long. Leaves lanceolate, 5 - 12 x 0.5 - 1 cm, cordate at base, lower ones with a small hairy petiole, acuminate. Racemes 2, 5 - 8 cm long; adpressed together, appears solitary. Sessile

spikelets oblong-lanceolate, 5–6 mm long, usually awned, rarely awnless; lower glume crustaceous below with 4–6 side nodules with ridges and furrows, 13–15-nerved; upper glume boat-shaped, dorsally keeled, chartaceous, 3-nerved; upper lemma deeply notched, awned or rarely awnless; awn 10–15 mm long; upper palea 2-nerved. Lower floret male; upper floret bisexual. Stamens 3; anthers c. 2 mm long. Ovary oblong; style 1.5–2 mm long; stigma c. 2 mm long. Pedicelled spikelets oblong, awnless; pedicels 1–2 mm long, glabrous; lower glume narrowly winged on one margin; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Oct. – Jan.

Ecology : Along banks of rivers and canals; occasionally floating over aquatic weeds.

Distribution : INDIA : Kerala (Alleppey). Endemic. Rare.

Note : *I. vembanadense* closely resembles *I. travancorensis* but differs in shorter leaves and racemes, awned sessile spikelets and narrowly winged margin of lower glume of pedicelled spikelets.

54. *Ischaemum wayanadense* Ravi, Mohanan & Shaju in Bot. Bull. Acad. Sin. 42: 223. 2001.

Type : India : Kerala; Kelloor, Thekkumpara ± 800 m, 14. Dec. 1996, Ravi 33779 (*Holo* : TBGT; *Iso* : K, CAL, MH, KPRI).

Perennials; culms tufted, up to 1.5 m long. Leaves linear-lanceolate to elliptic, up to 15 x 1.2 cm, cuneate, acuminate; ligules triangular, c. 3 mm long. Racemes 2, up to 7 cm long; joints triquetrous, 3–4 mm long. Sessile spikelets oblong-clavate, 5–6 mm long, with c. 1 mm long callus; lower glume oblong-ovate, 4–5 mm long, crustaceous, laterally keeled, winged or wingless, nodulose below with obscure interconnecting ridges, 11–13-nerved; upper glume 4–5 mm long, boat-shaped, keeled, narrowly winged, 5-nerved; lower lemma elliptic-lanceolate, 4–5 mm long, 3-nerved; lower palea elliptic-lanceolate, 3.5–4.5 mm long, 2-nerved; upper lemma 4–4.5 mm long, cleft to middle, hyaline, awned; awn up to 1.5 cm with column c. 8 mm long; upper palea elliptic-lanceolate, c. 3 mm, 2-nerved, incurved on sides. Pedicelled spikelets : Pedicels 1–2 mm long, turbinate; lower glume oblong-elliptic, 4.5–5 mm long, laterally keeled, broadly winged; upper glume without apical wing; lower lemma, lower palea and upper palea as in sessile spikelets. Lodicules 2, c. 0.2 mm long. Stamens 3; anthers 1–2 mm long. Ovary c. 2 mm long; style c. 2.5 mm long; stigma c. 2 mm long, purplish black.

Flowering & Fruiting : Sept. – Feb.

Ecology : Along bunds of water channels in cultivated fields and roadsides.

Distribution : INDIA : Kerala (Kelloor, Thetturadi). Endemic.

Note : Allied to *I. vembanadense* Patil & D'Cruz but differs in having non aquatic habit, reddish-brown herbage, spreading culms rooting at lower nodes, shorter blades, and shorter spikelets.

55. *Ischaemum yadavii* Harshala Gad & Janarth. in Kew Bull. 62: 499. 2007.

Type : INDIA; Goa, Surla, Harshala Gad & M.K. Janarthanam 240 (*holo* : CAL; *ISO* : BSI, K, MH).

Annuals. Culms tufted, erect, up to 45 cm high; nodes villous to glabrous. Leaves all along the culm; sheath up to 5 cm long, keeled on the back; ligule subcoriaceous, c. 5 mm long. Inflorescence of two racemes, appressed, up to 3.5 cm long, shortly exerted from spatheolate sheath. Joints of rachis triquetrous, oblong-clavate, c. 3.5 mm long, crustaceous. Sessile spikelet : lower glume oblong-ovate, c. 5 x 2 mm, thickly crustaceous convex-bulged in the lower ¾ region, 10–11-nerved. Upper glume boat-shaped, c. 5 x 2 mm, coriaceous, 3-nerved, sharply keeled on back. Lower floret staminate. Lower lemma elliptic-lanceolate, c. 4.5 x 1.5 mm, acute at apex, 3-nerved, narrowly winged at apex. Palea elliptic-lanceolate, c. 4 x 1.5 mm, 2-nerved. Stamens 3; anthers c. 2 mm long, yellow. Upper floret bisexual. Upper lemma oblong-lanceolate, c. 4 x 2 mm, hyaline, awned in sinus up to 25 mm long. Palea oblong-lanceolate, c. 3 x 1 mm, 2-nerved, margins infolded. Lodicules 2, denticulate, c. 1 x 0.5 mm. Stamens 3; anthers c. 1.5 mm long. Ovary oblong-lanceolate, c. 1 mm long; styles c. 2 mm long; stigma plumose, c. 1.5 mm long. Pedicelled spikelet obliquely oblong-elliptic, c. 4 x 1.5 mm, subacute at apex. Lower glume obliquely oblong-elliptic, c. 4 x 1.5 mm, 9-nerved, subacute. Upper glume obliquely ovate c. 4 x 2 mm; chartaceous, 3-nerved, 1-keeled, subacute at apex. Lower and upper florets staminate. Lemmas and paleas same as sessile spikelet, upper lemma entire, unawned.

Flowering & Fruiting : Oct. – Jan.

Ecology : This species grows in open areas of lateritic rocky plateau.

Distribution : India : Goa

Note : This species is allied to *I. santapau* but differs in crustaceous bulged lower glumes of sessile spikelet, dorsally humped, narrowly winged keel of the upper glume of the sessile spikelet and well developed pedicelled spikelet.

56. *Ischaemum zeylanicum* Bor, Grass. Burma Ceylon India Pakistan 186. 1960; V.J. Nair & V.S. Ramach. in Bull. Bot. Surv. India 22: 193. 1980; Sreek. & V.J. Nair, Fl. Kerala - Grass. 169. 1991; B.D. Sharma & al., Fl. Maharashtra State (Monocot.) 532. 1996. *Ischaemum timorense* Kunth var. *zeylanicum* Hack. in DC., Monogr. Phan. 6: 230. 1886. *I. timorense* sensu Hook.f., Fl. Brit. India 7: 136. 1896, p.p.

Type : Sri Lanka (Ceylon) *Thwaites C.P. (CAL)*.

Annuals or perennials; culms 30 - 100 cm long, willowy, geniculate or trailing. Leaves elliptic-lanceolate, lower leaves petiolate; petioles up to 5 cm long. Racemes 2, slender, hairy; joints with tooth-like projections on inner side, densely long ciliate. Sessile spikelets ovate-lanceolate, 4 - 5 mm long, awned; callus sparsely bearded; lower glume ovate-lanceolate, 4 - 4.5 x c. 2 mm, bicuspidate; upper glume boat-shaped, acuminate, aristate; arista 1 - 2 mm long; lower lemma oblanceolate, 3-nerved, ciliolate towards apex; lower palea 2-keeled, margins infolded; upper lemma 3 - 4 mm long, notched, awned, delicate. Lower floret male; upper floret bisexual. Stamens 3; anthers 2 - 3 mm long. Ovary oblong; style 1 - 1.5 mm long; stigma 1.5 - 2 mm long. Pedicelled spikelets 4 - 5 mm long, awned; pedicels turbinate, densely hairy; lower glume ovate-lanceolate, acuminate, 11- 13-nerved; upper glume and florets as in sessile spikelets.

Flowering & Fruiting : Oct. - March.

Ecology : Along margins of forests, growing in shades.

Distribution : INDIA : Andaman Islands, Assam, Kerala, Maharashtra; BANGLADESH, SRI LANKA.

Note : Nearer to *I. timorense* but is quite distinct from it in having petiolate lower leaves, tooth-like projections on inner side of raceme joints and glabrous glumes.

भारत में वंश *ईसकीमम एल.* (पोएसी)

एस.के. श्रीवास्तव और वी.जे. नायर

सार संक्षेप

वर्तमान पेपर भारत में वंश *ईसकीमम एल.* का वर्गीकरण प्रस्तुत करता है। 56 प्रजातियों में, जो भारत में मान्यता प्राप्त हैं, 43 स्थानिक हैं।